PDHonline Course D143 (12 PDH)

Trans-Siberian Railway: West Meets East

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2021

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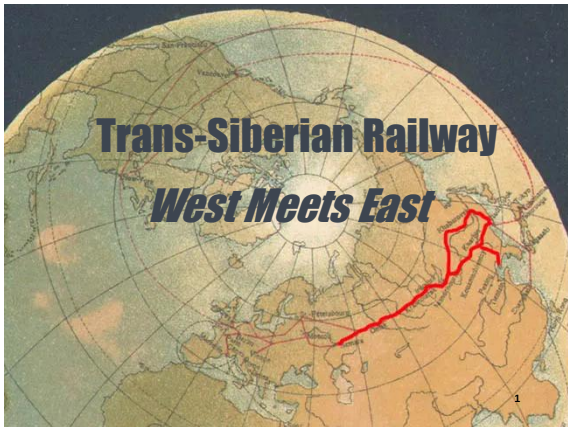

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Centenary

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A Matter of National Pride

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The Trans-Siberian Railway (TSR) laid its final ties between Moscow and Vladivostok 100 years ago this month, concluding a 25-year project first set into motion by Tsar Alexander III. His original motivation was economic - how best to connect and develop remote Siberia? - but the ambitious project has since become a point of national pride.

cntraveler.com, July 23, 2016
RE: introduction to an article entitled: "The Trans-Siberian Railway Turns 100"
Caption: "Tsar Alexander III of Russia"

5

"In order to unite the rich yields of Siberian nature with the network of Russian railways"
Tsar Alexander III

RE: known as the "Father of the Trans-Siberian," *Alexander III* instructed his son and heir to start the building of the great railroad through Siberia. The first stone of the "Great Siberian Railway" (the original name of the TR) was laid on May 31, 1891 in Vladivostok with the participation of *Tsarevich Nikolai Aleksandrovich* (who later became Emperor Nicholas II). The project's initiation was also marked with a special church service. It was decided to build the railway line in three stages and to complete the construction within 10 years. The first stage involved the design and construction of the *West Siberian Railway* - from Cheliabinsk to the *River Ob* (1418 km); the *Central Siberian Railway* - from the River Ob to Irkutsk (1871 km) and the *South Ussuri Railway* - from Vladivostok to Grafskaya Station (408 km). The second stage included the *Zabaikalsky Railway* - from *Mysovaya Station* (on the eastern shore of *Lake Baikal*) to Sretensk on the *River Shilka* (1104 km) and the *North Ussuri Railway* - from the *Grafskaya Station* to Khabarovsk (361 km). The third stage saw the difficult construction of the *Circum-Baikal Railway* - from *Baikal Station* (at the source of the *River Angara*) to *Mysovaya Station* (261 km) and the *Amur Railway* - from Sretensk to Khabarovsk (2130 km).

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Seductive and Inspiring

7

"IN its century of operation, the Trans-Siberian Railway has seduced and inspired countless film-makers, novelists, poets, playwrights, photographers, and bucket-list adventurers…"

cntraveler.com, **July 23, 2016**

RE: in modern times, the President of Russia; *Vladimir Putin,* occasionally travels to the East using the TSR in preference to flying. Perhaps this is because of his last name: "Putin" (Puteytzi), which in Russian means "to travel." There is a possibility that the TSR will connect *Sakhalin Island* with Eurasia, as well as with Japan's Hokkaido, in the near future. This despite the fact that Japan and Russia are still in a state-of-war, neither side having signed a peace treaty at the end of WWII and with both nations claiming sovereignty over the *Kuril Islands*.

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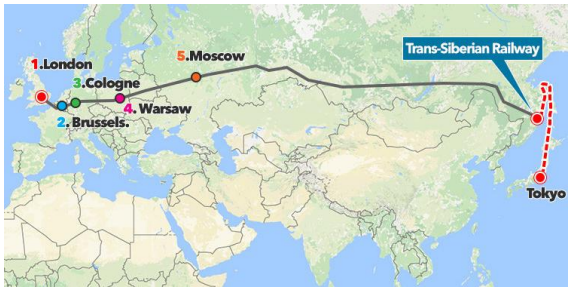

A 2016 article in *The Siberian Times* caught the attention of the world when it detailed plans between Japan and Russia to overhaul the existing lines of the TSR. Besides the goal of tripling current speeds, what caught everyone's attention was an ambitious plan to extend service to Japan. This was to be accomplished by using a series of bridges and tunnels over the *Sea of Oktosh*. The new route will bypass Vladivostok entirely and instead head north, crossing a 4-mile-long bridge to *Sakhalin Island*. After crossing the 600-mile-long island, a 26-mile-long tunnel will link Siberia to *Hokkaido*.

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One End to the Other

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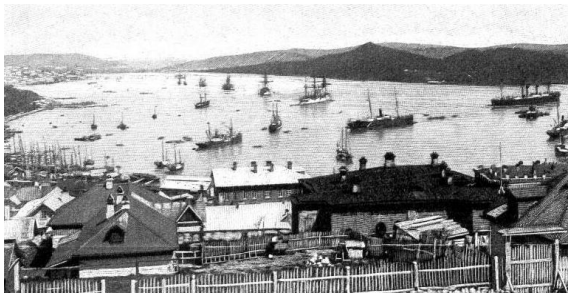

"…At its westernmost termini (St. Petersburg and Moscow), the expansive railway network connects with European trains from as far away as London. In the east, you can ride the TSR straight through to Vladivostok, spin off on sister routes in Mongolia and China, or link up to lines in Japan, Korea, and Southeast Asia…"

cntraveler.com, **July 23, 2016**

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Caption: "The Port of Vladivostock, on the Pacific Coast, Siberia"

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Most Storied Route

13

"…The most storied route, however, runs between Moscow and Vladivostok via Siberia, traversing seven time zones and covering an astonishing 5,772 miles…"

cntraveler.com, **July 23, 2016**

RE: the TSR was the most important achievement of a period in which the Russian rail network grew from 1K miles, in 1860, to 45K miles by 1917. The TSR is the world's longest single railway journey; 5,772 miles (9289 km) from Moscow to Vladivostok by way of Nizhny Novgorod, Yekaterinburg, Omsk, Novosibirsk and Irkutsk. It takes about a week to complete the journey.

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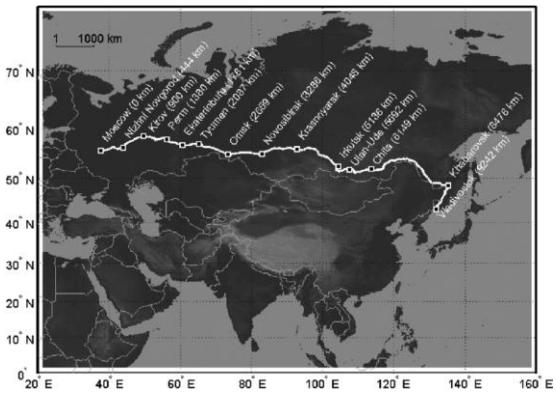

Caption: "Measurement route along the Trans-Siberian Railway. The total length of the route was 9242 km (one-way)."

15

Caption: "Pictured here: the Irkutsk region of southeastern Siberia, November 1980"

16

1891-1916

17

"…The TSR was built in sections between 1891 and 1916, with significant delays caused by unforgiving winters and inhospitable terrain. Thousands of soldiers, prisoners, and peasant migrants from Western Russia and Ukraine labored on these rails. The Baikal region, in particular, proved challenging, forcing workers to tunnel through mountains and erect bridges over gaping canyons. When construction was finally completed, it was a triumph…"

cntraveler.com, **July 23, 2016**

RE: nearly the entire length of the TSR was built through thinly-populated areas under harsh conditions, which included many rivers, lakes and districts that were either extremely waterlogged or filled with permafrost. The greatest difficulty the builders experienced were in the *Baikal Region,* where it was necessary to construct tunnels and bridges to traverse the canyons of the many mountain rivers that flow into *Lake Baikal.* The unforgiving terrain was not the only difficulty; the cost of construction was enormous and the supply of manpower insufficient. The central cities supplied many of the specialists required for the project, while the many thousands of common workers who took part in the construction came from the ranks of exiled prisoners or soldiers.

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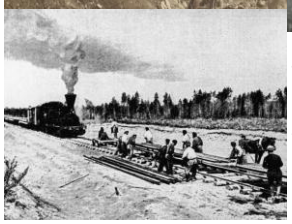

Above: caption: "Preparing the land"
Upper Left: "Russian prisoners at work on the Amur Railway"
Lower Left: caption: "Trans-Siberian Railway construction, ca. 1903"

19

The 100th Anniversary of the Trans-Siberian Railway

Obverse (left)
the two-headed eagle (designed by I.Bilibin), the letters under it indicate the metal sign, the fineness, the mint trademark and the fine metal content. The inscriptions along the rim: at the top — "25 РУБЛЕЙ 1994 г." (25 RUBLES 1994), at the bottom — "БАНК РОССИИ" (BANK OF RUSSIA).

Reverse (right)
an engine going from Baikal tunnel, under it – Siberia's coat-of-arms, the semicircular inscriptions along the rim separated by an anchor crossed with an ax, the emblem of the Russian Empire's Ministry of Railways: at the top – "100 ЛЕТ ТРАНССИБИРСКОЙ МАГИСТРАЛИ" (THE 100TH ANNIVERSARY OF THE TRANS-SIBERIAN RAILWAY), at the bottom – "БАЙКАЛЬСКИЙ ТОННЕЛЬ" (BAIKAL TUNNEL).

20

Caption: "Emerging from a tunnel near Lake Baikal"

21

Financiering

22

"…The emperor turned down offers of foreign investment, instead borrowing from the Russian treasury to fund the cross-continental railway…"
***cntraveler.com*, July 23, 2016**
Left: *Count Sergei Witte* was born in Tiflis, Georgia, on June 29, 1849. Of Dutch descent, he worked his way up; from selling tickets to stationmaster to upper railway management, Witte was a key figure as *Minister of Transport*. A forceful empire-building outsider, bent on the rapid industrialization of Russia and distrusted by conservatives, he persuaded *Alexander III* to make his son and heir Chairman of the *Siberian Railway Committee*, which had been set-up to overcome the usual bureaucratic delays and obstacles. The appointment gave the project reliable royal support and for Witte, a Chairman he could control. Appointed finance minister in 1892, Witte paid for the railway by raising loans, increasing taxes and simply printing rubles.

23

Lifeline

24

"…Though not without its flaws, the TSR would play a significant role in transporting manpower, artillery, and supplies during the Russo-Japanese War (1904-1905), the Russian Revolution of 1917, and World War II. Thousands of Jewish refugees, for instance, were able to use the TSR to escape Nazi Germany…"
***cntraveler.com,* July 23, 2016**

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The Battle of Lake Baikal

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Above: in 1918, the *Czecho-Slovak Legion* found itself fighting the *Red Army* in Siberia for control of *Lake Baikal.* It began on May 14, 1918, with an altercation between two men at the TSR station at Chelyabinsk. A still-loyal Austro-Hungarian soldier, angered by the legionnaires' betrayal, hurled a chunk of metal at one of the defecting Czechs, killing him. The soldier was quickly apprehended and killed in retaliation. Subject to repeated arrests by the Communists in charge of Chelyabinsk, the legionnaires took matters into their own hands and liberated their comrades from the local jail. Having done so, they prepared to resume their journey. However, in response to this direct challenge, *Leon Trotsky,* the leader of the Red Army, telegraphed dire threats that his soldiers would shoot any armed legionnaires on sight and imprison the rest. 50K legionnaires, who were strung-out along 5K miles of the TSR and were isolated in three major formations, revolted en masse. Day-by-day, week-by-week, one Siberian city after another fell to the Czecho-Slovaks. Having taken control of the Bolshevik strongholds of Irkutsk and Vladivostok, as many as 50K legionnaires remained stretched-out behind Irkutsk, cut-off from their comrades in Vladivostok.

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"…Gajda was a leader whose belief it was to strike at once, to strike often, and with determination. In those days, he seemed never to hesitate in his course of action…"
***Sergeant Gustav Becvar,* Czecho-Slovak Legionnaire**
RE: spooked by the legion's rapid advance in their direction, *Red Army* forces abandoned Irkutsk. The legionnaires soon learned that the retreating Bolsheviks had taken with them an entire train loaded with explosives, planning to blow-up one or more of the 39 tunnels, thereby trapping all the legionnaires west of *Lake Baikal.* However, *Captain Radola Gajda* realized that he and his men had to reach and clear the tunnels as soon as possible to prevent their destruction. The ice-breaking ferries *BAIKAL* and *ANGARA* shuttled passengers, trains and freight from *Port Bai-kal* across the lake to Babushkin until 1904, when the "missing link" was completed; with two tracks running 162 miles around the southern tip of the lake from *Port Baikal* to Babushkin on the lake's eastern shore. The legionnaires learned that it was at Port Baikal that the Bolsheviks had parked their explosives-laden train. The station and its tracks sat between the steep cliffs above Port Baikal and the mouth of the *Angara River*, at the lake. On July 15, 1918, Gajda dispatched three parties in the direction of the enemy. Suddenly, from the direction of the *Baikal Station,* came the sound of a huge explosion.

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Legionnaires who had reached the cliffs above the station confessed that when they fired on an enemy train, some of their rounds probably hit dynamite. After five days of fighting, the combined three units of legionnaires took Kultuk. The soldiers then advanced toward Slyudyanka, a town on the southern tip of *Lake Baikal,* beyond which lay the last of the 39 tunnels. Then came another booming explosion that echoed through the tunnels and across the lake to their left. It would take the legionnaires three weeks, to clear the pile of stone and earth from the tracks.
Caption: "The battle for Lake Baikal"

30

"…The Bolsheviks were entrenched strongly in front of this station, and not even our newly arrived armored train could shell them out of their fortified nests . . . The Bolsheviks were given no time or opportunity to use their trains. They were driven in a panic-stricken mass along the line towards Posolska. Rifle and machine-gun fire raked the driven mob until they scattered into the hills…"

Sergeant Gustav Becvar, **Czecho-Slovak Legionnaire**

RE: *Red Army* casualties numbered in the hundreds while the legion gained countless trains and a large arsenal. The legionnaires also set ablaze the train ferry *BAIKAL*, ending its career at the dock at Babushkin. In little more than three months, the legion had seized the entire TSR and, with it, all of Siberia; from the *Ural Mountains* to the *Sea of Japan* - about the distance from Honolulu to NYC. Fighting against the Red Army in the *Russian Civil War* had the effect of characterizing the *Czecho-Slovak Legion* as a reactionary, pro-tsarist army. In reality, the men risked their lives to oppose the Hapsburg monarchy in Vienna, not to support a monarchy in Russia. All available evidence confirms that most of the men, as well as their leaders, were socialists. About 10K Czech and Slovak POWs volunteered for the Red Army.

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"…Today, it remains vital to Russian commerce, moving goods and people alike…"

cntraveler.com, **July 23, 2016**

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Affordable Luxury

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"…To celebrate its 100th birthday, ultra-luxe operators like Golden Eagle Luxury Trains are running commemorative tours this summer…"

cntraveler.com, **July 23, 2016**

<u>Above</u>: caption: "Golden Eagle Trans-Siberian Express"

<u>Left</u>: caption: "Gourmet meals are prepared by world-class chefs on the Golden Eagle Siberian Express"

35

<u>Above & Left</u>: caption: "We offer our guests first-class customer service, a romantic exploration of the world's most remarkable sites and a room with a view that constantly changes. Aboard this luxury hotel-on-wheels you can expect welcoming cabins, fine dining and elegant surroundings - no matter where you choose to explore. Select departures from either Moscow or Vladivostok - plus the option of shorter durations between Moscow and Ulaan Baatar."

36

"…But you don't need to keep gold bars in your sock drawer to experience the magic of the TSR. Third-class tickets start as low as $165, making one of the world's most epic train journeys also one of its most accessible (visa approval pending, of course)."
***cntraveler.com*, July 23, 2016**

37

Sentimental Journey

38

The world's longest railway line was completed in 1916. Our writer embarks on the seven-day, 5,772-mile journey from Moscow to Vladivostok in the depths of winter when the snowy landscape is at its most beautiful
***theguardian.com*, November 12, 2016**
RE: introduction to an article written by *Caroline Eden* entitled: "On board the Trans-Siberian Railway for a Centenary Ride"

39

Next Stop Siberia

40

"VLADIVOSTOK railway station, far eastern Russia. The seven-day train journey from Moscow was over and we disembarked slowly into the black night, crunching through the snow and swaying slightly, as if we'd spent too long at sea…"
***theguardian.com*, November 12, 2016**
Caption: "Next stop Siberia . . . the Trans Siberian Railway"

41

"…To Russians, the Trans-Siberian Railway, stretching 5,772 miles from Moscow to Vladivostok (it takes more than nine hours to fly), is merely a commuter train. Businessmen, students and legions of soldiers use it, boarding and disembarking at remote stations to go home, visit family and reach army bases…"
***theguardian.com*, November 12, 2016**

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Caption: **"The original Trans-Siberian railway stretched across the vast and beautiful expanse of Siberia; between Moscow and the naval port of Vladivostok. In the years since its completion, a number of offshoots have been created, connecting the original Trans-Siberian railway to Ulan Bator, Harbin and Beijing, via the Trans-Mongolian and Trans-Manchurian railways, and the Russian northeast via the Baikal-Amur Mainline. The Trans-Siberian railway allows for seamless travel across two of the most beautiful, breathtaking continents on the planet."**

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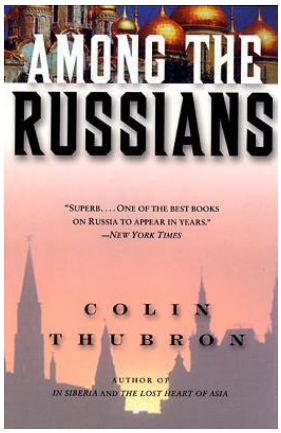
44



"…For many foreigners, though, it's the epitome of romantic train journeys – the chance to travel across the largest country on Earth on an absorbing, perception-shifting adventure, one that shakes up preconceived ideas about Russia and offers an insight into the Russian psyche. Like in Colin Thubron's travel book, you are Among the Russians, especially in winter when few tourists use it…"
***theguardian.com*, November 12, 2016**
Caption: **"Colin Thubron's exquisitely poetic travelogue is the perfect guide to a country most of us will never know firsthand"**

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Shortcut

46

"…This year marks the centenary of the Trans-Siberian Railway as we know it today. In 1916 as the first world war and civil war raged across Russia – causing the destruction of 60% of the country's railway network – the Trans-Siberian was completed. Before then, the eastern end of the journey involved cutting across China, into what is now the Trans-Manchurian route…"
***theguardian.com*, November 12, 2016**
RE: the main route of the TSR begins in Moscow and runs through southern Siberia to Vladivostok. A second primary route is the *Trans-Manchurian Railway* (TMR), which coincides with the TSR east of Chita as far as Tarskaya, about 621 miles east of *Lake Baikal*. From Tarskaya, the TMR heads southeast, via Harbin and Mudanjiang in China's northeastern provinces, joining with the main route in Ussuriysk, just north of Vladivostok. This is the shortest and the oldest railway route to Vladivostok.

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Above: **original Russian route-map of the TSR**

Siberia in Winter

48

"…Nowadays, twice a week, the Rossiya (Russia) departs Moscow's Yaroslavsky station, and it was from here that my Russian-speaking husband and I set off. Amid soldiers dressed in blue berets and camouflage fatigues, and worn-out looking policemen in black fur hats, we found our train. It was February. Although a summer trip offers endless daylight, we chose winter, when Siberia is at its most beautiful, snowy and photogenic…"
theguardian.com, November 12, 2016
Caption: "Caroline Eden about to board her train"

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Trans-Sibbers

50

"…We made our way to our second-class, four-berth compartment. Neat and narrow, it came complete with TV and a full-length mirror on the back of a sliding door. Keen for the chance to talk to locals, we'd opted for this over the anti-social first-class, two-berth compartments and the noisy, crowded open-plan bunks. Under the two fold-down bottom bunks, heaters belched out hot air. For the next three hours we had the cabin to ourselves; after that it would be a shared experience the whole way…"
theguardian.com, November 12, 2016

51

"…It is three nights to Irkutsk in Siberia, where, like most Trans-Sibbers, we'd break the trip for two nights before travelling for another three days to reach Vladivostok (literally 'to rule the east') on the Pacific edge of Asia. We'd rarely move faster than 43 mph. We eased out of a gloomy Moscow. The harsh economic chill mixed with a mild winter had created a subdued atmosphere and slush-lined streets…"
theguardian.com, November 12, 2016

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Russia Rushing By

53

"…It sounds simple, and it is, but to understand the Trans-Siberian journey, you need to look out of the window. First, there are the station stops. Some have fantastically long tongue-twister names, such as Uyarspasopreobrazhenskoye. Hard-to-spot kilometre posts edge the railway line, marking the distance covered. The countryside changes but retains a comforting familiarity, a snowy bucolic theme. Outside Moscow I scrutinised the picket-fenced dachas (summer houses) painted in pastel colours. Later on in the journey, I watched out for differences in the izbi (Siberian huts) with their painted shutters and log piles…"
theguardian.com, November 12, 2016

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55

"…Somewhere towards Kirov, an industrial city half-a-day out of Moscow, the journey found its rhythm. Our matronly provodnitsa (conductress) made regular appearances, checking tickets, selling pirozhki (stuffed buns) and handing out clean bedding. Passengers, in their standard issue grey and red Russian Railway sandals, flip-flopped back and forth to the samovar for hot water to make tea. Outside, a bleached-out white sun shone, torch-like, illuminating huge housing blocks that encircle industrial towns like mandalas…"
***theguardian.com*, November 12, 2016**

56

"…Good intentions to tackle Tolstoy were, I decided, laughable on this train. The landscape is too engrossing, too hypnotic. Our travel-tired eyes succumbed to the scenery until darkness fell. Come morning, the snowy motion picture of birch trees, banks of snow and taiga would repeat, as if on a loop, and once again our attention would be held hostage…"
***theguardian.com*, November 12, 2016**

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Cast-of-Characters

58

"…At Vladimir (119 miles), Michael, a businessman, and Yevgeny a bandy (similar to ice-hockey) referee, joined us, and shook our hands in the formal Russian way. Michael, Slavic-looking with high cheekbones and Putinesque eyes, told us that he wasn't a fan of train travel. 'No fresh air but a lot of fresh smells,' he said dryly…"
***theguardian.com*, November 12, 2016**

59

"…When we woke at Perm (892 miles), Vladimir, a bathroom salesman who spoke some English, had taken Michael's place. Yevgeny had left. It was piercingly cold outside, minus 20 C or so. Children in metallic puffa jackets hauled skis past spindly birch trees, dogs with bushy tails scavenged in frozen bins and the snow on the rooftops was so thick that the wooden houses looked fit to collapse…"
***theguardian.com*, November 12, 2016**

60

Deep Freeze

61

"…Every river we crossed was frozen solid. Watery sunlight melted the patchy ice that had collected on the inside of the train window overnight, creating rivulets of condensation…"
***theguardian.com*, November 12, 2016**

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Fine Dining

63

"…We went in search of food, darting through the freezing gaps that connect the carriages. The smell of fried potatoes and solyanka (a greasy thick soup with salty cured meats, sausages, olives, dill and sour cream) led us to the small dining car with its cherry-red faux leather seats, frilly yellow curtains and rattling light fittings. It was empty. 'Russians prefer to picnic in their cabins,' the provodnitsa told us glumly…"
***theguardian.com*, Nov. 12, 2016**
Caption: **"Two provodnitsa (carriage attendants)"**

64

"…I ordered tea and a £2 bowl of kasha (porridge), which came topped with a slick of butter. The chef appeared momentarily, dressed in slippers and a velour leopard-print tracksuit, her tangerine hair curled around pink rollers. She gave us a wink then quickly disappeared…"
***theguardian.com*, November 12, 2016**

65

Winter Sports

66

"…We gazed out of the grimy window. Near the town of Kungar (953 miles), men bulbous in winter clothes were ice-fishing in the middle of the Sylva river…"
***theguardian.com*, November 12, 2016**
Caption: "A dog on frozen Lake Baikal"

67

Moscow-Plus

68

"…Persil-white snow covered timber mills and gingerbread houses rushed past. Days became distorted as we sped through time zones – that the train runs on Moscow time the whole way adds to the confusion (it would be Moscow +7 by the end of the journey)…"
***theguardian.com*, November 12, 2016**

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Nostrovia!

70

"…Just before we hit Siberia proper, at 1,306 miles, Tatiana and Alexi boarded at Yekaterinburg, with a picnic bag the size of a washing machine. Inside was rye bread, a brick-sized hunk of white pork fat, several litres of vodka and a crate of beer. Alexi was 32, a staff sergeant in the army, and looked like a young Tony Soprano in his wolf fur-lined leather jacket. A crucifix swung around his grey vest and an ornate army sentry ring glittered on his left hand. His round-faced wife was rosy-cheeked and cheerful. Neither of them had ever left Siberia they told us…"
***theguardian.com*, November 12, 2016**

71

"…Shots were toasted one after the other and were chased with greasy chunks of the smoky, home-cured pork back fat. It cut the vodka beautifully. At 6 am, three bottles of vodka later, the cabin was swimming. Lulled by the cradle-rock of the train, we collectively dozed off. When we woke at lunch-time, the tangy air smelled of warm feet, booze and armpits. There are no showers on board and fresh sheets are given out just once, upon boarding…"
***theguardian.com*, November 12, 2016**

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Destination: Irkutsk

73

"…At 3,069 miles, where there was little more to see than vast expanses of taiga, even the stations had wintry names. We pull into Zima ('winter' in Russian), then Kuytun ('cold' in the language of the local Mongol Buryat people). Outside it was almost minus 30 C…"
theguardian.com, November 12, 2016

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"…Finally, we reached snow-clad Irkutsk (3,222 miles), capital of Eastern Siberia…"
theguardian.com, November 12, 2016
Caption: "Irkutsk, where travelers often take a break from the journey"

75

"…It is a handsome city of wooden 19th-century houses and good restaurants. Relieved to have proper food, we snatched at garlic bread and devoured piles of hot pasta and risotto at Figaro. On Karl Marx Street men shovelled the snow from rooftops onto the pavements below to stop their houses collapsing under the weight. Huge dagger-like icicles hung dangerously from window ledges…"
theguardian.com, November 12, 2016

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Lake Baikal

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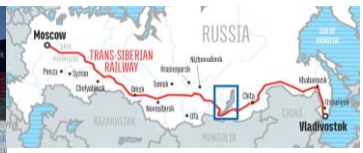

"…The following day, we drove for 45 miles out of Irkutsk to Lake Baikal, the world's deepest lake. We walked gingerly on the three-metre thick ice, passing wolf-like pet dogs out for their daily exercise. In the distance, cars drove across it, despite warnings of hot springs and perilous melted patches. We feasted on omul, the local oily fish, which is smoked and sold in supermarkets and restaurants…"
theguardian.com, November 12, 2016
Upper Left: caption: "A lonely bus stop outside the Lake Baikal Museum"
Lower Left: caption: "Omul fish for sale at Lake Baikal"

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The Geography of Nowhere

79

"…The next evening, at 21.22, we returned to the train, pleased to be back on board, despite the poor food and lack of sleep. Stockholm syndrome, we joked. The warm train was softly scented by omul – most passengers boarded with bags of it. In our cabin, the TV blared out the 1970s Soviet comic science fiction film Ivan Vasilievich Changes Profession. We shook hands with Andrei, a 22-year-old soldier, and Dmitri, our new cabin-mates, already settled into the top bunks. At Ulan-Ude, at 4 am, Pavel, a Navy officer, boarded and quietly replaced Dmitri…"
***theguardian.com*, November 12, 2016**

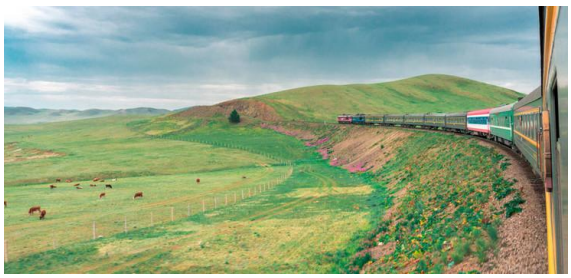
80

"…From the dining car at breakfast, we watched the wind-swept tundra, its long grass bent double by the wind. Thin and delicate clouds hovered above Lesnoy, a small station just before Chita (3,852 miles) and we continued past Takht-amygda, a grim valley with a grimmer prison, lined with inward-facing watchtowers and barbed wire. For the next two days the scenery changed little: taiga and permafrost met swampy lowlands for hundreds of miles…"
***theguardian.com*, November 12, 2016**

81

Another Seven Days

82



"…Every afternoon at 4 pm we'd return to the dining car and drink Baltika beer and chat with Olga, the lonely provodnitsa, who told us on arrival at Vladivostok she would 'return straight away to Moscow.' Another seven days on the Rossiya – cooking, cleaning and looking after her passengers. Another seven days crossing wild landscapes, ferrying an ever-changing cast-of-characters on an epic 5,772-mile journey across Russia."
***theguardian.com*, November 12, 2016**

83

Part 2

Setting a Precedent

84

Completion of the Canadian Pacific Railway

Scientific American Supplement
November 28, 1885

85

IN the completion of the Canadian Pacific Railway, just taking place, has been brought to a successful close another one of those great enterprises for which Americans are famous, says a correspondent of the *Tribune*.

86

Surveys began in 1870, and a vast amount of information was collected. The government undertook the building of the proposed road, and by the end of 1880 had constructed 432 miles of track between Winnipeg and Lake Superior, 213 miles up the Frazer River in British Columbia, and some other portions. The management proved unsatisfactory, however, and in 1881 the whole work was turned over to a corporation called the Canadian Pacific Railway Company, to which were given 710 miles of completed road and attached property, $25,-000,000 in cash, 25,000,000 acres of land, exemption from taxation or customs duties on construction materials, and various other privileges and immunities; in return for which it was to construct, equip, and operate a trans-continental line north of Lake Superior, within ten years. W.C. Van Horne, a resident of Milwaukee, who had large experience, was made general manager, and the work began.

87

Never was a railway pushed forward so rapidly. Forty-thousand men were at one time engaged all along the line, and half that number were almost continuously employed. In Ontario and Quebec old railways were bought and knit into the system. A new road was built from Montreal to Toronto via Ottawa, and a line of Clyde-built steamers put upon the Great Lakes to make complete the route between Winnipeg and the sea.

88

An army of engineers and laborers under the most admirable discipline, and aided by improved appliances was mustered on the plains, and before the end of 1881 the main line had been carried to 185 miles west of Winnipeg. The next year it was advanced 418 miles further, and by the end of November, 1883, the track had reached the summit of the Rocky Mountains.

89

The speed with which this was put down was wonderful. Scores of days together would show an average advance of three-and-three-quarter miles; while the total average between Winnipeg and the Rockies was over two-and-one-half miles for every working day.

90

Meanwhile, a great force of Chinese shovelers were pushing eastward in British Columbia, and there was no lack of activity in Ontario. The track already laid up the Ottawa was advanced beyond Lake Nippissing, and at the same time large bodies of men were landed along the northern shore of Lake Superior and began to work toward each other through the heavy forests, granite knolls, and dashing rivers that make up the scenery of that savage region.

91

A large amount of work here – hundreds of miles of track – was accomplished amid the snows of a semi-arctic winter. In May of the present year the various sections were united, and a continuous track presented from the wharves at Quebec to the western side of the Rocky Mountains, twenty-five hundred miles. All that remained to open the line clear through to the Pacific was the crossing of three mountain ranges, but this of itself was a significant undertaking.

92

The Rockies trend westward so rapidly that in British Columbia they are in the longitude of Salt Lake. There are three separate lines of mountains; easternmost, the Rockies, so-called; next, an equally lofty range called the Selkirk; third, the Gold Range. Between the Rockies and the Selkirks, near the boundary line, rises the great Columbia River. It flows northward vainly seeking escape, until it reaches the northern end of the Selkirks, just above latitude 52-degrees, when it sweeps around them and begins to flow directly southward along their western flank.

93

The engineers had, therefore, to carry their iron road over the Rockies, span the upper Columbia, surmount the Selkirks, cross the enlarged Columbia a second time, traverse the Gold Range, and meet the Pacific division at the Sushwap lakes. Today a completed track stretches 3,100 miles from Quebec to Port Moody, besides some 1,500 miles of branches.

94

Now a few words, all from personal observation, as to what is to be seen along this new route. The appearance of eastern Canada is nowhere remarkable, but the equipment of the new line will attract attention. The parlor and dining and sleeping cars, of solid mahogany, are all made in Ohio, but the company builds its own locomotives and commoner cars.

95

North of Lake Superior the country is wild in the extreme. Rugged forests stand upon rugged rocks. The many streams are full of cataracts, and boil and roar among ledges and boulders. Between Ottawa and the lake the track runs upon the Laurentian watershed, and you may launch your canoe on one side and float to Hudson's Bay, or on the other for an exciting trip to Lake Superior, each way through a primeval wilderness abounding in fish and game and opportunities for adventure.

96

On Thunder Bay, behind the basiltic headland of Thunder Cape, is the flourishing port of Prince Arthur's Landing, and near it old Fort William, which began to be a trading post when the Sieur du Luth, in 1678, built a fort here for trading with the Sioux. Then comes that wonderful tangle of rivers, marshes and lakes, hills of naked granite and nooks of forest, through which for two centuries the Indian trader and trapper, the French voyageur and red-skinned warrior, have been gliding in birch bark canoes on errand of peril and privation, glorified now and then by fabulous rewards. This is Keewaydin, "home of the northwest wind."

97

Four-hundred miles west of Port Arthur we emerge upon the prairies of the Red River country, and where the Red and the Assiniboine join, find a city of 30,000 people, covering what only ten years ago were the Indian camping grounds at the gates of Fort Garry. Winnipeg is to the Canadian Northwest what Chicago is to the Prairie States, or St. Paul to the upper Mississippi region, and its further growth will be rapid and sure. Five railways now center there, and it is thus the collecting and distributing point for all the great agricultural, fur-bearing, and fish-producing region of that northern interior.

98

The treeless plains which stretch through a thousand miles of open and level country west of the Red River are all cultivable, and for the first 500 miles are already doted with villages and farmhouses. The higher and somewhat drier western half abound in lakes, which brake the monotony of the journey most pleasantly.

99

The first glimpse of the mountains is got 100 miles away from their bases –a delicate crinkled line of white along the horizon, and at Calgary they come into plain view. Calgary is on the Bow River, which rushes down from the interior of the mountains to swell the great Saskatchewan. The Hudson's Bay Company had one of the most southerly posts there, and the mounted police force chose it for their chief station in that part of the world. Around this nucleus has sprung up a large town, which expects to be the Denver of that region, and will be supported by the cattle and sheep owners, whose increasing herds pasture between the foothills and the Saskatchewan everywhere south of the Red Deer River, and also by the varied industries of the mountains, in which mining, lumbering, and tourist-catching industries will begin to flourish.

100

Ah, those mountains! I know the Rockies "like a book," from the springs of the Columbia to the mouth of the Rio Colorado; and I vow there are none that surpass those that meet us after we roll through the gates of the Bow and begin the ascent of the Kicking Horse Pass. At the head of the pass you are close beneath the shear buttresses of Mount Stephen, crowned, six-thousand-feet overhead, by glittering masses of solid ice or of almost equally solid snow, and still there remain to astonish your eyes the loftier, even more abrupt, more glacier-studded, more gloriously savage Selkirks, which no man, white or red, had ever entered until the engineers fought their way across and drew the iron track after them. No person need go through the mountains without stopping for hotels are building at several favorable points.

101

Beyond the mountains in British Columbia stretch rolling grasslands. This is primarily a cattle-raising region, yet large areas are suitable for farming, and producers will find an adequate market in the mining camps which before long will be scattered along the Gold Range and about the Big Bend of the Columbia where the precious metals seem to be plentiful.

102

When the Thompson River has been descended to its mouth, the road follows the Frazer down its resounding canons until the passage through the Cascade Mountains has been effected. Then, crossing over to Burrard's Inlet, the Pacific terminus is reached, whence a steamer may be taken to Victoria, or, by and by, to China and Japan.

103

The annual meeting of the Canadian Pacific Railway Company was held at Montreal, June 15. The report showed that of $65,000,000 of stock, $40,-000,000 were held in England, 15,000,000 in Canada and $10,000,000 in the United States. The track will be completed by the end of September, there being only 203 miles in British Columbia yet to finish. At the beginning of next spring the company will have 4,000 miles of line in operation, with adequate terminal facilities.

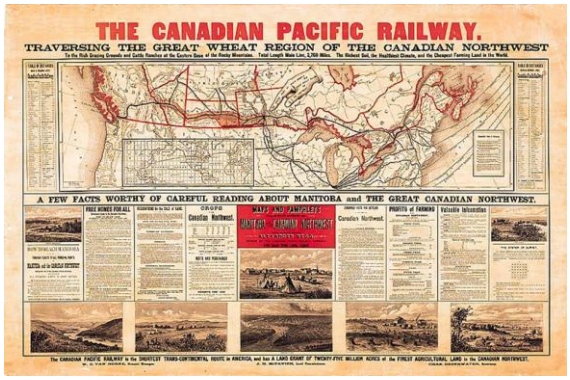
104

The floating indebtedness amounts to $6,803,401, of which about $4,702,000 has been created during the year by the purchase of rolling stock and the providing of elevating and terminal facilities and on these a further expenditure of $5,045,000 is to be made. This will be provided for out of the sale of $15,-000,00 of bonds. The balance will suffice to complete the work in accordance with the terms of the contract, and the assets of the company will then exceed the liabilities by $110,000,000, estimating the value of its land grant at $2 per acre.

105

When the line is completed and worked throughout, the fixed charges will amount to $3,000,000 annually. Last year the net earnings amounted to $1,191,-000; and the first four months of this year showed an increase over the same period of last year by $992,104; and it is expected that there will be a net profit this year of $2,500,000. In the year following the completion of the line a gross traffic of $12,000,000 is expected, and a net revenue of $3,500,000, or more than $500,000 over all fixed charges. The report was adopted.

106



Map of the Canadian Pacific Railway in 1885

107

New Railroad Construction in Canada and the Northwest

Scientific American
July 6, 1907
by Day Allen Willey

108

THE United States west of the Mississippi River is the principal field for railway builders, as might be expected. The most important undertaking in the Western States, however, is the extension of the Chicago, Milwaukee & St. Paul Railway from its present western terminus to the Pacific coast. This is one of the most extensive individual projects ever undertaken in railroad building in the United States, as it represents no less than 1,700 miles of new line.

109

The Western Pacific, which is being completed through California and Nevada, represents 750 miles, and will form the western extension of a system reaching across the continent, since it will form a portion of the Gould lines which now extend from the eastern terminus of the Western Pacific as far east as the city of Buffalo, New York. In the Pacific Northwest the Great Northern Railway Company is building an extension from the city of Spokane in eastern Washington by way of the Columbia River Valley to Portland, Ore. By the completion of this work the Great Northern will secure a second seaport on the Pacific Ocean in addition to the one which it now has on Puget Sound.

110

The work of the railroad builders in northwestern Canada, however, is remarkable for its extent, considering the comparatively small mileage which has been completed in this section. The new road is being built for the purpose of developing the immense territory available for agriculture which is embraced in the province of Manitoba, and the territories of Alberta, Assiniboia, and Saskatchewan. Until recently, one company had a practical monopoly of all the traffic from this section of Canada, but at the present time four large corporations are carrying out plans for railway extension, in addition to the number of what might be called local projects.

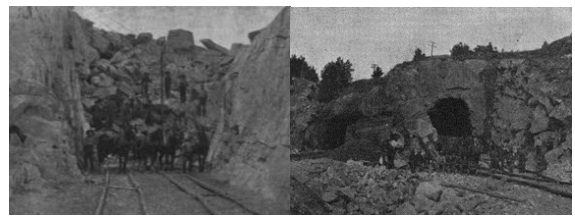
111

The Canadian Pacific, which at the present time has the unique distinction of controlling the only railway which extends entirely across America, has found it necessary to let contracts for a number of extensions northwest from Winnipeg to reach the great wheat belt in this section of the Dominion. The longest of these extensions will terminate at Edmonton in the Saskatchewan Valley, 750 miles from Winnipeg.

112

In addition to these projects, the company is expending $10,000,000 in enlarging the portion of its main line between Winnipeg and Fort William on Lake Superior. This section is termed the “Spout,” for the reason that it is the principal route for the bulk of the grain which is shipped east from northwestern Canada and either stored in the elevators at Port William and Port Arthur for shipment by lake, or sent by rail through Canada to the seaports on the St. Lawrence River for export. The grain traffic has increased to such an extent that a second track has become necessary, and work on this is now in progress.

113

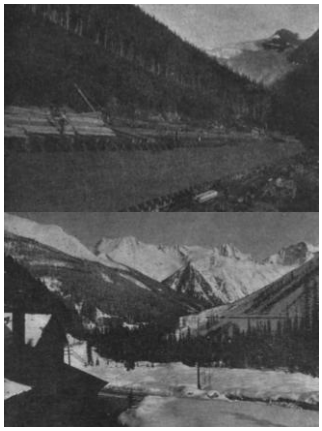


The construction of this additional mileage was begun in September, 1905, and it is expected that all of it will be completed within the next two years. In all, 425 miles of track will be laid. A portion of it will be built through a region in which an immense amount of excavation will be necessary in rock formation. The accompanying photographs give an idea of the difficulty of this work. In some places the rock cuts are over 25-feet-deep. While steam drills are employed to some extent, much of the drilling is done by hand. A force of 1,600 men is employed on this section alone, which represents about 100 miles of the work. As far as possible, the steam shovel is employed.

Left: caption: “A deep rock cut near Busteed, Ontario”

Right: caption: “A tunnel for the second track near Kolmar, Ontario”

114

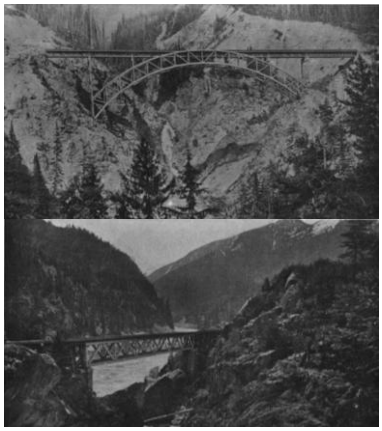


On the division east of Winnipeg Mr. W.A. James, the engineer-in-charge, has used from ten to twelve power shovels when the weather would permit, the machines being provided with dippers holding 3-1/2 cubic-yards. During the winter season, however, the weather is such that very little work can be done upon the extra track, and most of the construction has to be performed during the six favorable months of the year, and this accounts for the length of time which will be required for its completion.

Top: caption: "Building snow sheds near Glacier House, B.C."

Bottom: caption: "Snow sheds on the Canadian Pacific, showing the Hermit Range"

115

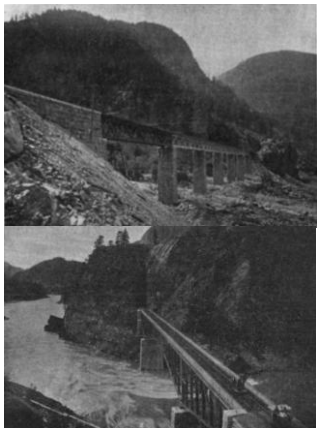


Another important extension of the Canadian Pacific, which has been completed in British Columbia, through one of the most mountainous sections of the Northwest, necessitated the building of numerous bridges, as well as much tunnel excavation. As will be noted by the illustrations, the work is of a very substantial character and includes some important viaduct and bridge work.

Top: caption: "Stoney Creek Bridge, Selkirk Range, on the Canadian Pacific"

Bottom: caption: "Canadian Pacific Railroad bridge across the Skazzy River, Fraser Canyon"

116



The enlargement of the Grand Trunk Railway into the Great Trunk Pacific means the completion of another trans-continental line, which will be fully 5,000 miles in length, reaching from Moncton, New Brunswick, to Port Simpson on the Pacific Coast. The surveys for this route required several years to complete, and the line lies farther north than any east-and-west railroad which has yet been planned in America, much of it traversing a section which at present is an unbroken wilderness. Contracts have been let and a considerable mileage of the Grand Trunk Pacific will be completed during the present year.

Top: caption: "Canadian Pacific bridge across White's Creek, Fraser Canyon"

Bottom: caption: "The Cisco cantilever bridge across the Fraser River"

117

Above: the *Grand Trunk Railway* (GTR) was, perhaps, the most ambitious early attempt at connecting Canada and the U.S. by rail. Completed nearly thirty years before the *Canadian Pacific Railway* was even chartered, the British-owned GTR helped develop much of southern Ontario and move Canada towards confederation in 1867.

118

Caption: "A 1903 map showing the proposed route of the Grand Trunk Pacific Railway. The lines north of Edmonton would never be built due to political reasons."

119

Another ambitious project is that of the Canadian Northern, which already has built a network of lines in Manitoba and adjacent territory. Its track is finished to the city of Edmonton, and it also reaches Lake Superior at Fort William and Port Arthur. This company expects to utilize Hudson Bay as a route for exporting grain and other products from the Canadian Northwest. From the heart of the wheat belt to the Bay is about 700 miles, and surveys have been completed by the Canadian Northern for a practicable route.

120

Recent investigation has shown that the water of Hudson Strait, which connects the bay with the Atlantic, is free from ice for fully one-third of the year, and it could be kept open fully two-thirds of the year by ice breakers, while there is open water in the bay itself all the year round. A glance at the map shows that this route is considerably the shortest to Europe from the Canadian Northwest, a haul of nearly 1,000 miles over land being avoided.

121

Consequently, grain sent by this northeast gateway across the Atlantic can be transported at a much smaller expense than by any of the present routes through Canada or the United States. This is why the Canadian Northern has determined to build an extension through what is practically an uninhabited country. Several other independent companies have secured charters from the Dominion authorities to build lines northward to the same body of water.

122

During the present year, work will be in progress on two more systems which will connect the city of Winnipeg with the Pacific coast. When these are completed three lines will traverse Northwestern Canada from eastern Manitoba to the ocean, for in addition to the Grand Trunk Pacific project, James J. Hill has completed arrangements for a line which will pass through southern Manitoba, Alberta, and British Columbia, terminating at the city of Vancouver. This will form a Canadian division of the Great Northern system and including branches will be 1,300 miles in length.

123

The route surveyed is nearly parallel to the Canadian Pacific, and traverses not only the extensive wheat-growing region, but the live stock country of Alberta, and that important section on which irrigation is being carried out on a large scale, as recently noted in the Scientific American.

Caption: "Map of the Canadian Pacific Railway. The red line marks the original route along the Canadian Pacific Railway. The blue line marks the current route along the Canadian National (CN) Railway."

124

Part 3

Overview

125

The Trans-Siberian Railway
Scientific American Supplement
January 30, 1892

126

IT has been publicly stated that the severe reverse which has this winter befallen the Russian Empire will necessitate the postponement, if not the abandonment, of the construction of the Trans-Siberian Railway. The statement has not, however, been officially confirmed, nor is it likely that it will be. There can of course be no doubt that the terrible drain on Russia's resources which the famine will occasion must prejudicially affect the speedy execution of the works; but to suspend operations at the present moment would be an act of folly, as the work will provide suitable and profitable employment for many of the sufferers from the famine. 127

Caption: "Chinese workers on the railway"

An enormous fund has been raised for the relief of the famine stricken, and Russia, if only to prevent it from demoralizing, would be well advised to employ on the railway as many as possible of those to whom relief is given. The directors of the undertaking, who at the present moment are in the Ural region, are apparently of this opinion, for, according to recent advices, they have made urgent representations to M. Hubbenet, the Minister of Ways and Communications, that during the winter season such work as can be carried out should be actively proceeded with. The Finance Minister, M. Vishnegradsky, on whose shoulders at this juncture so great a responsibility rests, is believed to question the advisability of this course, but a higher authority is declared to have overruled his objections. 128

HIS IMPERIAL MAJESTY
NICHOLAS ALEXANDROVICH,
Autocrat of All the Russias.
HIGH ACTUAL PRESIDENT OF THE COMMITTEE OF THE SIBERIAN RAILWAY.

The Czarevitch, whose recent tour through Siberia has led to his taking the greatest interest in the proposed railway, will shortly, it is stated, be entrusted with its supreme direction.

Above: caption: "On the 19th of May, 1891 at Vladivostok, His Imperial Highness, the Grand Duke Tsesarevich, with his own hands tilled a wheelbarrow with earth and emptied it on the embankment of the future Ussuri line, and then laid the first stone for the construction of the Great Siberian Railway." 129

We do not propose in the present article to do more than give a general view of the whole undertaking. Detailed estimates have been prepared by the engineers concerning the major portion of the line, but at the present stage of affairs details cannot be regarded as of much value. The undertaking will not, so far as engineering difficulties are concerned, present many features of special interest; but it is of supreme importance to the whole world in its political and commercial aspects. 130

It will, of course, be the biggest thing of its kind, as from the Urals to the Pacific is, roughly speaking, a distance of 5,000 miles. It will, therefore, be considerably longer than the Canadian Pacific line. In some respects, however, it will bear a close resemblance to its American forerunner. It will do for the Old World what the railway did for the New, viz., bring the Atlantic and Pacific oceans into direct communication, and it will run through a country the economic conditions of which are in every respect as favorable as were those of Canada and the Northwestern Provinces of America before the construction of the Canadian Pacific. 131

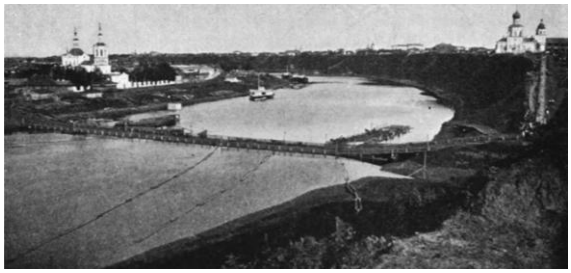
The subject of the Siberian Railway has been before the Russian Government for many years. At first it was not intended to construct a continuous line. It was proposed only to construct railways to connect the water systems of Western and Eastern Siberia. 132

Under this scheme through communication would have been established along the following route: From Kazan to Perm, by the river Kamam – 597 miles; from Perm to Tumen, by the existing Ural Railway – 512 miles; from Tiumen to Tomk, by the rivers Toora, Tobol, Irtish, Obi, and Tom – 1,856 miles; from Tomsk to Irkutsk, by a line to be built – 1,084 miles; from Irkutsk to Mweesoffsky to Srjetensk, by a line to be built – 669 miles; from Srjetensk to Graffsky, by the Amoor and Ussuri Rivers – 1,525 miles; and from Graffsky to Vladivostok, by a line to be built – 255 miles. 133

Caption: "Landing-places for steamers in Tiumen"

This combined water and railway system had the merit of cheapness. Its cost was estimated at only £23,500,000. But the objections to the scheme were many, the chief being that by it communication between European Russia and Siberia would only be possible, as now, during about four-and-a-half months, while the waterways are open, and that during that short period slow communication only would be possible. Under such circumstances the scheme was abandoned. It did not promise to be of much benefit to Russia, either from a political or from a commercial point-of-view.

134

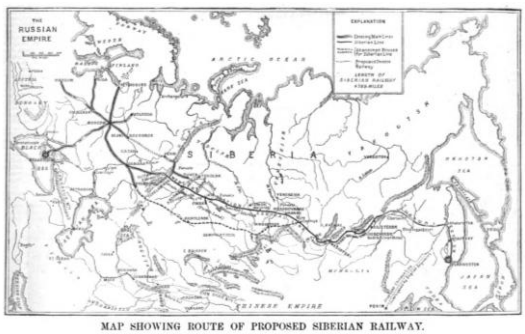


When the commission of engineers came to consider the project of a continuous line of railway, they found it a difficult matter to decide on the starting point. They had three proposals before them. The first was to make use of the existing isolated Ural Railway by extending it westward and eastward. It was suggested that a line should be built to connect Perm with Nijni Novgorod, and that from Tiumen the line should be extended across Siberia, by way of Nijni-Oodinsk, Irkutsk, and Srjetensk. 135

Caption: "View of the town of Tiumen"

The second proposal was to extend the Oofa-Zalatavost line to Miass, and to build a line by way of Tukalinisk, Kainsk, Nijni-Oodinsk, Irkutsk, etc. The third was to make Orenburg – the terminus of the Samara-Orenburg Railway – the starting point and to carry the line through the Kirghiz Steppes, and the districts of Akmonelsk, Semipalatinsk, Biesk, and Minoosensk, Nijni-Oodinsk, etc. Eastward of the last named place the route was the same in the three proposals. Westward of this town, by the first plan 2,343 miles of rail would have to be laid; by the second, 1,820 miles; by the third, 2,254 miles. The second plan has been adopted.

136



MAP SHOWING ROUTE OF PROPOSED SIBERIAN RAILWAY.

On reference to the accompanying map it will be seen that the route from Miass is by far the most direct. It has also other advantages. The country it passes through is less difficult, richer, and more populous than the districts through which the other routes proceed. The line, if carried along this route, would therefore be built at a less cost and bring in a larger revenue than if constructed according to either of the other plans. 137

The line will pass through many districts - especially in the neighborhood of Lake Baikal, and in the Trans-Baikal district - which possess as rich and varied flora and fauna, a scenery which resembles that of Switzerland, only on a larger scale, and a climate which, though severe enough in winter, is in summer mid-European in character. 138

Caption: "On the Baikal, the village of Kaltuk"

The termini of this gigantic line will thus be Miass and Vladivostok. Miass, a small town in the center of one of the richest mining districts of the world, is situated on the eastern slopes of the Urals. The line - a short one of twenty miles - to connect it with Zlatavost on the western slopes of those mountains has already been constructed. Vladivostok is Russia's principal port on the Pacific, and works are in progress designed to render its harbor capable of accommodating the whole Russian Pacific fleet, and to convert the place into a second Sebastopol. 139

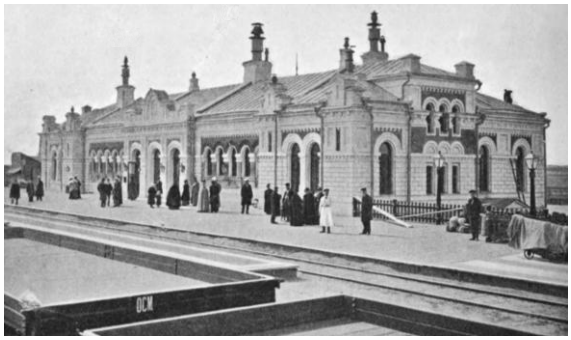
Caption: "View of Vladivostok"

The importance of Vladivostok is already becoming realized. A telegram from Shanghai to the *Figaro* – of Dec. 3, 1891 – states that the British Admiralty authorities are very much disquieted by the rapid development of the port. The Russians will, in the course of a few months, possess at this point a military position of great strength, and have at their disposal a fleet of fast cruisers which could safely assure their supremacy in the Yellow Sea. In order to remedy the great danger which such a position threatens us with, England intends to contract a defensive alliance with China. 140

The whole line is divided into six sections, the names of which, proceeding from west to east, are, 1, the Western line, 2, the Central line, 3, the Baikal line, 4, the Trans-Baikal line, 5, the Srjetensk-Graffsky line, 6, the Graffsky-Vladivostok line. The two last named sections are sometimes classed together as the Ussuri section. As our readers are probably aware, considerable progress has been made during the year with section 6. The section was taken in hand first, owing to its strategic importance. 141

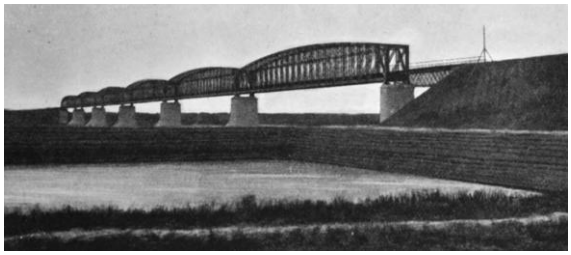
Caption: "The Ussuri province, Suifun Pass"

The Western line will extend from Miass to the river Obi, a distance of 1,028 miles, and pass through the districts of Koorgan, Eshemsky, Tukalinsk, part of Omsk and Petropavlovsk, Kainsk and Tomsk. The population of these districts is estimated at nearly a million, being at the rate of 4.5 persons to the square mile. The principal towns *en route* are Tehelabinsk, Koorgan, Tukalinsk, Kainsk, Kolivan; the principal rivers crossed, the Tobol, Ishim, Irtish. 142



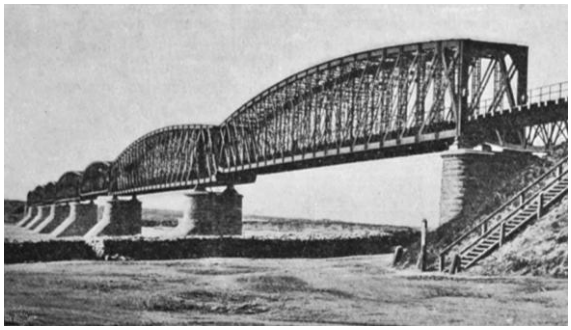
As will be seen from the map, the line does not diverge to take in Omsk. It will be connected with that important town by a branch line about sixty miles long. Another branch line will probably be constructed to connect Tehelabinsk with a station – either Ekaterinburg or Ostroffsky – on the isolated Ural Railway. 143

Caption: "Passenger station at Omsk"



The sub-sections of the western line are (*a*) Miass to Tchelabinsk, sixty-four miles, (*b*) Tchelabinsk to the river Obi, 964 miles. The shorter portion, on account of the mountainous character of the region which it will traverse, is estimated to cost half as much again per mile as the longer. The total cost of the whole section, including rolling stock, rails, stations, bridges, etc., is out at £6,752,000, or an average per mile of about £6,570. This estimate only allows for a pontoon bridge over the Irtish. The expense of a permanent iron structure would raise the total cost by £128,000. 144

Caption: "Bridge over the Irtish"



In the construction of this section the engineers will not meet with difficulties of a serious character. Between Tchelabinsk and the Obi the country is a perfect table land. Only in bridging the rivers will much labor be required, and this can be procured without difficulty. 145

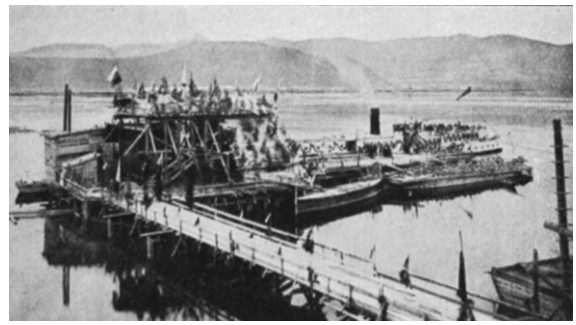
Caption: "Bridge over the Obi"

The central line will cover a distance of 1,114 miles. The principal towns *en route* will be Atchinsk, Krasnoyarsk, Nijni-Oodinsk, Oochtoosky, and Irkutsk, which will form the eastern termini of its five sub-sections, respectively 321, 115, 355, 158, and 165-miles-long. Tomsk will be connected with this section by a short branch line. Sub-sections two and three will be the most expensive portions of this section. The line here will have to be cut through a spur of the Gremyachefsk mountains and taken across the high table land watered by the rivers Yenisei, Kam, Borusa, and Ooda. Difficulties will also be met with in constructing the last sub-section, on account of the hills and the broad rivers.

146

Viewed as a whole, the country to be traversed by the central line is in marked contrast to that west of the Obi. Instead of being a table land, the ground gradually rises until Lake Baikal is reached, at an altitude of 1,600 ft. above sea-level. The average cost-per-mile of this section is not, however, anticipated to exceed much that of the Western line.

147



On the assumption that the broad expanses of the Rivers Obi and Yenisei – here nearly three-quarters-of-a-mile-wide – are crossed by means of ferries, at £20,000, for each river, the total cost of this section will be only £7,335,000, or only £6,580 per mile. If for ferries pontoons are substituted, a further expense of £66,000 will be incurred; and if permanent structures are erected, a further sum of £641,000. 148

Caption: "Inauguration of the future bridge over the Yenisei"

Materials for the construction of this section will be obtained without difficulty. The district is thickly wooded, and iron is abundant. An enormous quantity of the latter metal is smelted every year at Nicholaiffsky Iron Works. The labor obtainable will not, however, be of good quality, as the natives of these parts are not used to severe exertion. 149

Caption: "The Nicholas foundry and iron-works"

The Baikal line, although the shortest section – 194-miles-long – will be the most expensive. Its total cost is put at £2,674,000, *i.e.,* about £18,780 per mile – nearly twice as much per mile as either of the preceding sections. This is owing to the mountainous character of the district. The Zirekeszinsky mountain range will have to be pierced by a tunnel nearly three miles long, the cost of which will be about £200,000. The section will have as its eastern terminus a steamboat station called Mweesoffsky Pier, on the south-eastern shore of Lake Baikal. The chief intermediate stations will be Maifot and Kooltook.

Caption: "The Baikal. Place of the building of the dock for icebreaker near Listvennichnaya." 150

The Trans-Baikal line, 669-miles-long, also presents difficult features. Proceeding from Mweesoffsky Pier along the valley of the Seeling, the line will cross that river – here over 3,000 ft. wide – and then enter on a rocky region at an altitude of 3,700 ft. It will then descend into the valley of the Lena, and proceed thence into the basin of the Amoor. At Chita it will again meet with mountainous country, and crossing the river Nertcha will terminate at Srjetensk, the well-known Amoor steamboat station. It will have four sub-sections – (*a*) The Seelingink, 107 miles; (*b*) the Verchne-Oodinsk, 275 miles; (*c*) the Chitinsk, 188 miles; (*d*) the Nertchinsk, 99 miles. Its total cost, allowing only for a ferry for the Seeling, is put at £6,004,000, or £9,110 per mile. A permanent bridge over the Seeling would increase the cost by £305,000. The country traversed by this section will yield abundant supplies of material for use in the construction of the line. It contains no lack of sand, clay, stones, granite, lime, coal and wood.

151

The Srjetensk-Graffsky section will cover a distance of 1,525 miles. Although this portion of the route has not been surveyed, the character of the country is fairly well known, and no difficulties worth speaking of are anticipated. The total cost of the section is put roughly at £10,222,000, or about £6,700 per mile.

152

The Graffsky-Vladivostok section, which is only 255 miles, is deemed of the greatest political importance. The Chinese contemplate constructing a line through Manchuria, the route of which has been surveyed by English engineers, and the Russian Government has become fearful lest the Chinese cast longing eyes on the rich province of Ussuri. In a letter to M. Vishnegradsjy of the 7th of May, 1890, M. De Giers, in urging the importance of constructing the Siberian Railway, said, "The Chinese may not now have any hostile intentions against Russia, but Russia can never be certain that such ideas may not hereafter enter their heads, especially if they were brought into collision with any of the European naval powers. In this event the possessions of Russia in Eastern Siberia, cut-off as they now are seven months out of the twelve every year, would be in an exceedingly precarious position." The cost of this, the final section, is put at £2,614,000, or £10,250 per mile. This high figure is occasioned, not by the nature of the country, but by the fact that the materials and labor will have to be conveyed from Russia by sea.

153

The following table shows the length and probable cost, with and without bridges over the broad rivers, of the several sections:

Section.	Length. Miles.	Cost with permanent bridges. £	Cost without permanent bridges. £
1. Western line.....	1,028	6,880,000	6,752,000
2. Central line.....	1,114	7,976,000	7,335,000
3. Baikal line.	194	2,674,000	2,674,000
4. Trans-Baikal line.....	669	6,399,000	6,094,000
5. Svjetensk-Graffsky line....	1,525	10,222,000	10,222,000
6. Graffsky-Vladivostok line..	255	2,614,000	2,614,000
	4,785	36,765,000	35,691,000

154

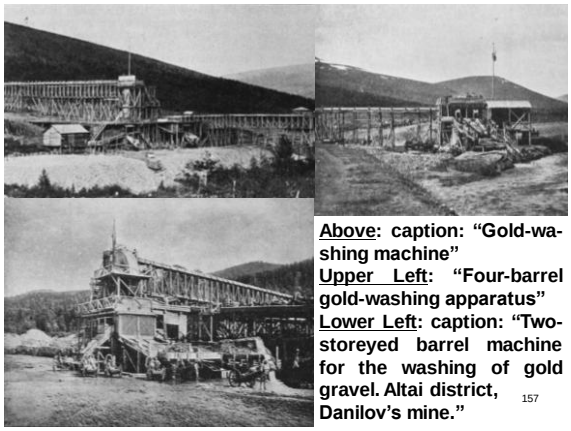
We have not space to dwell upon the benefits which it is hoped will accrue from the railway. In deciding on its construction, the Russian Government have doubtless had mainly in view the consolidation of the empire and the better defense of the remote Siberian provinces; but no doubt is entertained in official quarters that in the end the undertaking will and must be a commercial success.

155

For the districts through which the line will pass are, contrary to the ideas of most people in this country, full of potential wealth. Western Siberia, and in the Amoor and Ussuri regions, there stretch vast tracts of the finest black earth, highly suitable for colonization purposes; while in Central and Eastern Siberia all kinds of minerals are already obtained, by the primitive methods in use, in the greatest abundance. Since 1884 there has been an output from these provinces of gold alone of about thirty million ounces.

156

Caption: "Getting gold from tailings"

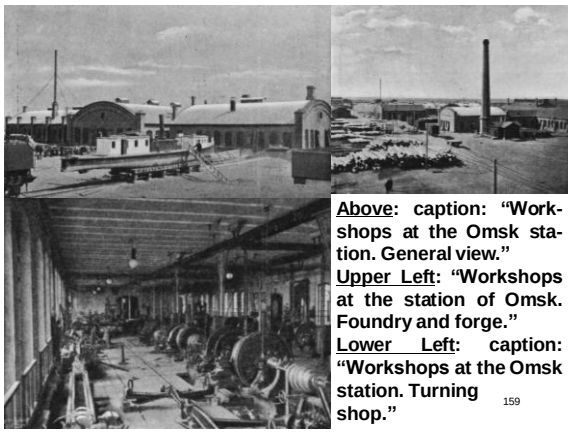


Above: caption: "Gold-washing machine"
Upper Left: "Four-barrel gold-washing apparatus"
Lower Left: caption: "Two-storeyed barrel machine for the washing of gold gravel. Altai district, Danilov's mine."

157

Calculating on the basis of the very considerable carrying trade at present in existence in tea, manufactured goods, and grain, and taking into account the saving which will be effected in the transport of prisoners, troops, officials, and government stores, the government estimate the probable revenue of the line at £3,224,000. The expenditure they put £3,481,000 – being £1,400,000 for interest at 4 per cent on £35,000,000, and £2,081,000 for maintenance and management. The deficit, £257,000, would be met by a subsidy, but it is confidently expected that the line will not have been opened many years before it will pay its way without state assistance.

158



Above: caption: "Workshops at the Omsk station. General view."
Upper Left: "Workshops at the station of Omsk. Foundry and forge."
Lower Left: caption: "Workshops at the Omsk station. Turning shop."

159

Progress of the Trans-Siberian Railway
Scientific American
March 20, 1897

160

THE Siberian Railway is making rapid progress according to an account by Mr. J.Y. Simpson in the January number of Blackwood. Sixty-two thousand workmen are employed – on the western section. Russians, Siberians, and Italians; on the eastern, convicts, Chinese, and Koreans. The best are the convicts, whose faithfulness is rewarded by the lessening of their terms of exile – a third, for instance, in one class.

161

Caption: "Convicts at work on the Ussuri Railway"

Technical schools for the education of engineers have been opened in three of the large towns on the line. Emigration has been encouraged by grants of land and low fares on the railways, with the result that a tide has set in from Russia far beyond the capacity of the road to handle. In the first five months of 1896 there passed through Teheliabinsk alone 170,000 persons. Towns are springing up in great numbers along the western section, which runs through a "black earth" country.

162

Caption: "Railway technical school at Krasnoyarsk"

Above: caption: "The medical and feeding station for emigrants near the station of Kurgan"
Left: "Type of church in emigration settlements and at railway stations"

In anticipation of a great grain crop (Siberia raises now 432,000,000 pounds of grain for export) the government is constructing a railway to connect the Ob with the Dvina, so that the expensive transit through Russia to the Baltic or Black Sea may be avoided. A large sum has also been appropriated to improve the navigability of these rivers.

The Trans-Siberian Railway
Scientific American
March 27, 1897

Sections of the Great Siberian Line already built and in course of construction.

COMMENCEMENT.	SECTION.	Length in versts.	Cost of line in rubles.	Cost of rol. ling stock in rubles.	Working capital in rubles.	Opening of regular traffic.
1892 7 July.	West-Siberian.....	1329	37,571,940	9,552,750	1,200,000	1 Oct. 1896.
1894 Summer.	Ekaterinburg Chelliabinsk branch.....	226	6,339,467	—	—	10 Oct. 1896.
1893 May.	Mid-Siberian I Section.	711	31,541,481	4,715,690	624,000	1 Jan. 1898.
1894 Summer.	II section.....	1004½	65,133,379	6,640,095	888,000	— 1898.
1896 Summer.	Tomsk Branch.....	89	2,494,199	—	70,000	1 Jan. 1898.
	Irkutsk-Baikal Branch.	64	3,020,330	—	—	— 1899
1895 11 April.	Transbaikal.....	1057½	54,992,391	8,258,000	1,000,000	In course of construction.
1897 —	Kuitchiva Chinese Eastern.....	1247½	21,261,378	2,737,000	314,286	In course of construction.
1894 3 July.	North-Usuri.....	339	20,365,033	2,093,846	570,300	1 Nov. 1897.
1891 19 May.	South-Usuri.....	362	19,117,229	1,466,250	681,000	1 Febr. 1896.
1897 —	Kitaika Chinese Eastern.....	110	6,046,867	811,120	176,000	In course of construction.
	Total...	5614½	274,873,743	39,371,370	5,571,480	

WHILE it is well known that the Russian government has been displaying extraordinary activity in pushing the work on the great Trans-Siberian Railway, the magnitude of what has been accomplished and of what remains to be done is not fully realized by most people. It will, therefore, be of general interest to state the present condition of the undertaking and the progress to be expected in the near future.

The Trans-Siberian Railway has its western terminus at Tschelyabinsk, where it connects with the railways of European Russia. It then proceeds in a mainly eastern direction to Krasnoyarsk, on the Yenisei River, at 2,654 kilometers (3,057 miles) from St. Petersburg. Krasnoyarsk is at present the eastern terminus of the completed section of the railway.
Caption: "The Yenesei near Krasnoyarsk"

By looking at the map, it will be seen that Krasnoyarsk is located in the very center of Siberia; in fact, the Yenisei forms the dividing line between Eastern and Western Siberia. As nearly all rivers in Siberia have a northerly course, the railway crosses most of them, necessitating the construction of a large number of bridges. Particular difficulties will be encountered on the section east of Irkutsk. According to the plan shown on the map, it was contemplated to have the railway follow the southern bank of Lake Baikal, but as this region is very mountainous, unexpected delays and expenses were liable to arise.

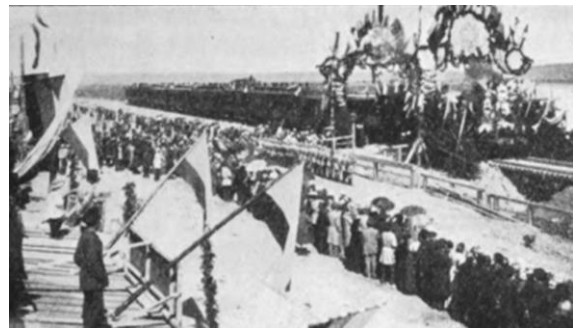
Map Showing Progress of Work on Trans-Siberian Railroad 169
Black line shows railroad in operation; dotted line shows railroad under construction; B&W line shows railroad to be constructed

It has now been decided to ferry the trains across the lake, a distance of not quite 20 miles, whereas similar ferries are successfully operated in this country for distances over 60 miles. Of the eastern section of the railway, the portion from Vladivostok on the Pacific to Gravskaya has been open to traffic for some time, and the northerly continuation to Charabovsk on the amur will be completed very soon, if it is not completed already.

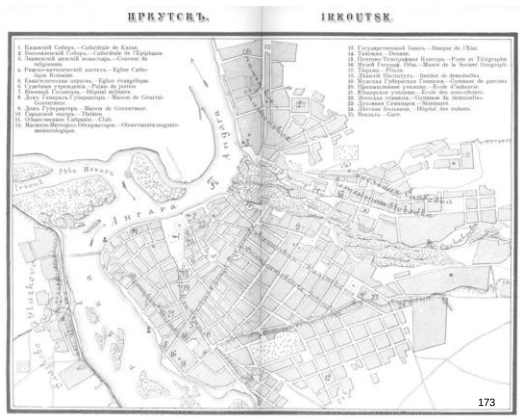
170

From Lake Baikal to the Amur, the line, instead of following the originally planned northern course indicated on the map, will take the more direct southern route through Manchuria, the Russian Government having secured the consent of China to this alteration. This will shorten the line by 1,000 kilometers (664 miles) and will open to traffic a region densely inhabited and rich in natural products, but poor in industries. This Trans-Baikal section will probably be completed last. Connections will be made as shown on the map, to Mukden, Port Arthur, Pekin and Korea, thus linking China and Korea to the civilized world.

171



Work is being pushed very rapidly on the section from Krasnoyarsk to Irkutsk, no less than 70,000 hands being employed on the line and in the workshops. It is expected that next summer the railway will be completed as far as Irkutsk, the largest city of Siberia (about 50,000 inhabitants). 172
Caption: “Arrival of the first train at Irkutsk, 16 August 1898”



173

Above: caption: “Irkutsk. Commercial school.”
Upper Left: caption: “Irkutsk. Sukachev’s house, containing judicial institutions”
Lower Left: “Theatre in Irkutsk”

174

The Russian budgets for 1896 and 1897 clearly show the importance of the work. Thus for 1896, 82,248,170 rubles (about $45,000,000) were provided for the construction of the Trans-Siberian Railway, while there was an additional item of 2,485,410 rubles (about $1,350,000) for the construction of branch lines connecting with the Trans-Siberian Railway, and 20,000,000 rubles (about $11,000,000) for rolling stock, the greater part of which certainly was intended for the Trans-Siberian Railway. 175

Caption: “First-class saloon”

The budget for 1897 calls for 61,124,110 rubles (about $33,500,000) to be expended on the Trans-Siberian Railway proper and 3,280,652 rubles (about $1,800,000) for branch lines connected therewith. The total cost of the work has been estimated at 350,000,000 rubles (about $190,000,000), and of the whole length of 7,317 kilometers (4,448 miles), 2,654 kilometers (1,648 miles) have been completed. The length of the Canadian Pacific Railway is only 4,915 kilometers (3,055 miles), so that the Trans-Siberian Railway will exceed it by 1,393 miles. The completion of the Trans-Siberian Railway may be expected before the end of the nineteenth century.

176

Political considerations principally have induced Russia to undertake this great work, but the industrial and commercial development to which the construction of the railway will undoubtedly lead has likewise been of considerable weight in deciding the government to start and actively push the enterprise. It is evident that Russia and Siberia will profit largely by being able to exchange their products in much shorter time than hitherto. The completion of the railway, however, will also affect the trade of the extreme East, as many goods which are now shipped to China and Japan through the Suez Canal will then be forwarded via Siberia. 177

Caption: “Village of Telma, Distillery and cloth manufactory”

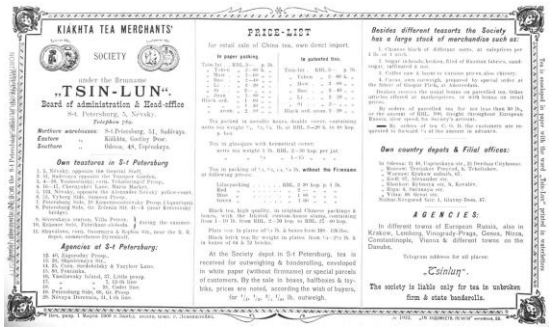
Quantity of raw products conveyed in 1897 from the station of Petropávlovsk.

Governments.	Fresh meat		Guts.	Offal.	Raw hides.				Wool				Hemair	
	Beef	Lamb.			Horse.	Cow.	Camel.	Sheep and goat.	Sheep's	Camel's	Coarse	Superfine quality.		
	Puds.				Number.				Puds.					
St. Petersburg	127,063	1,210		3,060	—	—	—	31,000	2,045	—	—	—	671	—
Moscow	57,034	630	2,660	200	—	—	—	—	—	—	—	—	—	—
Tobolsk	300	7,300	—	—	4,168	8,180	1,403	24,800	4,642	—	—	—	—	—
Vladimir	25,540	450	—	81	—	—	—	345,792	—	—	—	—	—	—
Kazan	8	—	—	—	9,327	5,500	100	272,245	12,624	2,500	179	—	93	—
Orenburg	—	3,940	257,572	—	4,369	32,105	647	32,800	2,165	—	—	—	—	—
Nizhni Nóvgorod	12,200	—	—	—	4,400	18,065	—	131,572	6,576	9,789	853	4,393	4,612	—
Perm	6,391	26,987	—	202	1,588	3,536	160	70,821	2,784	—	—	—	—	—
Grodno	—	—	—	—	23,226	—	—	202,526	4,884	—	—	—	749	—
Samara	—	419	96,320	—	—	400	—	1,150	—	—	—	—	—	—
Tula	610	1,200	—	5,040	12,183	500	—	—	—	—	—	—	—	—
Kherson	—	—	—	—	—	1,180	—	6,100	—	—	—	—	—	—
Estonia	—	—	—	—	—	—	—	10,000	—	—	—	—	1,886	—
Warsaw	—	—	—	—	—	—	—	60,150	—	—	—	—	—	—
Podolia	—	—	—	—	—	—	—	2,000	—	—	—	—	—	—
Simbirsk	—	—	—	—	—	—	—	2,800	3,188	1,280	—	—	300	—
Tambóv	—	—	—	—	—	—	—	5,656	14,084	—	—	—	—	40
Yaroslávl	9,150	—	—	610	—	—	—	—	—	—	—	—	—	—
Towns.														
Saratov	—	—	12,000	—	—	—	—	1,884	25	—	—	—	—	—
Astrakhan	—	—	—	—	—	—	—	2,000	—	—	—	—	—	—
Kostroma	1,220	—	—	—	—	—	—	—	—	—	—	—	—	—
Ufa	—	200	—	—	5,690	3,280	—	8,176	283	68	—	400	—	600
Riazán	—	—	—	—	—	—	—	38,690	—	—	—	—	—	—
Tomsk	—	—	—	—	—	—	—	700	500	—	—	—	—	—
Kóvno	—	—	—	—	—	—	—	28,000	14,084	—	—	—	—	—
Tver	2,440	—	—	—	—	—	—	5,650	—	—	—	—	—	—
Penza	—	—	—	—	—	—	—	1,500	—	—	—	—	—	—
Kaliga	—	—	—	1,220	—	—	—	—	—	—	—	—	—	—
Omsk	—	—	5,000	—	868	567	—	23	—	—	—	150	—	—
Petróvsk (Dagestán)	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Riga	—	—	—	—	—	—	—	470	—	—	—	—	586	—
New Port	—	—	—	—	—	—	—	14,060	—	—	—	—	1,208	—
Total	235,857	37,236	373,852	8,413	119,656	73,113	2,310	1,295,354	53,801	13,597	682	4,643	9,661	940

178

China, Japan and Korea have an aggregate population of about 460,000,000, but their trade with Europe and with the rest of the world is as yet entirely out of proportion with the extent of their territories and with the size of their population. When China will have opened all its seaports and inland ports to foreign trade, the densely inhabited inland provinces, which are now practically closed to foreigners, will be made accessible to international commerce.

179



The Trans-Siberian Railway will pass through Manchuria, as above mentioned, and branch lines will probably run to other Chinese provinces; the line to Port Arthur will probably be among the first to be constructed. China’s main export articles are tea and silk, while the largest importations are in cotton and wool (yarns and textile fabrics). 180

Great Britain handles most of the Chinese exports in tea. At the same time, Great Britain competes successfully with China in the growing of tea, the plantations in India and Ceylon supplying most of the tea consumed to other civilized countries. In this competition India is considerably better off than China by having railways leading to the seaports, while Ceylon has at least the advantage of a shorter journey by sea than that from China.

181

Owing to these conditions, the exports of Chinese tea have decreased, causing a considerable loss to the Chinese people as well as to the government, in view of the fact that there is a heavy export duty on tea in China. The continued decrease in the exportation of tea has become a serious question for China. After the completion of the Trans-Siberian Railway, China will be able to send her tea to Europe overland much quicker than by sea. It is, moreover, well known that tea sent overland is superior to that shipped by sea. Silk goods also will reach Europe via Russia. The gain of the latter country will be as great as China's, and it will be obvious that the interests of both countries meet in this respect. Russia also is a large consumer of tea, and will probably do a lively trade in this commodity with China.

182

Cotton, woolen and metal goods, which are now imported into China chiefly from England and Germany, will be sent on the new railway, and the industrial works of the Ural Mountains and of Siberia will be enable to dispose of their goods with greater facilities than their western competitors. Siberia itself will probably have an era of surprising prosperity. The country is rich in mineral and agricultural resources, and as the railway will cross most of the rivers at points where they are navigable, the distribution of goods over the whole country will be made remarkably easy.

183

Caption: "Mole on the Amur at Blagoveshchensk"

After its completion, the Trans-Siberian Railway will form the shortest connection between Europe and eastern Asia. Prior to January 1, 1897, the trains on the western section of the railway ran at an average speed of 28 kilometers (about 17.4 miles) per hour. Since that time express trains of an average speed of 33 kilometers (20-1/2 miles) an hour have been added. Omsk can now be reached from Moscow without change of cars in less than four days. Moscow can be reached from Berlin in forty-two hours, and from St. Petersburg in fourteen hours. The journey from Berlin to Irkutsk will take from eight-an-a-half to nine days, and that from Berlin to Vladivostok, on the Japanese Sea (Pacific Ocean), about fourteen days, and might easily be made in twelve or thirteen days.

184

The strategic importance of the railway will be obvious in view of possible complications in the extreme East. It will be seen that Russia could easily transport troops from Moscow to Vladivostok, near the Korean boundary, in about sixteen or seventeen days.

Caption: "Troops on Eastern Siberian section car"

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It has been stated by the English press that troops from England or Scotland, embarking at Liverpool, would land in Canada about ten days later and would be ready for again embarking at Vancouver within a week after their arrival in America, reaching the Yalu River at about the same time as Russian troops dispatched from Moscow. There has been just a slight error in the calculations of the English press, for it will appear from the figures quoted above that the Russians would probably arrive at the Yalu before the Highlanders or other British troops would even have left the American continent.

186

A comparison of the several routes by which Yokohama in Japan will be accessible after the completion of the Trans-Siberian Railway clearly shows the advantage of the latter route. The journey from London to Hong Kong via Brindisi and Suez, employing the steamers of the Peninsular and Oriental Steamship Company, is made in thirty-four to thirty-seven days; one day or two is allowed at Hong Kong, and six to eight days for the passage from Hong Kong to Yokohama, making forty-one to forty-seven days in all. From Berlin, Yokohama may be reached in forty-two days via Naples, taking there the steamers of the North German Lloyd.

187

The journey from London to Yokohama via Canada will not take more than twenty-nine or thirty days at present. But a further saving of ten or eleven days will be effected when the Trans-Siberian Railway will be completed, as the time from Berlin to Yokohama will then be reduced to eighteen or twenty days. A line of fast ocean steamers will connect Vladivostok and Japan. It is also probable a new Trans-Pacific line of steamers will run from San Francisco, and it is stated that American and Russian capitalists have already taken steps toward founding a company for that purpose.

188

It, therefore, will be evident that the Trans-Siberian Railway will be a work of international importance. It will be a new and important export route for valuable Chinese and Japanese goods; it will be an import route for manufactured articles, especially from Russia, to the northern Chinese provinces of Mongolia and Manchuria; and lastly, it will be of immense value for passenger traffic from Europe to China and Japan, besides giving Russia a decided political and strategic preponderance in the Far East.

189

The Trans-Siberian Railway
Scientific American Supplement
November 6, 1897

190

BEGUN in the month of May, 1891, the work of constructing the great Trans-Siberian Railway has been pursued with what may be called feverish haste. Such haste, although excessive, is nevertheless preferable to too great dilatoriness. After deciding to undertake the work, the Russian Government immediately got at it, and it is certain that the Asiatic transcontinental will be completed within the time originally fixed.

191

On the day upon which the last rail has been bolted, the new railway, although inadequate for an extensive traffic, and not as yet possessing all of its commercial utility, will nevertheless possess all of its political importance. The two extremities of the Czar's immense empire will be closely connected, a route to China will have been created, and Russia, mistress of such route, will improve it at her leisure.

192

MAP OF RUSSIA

Composed in 1614 by Hessel Guerard from a sketch of Tsarevitch leader Borisevitch Godunof for the Tsar Michail Fedorovitch

193

At the end of last year the trains starting from Teheliabinsk were already running as far as to Krasnoiarsk. This city, of rich and flourishing aspect, is destined for considerable development. An English company, which has recently established entrepots here, is bringing in by ocean and river large quantities of products of English manufacture, principally linen and cotton goods. At the end of January the section from Krasnoiarsk to Kainsk was open to the running of trains. From Kainsk to Kloutchi, too, the road is finished, but trains are running thereon only irregularly.

194

Kloutchi is now the terminus of the Trans-Siberian of the west, and we have just learned by telegraph that Khabarovka has, for some days, been the terminus of the Trans-Siberian of the east, or the Oussouri Railway, the head of the line of which is Vladivostok. From Kloutchi to the Oussouri, that is to say, from the center of Russian Asia to the shore region of the Pacific, nearly a hundred thousand laborers are busily engaged upon the colossal work. Some of these, such as the blacksmiths, carpenters, etc., are free workmen, while others, who are employed upon rough work, such as digging trenches, filling-in, carrying wood and iron, etc., are criminals who are closely watched by soldiers

195

Caption: "Criminals working upon the Trans-Siberian Railway under the supervision of soldiers"

On the west and east sides the rails are being rapidly laid and the sections constructed simultaneously at a large number of points are being connected. Strietensk and Khabarovka, which were connected during the summer by steamboat service upon the river and its affluent, the Chilka, will be two provisional extremities of the line.

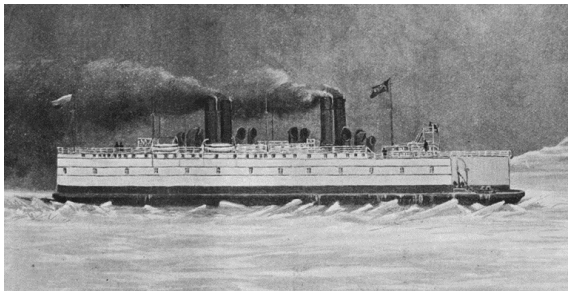
196

Between Kloutchi and Irkoutsk the work is far enough advanced to allow it to be seen that in January 1898, travelers starting from Moscow or St. Petersburg will reach Lake Baikal without leaving the cars. Along the postal road from Irkoutsk to Krasnoiarsk travel innumerable caravans, some bringing into Russia bales of tea that have come from China through Kiakhta, and others carrying to Irkoutsk European merchandise from the entire region of the Baikal. Such animation is a good omen for the traffic of the railway.

197

The section of the line that is run to around Lake Baikal from Irkoutsk to Mysovsk is for the moment entirely neglected. The government has decided to postpone the construction of the railway in this rough and mountainous region, the cost of which, it is calculated, would be $60,000 per mile.

198



The project is to employ large ferry boats of the American type, powerful enough to break the ice in winter, for carrying the trains from one shore of Lake Baikal to the other. These boats, gaging 4,000 tons, will be provided with two screws driven by a 3,750 horse-power steam engine. They will be capable of carrying a train of twenty-five cars at a speed of about fifteen miles-an-hour, and will consequently take three hours to cross the lake. 199

Caption: "Icebreaker on the Baikal"

In order to reach Lake Baikal from Irkoutsk, one ascends the river Angara. In winter this river is frozen over at Irkoutsk, as is also the lake for its entire extent. Nevertheless, starting from the Baikal, for a length of from six to nine miles, the river never freezes. This curious fact must be attributed both to the swiftness of the current at this place and to the relatively high temperature of the deep water of the lake, which is fed by a large number of warm springs. 200

Caption: "The Baikal. Little Baranchik, source of the Angara"

The work on the railway is being resumed at Verkhne Oudinsk through Transbaikalia. As far as to Tehita it is not far advanced, but from Tehita to Nertchinsk it is being pushed with the greatest activity. This important section will be opened to exploitation during the course of next year. The line of Manchooria, designed to replace the Strietensk-Khaharovka section, will make a connection between the cities of Nertchinsk and Strietensk.

201

Strietensk, upon the Chilka, and Khabarovka, upon the Amoor, would be connected by an admirable water way if the Siberian winters were not so severe. Unfortunately, the Amoor and its affluent the Chilka are free from ice only from May to September. Navigation, therefore, lasts but four months, or five at the most; but during this very short period it is very active.

202

Upon the Amoor, at a nearly equal distance from Strietensk and Khabarovka, at the mouth of the river Zeia, which comes from the country of gold mines, there has been built an important and growing city. This is Blagovestchensk, which is both a mining center and a fluviatile port of the first rank. The complete melting of the snow and breaking up of the ice in the river take place here toward the middle of May. It is then that the city is busiest. Numerous boats daily arrive and strt and ascend or descend the Amoor. The majority are now occupied in the carriage of rails and other materials designed for the railway. The Trans-Siberian, until it is finished, will thus absorb the entire activity of Siberia.

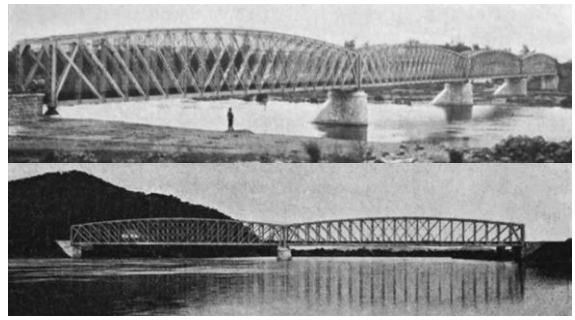
203

One of the boats that descend the river takes us to Khabarovka, at the confluence of the Amoor and Oussouri. Khabarovka, which is a military city, is the residence of the Governor General of the three provinces of Transbaikalia, Amoor and Littoral. Thence to Vladivostok, the railway leaves its general direction from west-to-east, in order to take a direction exactly north-south. This section, which is called the Oussouri Railway, has just been completed, but it is not probable that the exploitation of the line can be begun for several months yet.

204

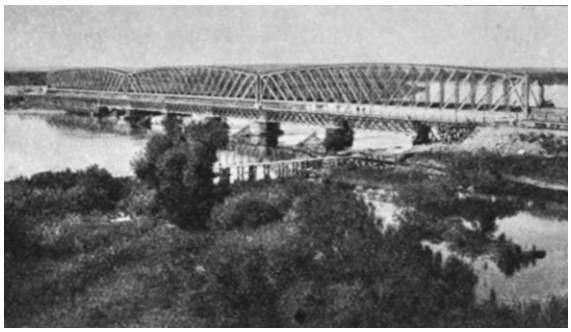
In leaving Khabarovka, the direction line follows for 270 miles the right bank of the Oussouri, the left bank of which belongs to Chinese Manchooria. The valley of the Oussouri is narrow. This river, all along its course, receives numerous torrents and a few affluents of a certain importance, separated from each other by high offshoots of the Sikhota chain of mountains. No part of the Trans-Siberian necessitated so many bridges and cuttings and so much filling in. It has been possible, however, to avoid the construction of tunnels. In this valley, moreover, an enormous amount of rain falls every year. Inundations are frequent, and wherever the railway approaches the bed of the Oussouri important sustaining walls have had to be built in order to protect it.

205



Three of the bridges over the affluents of the Oussouri are 840-feet in length. These are those of the rivers Khor, Bikin and Ima. Like the rails, the bridge iron came from the Russian works of the Oural and Donetz. As the superstructure of these bridges could not be of a single span, it rests upon stone piers.
Top: caption: “Bridge over the Khor”
Bottom: caption: “Bridge over the Bikin”

206



The establishment of a masonry pier in the bed of a Siberian river, such as the Ima, which is immeasurably swollen at the time of the melting of the snow or as a consequence of torrential rains, and which is covered for four months with thick ice, requires special processes.
Caption: “Bridge over the Ima”

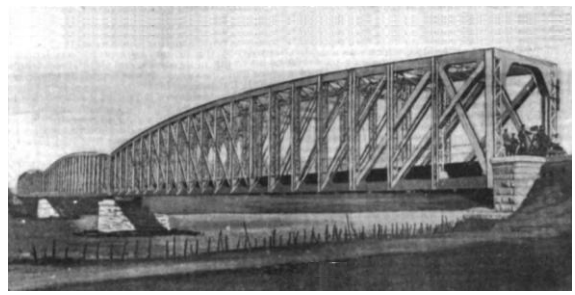
207

It was necessary to take advantage of the period of congelation of the water. The materials were easily carried upon the ice by means of sleighs. Around the site of the pier foundations, upon the frozen surface, was constructed a wooden house for the workmen, and it was in the interior of this, protected from the cold, snow and storms, that they did their work. When the period for the ice to break arrived, they removed their improvised shop, but the pier remained ready for te reception of the long metallic superstructure.

208

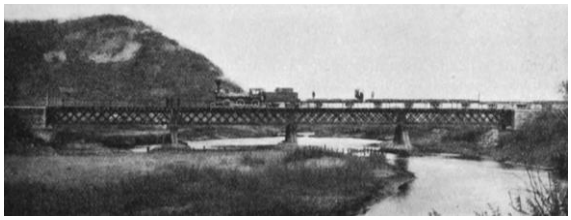
Upon the river Ima is situated the little village of Iman, where but yesterday stopped the trains coming from Vladivostok, and which thus acquired a certain temporary importance. It was here that was unloaded the merchandise for trans-shipment upon boats that afterward reached the Amoor in descending the Oussouri. The boats that did the carrying were those that had brought either to Iman or to the different points situate between Khabarovka, a seaport at the mouth of the Amoor and designed for the construction or exploitation of the railway.
Caption: “Landing stage in Iman, on the River Ima”

209



From Iman station to that of Vladivostok the line (upon which trains have been running since 1895) is 265 miles in length. The locomotives were, almost all of them, purchased in the United States. As for the cars, they came for the most part from the great Russo-Baltic works of Riga. A few of them were purchased at Vladivostok. At 37 miles from Iman the line crosses the Oussouri upon a new bridge.
Caption: “Bridge over the Oussouri, 288 miles from Vladivostok”

210

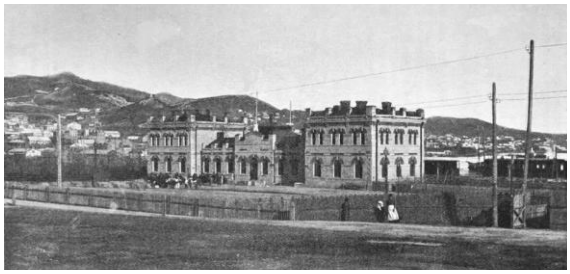


To the west it leaves Lake Khanka, a simple permanent inundation called by the Chinese Khan-Khai, or "Mediterranean." Then the road follows the valley of the river Lefou, which falls into this lake not far from the station of Nikolskoie, which is destined to become the head of the line of the Manchooria Railway. After leaving this station, which is 83 miles distant from Vladivostock, the line enters the valley of the river Sonifonn. The inundations of this little affluent of the Sea of Japan are far more dangerous than those of the Oussouri. The line along the side of the mountain had been insufficiently studied, and the exploitation had hardly been begun when the engineers perceived that an entire section, constructed upon loamy earth, at about 50 miles from Vladivostok, was slowly descending into the Souifoun. Such sliding could only be arrested at the cost of important works that have been but recently finished. 211

Caption: "Bridge over the river Lefou, at 100 miles from Vladivostok"

Could this valley, so beset with obstacles, be avoided? Competent men think that it could, and adversely criticize the direction line that was adopted between Vladivostok and Nikolskoie, in that it causes the railway to run a greater danger than that of the inundations from above and slidings from below, since twelve miles before reaching Vladivostok the line runs along the shore of the bay of Peter the Great, and incase of war it would be easy for the ships of an enemy to bombard the track, and thus cut-off the communication of Vladivostok with the valleys of the Oussouri and the Amoor. Such considerations, it is said, are capable of determining the abandonment of the present line and the selection of a new one nearer to the east. The general rules laid down for the entire Trans-Siberian have naturally been applied to this eastern section. The track is single and the most distant stations are 33 miles apart. Three trains-a-day are run in each direction.

212



"Vladivostok! all out!" It would not be commonplace to hear this cry on the evening of the tenth day passed in a car of this monster Oriental Express that the Trans-Siberian train will be. But it is only in France that travelers are thus notified as to what they have to do by the indistinct yells of men appointed for the purpose.

Caption: "Passenger station in Vladivostok. Its construction was inaugurated in the presence of H.I.M. the present Emperor Nicholas II, on the 19th May, 1891." 213

Vladivostok, the name of which signifies "Ruler of the East," and which has been developing for the last two or three years with a rapidity seen only in American towns, was founded in 1861 at the extremity of a peninsula that divided the bay of Peter the Great into two parts. This peninsula is contained by a group of islands, the principal of which is Kozakovitch. The strait that separates this island from terra firma has received the name of "Eastern Bosphorus." It is in the center of this strait that has been built the city of Vladivostok surrounded with verdant hills, which themselves surround one of the finest ports in the world, called by the Russians the "Golden Horn." Vladivostok is not yet, but may hope to become the Constantinople of the Far East. Its climate, without resembling that of Marseilles, which is in the same parallel, is not so severe as might be supposed. Like the port of Odessa, the Golden Horn is blocked by ice for only a month-an-a-half or two months in the year. 214

Caption: "Panoramic view of the city and port of Vladivostok"

215

Two Russian ports upon the Pacific now divide between them the importations of European merchandise – those of Vladivostok and Nikolaievssk. The latter, although closed for six months of the year, has for a long time been able to benefit by its situation at the mouth of the river Amoor, which carries the imported products into the interior. Nevertheless, in recent years, the supremacy of Vladivostok has become indisputable, and the completion of the Trans-Siberian and opening of the Trans-Manchoorian will definitely consecrate it.

216

The vessels that the Golden Horn receives bring to Siberia linen and cotton goods from England, the same goods, but in ordinary quantities, along with tobacco, sugar and alcohol, from Russia, glass and table utensils from Belgium, flour, machines and farming implements from the United States, agricultural products from Korea, fruit and rice from Japan, etc. The exportations from Vladivostok, which up to the present are not of much importance, consist of furs and especially various products derived from the whale and seal fishing.

217

The commerce of the city is concentrated in the hands of foreigners in the proportion of 75 per cent. Of the business about 30 per cent, is done by Germans; about 13 per cent, by English; 12 per cent, by Chinese and 5 per cent, by Americans.

218

The Trans-Siberian Railroad
Scientific American
September 24, 1898
by Horace C. Hovey

219

A YEAR AGO a card came to the writer from St. Petersburg, which, on being deciphered, proved to be a pass over the entire system of Russian railways. Maps and special guide books accompanied this favor, and access was also given to official reports. Ours was a geological party, and our errand was to inspect soils, fossils, mines, and quarries; but we could not do otherwise than take an interest in the magnificent iron highways that carried us safely from the western frontier, across limitless steppes, over broad rivers, and beyond the Ural Mountains into Siberia, and then back again to the frontier.

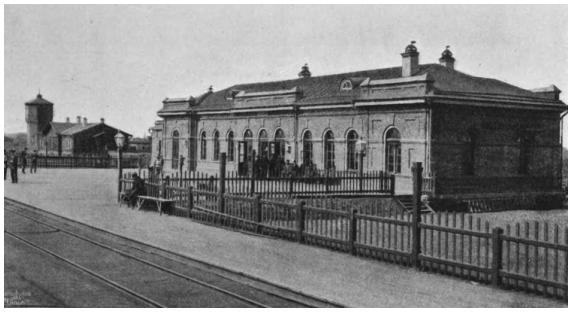
220

As we had a special train, we escaped many of the annoyances usually met with by tourists, and enjoyed every imaginable courtesy and facility for making our trip successful. The paternal oversight taken by our officials was amusing to those of us who were accustomed to American manners, and yet we must say that it was agreeable and even necessary under the circumstances.

221

My object, however, is not to give incidents of travel, but to describe briefly the railroads themselves, especially the gigantic one that is now binding Europe and Asia together by bands of steel. As usual, the ubiquitous Yankee is in evidence, and undoubtedly had much to do with the introduction of railroads into Russia.

222



This helps to explain the fact that many conveniences are found there which we look for in vain in other parts of Europe. But we were struck by one fact so decidedly unlike the American way that we sought an explanation, namely, that the road never hits any except the large cities, the station being usually several miles from the town or village whose name it bears. 223
Caption: "Station at Petropavlovsk"

Above: caption: "Station at Shumikha"
Upper Left: caption: "Station at Olginskaya"
Lower Left: "Station at Oyash" 224

The explanation is that when two American engineers laid before a former Czar carefully drawn plans for a railroad from St. Petersburg to Moscow, touching at intervening cities, his majesty took a ruler, drew a straight line between the two capitals, saying like the autocrat that he was, "Build it there!" Of course it was done, and the example thus set was followed elsewhere throughout the empire.

225

To understand the railway system one must first glance at the river system. The streams of European Russia mainly rise in the Valdai plateau, parts of which are 1,500-feet above the sea-level, whence they sluggishly flow to the Arctic, Black, Baltic, or Caspian Sea. This immense river system, aided by canals, makes Russia in Europe accessible to St. Petersburg by 38,000 miles of navigable water, carrying last year 81,000 vessels and 140,000 rafts. 226
Caption: "The Ob-Yenesei Canal, sluice at the 103 verst"

Imagine a vast plain stretching for 1,800 miles from the Baltic Sea to the Ural Mountains, and for double that distance from the Arctic Ocean to the Caucasus, including vast forests, the rich black zone of "tschernoziom," then barren, treeless steppes, beyond which is the saline desert formerly the bed of an immense sea of which the Caspian and Aral are the remnants; and it is evidently a region favorable to the railroads which are now being built over it in every direction, to meet the varied wants of 115,000,000 inhabitants.

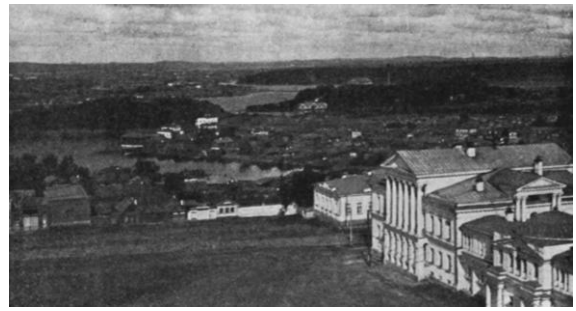
227

The Siberian river system, however, is different. All large streams, whether rising near the Urals or the Pacific coast, flow northward to the Arctic Ocean. Yet here, as in Europe, there are immense plains, so that the waterway from the river Ural to the mouth of the Lena, a distance of 6,000 miles, is interrupted by only two short portages. Hence this Asiatic region also favors easy railroad building, with the exception of the rugged hills and deep volcanic fissures around Lake Baikal, where the obstacles can only be overcome at a great outlay of money and labor.

228

From the times of Peter the Great to these days of Nicholas II, the great problem of Russia has been that of getting free access to the outside commercial world. The ports along the White and Arctic Seas are blocked by ice most of the year; the Caspian is landlocked; egress by the Black and Baltic can only be had by the friendly permission of other nations. Hence arose an imperative demand for a transcontinental railway that should wind over the steppes of Orenburg, the Ural plateaus, the plains of western Siberia, climb or pierce the hills below Lake Baikal, cross Trans-Baikal to the valley of the Amur, thence down to Vladivostok, on the Japan Sea, and ultimately to Port Arthur and the open Pacific Ocean.

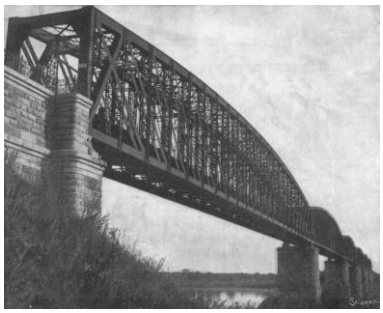
229



This most extraordinary railroad undertaking could not all be done at once. Nor is it clear to every writer where the Trans-Siberian Railway actually begins. In 1878 the Ural line was built as far as Ekaterinburg. Four years later Ostrovski made surveys that met governmental favor, outlining a road from Perm to Tobolsk and thence to Irkutsk, his object being to open the mining regions.

Caption: "View of the town of Ekaterinburg"

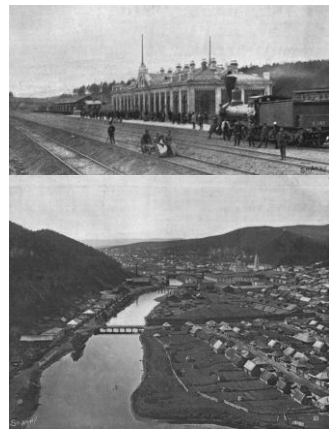
230



A line was also projected from Moscow across the tschernoziom belt to Oufa. where our Russian friends drew our attention to the splendid lattice girder steel bridge, over the river Bielaia, which is a subject of illustration, as a specimen of the work being done on their Tran-Siberian road.

Caption: "Trans-Siberian Railway – steel bridge at Oufa, over the Bielaia River"

231



They likewise spoke of the charming city of Zlatoost as the starting place for the great railway. No more lovely situation can be imagined than that held by this busy mart and manufacturing city of 40,000 inhabitants, the last European station of any importance before crossing the boundary line into Asia. It is in the picturesque valley of the River Ai, whose waters here expand in a lake.

Top: caption: "Railway station at Zlatoost, Russia"

Bottom: caption: "Zlatoost, Russia – western terminus of the Trans-Siberian Railway"

232

But, so far as the Siberian part of the road is concerned, it is proper to speak of it as starting from Tcheliabinsk, where are the offices and works. But, after all, when ultimately completed, the main termini will be St. Petersburg and Vladivostok or Port Arthur.

233

The relation held to this continental enterprise by the reigning Czar is interesting. While Czarovitch he explored Siberia, went on to China as the guest of Li-Hung-Chang, and made himself master of every available source of information concerning the projected railway. The result was an imperial rescript, March 17, 1891, ordering work to begin at several points simultaneously. The formal inauguration of it was by the Czarovitch, who wheeled away the first barrowload of soil and laid the first block of stone at Vladivostok. The Emperor also made him the first president of the road, a relationship which the latter continued to hold after he became the reigning Czar.

234

The committee of construction divided the main line into seven sections, and estimated the cost of each as follows, although subsequent modifications were made both in the sections and estimates:
1. Teheliabinsk to Ob, 1,328 versts, cost 47,000,000 rubles.
2. Ob to Irkutsk, 1,745 versts, cost 78,000,000 rubles.
3. Irkutsk to Misovskaia, 292 versts, cost 22,000,000 rubles.
4. Misovskaia to Srjetensk, 1,009 versts, cost 53,000,000 rubles.
5. Srjetensk to Khabarovsk, 2,000 versts, cost 117,000,000 rubles.
6. Khabarovsk to Grafskaia, 347 versts, cost 18,000,000 rubles.
7. Grafskaia to Vladivostock, 383 versts, cost 17,000,000 rubles.
Thus, the total distance between the Siberian termini would be 7,112 versts (4,742 miles), and the total estimated cost 347,000,000 rubles (about $173,-000,000) – although this cost will be much exceeded.

235

At the time our visit to Siberia we were informed that more than 5,000 miles of steel rails had been laid, at a cost of about 350,000,000 rubles, and the close of the year 1897 saw the road open as far as Nijni Udinsk. Now Irkutsk has been reached on a tributary of the Yenisei, the most important place in Eastern Siberia, and 3,780 miles distant from St. Petersburg. It is promised that by 1899 direct railroad communication between St. Petersburg and Vladivostok, with the exception of ferrying across the treacherous currents of Lake Baikal, a body of water 466-miles-long and about 55-miles-wide, supposed to be the reservoir of numerous subterranean rivers. The ferrying will be by a steamer of 4,000 tons, carrying the trains. Ultimately, this hazardous bit of navigation will be obviated by the track now being laid around the south shore of the lake and through tunnels, one of which will be 12,500-feet in length. The imperial order is that the entire road shall be completed between 1902 and 1905.

236

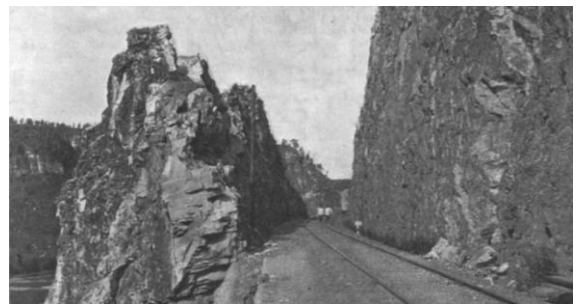
In 1895 the department reported as employed on the West, Middle, Trans-Baikal, and Ussuri divisions 36,629 navies, 13,090 carters, 5,851 surface men, 4,310 carpenters, 4,096 stone masons, and 2,091 riveters – 62,000 men in all. But such was the eagerness for the speedy completion of this undertaking that, in the following year, there were said to be fully 200,000 men at work. 237
Caption: “Cutting at the 562 verst”

The portion of the road that we saw was rock ballasted and equal to the best to be found anywhere in Europe; though, from our American point of view, the rails are too light, about 75 pounds to the yard, for the heavy traffic. Colonel Waters, of the British embassy, is quoted as saying, “The work done has been remarkably good, and in point of quality the line, when completed, will be equal to the Canadian Pacific.” On the other hand, we were told, concerning certain portions of the road, that the ties were laid directly on the grass or sand, and that the work is being pushed along too rapidly. All agree, however, that the road, when finished, is to be equipped with every modern appliance for safety, comfort and convenience.

238

Convict labor has been used on a large scale in the central section of the road, the terms being that eight months of railroad work should offset one years’ imprisonment; and special offers of registration as peasants were held out as an inducement to exiles. Free labor was paid for usually at the rate of from 50 cents to $1-a-day, according to skill required and the nature of the work to be done. Many, however, received less than this amount.

239



It is not easy to estimate the great variety and quantity of labor needed for building this thoroughfare. For instance, the bridges involve very difficult engineering problems. They must be protected by peculiar skill against the tremendous ice gorges that occur at the breaking up of winter. We saw retaining walls more than one-hundred feet high, lain in cement. The deep cuts through limestone, granite, and other rocks are of enormous magnitude. An illustration is given of a deep cut amid the Ural Mountains. 240
Caption: “Cutting through the Dergach mountain”

Some of the bridges are very long. That over the Volga is 4,500-feet in length, and is said to be the longest steel bridge in the world. The river Ob is spanned by a bridge 2,500-feet-long, and the Yenisei by one 3,000-feet-long. 241
Caption: "Construction of the Yenisei bridge in winter"

The manner of testing these massive structures is to let four or more locomotives with a loaded train of cars stand on a bridge for several hours, and then to run them back and forth a number of times at a constantly increasing rate-of-speed, till the maximum is reached. 242
Caption: "Bridge bend tested by the Frenkel apparatus"

The fuel used on the engines has been wood and crude petroleum. Coal has been found along the road near Pavlodai, allied to anthracite, and some of the seams in the Selenga valley are said to be thirty-feet-thick.

243

In December, 1896, the Cassini treaty was published, securing the right to build a Trans-Manchurian branch, leaving the Siberian road at Onon, entering China, running through Manchuria for 1,280 miles, and joining the original line at Nikolskaia on the Ussuri section, thus shortening the route about 350 miles. The significance of the Cassini treaty is that it really means a Russian administration of the affairs of Northern China, and that it will make the actual eastern terminus, not Vladivostok, but Port Arthur.

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This occupation of Port Arthur has been regarded as a Russian trick; but in reality it was a commercial necessity. As Count Mouzavieff claimed last February, "It is natural that Russia should wish to have an outlet for her commerce on the coasts of the North Pacific." But he added, "Any such port would be open to the ships of the great powers, and open to the commerce of all the world."

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We are apt to forget that 4,000 miles of Russian frontier touch China, and it is inevitable that the two nations should combine for the mutual protection of that long stretch. At all events, Russia, in March, 1898, formulated its final demand for the permanent lease of Port Arthur and Talienwan, as requiting her for her service in clearing the Japanese from China, and her claim was granted. As remarked by an English writer, "Had Port Arthur been called Fort Arthur, certain mistakes would have been avoided. It is a military point, and is to Talienwan what any fort would e to a port that it covered and commanded. The latter is destined to be the Russian Liverpool, the terminus of a railroad costing $250,-000,000; and Russia must protect such an emporium of world-wide commerce."

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Of course this transcontinental railroad will enormously affect the transportation of eastern goods of high value, as well as passenger travel and immigration. It is estimated that the revenues from duties on the single item of tea will be increased by 9,000,000 rubles-a-year. There will be a great output of all kinds of farm produce, and we shall remember that Russia, is one of the greatest agricultural regions on the globe. Mining products will also feel the stimulus and have such a development as will astonish those who have not given the matter due attention. Our geological party were impressed by the conviction that the mines of Russia are but very imperfectly worked, as compared with those of our own country, and are capable of yielding many fold what they now produce.

Left: caption: "Sale of onions and boiling water at a railway station"
Right: caption: "Gold-washing machine in the South Yeniseisk district"

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APPENDIX OF

FARES AND TIME TABLES.

The information as to railway communications in this Appendix is taken from the Official Guidebook for railway, steamer and other passenger communications published by the Ministry of Ways of Communication, preserving the XX of the routes therein contained.

FARES

between St.-Petersburg, Moscow, Warsaw and the chief stations of the Siberian Railway.

	STATIONS	Distance, versts.	Fast train. I cl.	Fast train. II cl.	Passenger train. I cl.	Passenger train. II cl.	Passenger train. III cl.	10 lbs. lugg.	Days available.
			r. k.	r. k.	r. k.	r. k.	r. k.		
FROM St.-PETERSBURG.	Moscow	604	19 50	11 70	15 00	9 00	6 00	33⅝	3
	Samára	1728	38 40	23 05	29 50	17 70	11 80	77¼	6
	Ufá	2219	44 60	26 75	34 50	20 70	13 80	92¼	7
	Cheliábinsk	2669	50 00	30 00	39 00	23 40	15 60	105⅝	8
	Kurgán	2910	52 50	31 50	41 00	24 60	16 40	111¾	9
	Petropávlovsk	3159	55 50	33 30	43 50	26 10	17 40	119¼	10
	Omsk	3415	59 00	35 40	46 50	27 90	18 60	128¼	10
	Ob	4001	65 70	39 40	52 00	31 20	20 80	144¾	12
	Taigá	4216	68 60	41 15	54 50	32 70	21 80	152¼	12
	Mariinsk	4354	69 90	41 95	55 50	33 30	22 20	155½	13
	Achinsk	4543	71 30	42 80	56 50	33 90	22 60	158¾	13
	Krasnoyársk	4712	74 60	44 75	59 50	35 70	23 60	167¼	13
	Kansk	4939	77 10	46 25	61 50	36 90	24 50	173¼	14
	Nizhneúdinsk	5246	80 70	48 40	64 50	38 70	25 80	182¼	15
	Tulún	5355	82 90	49 15	65 90	39 30	26 20	185½	15
	Irkútsk	5718	86 60	51 95	69 50	41 70	27 80	197¼	16

And as to passenger rates, it is officially announced that the time from St. Petersburg to Vladivostok will be less than fourteen days, and possibly as low as ten; and that when all plans are worked out, the time from London to the Far East will not exceed eleven days, instead of the thirty now consumed by the trip via Brindisi and the Suez Canal. A ticket by the latter route now is sold for $428; but by the Trans-Siberian route it will cost only $118, first class, and other classes in lower proportion. Plainly this will be the great highway of the nations, and England herself will have to send her Australian mail via Moscow and Talienwan.

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	STATIONS	Distance, versts.	Fast train. I cl.	Fast train. II cl.	Passenger train. I cl.	Passenger train. II cl.	Passenger train. III cl.	10 lbs. lugg.	Days available.
			r. k.	r. k.	r. k.	r. k.	r. k.		
FROM MOSCOW	Samára	1118	26 90	16 15	22 50	13 50	9 00	56¼	4
	Ufá	1609	33 60	20 15	28 00	16 80	11 20	72¾	6
	Cheliábinsk	2059	39 —	23 40	32 50	19 50	13 00	86¼	7
	Kurgán	2300	42 —	25 20	35 00	21 00	14 00	93¾	7
	Petropávlovsk	2549	43 —	25 70	35 50	21 30	14 20	95¼	8
	Omsk	2805	48 —	28 80	40 00	24 00	16 00	108¾	9
	Ob	3391	55 20	33 10	46 00	27 60	18 40	126¾	10
	Taigá	3606	57 60	34 55	48 00	28 80	19 20	132¾	11
	Mariinsk	3744	58 40	35 65	49 50	29 70	19 80	137¼	11
	Achinsk	3933	61 80	37 10	51 50	30 90	20 60	143¼	12
	Krasnoyársk	4102	63 60	38 11	53 00	31 80	21 20	147¾	12
	Kansk	4329	66 60	39 95	55 50	33 30	22 20	155¼	13
	Nizhneúdinsk	4636	70 20	42 10	58 50	35 10	23 40	164¼	13
	Tulún	4745	71 40	42 85	59 50	35 70	23 80	167¼	14
	Irkútsk	5108	75 60	45 35	63 00	37 80	25 20	177¾	14
			r. k.	r. k.	r. k.	r. k.	r. k.	r. k.	
FROM WARSAW.	Moscow	1229	30 20	22 12	24 00	14 40	9 60	60¾	5
	Samára	2357	36 10	27 67	35 50	21 30	14 20	98¼	8
	Ufá	2848	42 30	31 37	40 50	24 30	16 20	110¾	9
	Cheliábinsk	3298	47 70	34 62	45 00	27 00	18 00	123¾	10
	Kurgán	3539	50 70	36 62	47 50	28 50	19 00	131¼	11
	Petropávlovsk	3788	63 70	38 22	50 00	30 00	20 00	138¾	11
	Omsk	4044	66 70	40 62	52 50	31 50	21 00	146¼	12
	Ob	4630	72 30	44 32	58 50	35 10	23 40	164¼	13
	Taigá	4845	76 30	45 77	60 50	36 30	24 20	170¼	14
	Mariinsk	4983	78 10	47 12	62 00	37 20	24 80	175¾	14
	Achinsk	5172	80 50	48 32	64 00	38 40	25 60	180¾	15
	Krasnoyársk	5341	82 30	49 37	65 50	39 30	26 20	185¼	15
	Kansk	5568	85 30	51 17	68 00	40 80	27 20	192¾	16
	Nizhneúdinsk	5875	87 90	52 72	70 00	42 00	28 00	198¾	16
	Tulún	5984	90 10	54 07	72 00	43 20	28 80	204¾	17
	Irkútsk	6347	94 30	57 67	75 50	45 20	30 28	215¾	18

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FARES

between Cheliábinsk and the chief stations of the Siberian Railway.

STATIONS	Distance, versts.	Fast train. I cl.	Fast train. II cl.	Passenger train. I cl.	Passenger train. II cl.	Passenger train. III cl.	10 lbs. lugg.	Days avail.
		r. k.	r. k.	r. k.	r. k.	r. k.	r. k.	
Cheliábinsk	—	—	—	—	—	—	—	—
Kurgán	241	—	—	7 58	4 55	3 03	13 86	2
Petropávlovsk	490	—	—	13 00	7 80	5 20	27¾	3
Omsk	746	—	—	17 50	10 50	7 00	41¼	3
Ob	1332	30 00	18 00	25 00	15 00	10 00	63¾	5
Taigá	1547	32 00	19 20	26 50	15 90	10 60	68¾	6
Mariinsk	1685	30 90	20 90	29 00	17 49	11 60	75¾	6
Achinsk	1874	37 20	22 30	31 00	18 60	12 40	81¾	6
Krasnoyársk	2040	39 70	23 40	32 50	19 50	13 00	86¼	7
Kansk	2267	42 00	25 20	35 00	21 00	14 00	93¾	7
Nizhneúdinsk	2574	45 70	27 35	38 00	22 80	15 20	102¾	8
Tulún	2683	46 80	28 10	39 00	23 40	15 60	105¾	8
Irkútsk	3049	51 00	30 60	42 50	25 50	17 00	116¼	9

Note. I. Each passenger has the right to take one child under five years of age free. For other children and children aged from 5 to 10 years, a fare is charged at the rate of ¼ of that for adult passengers.

II. Each passenger ticket gives the right to the conveyance of one pud of luggage and each child's ticket—20 lbs.; for the conveyance of luggage in excess of this, a charge is made for every 10 lbs. according to the luggage tariff.

III. In the fast train, all places are numbered and the passengers must, moreover, take place-cards at the rate of R. 1 50 k. for each line separately and pay for bed-linen R. 1 a change, serving not more than three days.

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Samára-Zlatoúst Railway.

(Office in Samára).

Syzrán-Cheliábinsk . . . . № 170.
Samára-Orenbúrg . . . . № 171.
Krótovka-Sérgievsk . . . . № 171a.

170. Syzrán—Cheliábinsk and back.

Pt. 2 I—II	Pr. 6 I—III	Ml. 4 I—III	Versts.	*Samára-Zlatoúst r. w.*	Versts.	Pr. 5 I—III	Pt. 1 I—II	Ml. 4 I—III
2 52	9 34	11 47	—	Dep. Syzrán bf. . . . . Arr.	—	7 23	1 0	4 5
3 10	9 55	12 10	—	Arr. Batraki Syzr. V. bf. . . Dep.	1057	7 0	12 40	3 40
3 20	10 5	12 28		Dep. . . . Arr.		6 50	12 25	3 30
—	—	—	—	" Batr. S.-Zl.	—	—	—	—
—	—	—	—	" Prav. Volga (sid.)	—	—	—	—
—	10 45	1 8	17	" Obsharovka	1041	6 17	—	2 57
—	—	—	—	" Sam. Luká s.	—	—	—	—
—	11 17	1 40	33	" Mylnaya	1025	5 41	—	2 19
—	—	1 56	—	" Bashkir. sid.	—	—	—	2 0
4 55	11 57	2 21	—	" Maltóga	—	5 5	11 10	1 34
—	12 19	2 44	56	" Bezenchúk	1002	4 40	—	1 6
—	—	—	—	" Yeriki sid.	—	—	—	—
—	1 9	3 34	80	" Tsmylovo	978	3 52	—	12 18
—	—	—	—	" Zhiguli (sid.)	—	—	—	—
—	1 49	4 15	101	" Lipiagi	957	3 4	—	11 30
—	2 7	4 30	109	" Kriázh	948	2 42	—	11 8
6 34	2 22	4 50	116	Arr. Samára bf. . . . Dep.	942	2 25	9 20	10 48
7 10	4 0	6 20	116	Dep. Samára . . . Arr.	942	1 15	8 44	8 8
—	—	—	—	" Bezimianka	—	—	—	—
—	4 40	7 0	136	" Smyshliaevka	922	12 41	—	7 34
8 14	5 22	7 42	155	Arr. Kinel bf. . . . Dep.	902	11 50	7 33	6 45
8 29	5 37	8 0		Dep. . . . Arr.		11 35	7 22	6 30
8 59	6 13	8 34	169	" Turgénevka	888	11 13	7 3	6 8
—	6 37	—	—	" Rab. Sarbai	—	—	6 36	—
9 30	6 56	9 10	190	Arr. Krótovka . . . Dep.	867	10 25	6 19	5 17
9 33	7 6	9 20	190	Dep. Krótovka . . . Arr.	867	10 12	6 17	5 2
	7 34	9 48	204	" Mukhanovo	853	9 50	—	4 40
10 12	7 59	10 13	220	Arr. Cherkásskaya . . . Dep.	837	9 20	5 36	4 10
10 27	8 10	10 25		Dep. . . . Arr.		9 5	5 24	3 54
—	—	—	—	" Tungúz (sid.)	—	—	5 8	—
—	8 59	11 15	244	" Klúchi	814	8 26	—	3 15
—	—	—	—	" Avérkino (sid.)	—	—	—	—
11 36	9 42	11 58	266	Arr. Pokhvistnevo bf. . . . Dep.	791	7 37	4 15	2 27
11 50	10 0	12 23		Dep. . . . Arr.		7 22	3 57	2 2
—	—	—	—	" Sarrákha (sid.)	—	—	—	—
12 18	10 32	12 55	285	Arr. Bugurusian . . . Dep.	772	6 50	3 20	1 30
12 21	10 42	1 20		Dep. . . . Arr.		6 35	3 28	1 11

*) The fast trains 2 and 1 are without changing for comm. Moscow-Irkútsk. These trains leave: Moscow (№ 17) on Sat. (№ 2) Batraki on Mond. (№ 1) Irkutsk on Frid., Cheliábinsk on Thurs.

**) Without changing: Moscow—Irkútsk I—II cl. trains 2 and 1. Moscow—Tula—Cheliábinsk I—III cl. trains 4 and 3.

Night time from 6.0 P. M. to 5.59 A. M. indicated by heavy type.

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Pt. 2 I—II	Pr. 6 I—II	Ml. 4 I—III	Versts.	*Samára-Zlatoúst r. w.*	Versts.	Pt. 1 I—III	Pr. 5 I—II	Ml. 3 I—III
—	—	—	—	Dep. Zavidovo (sid.) . . . Arr.	—	—	—	—
—	11 24	2 4	306	" Zaglúdino	751	—	—	12 35
1 19	11 50	2 35	316	" Asekeevo	742	5 43	2 43	12 14
—	—	—	—	" Kisla (sid.)	—	—	—	—
—	12 42	3 30	335	" Filippovka	723	5 1	—	11 32
—	—	—	—	" Mochegai	—	—	—	—
—	1 24	4 14	353	" Sarai-Gir	706	4 23	—	10 52
—	—	4 35	—	" Yakúpovo (sid.)	—	—	—	—
2 50	1 57	4 49	374	Arr. Abdúlino . . . Dep.	684	3 31	1 1	10 0
3 21	2 27	5 15		Dep. . . . Arr.		3 1	12 41	9 30
—	2 46	—	—	" Ik (sid.)	—	2 45	—	—
—	3 10	5 56	393	" Taldy Bulak	665	2 25	—	8 50
—	—	—	—	" Turaevo (sid.)	—	—	—	—
4 31	3 51	6 40	408	" Priyútovo	649	1 48	—	8 25
—	—	—	—	" Bishbúl (sid.)	—	—	—	—
5 5	4 26	7 18	427	Arr. Belek. Aksákovo . . . Dep.	630	1 8	11 20	7 47
5 8	4 35	7 30		Dep. . . . Arr.		1 0	11 10	7 37
—	—	—	—	" Maksiútovo	—	—	—	—
5 44	5 13	8 8	444	" Glukhovskaya	613	12 30	—	7 7
—	—	—	—	" Gusa	—	—	—	—
6 19	5 52	8 52	464	" Aksénovo	593	11 46	10 10	6 23
—	6 4	—	—	" Aldarovo (sid.)	—	—	—	6 3
6 47	6 26	9 28	479	" Shafránovo	578	11 6	—	5 38
—	—	—	—	" Sluk (sid.)	—	—	—	—
7 16	6 59	10 1	499	Arr. Raevka bf. . . . Dep.	558	10 10	8 50	4 45
7 30	7 52	10 21		Dep. . . . Arr.		9 50	8 02	4 20
—	8 18	—	—	" Tiuliúk (sid.)	—	—	8 17	—
8 3	8 36	10 50	517	" Davlekánovo	540	9 15	8 2	3 51
—	—	—	—	" Kuzangul	—	—	—	—
8 36	9 10	11 33	539	Arr. Shingak Kul . . . Dep.	518	8 30	—	3 4
8 46	9 20	11 45		Dep. . . . Arr.		8 21	—	2 54
—	—	—	—	" Udriak	—	—	—	—
9 34	10 10	12 35	563	" Chishmy	494	7 40	6 53	2 13
—	—	—	—	" Alkino	—	—	—	—
—	10 53	1 16	586	" Yumátovo	472	6 49	—	1 24
—	—	1 37	—	" Diema (sid.)	—	—	—	—
10 40	11 31	1 55	607	Arr. Ufá bf. . . . Dep.	450	6 0	5 36	12 35
11 10	12 1	2 30		Dep. . . . Arr.		5 20	5 16	12 0
—	—	—	—	" Chernikovka (sid.)	—	—	—	—
12 15	1 9	3 30	628	" Urázovo	430	4 24	—	11 4
—	1 38	4 7	640	" Iglino	417	3 53	4 4	10 36
—	—	—	—	" Chuvashi (sid.)	—	—	—	—
—	2 20	4 45	658	" Tavtimánovo	399	3 10	—	9 57
—	2 44	—	—	" Kudeevka (sid.)	—	2 43	—	—
1 50	3 10	5 37	683	" Ulu Telák	374	2 4	2 37	9 4
—	—	—	—	" Kamysh (sid.)	—	—	—	—
2 24	3 50	6 17	704	Arr. Ashá Balashévskaya bf. . Dep.	353	1 11	1 53	8 20
2 30	3 58	6 26		Dep. . . . Arr.		1 5	1 43	8 10
—	—	—	—	" Grenádski Klúch (sid.)	—	—	—	—
—	4 37	7 8	723	" Miniár	334	12 29	—	7 34
3 36	5 10	7 41	736	" Simskaya	321	11 56	12 47	7 3
—	—	—	—	" Yerál (sid.)	—	—	—	—
4 30	6 26	8 52	758	" Kropachóva	299	11 10	12 0	6 15
—	—	—	—	" Yakhino 590 ver.	—	—	—	—
5 15	7 4	9 30	77[illegible]	" Ust Katáv	284	10 17	—	5 13
—	—	9 50	—	" Yuresan	—	9 52	—	—
5 46	7 40	10 8	791	Arr. Viazovaya bf. . . . Dep.	266	9 25	10 38	4 28
6 1	7 55	10 23		Dep. . . . Arr.		9 7	10 23	4 7

For trains № 1 and 2, tickets of reduced tariff are not available.
Night time from 6.0 P. M. to 5.59 A. M. is indicated by heavy type.

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5 0	9 15	12 20	—	Dep. Cheliábinsk	172 Arr.	3049	5 12	11 0	1 0
9 25	2 31	7 22	746	„ Omsk	„	2303	11 33	6 37	7 28
7 15	5 0	5 40	3049	Arr. Irkútsk	Dep.	—	1 20	9 45	4 0
—	—	10 48	—	Dep. Cheliábinsk	175 Arr.	698	—	—	2 44
—	—	8 42	231	„ Yekater. I	„	467	—	—	5 26
—	—	12 13	698	Arr. Perm	Dep.	—	—	—	1 16

Night time from 6.0 P. M. to 5.59 A. M. is indicated by heavy type.

Steam navigation on the rivers Vólga, Káma and Bélaya.

Steamers leave Samára daily up and down the Vólga. They belong to the following companies: 1) „The Vólga S. S. Company founded in 1843", 2) „The Vólga Trading and Passenger S. S. Company", 3) „The Nadézhda", 4) „The Caucasus and Mercury" and 5) „The Samoliót".

(Information on sailings and fares is contained in the Official Guide of the Ministry of Ways of Communication, №№ 365–388).

Between Ufá and Nízhni Nóvgorod, on the rivers Bélaya, Káma and Vólga, ply the steamers belonging to „Yakímov and Sons" and „Burlychóv". (Sailings from Ufá four times a week).

(Information on sailings and fares is to be found in the Official Guide of the Ministry of Ways of Communication, № 363).

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Perm Railway.

(Office in Perm).

Perm-Viátka-Kotlás . . . . . . № 174a.
Perm-Cheliábinsk . . . . „ 175.
Yekaterinbúrg-Tiumén . . . . . „ 176.
Chúsovaya-Berezníki . . . . . „ 177.
Alexándrovskaya-Lúnievka . . . „ 178.
Bogdanóvich-Ostróvskaya . . . . „ 179.

175. Yekaterinbúrg-Cheliábinsk and back.

Mixed 26 II-IV	Mail 4 I-III	Versts	Perm railway.	Versts	Mail 3 I-III	Mixed 25 II-IV
12 37	5 26	467	Dep. Yekaterinbúrg M. . . . Arr.	231	8 8	1 10
12 58	5 37	471	„ Yekaterinbúrg II . . . „	227	7 59	1 1
1 23	5 57	477	„ Uktús . . . „	221	7 42	12 36
2 46	7 14	507	„ Mrámornaya . . . „	191	6 30	11 23
3 50	8 15	536	„ Pokháliyaya . . . „	162	5 10	9 54

Night time from 6.0 P. M. to 5.59 A. M. indicated by heavy type.

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176. Yekaterinbúrg—Tiumén and back.

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Siberian Railway

(Office in Tomsk).

Cheliábinsk—Irkútsk—№ 173.
Taigá—Tomsk—Cheremóshniki—№ 173.
Omsk (station)—Omsk (town)—№ 173a.

172. Cheliábinsk—Irkútsk and back.

Without changing Moscow—Irkútsk I—II cl. in trains 2 and 1.

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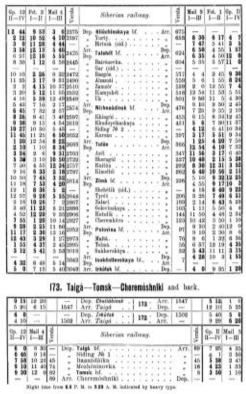

[illegible]

173. Taigá—Tomsk—Cheremóshniki and back.

9 15	12 20	—	Dep. Cheliábinsk	172	Arr.	1547	5 12	1 0
5 20	6 15	1547	Arr. Taigá		Dep.	—	12 10	5 25
4 0	—	—	Dep. Irkútsk	172	Dep.	1502	5 40	5 0
4 10	—	1502	Arr. Taigá		Arr.	—	9 20	6 20

Op. 12 II—IV	Mail 4 I—III	Versts	Siberian railway.	Versts	Op. 11 II—IV	Mail 3 I—III
6 0	8 35	—	Dep. Taigá bf. . . . Arr.	89	7 25	4 35
6 46	9 16	—	„ Siding № 1 . . . „	—	6 1	3 50
7 58	10 23	45	„ Basandáika . . . „	45	5 38	2 47
9 10	11 40	74	„ Mezhéninovka . . . „	16	4 23	1 33
9 30	12 0	82	„ Tomsk bf. . . . „	8	3 50	1 10
—	—	89	Arr. Cheremóshniki . . . Dep.	—	—	—

Night time from 6.0 P. M. to 5.59 A. M. indicated by heavy type.

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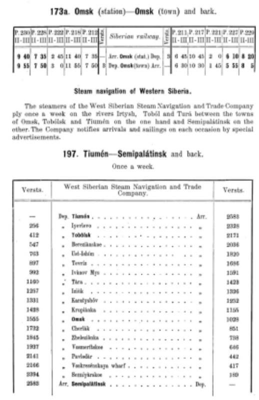


173a. Omsk (station)—**Omsk** (town) and back.

P. 230 II-III	P. 228 II-III	P. 222 II-III	P. 218 II-III	P. 212 II-III	Versts	Siberian railway.	Versts	P. 211 II-III	P. 217 II-III	P. 221 II-III	P. 227 II-III	P. 229 II-III
9 40	7 35	2 45	11 40	7 35	—	Arr. Omsk (stat.) Dep.	8	6 45	10 45	2 0	6 10	8 20
9 55	7 50	3 0	11 55	7 50	8	Dep. Omsk (town) Arr.	—	6 30	10 30	1 45	5 55	8 5

Steam navigation of Western Siberia.

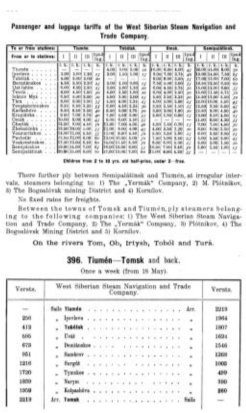
The steamers of the West Siberian Steam Navigation and Trade Company ply once a week on the rivers Irtysh, Toból and Turá between the towns of Omsk, Tobólsk and Tiumén on the one hand and Semipalátinsk on the other. The Company notifies arrivals and sailings on each occasion by special advertisements.

197. Tiumén—Semipalátinsk and back.

Once a week.

Versts.	West Siberian Steam Navigation and Trade Company.	Versts.
—	Dep. **Tiumén** . . . Arr.	2583
256	„ Iyevlevo . . . „	2328
412	„ **Tobólsk** . . . „	2171
547	„ Berezlánskoe . . . „	2036
763	„ Ust-Ishím . . . „	1820
897	„ Tevriz . . . „	1686
992	„ Ivánov Mys . . . „	1591
1160	„ Tára . . . „	1423
1257	„ Ishik . . . „	1326
1331	„ Karatyshóv . . . „	1252
1428	„ Krupiánka . . . „	1155
1555	„ **Omsk** . . . „	1028
1732	„ Cherlák . . . „	851
1845	„ Zhelezínka . . . „	738
1937	„ Yamerítskoe . . . „	646
2141	„ Pavlodár . . . „	442
2166	„ Voskresénskaya wharf . . . „	417
2394	„ Semiyárskoe . . . „	189
2583	Arr. **Semipalátinsk** . . . Dep.	—

260



Passenger and luggage tariffs of the West Siberian Steam Navigation and Trade Company.

[illegible]

Children from 2 to 10 yrs. old half-price, under 2—free.

There further ply between Semipalátinsk and Tiumén, at irregular intervals, steamers belonging to: 1) The „Yermák" Company, 2) M. Plótnikov, 3) The Bogoslóvsk mining District and 4) Kornílov.

No fixed rates for freights.

Between the towns of Tomsk and Tiumén, ply steamers belonging to the following companies: 1) The West Siberian Steam Navigation and Trade Company, 2) The „Yermák" Company, 3) Plótnikov, 4) The Bogoslóvsk Mining District and 5) Kornílov.

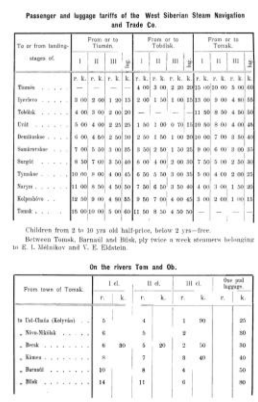
On the rivers Tom, Ob, Irtysh, Toból and Turá.

396. Tiumén—Tomsk and back.

Once a week (from 18 May).

Versts.	West Siberian Steam Navigation and Trade Company.	Versts.
—	Sails **Tiumén** . . . Arr.	2219
256	„ Iyevlevo . . . „	1964
412	„ **Tobólsk** . . . „	1807
595	„ Urát . . . „	1624
673	„ Demiánskoe . . . „	1546
951	„ Samárov . . . „	1268
1216	„ Surgút . . . „	1003
1720	„ Tymskoe . . . „	499
1839	„ Narym . . . „	380
1959	„ Kolpashóva . . . „	260
2219	Arr. **Tomsk** . . . Sails	—

261



Passenger and luggage tariffs of the West Siberian Steam Navigation and Trade Co.

To or from landing-stages of.	From or to Tiumén. I	II	III	lug.	From or to Tobólsk. I	II	III	lug.	From or to Tomsk. I	II	III	lug.
	r. k.	r. k.	r. k.	k.	r. k.	r. k.	r. k.	k.	r. k.	r. k.	r. k.	k.
Tiumén	—	—	—	—	4 00	3 00	2 20	20	15 00	10 00	5 00	60
Iyevlevo	3 00	2 00	1 20	15	2 00	1 50	1 00	15	13 00	9 00	4 80	55
Tobólsk	4 00	3 00	2 00	20	—	—	—	—	11 50	8 50	4 50	50
Urát	5 00	4 00	2 25	25	1 50	1 00	0 70	15	10 50	8 00	4 00	48
Demiánskoe	6 00	4 50	2 50	30	2 50	1 50	1 00	20	10 00	7 00	3 50	40
Samárovskoe	7 00	5 50	3 00	35	3 50	2 50	1 50	25	9 00	6 00	3 00	35
Surgút	8 50	7 00	3 50	40	6 00	4 00	2 00	30	7 50	5 00	2 50	30
Tymskoe	10 00	8 00	4 00	45	6 50	5 50	3 00	35	5 00	4 00	2 00	25
Narym	11 00	8 50	4 50	50	7 50	6 50	3 50	40	4 00	3 00	1 50	20
Kolpashóva	12 50	9 00	4 80	55	9 50	7 00	4 00	45	3 00	2 00	1 00	15
Tomsk	15 00	10 00	5 00	60	11 50	8 50	4 50	50	—	—	—	—

Children from 2 to 10 yrs old half-price, below 2 yrs—free.

Between Tomsk, Barnaúl and Bíisk, ply twice a week steamers belonging to E. I. Mélnikov and V. E. Eldstein.

On the rivers Tom and Ob.

From town of Tomsk.	I cl. r.	I cl. k.	II cl. r.	II cl. k.	III cl. r.	III cl. k.	One pud luggage. r.	One pud luggage. k.
to Ust-Chulа (Kolyván)	5		4		1	90		25
„ Nóvo-Nikólsk	6		5		2			30
„ Berdsk	6	30	5	20	2	50		30
„ Kámen	8		7		3	40		40
„ Barnaúl	10		8		4			50
„ Bíisk	14		11		6			80

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Transbaikál Railway.

(Office in Irkútsk).

Passenger trains daily leave Irkútsk by Baikál branch line to Baikál and thence by Transbaikál railway from the Mysováya st. to Srétensk (1,034 versts).

The time-table for this line is not yet published.

Steam Navigation

on the rivers of the Amúr system.

398.

Amúr Steam Navigation Co.

Amúr line:

Passengers and goods taken at and for towns of *Nikoláevsk, Khabaróvsk, Blagovéshchensk, Srétensk* and landing-stages on way.

Ussúri line:

Passengers and goods taken at and for towns of *Nikoláevsk, Khabaróvsk, Blagovéshchensk, Srétensk* and other points to the Imán st. of Ussúri railway and back.

Zéya line:

Passengers and goods taken at and for towns of *Nikoláevsk, Khabaróvsk, Blagovéshchensk, Srétensk* and other points to Zéisk Warehouse and back.

Amgún line:

Passengers and goods taken at and for towns of *Nikoláevsk, Khabaróvsk, Blagovéshchensk, Srétensk* and other points to Kerbínsk Warehouse and back.

I and II class passengers are accomodated with cabins, and III class are placed on the decks of steamers and barges under awnings.

The sailings of steamers from: *Nikoláevsk, Khabaróvsk, Blagovéshchensk* and *Srétensk* are each time specially advertised.

Passenger and luggage tariff of Amúr Steam Navigation Co.

Length of voyage.	Versts.	I	II	III	1/10 kop. per pud (lugg.) and verst.
		r. k.	r. k.	r. k.	r. k.
From Srétensk to Blagovéshchensk	1279	25.58	19.19	6.40	1.27
„ Blagovéshchensk to Khabaróvsk	853½	17 11	12.84	4.28	0.85
„ Blagovéshchensk to Zéisk wh.	657	—	10.—	5.—	0.65
„ Khabaróvsk to Nikoláevsk	939¾	18.80	9.40	4.70	0.94
„ Khabaróvsk to Imán st.	390	7.80	5.85	1.95	0.30
„ Nikoláevsk to Udínsk wh.	200	—	5.—	3.—	0.00
„ Nikoláevsk to Kerbínsk wh.	450	—	10.—	5.—	0.00

Each passenger has the right to take one pud of luggage free.

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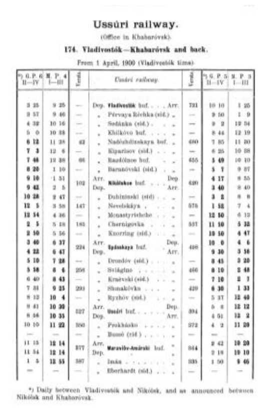

Ussúri railway.

(Office in Khabaróvsk).

174. Vladivostók—Khabaróvsk and back.

From 1 April, 1900 (Vladivostók time).

*) G. P. 6 II—IV	M. P. 4 I—III	Versts	Ussúri railway.	Versts	*) G. P. 5 II—IV	M. P. 3 I—III
3 25	9 25	—	Dep. **Vladivostók** buf. . . . Arr.	721	10 10	1 25
3 57	9 46	—	„ Pérvaya Réchka (sid.) „	—	9 50	1 9
4 32	10 16	—	„ Sedánka (sid.) . . „	—	9 2	12 34
5 0	10 38	—	„ Khilkóvo buf. . . „	—	8 44	12 19
6 12	11 38	42	„ Nadézhdinskaya buf. „	680	7 35	11 30
7 3	12 6	—	„ Kiparísov (sid.) . . „	—	6 25	10 38
7 46	12 38	66	„ Razdólnoe buf. . . „	655	5 49	10 10
8 20	1 10	—	„ Baranóvski (sid.) . . „	—	5 7	9 37
9 10	1 51	102	Arr. **Nikólskoe** buf. . . . Dep.	620	4 17	8 55
9 42	2 5		Dep. . . . Arr.		3 40	8 40
10 28	2 47	—	„ Dubinínski (sid) . . „	—	3 2	8 8
12 5	3 58	147	„ Nevelskáya . . . „	575	1 52	7 4
12 54	4 36	—	„ Monastyríshche . . „	—	12 50	6 12
2 5	5 18	185	„ Chernígovka . . . „	537	11 50	5 32
2 50	5 56	—	„ Knorring (sid.) . . „	—	10 50	4 47
3 40	6 37	224	Arr. **Spásskaya** buf. . . . Dep.	498	10 0	4 6
4 22	6 47		Dep. . . . Arr.		9 30	3 56
5 10	7 28	—	„ Dromdóv (sid.) . . „	—	8 45	3 20
5 58	8 6	256	„ Sviágino . . . „	466	8 10	2 48
6 40	8 43	—	„ Kraévski (sid.) . . „	—	7 10	2 7
7 31	9 25	293	„ Shmakóvka . . . „	429	6 30	1 33
8 12	10 4	—	„ Ryzhóv (sid.) . . „	—	5 37	12 40
9 41	10 30	327	Arr. **Ussúri** buf. . . . Dep.	394	5 6	12 12
8 56	10 35		Dep. . . . Arr.		4 51	12 2
10 10	11 22	350	„ Prokhásko . . . „	372	4 2	11 20
—	—	—	„ Busé (sid.) . . . „	—	—	—
11 15	12 14	377	Arr. **Muravióv-Amúrski** buf. . . . Dep.	344	2 42	10 20
11 54	12 14		Dep. . . . Arr.		2 18	10 10
1 5	12 55	387	„ Imán . . . „	335	1 50	9 46
—	—	—	„ Eberhardt (sid.) . . „	—	—	—

*) Daily between Vladivostók and Nikólsk, and as announced between Nikólsk and Khabaróvsk.

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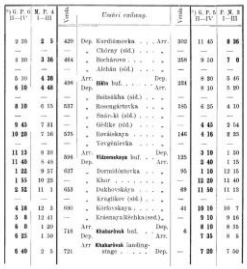


Marine Steam Navigation.

Between Vladivostok, Nagasaki, Port-Arthur, Singapore, Colombo, Perim or Aden, Port-Said, Constantinople, Odessa and St. Petersburg, ply the steamers of the Volunteer Fleet and of the Russian East Asiatic S. S. Co.

(Official Guide of M. W. C., № 305).

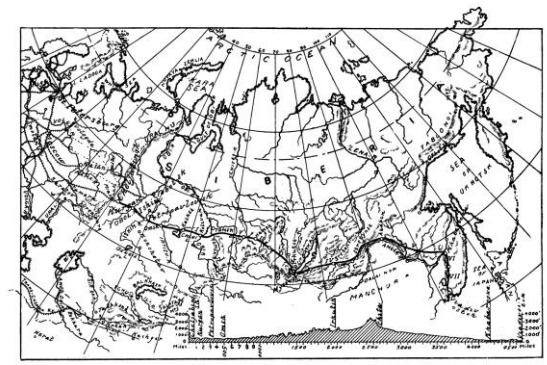
The reader is referred, for more full statistics, to the official report on “Siberia and the Great Siberian Railroad,” recently published at St. Petersburg, by the Department of Trade and Manufacture, Ministry of Finance; also to the reports of M. Chilkov, the Russian Minister of Communication. This latter authority confidently predicts that, early in the twentieth century, the diligent “globe trotter” can girdle the earth from St. Petersburg around to St. Petersburg again in thirty-three days.

The Trans-Siberian Railroad

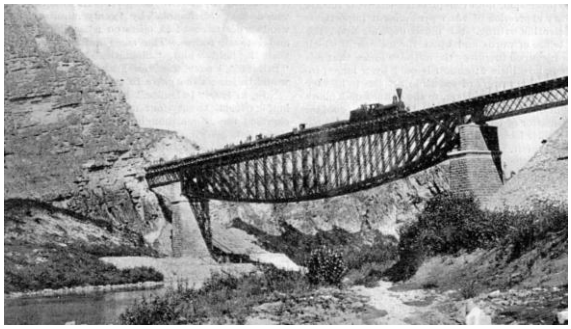
Scientific American
August 26, 1899
By Henry Michelson, Secretary,
National Irrigation Congress

THE results of the operations of the Trans-Siberian Railroad for the year 1898 are said to be encouraging to the Russian government. In its present unfinished state the traffic must be strictly local. An analysis of the government report shows that the country through which the line runs, though at present undeveloped and subject to the rigors of the climate on a prairie sloping to the Arctic Sea under the fifty-first degree of latitude, is still capable of producing great crops of grain; that it has fine forest resources, that live stock may flourish in it, and that coal has been found sufficient for the purposes of the railway and the population which may settle on the lands contiguous to it. Therefore, the railway may be expected, when finished, to become a factor in the commercial business of the world, even if its through traffic is not considered, by the opening up of the riches of the hitherto unknown continent which it is destined to make accessible.

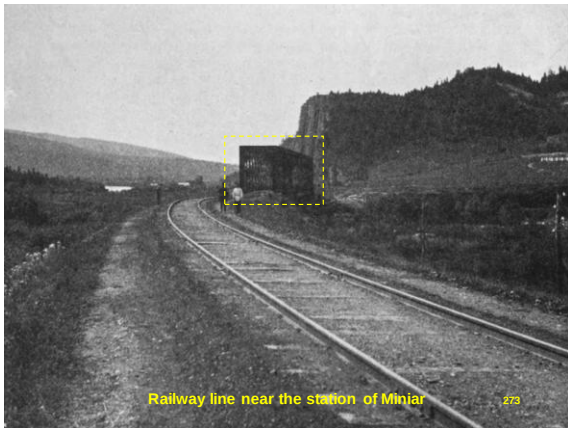
The length of the road with its projected extensions is so great that even Americans, who are accustomed to deal with large distances, will have some difficulty in comprehending the scope of this undertaking. The longest continuous line on the North American continent is the Canadian Pacific Railway. Its main line from Montreal to Victoria is 2,990 miles in length. The located line of the Siberian railway, from Cheliabinsk to Vladivostok, is 4,776 miles; the branch through the recently acquired territory of Manchuria to Port Arthur will be 1,273 miles; so that the system will commence, before any feeders are built, with 6,000 miles of track. The distance from Vladivostok to St. Petersburg will be nearly 6,700 miles. The distance from Port Arthur to the harbors of the North Sea, on the estuaries of which the European trade with Eastern Asia is centered, is, approximately, 6,900 miles by the nearest route.

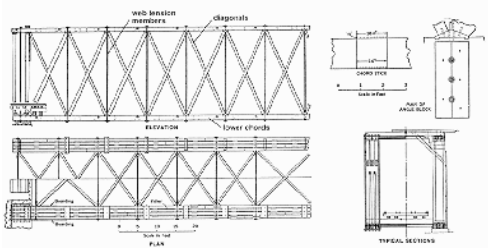


Map Showing Route of the Trans-Siberian Railroad.



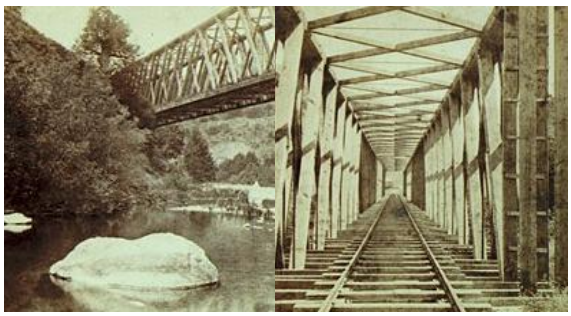
The Siberian Railway is, like all Russian roads, of a five-foot gage. It is constructed after the manner of American Western railways, single-tracked, gravel-ballasted, where ballasted at all, with Howe truss bridges over the smaller waterways, and steel bridges across the large rivers. 271
Caption: "Inverted Bowstring truss bridge across the River Zouriazan"



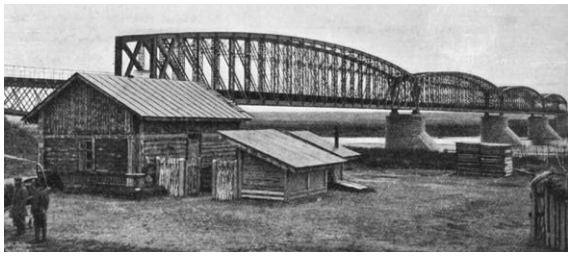


Above: caption: "Howe Truss Railroad Bridge." *William Howe* was granted a patent in 1840 for the *Howe Truss*, which was a very popular design for bridges for many years. Constructed mostly of wood, it used iron rods for web-tension members. In 1844, *Thomas W. Pratt* was granted a patent for the *Pratt Truss*, which used iron rod diagonals and timber verticals. The development and use of iron in these bridges soon led to the use of iron lower chords and other components, followed by combination bridges consisting of iron diagonals and timber lower chords (used as compression members). In 1859, *Howard Carroll* built the first all-wrought-iron bridge for railroad use, beginning a slow decline in the use of timber bridges. 274

Above: as first built, the bridge over the *American River* consisted of two spans covering a distance of 400-feet. In addition, there was a trestle approach on the south (Sacramento) side of 2,196-feet and one on the north side of 2,890-feet (over the bottom lands of the river). The total length of trestle was thus 5,086-feet, making the total length of the bridge 5,486-feet (over a mile long). Trusses of the bridge were simple *Howe* trusses where all members (including the lower chord) were made of timber. Only the vertical members were made of iron. The original bridge was founded on pile piers that were later replaced by stone masonry piers. The stone piers rested on piles that had been driven into the bed of the river, cut-off below low water and covered with a timber grillage. 275

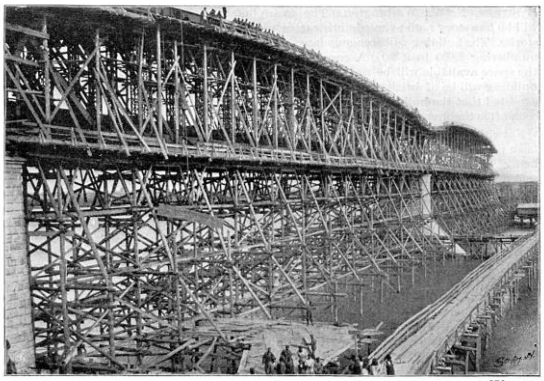


276

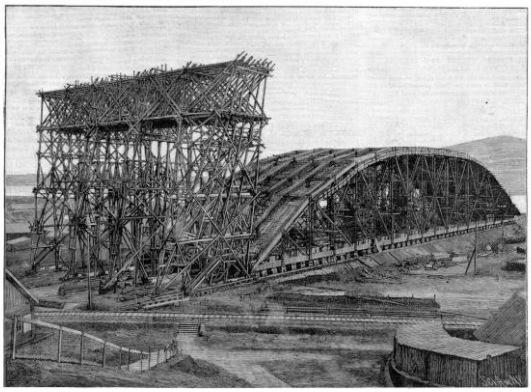


The watershed of the country east of the Ural Mountains is from south-to-north for more than 3,000 miles, which means a northern exposure entailing more severity of climate than is known on the railways of the United States and Canada. The rivers here are deep, full flowing streams, the alluvial bottoms of which necessitate large spans and make it desirable to have as few bridge piers as possible. Floating ice is in the rivers for about seven months of the year. The bridge at the Ishim has openings amounting to 700-feet, that at the Tobal 1,400-feet, that at the Irtish 2,100-feet; and the bridge over the Yenesei has a total length of just under 3,000-feet. Lake Baikal is traversed by a steam ferry for a distance of some forty miles. 277

Caption: "Bridge over the Tobal"



West Siberia Railway—Bridge Over the Irtish. 278



Erection of 469-foot steel trusses for the great bridge across the Yenisei.
Total length of bridge, 2,975-feet. 279

Forty bridges, each over 200-feet-long, cross the tributaries of the Obi River between Omsk and Irkutsk. East of Baikal the road passes into the valley of the Amoor River, bridging waterways running from north-to-south. After spanning the Amoor at Khabar-ovka by a steel bridge some 5,000-feet in length, it turns abruptly to the south toward Vladivostok, running to the east of the rivers skirting the Khenden-a-Lin Mountains. The total length of water crossings between Cheliabinsk and Vladivostok is given at 301 miles exclusive of the forty miles of ferry; the snow sheds and fences at 565 miles.

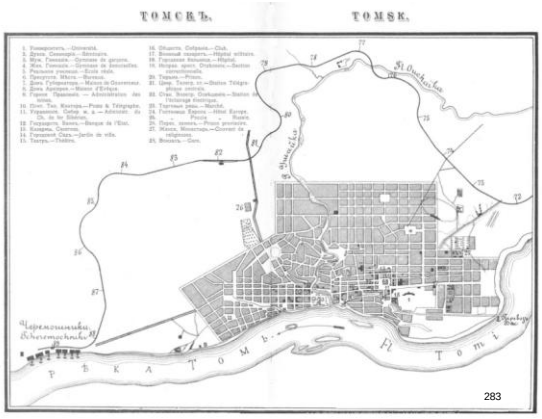
280

The western section extends from Cheliabinsk on the European frontier to Pochitanka, 1,080 miles. It runs for 880 miles over a highland plane so level that the distance exceeds an air line by only 2½ per cent. There are tangents on this division of 50, 62, and 86 miles. For fully 600 miles the line traverses an excellent agricultural country, producing all kinds of grain in abundance. 281

Caption: "View of the town of Cheliabinsk"

The 300 miles west of Tomsk run through a fine stock country containing many small lakes of slightly brackish or alkaline water; 200 miles east of the main stream of the Obi River the country is hilly, heavily timbered, and cut up by many small streams. The central division commences at Tomsk and extends to Irkutsk, through a barren upland, climate and soil alike forbidding settlement. The third section crosses the Baikal Lake, and extends to Misorskaia.

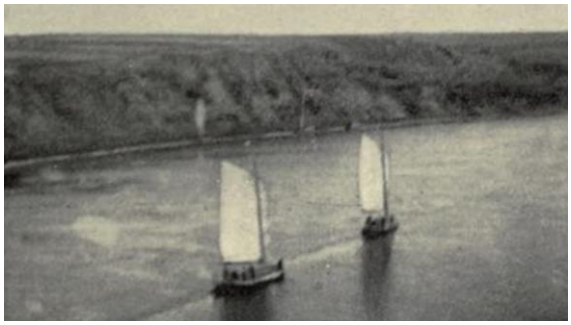
Above: caption: "Tomsk University"
Left: caption: "Theatre in Tomsk" 282



283

From this point to the Amoor section, the road passes its summit to drop down into the Pacific slope, running along the old Chinese frontier, touching Kiahta - the emporium of Russo-Chinese overland trade - through a country rich in gold, silver, copper, and iron, producing even now, with antiquated machinery, some fifteen millions of dollars worth of gold annually. The Amoor section extends eastward toward the Pacific, approximately 1,600 miles. This is the district from which the greatest returns may be expected agriculturally. It is well timbered, contains large bodies of alluvial lands and its climate is tempered by the proxymity of the Pacific Ocean. The next, the Ussouri section, extending southward to the terminus at Vladivostok, runs through a hilly country fit for agricultural and stock raising purposes, and rich in excellent bituminous coal.

284



The branch which runs through Manchuria passes through a thickly settled farming country; it leaves the Khingan Mountains to the west and crosses the many streams flowing into the Soongaree River, reaching the fine harbor of Port Arthur, which, being ice free the year around, will, it is safe to say, rival Hong Kong at no distant day. Port Arthur is destined to become the great city of Siberia.

285

Caption: “The Sungari River, Manchuria”

The fertile territory tributary to the Siberian Railway proper is equal in size to Germany, Austria, Belgium, the Netherlands, and Denmark combined. This territory is capable, if once peopled, of sustaining a railroad out of the local traffic it will produce. The long stretch of 1,500 miles extending from Tomsk to the head waters of the Amoor is perhaps the only distance on the line of the road which a Western railway man would consider difficult to handle success-fully as regards revenue. But this upland country has not been explored, and there is a possibility of its becoming a mining country of great importance.

286

The transportation problem of the Trans-Siberian Railway is a peculiar one. The products which it may expect to carry are what Americans would call low-grade freight - grain, ore, live stock, and timber. To transport these articles from the interior of Asia to the markets of the world must entail too long a railroad haul. It may be pointed out that California wheat is carried from San Francisco to Liverpool via Cape Horn, not all rail by way of New York. In general it may be held that agricultural staples cannot stand a railroad haul of over 2,500 miles.

287

The greater part of the import and export trade of Eastern Asia is in the hands of the western European nations, taking its way through the Suez Canal. The schedule time of the North German Lloyd’s steamers between Bremen and Shanghai is 46 days. Its tariff rates are less than $6 per ton or cubic-meter of room to Shanghai or Port Arthur, $6.25 to $8.75 to Yokohama and Hiogo, and $8.75 to $11.87½ to Nagasaki. Between London, Liverpool, and other English harbors and Asiatic points, the freights are a little less than is charged to and from German ports. This means, practically, that in the competition for through freights, the Trans-Siberian Railway may not cope with the steamship lines to Europe, either in rates or time. For, assuming the adoption of the European classification, with its tariffs running from 0.47 to 2.35 cents per 1,000 kilogrammes-per-kilometer, we have a rate-per-ton of the lowest grade of freight for 7,000 miles of over $200, which is prohibitory.

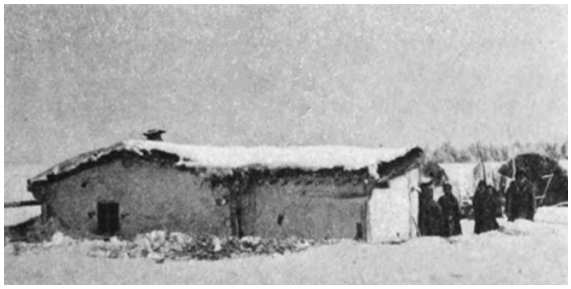
288

As to the time, we must consider the necessity of a transfer from the Russian five-foot gage cars to the standard gage cars at the European frontier, and also the physical condition of Russian railways in general. Railroad men will concede that on crowded, single-track Asiatic railways a freight train will do well if it makes 240 kilometers, or 150 miles-a-day, for many consecutive days, taking into consideration the liability to accidents, delays by reason of accumulated traffic from opposite directions, and the uncertainties incident to an Arctic climate. At any rate, this is the standard adopted by other Russian roads, of which Mr. Poultney Bigelow says that "an express train means a train that does not carry cattle and occasionally attains a speed of 25 miles-an-hour," and where the adaptability of the inferior administrative officials to the requirements of modern railway service has not, as yet, been demonstrated.

289

The time, therefore, between Vladivostok and Hamburg, under present conditions, will be about the same either by rail or steamer, with the advantage of uninterrupted passage and fragmentary rates in favor of the latter. For east bound freights from the interior of Asia to the United States or Canada there will be but little demand. Siberia, Canada, and the States of the Union raise products of the same kind, making an interchange unlikely to occur. We are therefore bound to assume that if the Siberian Railway is to earn its expenses at all, it must rely upon its local traffic almost exclusively. This can only be made possible by the introduction and establishment of a new population, both agricultural and manufacturing, originating beyond the old limits of the empire into the territory traversed by the road.

290



Now this population is close at hand. It does not have to cross broad seas, as did the immigrants that built up the United States. The time is big with events in the Far East. The close of the century witnesses the breaking up of the greatest of old world industrial nations, the empire of China, and Russia will fall heir to whatever it may choose to take, both as to Chinese population and territory. So far from imitating American anti-Chinese legislation, Russia favors the immigration of its newly acquired subjects into the Siberian provinces.

291

Caption: "Settler's earthen huts in the steppe"

Above: caption: "Settler's hut in winter"
Upper Left: caption: "Group of emigrants from the Poltava government on the shore of the Baikal"
Lower Left: "At a medical feeding station for immigrants"

292

The "spheres of interest" in China, at present, stand thus:

ITALY

Tokien and Che Kiang	72,630 square miles

GERMANY

Shantung	65,104 square miles

FRANCE

Kwang Se	78,250 square miles
Kwang Tang	79,456 square miles
Quei Chow	64,554 square miles
Yunnan	107,969 square miles
TOTAL	330,229 square miles

293

GREAT BRITAIN

Kiang Su	44,500 square miles
Kiang Se	72,176 square miles
Ngan Hoe	48,461 square miles
Honan	74,320 square miles
Hoo Peh	70,450 square miles
Sgetchuen	166,800 square miles
TOTAL	476,707 square miles

RUSSIA

Mongolia	1,500,00 square miles
Manchuria	400,000 square miles
Pe Chili	58,949 square miles
Kansuh	86,608 square miles
TOTAL	2,045,557 square miles

294

The Chinese, as known to the citizens of the United States, are a frugal, intelligent, hardworking race. As irrigators and fruit farmers they are unequaled; as miners, both in placer and fissure mining, wherever they have been permitted to work, they have excelled. For the development of such a country as Southern Siberia they will be found eminently adapted. They are imitative to a degree, docile and obedient, and will make excellent factory hands. We conclude, therefore, that a railroad having farming, mining, and manufacturing prospects like those enumerated above may be supposed to have reasons for anticipating a successful issue of its financial affairs.

295

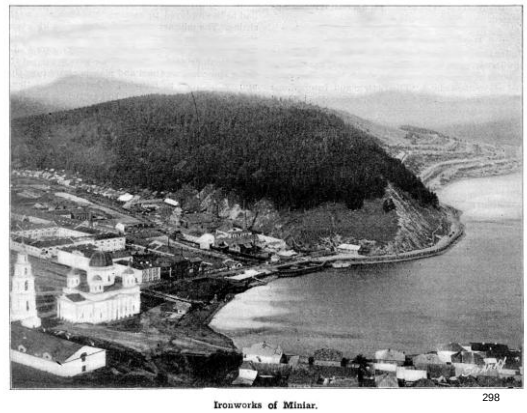
The mere construction of a line of railway extending communication between the ports of the Pacific and those of European Russia would have been comparatively an easy achievement. The builders of the road had immeasurably more than this to accomplish. They had to make a scientific exploration of half a continent, to drain swamps, utilize peat bogs for fuel, lay out irrigation ditches, dig wells, provide for the housing, feeding, and health of incoming settlers and their animals, to erect school houses, bring in agricultural teachers to show the immigrants how to plant, water, and raise crops fitted for soil and climate, make country roads and bridges, arrange rural mail facilities, and a multiplicity of other things about which an American railroad man has not to think.

Caption: "Surveying under difficulties, near the summit of the Khamar, Dabansk Mountains"

296

The construction of the railway led to the rectification of navigable streams for the shipment of material, to the sinking of shafts to obtain iron and coal, the laying out of villages for the workmen, the erection of machine shops, plants for the manufacture of cement, and technical schools for railway employees. For purposes of construction it was necessary to examine the mouths of the great rivers flowing into the Arctic Sea, to explore Lake Baikal and place buoys in its channels. The "volunteer fleet" was increased by three great ocean steamers, and railway connection was built to the port of Archangel on the White Sea.

297



Ironworks of Miniar.

298

In the Trans-Siberian Railway we have a magnificent exposition of well considered and ordered human endeavor. No one will want to contend that in the accomplishment of so stupendous an enterprise all mistakes have been avoided; but the effort is a noble one, and worthy of the great nation which has undertaken the task.

299

The Marine Department of the Trans-Siberian Railroad

Scientific American
March 31, 1900
By Waldon Fawcett

300

Probably never in the history of transportation enterprises has there been constructed a railroad system which has been dependent to so great an extent upon auxiliary water communication as the Trans Siberian Railway, which has, within the past few months, progressed to the point where uninterrupted communication across the continent is possible.

301

Ultimately, when the whole great project has been carried out in its entirety, the proportion of the work of the system performed by water craft may be greatly lessened; but for years to come the shallow draught steamers are likely to constitute the connecting links between many sections of railroad. Nor indeed will the marine interests fostered by the new system be confined to this class of shipping.

302

Many vessels of large size will be required to handle the commerce on the Pacific, the growth of which will be in a great measure resultant from the influence of the new railroad system; and it is significant that upward of a dozen vessels designed especially for such service are now building in the shipyards of the United States.

303

The final section of the road to be completed is in the neighborhood of 700 miles in length, and extends from the eastern shore of Lake Baikal to Stretensk. Communication between the last-named place and Vladlvostok, the ultimate terminus of the line, is principally by boat. The Shiiko River, on which Stretensk is situated, is a tributary of the Amur, and on these two rivers steamers are operated to the north end of another section of the railroad which follows the Ussuri River direct to Vladivostok. Ultimately, of course, the main line of the railroad is to pass down the valley of the Amur to Vladivostok; but the consummation of this plan is certainly several years distant.

304

The Manchurian Railroad, however, a short cut or branch road from Stretensk straight to Vladivostok, through Chinese territory, will it is expected, be completed within two years. While it may be taken for granted that upon the completion of this new Manchurian Railroad, much of the through business will take the all-rail route, there is no doubt that a constantly increasing volume of traffic will be developed in the territory drained by the Amur and its tributaries, and this will, of course, be handled almost exclusively by boat.

305

Appreciating this, the Russian government has already taken steps to deepen the channels and otherwise improve the Shiiko, Amur, and Ussuri Rivers. Not only have the rivers been buoyed so that the best navigable channel is clearly indicated, but upward of two dozen stations have been established at which daily records are kept of the depth of water. New charts of the rivers have been published and these will, before long, be supplemented by others.

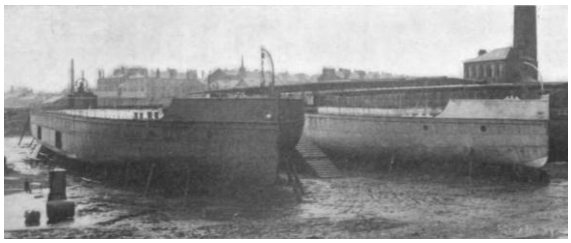
306

One of the avenues of usefulness in which the marine department of the railroad early figured was in the operation of huge barges on the Amur River. These vessels which conveyed all classes of constructive material to Stretensk, the head of navigation, were, together with the steamers which towed them, built at the Sentinel Works of Alley & Maclellan, at Glasgow, Scotland. The vessels were erected at the Scotch yard and then dismantled, shipped in sections to Siberia, and there re-erected by forces of workmen sent especially for the purpose.

307

The steamers or tugs were each 183-feet in length over all, 175-feet between perpendiculars, 26-feet molded beam, 8-feet depth and 3-feet 9-inches draught. Each is fitted with compound, surface-condensing engines of 600 indicated horse-power, with cylinders 30 and 40-inches in diameter and 48-inches stroke. To these steam is supplied from two locomotive type of boilers, arranged for wood firing, and with a total heating surface of 2,300 square-feet and a working pressure of 150 pounds.

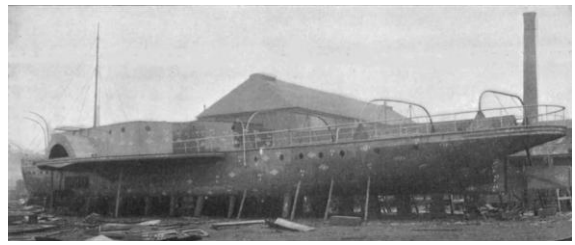
308



The barges designed to be towed by steamers of the class just described are each 310-feet in length, 35-feet beam, and 9-feet depth, and will carry a cargo of 400 tons on a draught of only 3-feet 6-inches.

Caption: "Steel barges for service on the Amur River – Trans-Siberian Railroad; length, 210-feet; beam, 35-feet; depth, 9-feet; capacity, 400 tons on draught of 3-feet 6-inches"

309



Possibly the most striking transformation which has been effected in the entire system is found in the service on the Amur and Sungari Rivers, where the poorest type of Chinese junk has been supplanted by handsome new steamers which make regular runs of more than 3,000 wiles per trip. The "Amgoon" may be taken as thoroughly typical of the vessels engaged in this service. She is a side-wheel steamer 160-feet in length over all, 24-feet molded beam, 8-feet depth, and 3-feet draught. Her engines also are of the compound, surface-condensing type, and the locomotive type boilers, like those in the vessels previously described, are arranged for burning wood fuel.

Caption: "Paddle steamer 'Amgoon' for the Amur River passenger service – Trans-Siberian Railroad. Length, 160-feet; beam, 24-feet; depth, 8-feet, draught, 3-feet; compound surface-condensing engine supplied by two locomotive wood-burning boilers"

310

Another break in the rail line which requires boats to serve as a connecting link is found at the southern end of Lake Baikal, a point at which the mountains extend practically to the water's edge. An expenditure of many million dollars would have been necessitated to put the railroad through this section, and so it was decided to substitute instead a fleet of ferry-boats, which now transfer trains of cars back and forth just as is done at numerous ports in the United States. An ice-breaking steamer, somewhat similar in design to those in service on the Great Lakes of America, keeps the channel open in winter. The trip across the lake is about forty miles in length, and the vessels employed on the route are especially designed for the service.

311

Another very interesting type of vessel shipped from British yards for service in Siberia is a class of stern-wheel steamers, each of which is 91-feet 6-inches in length over all, 80-feet between perpendiculars, 20-feet beam, 3-feet 6-inches depth, and 1-1/2-feet draught. These vessels have high-pressure engines and boilers of the locomotive type. The vessels were built in riveted sections weighing about 15 tons each, and shipment to Siberia was thus made possible. It will be noted in the accompanying illustrations what precautions the builders took to plainly mark every component part of the vessel in order that there might be no possibility of confusion during the process of re-erection.

312

The center of maritime activity in connection with the Siberian system is at Vladivostok, in the improvement of which port millions of dollars have been spent, and where there are magnificent piers and an excellent floating dry-dock. Ultimately Port Arthur may in some degree divide supremacy with her; but this is a long look ahead.

313

The development of the maritime phase of the project will henceforth be largely under the control of the Chinese Eastern Railway, which is the official name of the short-cut line through Chinese territory, previously mentioned. To all intents and purposes, this latter line is a Russian institution, being nothing more nor less than the final section of the Trans-Siberian Railway; but in the transaction of business the two corporations are kept rigidly distinct. That in reality, however, they are one is evidenced by the fact that the immense docks constructed at Vladivostok, when it was supposed that that city would be the main terminus of the Trans-Siberian line, have been transferred to the Chinese Eastern Company.

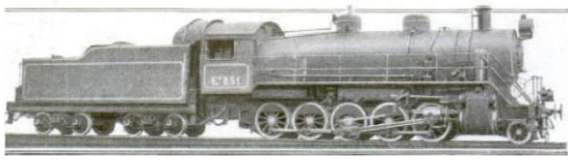
314

The Chinese Eastern Railway will operate a fleet of eighteen vessels, averaging 4,000 tons each, for the purpose of carrying freight from Shanghai to Port Arthur and Vladivostok. For the maintenance of this fleet, large repair shops are being constructed at Port Arthur.

315

Much has been written regarding the triumphs of American tools and American locomotives in the construction of the rail line, and it would seem that the creditable record is to be maintained, for the Russian officials have stipulated that the entire equipment of these new repair shops, including engines, boilers, and machinery, shall be purchased in America. This, too, in the face of the fact that several European firms offered to supply the equipment at a lower figure. A representative of the Russian officials has been in this country for several weeks past filling out the equipment specifications of the new Port Arthur plant, and has placed contracts aggregating upward of $200,000 with American manufacturers.

316



Locomotives for Siberia Railway Built Here

Twenty locomotives are being constructed at the New York plant of a large domestic company for the use of the Russian government on the Trans-Siberian Railway. As rapidly as they are assembled and tested they are taken down and shipped to the coast, from where they are transported via Panama Canal and Japan. Each has a weight of approximately 316,000 lb. when in working condition and a wheel arrangement known in railroad parlance as "2-10-0." The cylinders are 25 by 28 in. in dimension, and the driving wheels 52 in. in diameter. Following the receipt of a rush order for these locomotives, work was commenced upon them June 26. The first of the number was completed August 13, a performance which came near being a record at the plant.
(*Popular Mechanics,* November 1915)
Caption: "Type of locomotives being built for the Russian Government"

317

Progress and Prospects of the Trans-Siberian Railroad
Scientific American
April 28, 1900

318

IN point of magnitude and cost the Trans-Siberian Railroad is certainly the greatest engineering work of the age. According to figures furnished by the Russian Imperial Ministry of Ways of Communication, the total cost of the railway will be $500,000,000, of which about $295,000,000 has been already expended. It is considered that this lavish outlay is justified by the fact that the work, when completed, will make available the resources of a country whose wealth has never been told.

319

The day has gone by when the word *Siberia* was suggestive only of barren wastes and an outlawed population. Such opening up of the country as has already been accomplished, and the reliable testimony of various explorers, have dispelled this illusion and raised a reasonable expectation that Siberia will have a future comparable only to the development which followed the completion of the railroad system of the United States to the Pacific seaboard.

320

Caption: "View taken near the Ufalei station"

The two most important sections of the Trans-Siberian road are practically completed and ready for the cars. One of these extends from Cheliabinsk in the west of Siberia to a point which is only 120 miles from the northwestern frontier of Manchuria; the other section extends from Khabarovsk to Vladivostok. These two sections have a combined length of about 3,250 miles.

Top: caption: "View of the town of Cheliabinsk"

Bottom: Caption: "Church near the station of Cheliabinsk"

321

If to this be added the aggregate length of various branch lines which are completed, or nearly so, there is a grand total of 4,300 miles of road which will soon be placed in operation. According to the official report above mentioned, it was determined that for the present the stations and various yard buildings, and in fact, the general construction of the line sub-grade, should be built as cheaply as was consistent with safety and the strict necessities of traffic. Light rails were put down and wooden bridges of the Howe truss type, so well known in our Western railroads, were built, the intention being to replace them with more solid construction as soon as the increase of traffic would justify it.

322

Caption: "Bridge over the Suputenka at the 99 verst"

It seems, however, that this policy has not been as successful in Siberia as it was on our pioneer railroads in this country, for during the last year large sums of money were spent in replacing the rails with heavier steel and erecting steel bridges in place of the wooden trusses referred to. It may be that this sudden reversal of policy is due to the remarkable increase in the traffic which has taken place this early after the opening of the line, an increase which, according to reports, has been altogether beyond expectations.

323

Caption: "Bridge over the Chik"

According to figures published in the official guide to the Siberian Railway, the total number of passengers carried in 1896 was 160,000, and this increased to 286,000 in 1897, and to 379,000 in 1898, while the amount of freight carried had increased in two years from 160,000 tons to 484,000 tons. This increase referes only to traffic upon the Western Siberian Railway. Upon the Central Siberia Railway, the number of passengers increased from 177,000 in 1897, to 476,000 in 1898, while the amount of freight carried rose from 87,000 to 177,000.

324

To the Russian official mind there is no doubt, whatever, that the traffic will increase at an equally rapid rate in the future. As regards passenger through traffic, the new overland route to the Far East from Europe will occupy much less time and be considerably cheaper than the sea route. The voyage from London to Shanghai, for instance, now takes from thirty-four to thirty-six days to complete and costs $350 to $500, whereas the journey by rail between these two cities, if made at the present rate-of-speed, which is between twenty-three and twenty-four miles-an-hour on the Siberian Railway, can be made in sixteen days, or less than half the time, at a cost of $175.

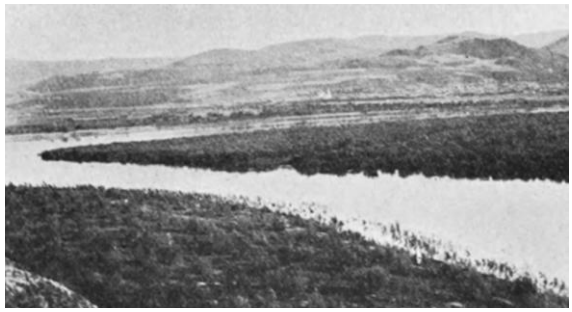
325

It is not by any means upon through passenger traffic, however, that the Siberian Railway will depend for its revenue, for it is the enormous anticipated shipments of freight from which the promoters of this road expect to realize its profits. It is expected that the freight traffic will be heavy in both directions, for not only will the opening up of railway communications between China, Japan, and Korea and the European markets lead to a large importation of European goods, but there is a considerable export trade which only awaits the completion of the railway to enable it to escape from the heavy shipping rates which at present are obtained.

326

The net yearly receipts from the working of the road when it is completed are estimated at a little over $4,000,000, and while this looks to be a very small return on such an enormous outlay, it is to be borne in mind that the construction of this great work was not undertaken so much with a view to commercial profits as from a desire to develop a vast region which is rich in natural resources, and to secure the military and naval advantages which rail communication will confer.

327



In connection with the construction of the railway, systematic explorations have been made of the various great river systems which it intersects, and which form its natural feeders. Hydrographic parties have been sent out which are surveying both the rivers and that great inland sea, Lake Baikal, whose shores are reputed to be rich in mineral wealth.

328

Caption: “The Transbaikal, mouth of the river Nercha”

The government is facing the serious problem of building a railroad around the southern shore of the lake, a work which, while both difficult and costly, is absolutely indispensable to the future success of such a trans-continental line as this. The uncertainty of the winter weather on the lake would always be a serious menace to communication during the winter months.

329

Caption: “On the ice of Lake Baikal”

According to the official statistics, Siberia has a total are of 5,333,333 square miles. It is liberally watered by some of the finest rivers in the world. The total area of land that is capable of agricultural development is about 20,000 square miles, and the soil of these sections consists of a deep layer of black loam. A total of about 16,500 acres of land has already been colonized, and the government is now parceling out the prairies through which the line runs, with the confident expectation that Siberia will become one of the most powerful competitors in the world’s supply of wheat.

330

Caption: “The river Katun”

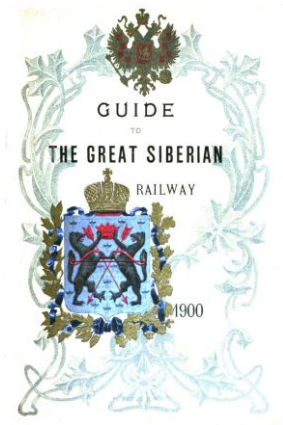
For the immediate future it is expected that the new settlers will devote themselves chiefly to cattle raising, which, so far, has proved to be profitable. It seems that the virgin forests of Siberia have been cut down in the same ruthless and wasteful manner that characterized the denudation of our own forest lands; nevertheless, it is estimated that there still remains about 80,000 square miles of valuable pine and fir timber.

331

Caption: "Calf bred by Skoptsy. Vilidisk district. Yakut territory."

The official estimate of the mineral wealth of Siberia is remarkable reading, for it would indicate that this mysterious country is, minerally speaking, one of the richest in the world. North of the Aral Sea and Mountains the land is rich in lead, silver, copper, and gold. Several ranges of the Altai Mountains are known to be rich in gold, copper ore, and minor precious stones, while the varieties of porphyry and jasper, known by the name of this range, have an established reputation. Extensive deposits of coal are found in the Kusnetz region. It seems that in far eastern Siberia the mountain ranges are equally rich in silver, copper, iron, coal, and graphite, while the gold fields of Eastern Siberia are known to be particularly promising. Elsewhere, coal and naphtha have been developed, while the coast line of Eastern Siberia has yielded good results to the gold washers.

332



We have been so frequently told during the progress of the Trans-Siberian Railway that the work was being undertaken mainly for military and strategic reasons, that it is with peculiar satisfaction we learn from this official guide that the resources of the country are in themselves sufficient to warrant the construction of the railway.

333

Just how the opening up of such a vast and apparently rich region will effect the present economic equilibrium of the world, it is difficult to foretell, but that its influence will be far-reaching and profound, can scarcely be disputed.

334

The Great Siberian Railway

The North American Review
Volume 170, Issue 522
May 1900
by M. Mikhailoff

335

The immense and sparsely populated country of Siberia was for a long time merely an accidental adjunct of the Russian Empire. Its sole importance to the latter lay in the fact that it supplied valuable furs and precious metals. In spite of its enormous extent, its fertility and its various natural resources, it attracted very few Russians who possessed land in their own country. The population consequently increased but slowly.

336

The first emigrants to Siberia were men who were at variance with the conditions of life in their native country, and were obliged to leave it either of their own free will, or otherwise. To the majority of Russians, Siberia remained an inhospitable land, and its very name called up no other thought than that of cold, exile and dreary drudgery. Time, however, slowly but surely effected an improvement in the relations between Siberia and the mother country. On the one hand, the increasing population of Russia in Europe required more room, and this was to be found in the uninhabited parts of Siberia. On the other hand, the propagation of more exact information about its natural wealth and great fertility soon modified public opinion, and what had seemed but a land of exile began to exercise the allurements of a land of promise.

337

At that time the community of interests between Russia proper and its colony became daily more distinctly felt, and Siberia began to be of more vital importance to the former. Side-by-side with this slow economical evolution, a radical change took place, in the middle of this century, in the views of the governing bodies concerning Russia's political interests in Siberia. Simultaneously with the annexation of the Amur, Primorsk and Usuri territories, and the opening of Japan to foreigners, Russia firmly established herself on the shores of the Pacific and took steps to consolidate her power there. The time had now come when the Government had to face the main obstacles which prevented closer intercourse between the two countries, retarded the solution of Russia's political problems in Asia and stood in the way of the normal development of the region. These obstacles were time, distance and the vast extent of Siberia.

338

The only way to overcome these obstacles was by the construction of a railway throughout the whole extent of Siberia. This idea was first mooted about 1850, but the Russian Government for a long time hesitated to undertake the execution of this project, through apprehension of the immense expense it would entail. However, the present Minister of Finance, M. Witte, had the requisite faith in Russian financial resources. Being appointed Minister of Ways and Communications at the beginning of 1892, he rapidly conducted surveys of the railway line; and then, becoming Minister of Finance at the end of the same year, he insisted on the immediate construction of the great Siberian Railway.

339

According to the original plan, the direction of the Siberian Railway was to be as follows:

	Kilos.
From Chelyablnsk to Omsk, West Siberian Railway	1,415
From Omsk to Irkutsk Central Siberian Railway	1,828
From Irkutsk to Missoyaga, Baikal Railway	318
From Missoyaga to Stretensk, Transbaikal Railway	1,076
From Stretensk to Khabarovka, Amur Railway	2,132
From Khabarovka to Vladivostok, Usuri Railway	764

Some time later, two very important changes were made in this original scheme.

340

In consequence of the great technical difficulties presented by the Baikal line, and in order to accelerate the construction of a continuous railway through Siberia, it was decided to make a straight line from Irkutsk to Lake Baikal. The train was to cross the lake on special ice-breakers, similar to those in use between Lake Huron and Lake Michigan in America. In consequence of even greater difficulties presented by the Amur line, permission to construct and exploit a railway in Manchuria, connecting the Baikal line with Vladivostok, was obtained by the Russo-Chinese Bank from the Chinese Government. Thus the estimated length of the Siberian Railway was reduced by about 550 kilometres. In March, 1898, the Chinese Government permitted the construction of a branch to Port Arthur and Ta-lien-wan, and in this way the Siberian Railway acquired two outlets to the Pacific, of which one is free from ice all the year round.

341

Left: caption: "Cathedral at Irkutsk"
Right: caption: "Shores of Lake Baikal"

Though the project of constructing the Amur Railway was now left in abeyance, yet the junction of Vladivostok with Khabarovka was effected, and thus Russia will soon have both an uninterrupted railway route through Manchuria and a combined railway and waterway in the direction of Irkutsk, Stretensk, Shilka, Amur, Khabarovka, Vladivostok. The construction of the railway is very rapidly advancing, and the West Siberian, Central Siberian and Usuri lines actually are completed and opened for traffic. On the other portions, work is being carried on very energetically.

342

Caption: "A railway station in Manchuria"

Let us now glance at this country, of which so little is known, and consider the present and prospective results of the construction of the railway. Siberia occupies 5,000,000 English square miles in the northern part of Asia. Its natural features are very varied. The western and northern parts of this enormous country consist of a level plain: in the north, the lifeless swamps (tundra) merge into a large tract of virgin forest. Further south, this is succeeded by rich steppes, which resemble the pampas, and extend to the mountains which occupy the southern and eastern part of Siberia. 343

Caption: "The desolate post of Kahrkhons"

The polar tundra zone occupies all the space north of the sixty-fourth degree of latitude. It is a swampy plain covered with moss and bush and frozen during the greater part of the year. Its soil never thaws to a greater depth than one foot, and consists of alternate layers of frozen earth or pure ice. Anything approaching civilized life is out of the question in this desolate land. Its sole inhabitants are a few nomadic tribes, who eke out a living by fishing, hunting and the breeding of reindeer. 344

Caption: "One of the 'First Families' of Siberia"

The region between the fifty-seventh and the sixty-fourth degrees is covered with thick virgin forest, consisting of ancient cedars, larches, pines and other species of firs. Further south we find, in addition to these, birch, poplar, aspen and even linden trees; a great quantity of berry-bearing and other bushes increase the variety of plants, and hops and other climbers winding round the trees remind one of the virgin forests of America. In this vast region, with its boundless forest wealth, habitable spots are chiefly found on the banks of the different rivers.

345

To the south of this forest tract, we find a cultivated belt of land, very spacious in the west and much resembling a steppe. It extends as far as the mountains which stretch along the south of Siberia. The steppes of Western Siberia have the appearance of plains, covered with luxurious vegetation and birch groves. The soil is rich and fertile, and tends to promote the development of agriculture and settled life. In these steppes, there are large water basins like Lake Chany, surrounded by smaller lakes. 346

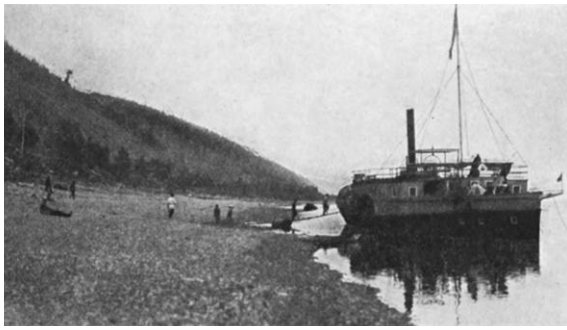
Caption: "Flock of sheep in the steppe"

The Siberian mountains extend along the southern border of Siberia and then occupy its whole eastern part. They are remarkable for their beautiful views. Many picturesque spots in the Altai Mountains and Semiretchensk might be compared with those of Switzerland, and the Irtish flowing through the mountains resembles the Rhine. 347

Caption: "Altai, the Talmen lake"

Siberia extends from the Arctic Circle right away to the steppes of Central Asia, and therefore presents many varieties of climate. There are the perpetual frost of the lifeless tundra deserts, the tropical heat of Central Asia, the genial climate of the favored spots at the foot of the Altai Mountains, the balmy air in the oases of the Chui Valley and Lake Issik-Kul and the striking southern vegetation of the banks of Amur. Owing to those climatic variations, we meet with the most startling changes in natural features, and an amazing variety of flora and fauna. 348

Caption: "Altai, valley of the Upper Ligumen"



Siberia possesses four great river basins, which are equal to those of the largest American rivers. Three of them - Obi, Yenisei and Lena, with their numerous tributaries - greatly facilitate the trade of the interior, and the fourth river, the Amur, facilitates intercourse between Central Siberia and the Pacific. 349
Caption: "The river Lena"

The population of Siberia consists of very various elements. After the bloody and rapid conquest of Siberia, it became for some time an El Dorado for hunters and gold diggers. Like the Spaniards in America, these were attracted by the thirst for gain, and they treated the natives with the most barbarous cruelty and plundered in the most irrational manner the natural treasures of the country. Some time later these rough and ready pioneers were succeeded by exiles. These were but few in number at first, but latterly there were as many as 18,000 to 20,000 yearly. The introduction of this element was of sinister import for Siberia. It was forced to accept criminals, who had been driven forth from their own country and who, hardened in their wickedness, could not but have a contaminating influence on the people they came among.

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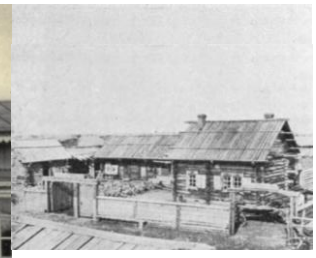
Fortunately for Siberia, at the same time with this artificial colonization, a natural colonization was advancing, for men who had been unfortunate in their native land were attracted by the free life of Siberia and made their way thither in small but steady numbers. From these men, who had proved themselves enterprising and of great physical and mental vigor, the present population of Siberia has been evolved. It embodies all the best characteristics of the daring adventurers and conquistadores who first subdued it; of the exiles and emigrants, who went there in such numbers, and of the Cossacks and peasantry, whom the Government induced to settle there by the offer of large subsidies, hoping thereby to promote the development of agriculture. 351
Caption: "A sotnia (hundred) of Siberian Cossacks"

The unaided struggle with stern Nature called all their hardier qualities into play. The result is a vigorous, enterprising type, not unlike that which we meet with in the United States, Canada and Australia. 352
Caption: "Winter road in the northern taiga"

The Russian population of Siberia moved farther and farther eastward from the Ural Mountains through the southern part of Siberia; at present it occupies a broad, unbroken belt of land, which narrows down toward Lake Baikal. Small branches are found on the banks of the chief rivers, the Obi, the Yenisei, the Lena and the Usuri, and extend from the basin of the last to the shores of the Bay of Peter the Great. Besides this, little Russian communities are scattered about in different places. 353
Caption: "Settlement of Novo-Kikolaevsk"



The indigenous Mongol, Finnish and Tartar tribes of Siberia, which occupy immense tracts, are much smaller in number than the Russian population, whom they surround on all sides.
Above: caption: "Farmhouse. Viliuisk district."
Left: caption: "A Mongol passenger" 354

Immediately beyond the Ural and north of the region entirely occupied by Russians, there lives the tribe of Voguls. Further north and northeast we find Siberian Tartars, Ostyaks, Samoyedes, Tunguses, Yakuts, Yukahirs, Koryaks, Tchuktchis, Kamchadales and Guiliaks.
Above: caption: "Tungus of the Yakut territory"
Left: caption: "Yakut of the Olekminsk district"

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With the exception of the Tartars, who are partly settled, these are all nomadic tribes, and are engaged in hunting, fishing and cattle raising. In the extreme north, reindeer breeding is carried on. South of the region occupied by Russians, there are settled Siberian Tartars, Kirghizes, Altayans, Kalmuks, Soyots and Buriats, who live only by cattle breeding and agriculture. Some of these elements of the Siberian population such as Tchuktchis, Guiliaks, Kamchadales, who are not amenable to the influences of civilization, are very scant in number, and will most likely die out altogether; others, such as Kirghizes and Buriats, on the contrary, are important ethnographical unities, and give promise of increased vitality.
Caption: "A Gypsy fortune-teller"

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The mineral wealth of Siberia, particularly in its eastern part, is fabulous; its extent is far from being finally determined, but it is certain that its treasures are almost inexhaustible. The area of its auriferous regions is much larger than that of the celebrated gold mines of California, Australia and Africa taken together. Beginning from the Alatau Mountains, of which both slopes are very rich in gold, this auriferous region extends eastward along the northern slope of the Saiansk Mountains in an almost continuous broad strip. Then it continues across both slopes of the Stanovoi and Yablonoi Mountains right away to the extreme east of Siberia. The extensive gold deposits of the Yenisei, Olekma, Vitim, and many other river systems, constitute, as it were, an immense addition to the chief gold area. Up to the present, gold has almost exclusively been obtained from sand. Mining of gold ores is carried on in the Yenisei, Altai and Transbaikal district, but only to a very small extent, owing to the difficulty of working and the lack of mechanical appliances.

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In many parts there are lodes of copper, silver and lead. Those found on the branches of the Saiansk and Alatau Mountains, in the district of Nertchinsk and the Kirgiz steppe are particularly remarkable. The quantity of metal contained in the ores varies greatly. Silver, lead and copper mining reached a high point of development last century, but within the past twenty-five years this industry has begun to fall off, chiefly owing to the rise in the price of labor.

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Iron and coal exist in great quantities throughout the whole extent of Siberia, from the borders of the Government of Orenburg to the mouth of the Lena, to Kamtchatka, the Island of Sagalien and the frontier of Korea. At the present time, coal is worked only in the Kuznetsk basin, on the Island of Sagalien and in the Kirgiz steppes. It is also proposed to exploit the coal beds recently discovered in the southern part of the Primorsk province. These have been surveyed and found to be very rich, and to contain some quantity of anthracite. Contiguous veins of coal and iron were found in some places, foundries were formed, but these have been in anything but a flourishing condition until quite lately, owing to the small demand for their output and their remoteness from the markets.

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Caption: "The Satka ironworks"

In Western Siberia, common salt is extracted from the self-depositing lakes, which occur in considerable numbers in the southern portion of the steppe region lying between the forty-seventh and fifty-fifth degrees of north latitude and the sixty-third and seventy-third degrees of east longitude (from Paris), which was once the bottom of a sea basin. In the northern portion of this salt basin, which embraces the Barabinsk and Kouloundinsk steppes, the salt lakes always contain a greater or less amount of other salts besides common salt. There are many lakes which contain rich layers of glauber salt only. In Eastern Siberia there are very rich beds of rock salt, but the best salt springs and layers are found in thinly inhabited districts, so that transport to the markets is very expensive, owing to the want of proper means of communication.

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Besides all this mineral wealth, tin, mercury and sulphur are found in the Transbaikal territory; naphtha on the Sagalien Island and many kinds of precious stones, such as lapis-lazuli, topaz, beryl, aqua-marina, etc., in the Transbaikal territory. In the basin of the Yenisei, large deposits of graphite are found. From experiments made in America, this seems to excel the Ceylon variety in purity.

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Siberia has long been famous for its fur-bearing animals and the teeming wealth of its rivers and lakes. After agriculture and cattle breeding, fishing and hunting are the chief pursuits of the inhabitants. The shooting and trapping of squirrels is at present the main object of the chase. In the northern part of Eastern Siberia, where the slaughter of fur-bearing animals has not been quite so wholesale as in Western Siberia, more valuable fur-bearing animals, such as the marten, ermine, sable, fox and arctic fox, are caught. Beavers, which formerly existed in Kamtchatka, are now very rare, but the fur industries in the waters washing the Russian shores of the Pacific are much more important at present. Among the most important is the seal industry, which is specially developed on the Commandorskie and Pribyloff Islands, the former belonging to Russia, the latter to America. From 1871 to 1891, 730,539 seal skins came into the market from Russian territory alone. Besides seals, the northern and eastern waters of Russia are very rich in sea calves, whales, sea lions and other marine animals.

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The supply of fish in Siberia, and particularly in the rivers falling into the Pacific and Northern Oceans, is almost inexhaustible. The Sea of Okhotsk and the Sea of Japan abound in fish. The more valuable species of fish, kinds such as sturgeon and salmon, are so plentiful that while making their periodical progress from the seas to the rivers, they force each other on to the bank, whenever the stream happens to be shallow. Capital is so scarce, means of communication so scant, and the natives know so little of fish curing, that only so much fish has been consumed hitherto as was required locally, the remainder being sent to Japan by Japanese traders.

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Notwithstanding the immense wealth of Siberia, manufacturing industry and trade have not been able to develop themselves to a corresponding extent, owing to the thinness of the population and the absence of cheap and suitable means of communication. Consequently, though there have been repeated attempts on the part of the Government and private individuals to establish industry on a large scale in Siberia, manufactories and works have been started there only with the greatest difficulty, and only such have succeeded as served to meet the modest wants of a small local population or produced an article of such value that it could bear the cost of carriage to a great distance.

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Such was the general condition of the country at the time when the construction of the great Siberian Railway heralded the dawn of a new era.

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Though the line will not be finished till 1902, some instances have already come to light which prove what a great civilizing effect it will have in future. Among others, we may note the rapid increase in the population. As we have already mentioned, the Russian Government long ago took various measures to attract pure Russian elements to Siberia. At present, the Russian Government deems it very necessary to consolidate Russian national feeling there in view of a possible invasion of the region by the yellow race in the near future.

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The Government has, therefore, taken this matter under its direct control, propagating exact information about Siberia, publishing special maps on a large scale, preparing and adapting sections of land for the settlement of immigrants by the help of local Government agents. Such places as still remain uninhabited, owing to their wild character, are carefully explored. 367

Caption: "Movable school at an emigration center"

There is yet but little land available for colonization, and which could be granted to newcomers without encroaching on the reserves of the old inhabitants, whether Russian or indigenous; and the greater part of these lands is already occupied. 368

Caption: "Chiefs and Bis of a Kirgiz village"

Therefore, the Government has now permitted the occupation of tracts less suitable for culture, which have hitherto been waste land, as, for instance, the well-known Barabinsk steppe, which suffers from a lack of good water and is infested with insects that torment the inhabitants. Further, with a view to extending and enlarging the area for the reception of immigrants, forests are being cut down, drainage systems planned and wells sunk for the purpose of obtaining good water. In order to ensure the future prosperity of the immigrants, the Government is taking measures of every description to preserve the forests and natural riches in those parts intended for settlements. It furnishes material assistance and provides medical aid for immigrants who are usually of the poorer classes, and it has set aside a special fund for their benefit. In this way, regions which till quite lately were endless steppes, such as we find in Western Siberia, or dark, impassable forests, as in Eastern Siberia, even now, when the railway is far from being completed, already show a great animation. In many places along the line, settlements with a population of 8,000 or 9,000 have already sprung up, such as the settlement of Novonikolaevsk, near the bridge across the Obi, the station of Taiga at the beginning of the Tomsk branch, and the stations of Niman and Krasnaya-rietchka on the Usuri line.

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The following table shows the annual number of immigrants:

In	Men.	In	Men.
1887	25,137	1894	72,224
1888	35,848	1895	120,000
1889	40,195	1896	201,622
1890	48,776	1897	84,978
1891	87,432	1898	175,000
1892	92,146	——	
1893	64,321	Total	1,047,679

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The Siberian Railway has brought into the country not only a new population, but new institutions and new culture. It was difficult for the new arrivals from Russia to adjust themselves to the legal forms which already existed. This fact prompted the Government to extend to Siberia the statutes of the Emperor Alexander III, relating to juries and the appointment of justices of the peace. The great importance of this reform can only be realized by Siberians, who, thanks to it, will really obtain speedy and equitable and clement justice, but who were previously tried in courts of an administrative character. In a short time this reform was followed by the long-wished-for abolition of transportation of criminals.

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Simultaneously with the increase of population in the districts through which the Siberian Railway passes, and in proportion as it was opened to traffic, all kinds of industries, which already existed there, began to develop. It now seemed possible to export goods to the Russian and foreign markets, which could not be sent there under the former conditions of transport. The greatest improvement hitherto has been apparent in agriculture, which, as already stated, constitutes almost the sole occupation of the civilized inhabitants. Thanks to the railway, Siberian corn has found its way to foreign markets. Indeed, since the opening of the West Siberian line, the railway authorities have sometimes been unable to send off all the consignments of corn in proper time. These were often stored in large quantities along the line.

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In 1898, there were 6,500 wagon loads of corn stored in this way; 240 wagons were added daily, and the railway could only send off 120 wagons. The export to Russia of tallow, skins, wool and frozen meat has increased enormously of late years. This is one result of the development of cattle breeding in those districts traversed by the railway. Another is the increased activity in the butter-making industry, especially in the Province of Tobolsk. This industry has found a large market abroad, some 2,600,000 kilograms of Siberian butter having been exported in 1896.

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Of course, these facts show only the small beginning of the great revolution which will be effected by the railway in all branches of Siberian economical life, in agriculture and cattle breeding, manufactures and trade. In the mining industry, we might say that at present attention is only given to the working of gold. Such a state of affairs is abnormal, for besides gold there are immense stores of other mineral wealth. The construction of a railway near rich seams of coal, iron, copper and other minerals will give an impulse to the working of them; for, on one hand, the railway itself will require some of the productions of mining industry; on the other, it will make it possible to largely extend the market for them, and thus will bring about a better organization of existing mining enterprises.

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The construction of the Great Siberian Railway has even now begun to produce a marked effect on Siberian trade, which formerly was carried on entirely by monopolists. In each district or town there was a local capitalist, who laid in a stock of goods at the fairs of Nijni-Novgorod, or elsewhere, and then fixed his own prices according to the means of his customers, and competition was non-existent. An enterprising man, who had neither capital nor credit, could not compete with these monopolists, because of the absence of good means of communication. This abnormal state of affairs is already improving. The railway which has connected Siberia with centres of production has rendered travelling cheaper and quicker, and made capital circulate more freely. People of small means are now enabled to make long journeys for the purchase of stock, and they can enter into direct communication with the producers and wholesale merchants in large centres. The trade of Siberia has become more democratic, and increasing competition has effected a change in its character.

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Notwithstanding the small population, the uniformity of occupation, the poverty of the inhabitants and the absence of important industrial centres along the line, the traffic on the portions of the railway already opened has exceeded all expectations. Instead of the former three pairs of trains each day, as originally intended, the managers have been obliged to send off five pairs daily. These convey consignments of raw materials, particularly grain, and are sent to the markets of Russia and Western Europe. Purely local loads sent from one part of Siberia to another are small in quantity, for, owing to the uniformity of occupation in Western and Central Siberia, large exchange of goods is unnecessary, and the country people can supply their own modest wants. The influence of the railway on the export of Siberian goods to the adjacent countries of Asia is so far also very insignificant. But, of course, this state of affairs is only temporary, and may be explained by the fact that the railway is not yet finished, and that Siberia is only beginning to emerge from very primitive conditions. With the termination of the railway and the influx of population and capital to the country, not only will the trade of the interior be developed, but Siberia will also supply the countries of Eastern Asia with manufactured goods.

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One of the inevitable results, in conjunction with the influx of immigrants and capital, will be a greater division of labor, so necessary to the economical development of these dominions. In dependence on the natural and economical conditions, the population of each locality will devote their attention to one or many defined industries, and the railway will assure the sale of their goods either abroad or in other parts of Siberia.

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As far as we can judge at present, Siberia will in future be divided into the following industrial regions:

(1) The agricultural region, extending along the railway line from the Ural to Lake Baikal. The products of this region, which are principally grain, will be sent abroad through Russia in Europe and also to Eastern Siberia and Turkestan. The project of a branch line to Turkestan has already been discussed by the Administration, and its construction is merely a question of time. This branch line would indirectly be very advantageous to the whole Empire, for Siberian corn could be sent over it to Turkestan, and the inhabitants of that country would then devote their entire energies to the cultivation of the cotton plant.

(2) Two cattle breeding regions, in Transbaikalia, and in the steppes of Western Siberia, south of the agricultural region.

(3) The forest region, occupying the immense forests north of the agricultural region.

(4) The fishing centres, along the shores of the Pacific and near the mouths of large rivers.

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(5) The mining and manufacturing region, which coincides with the basin of the Amur, and to which we may add the territory situated northeast of it and the Island of Sagalien. Owing to its mountainous character and the comparative absence of land suitable for agricultural purposes, the cultivation of cereals is not likely to be carried on here on a large scale, more especially as countries round about - Central and Western Siberia, Manchuria, Korea, Japan, China, India and America - are already well supplied with grain. We may presume that gold mining will for a long time remain one of the chief occupations of the inhabitants of this region. On the other hand, the abundance of coal and iron in this region - both such powerful aids to economical development - sufficiently guarantees the rise of the manufacturing industry at no very distant date. In the Amur territory, there will doubtless be a rapid growth of factories to supply the large demand for cotton goods in the neighboring countries of Manchuria and Korea. These factories will draw their supply of raw material from Russian Turkestan, China, Korea, India and North America. The importation of woollen stuffs to China and Japan, where no sheep breeding is carried on, is increasing yearly. It would be greatly to the advantage of the Amur manufactories to participate in this industry, as they could procure large quantities of cheap wool from Transbaikalia and Mongolia. Finally, the climate and soil of the Amur territory are both favorable for the cultivation of the sugar beet, tobacco, flax and hemp, the manufactured product of which may also find a market in the countries round about.

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In the economical awakening of Siberia, and particularly of it richest part - the basin of the Amur - an important role will doubtless be played by the United States, which is the nearest civilized neighbor, with whom Russia can have no serious misunderstandings. The trade of North America with Vladivostok has hitherto not been very extensive, and has been confined to the importation of small quantities of flour, other foodstuffs, machinery, agricultural implements, leather, etc., from San Francisco. Owing to the absence of economical life in Siberia, nothing else, of course, was to be expected. But the small volume of trade up to the present time is no indication of what future years will bring about. In fact, an improvement has already been made, and American factories have supplied various materials, locomotives and rails particularly, for the Manchurian railway.

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The Manchurian railway at present consists only of a single line, but the management has had the track made broad enough to admit of a double line, and its construction will follow in due course. For the construction of this second line 192,000,000 kilograms of rails will be required. Then, besides the amount of rails necessary for the smaller yearly repairs on the Manchurian and Siberian lines, and the proposed branches of the latter, 960,000,000 kilograms of rails will be required in ten years' time for a thorough repair of these railways. At the same time, a gradual renewal of the rolling stock will be necessary.

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At the rail, engine and car-building works of the United States work is as well done as in England, and at the same time much more quickly and cheaply; it is therefore certain that the United States will have many opportunities of supplying the Siberian and Manchurian railways with rails and rolling stock. In general, machinery and mechanical industries of America will find a large market in all parts of Siberia for their productions, such as machinery necessary for new manufactories and workshops, and for various mining industries, agricultural implements and appliances for the equipment of fishing and other vessels.

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It must be mentioned here that the Russian Government, in order to promote the economical development of Siberia, has sanctioned the importation, duty-free until 1909, of all plants necessary for the Siberian and Ural mining industry, through all her frontiers. Besides this, no customs dues are to be levied until 1903 upon fishing nets and machinery necessary for the different manufacturing and mechanical establishments of Siberia, which may be imported through the mouths of Siberian rivers.

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Among other important articles exported from the United States, the following may find a market in the districts traversed by the Siberian railways: In Manchuria, cotton goods and sugar and steel and iron ware, which, as contracted between the Chinese Government and the company constructing the Manchurian railway, will be subject only to the ordinary Chinese customs duties when brought to Manchuria via Dalny; in Siberia, chemical goods, soap, fruit, hops, watches, musical instruments, cycles, typewriters, tinware, ready-made clothing and last, but not least, raw cotton for the factories, which, as stated above, will certainly spring up in the Amoor territory. Siberian productions which may find a market in the United States are hides, wool and especially coal.

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It is not only the coal-fields of Siberia, but likewise all the rich stores of natural wealth, that are awaiting the advent of energetic and enterprising men. To such the Russian epithet “gold bottom,” as applied to Siberia, will prove no misnomer. These vast treasures are lying idle because of the absence of capital and enterprise. In this respect Siberia offers a wide and important field of action to the capitalists of North America, who are famous for the breadth of their views and their energy. Every serious enterprise in Siberia in which American capital will be invested will be welcomed by the Russian Government.

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The Siberian Railway will be an important factor in the trade of the world, as a means of transit between Europe and the Far East. It is true that, in this respect, it has rivals in the sea route through the Suez Canal, and the combined sea and land route through North America. Yet the Siberian Railway has on its side an advantage, which is most important in our day, and which is indicated in the old saw, “time is money.” With the completion of this work, Port Arthur will be connected With St. Petersburg by a railway of 5,850 English miles, with Berlin of 6,350 English miles, with Paris of 7,100 English miles and with London of 7,300 English miles.

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Caption: “Port Arthur”

With the quick trains on the European system, these distances could be covered in from eight to ten days (in five-and-a-half days by the Nord Express). But even if we take the present speed of the West Siberian trains (twenty-two versts-an-hour), it follows that only eighteen days are necessary for the journey from Western Europe to Port Arthur. This speed can easily be increased to twenty-five versts-an-hour. Then the journey from London to the Far East will take the following time by the rival routes:

	To Yokohama	To Shanghai	To Hong kong
Via Siberian Railway	18 days.	17 days.	20 days.
Via Suez Canal	34 days.	28 days.	25 days.
Via America	25 days.	81 days.	33 days.

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This great advantage possessed by the Siberian Railway will cause an important revolution in the communications between Europe and the Far East. Firstly, the mails, for which speed is so essential, will be sent by this railway, and secondly, the greater part of the passenger traffic will come to it. It is true, that some apprehension is felt about the fatiguing effect of a long railway journey on the passengers, but in the special Siberian trains everything is done that can conduce to comfort and amusement. There are a library, bath rooms, and even cars fitted up for gymnastics. Of course, the railway journey is not so pleasant as the voyage on one of the excellent ocean steamers, when the weather is fine. But, first of all, the Chinese Sea and the Indian Ocean are never calm except in March and April, and, secondly, there is for two whole weeks no escape from the intense tropical heat when coming through the Suez Canal. The Canadian route, on the other hand, involves a double transfer from ship to train. We must also bear in mind the fact that the Siberian route will be the cheapest as well as the most rapid one. At present the journey from Paris or London to the ports of China and Japan, by the transoceanic route, costs, first-class, from 1,800 to 1,840 francs, including food. But owing to the very low fares charged for long distances in the Russian Empire, the overland journey will cost in all only from 800 to 950 francs - that is, only about half the cost of the route by Suez or America.

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With the goods traffic, things will be different; for most commodities, the cost of transport is more important than speed; therefore, as far as all heavy merchandise is concerned, the railway cannot compete with the sea route. But, in spite of this, we may anticipate that the greater part of valuable goods from Russia, or Europe, to the Far East will be sent by railway, as, with a tariff of half a cent per English mile, per-ton, the transport by land would only be slightly dearer than by sea, not to speak of the possibility of reducing the land journey to twenty-five or thirty days, whereas, by sea, at present, goods from Moscow to Vladivostok are forty-five days in transit. Goods which suffer from sea-damp and tropical heat will also be sent by the Siberian Railway.

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The Manchurian railway will have at its own disposal steamers running between the termini of the Siberian Railway and the chief ports in the Far East, which will also tend to attract passengers and goods to the Siberian line. The Siberian Railway will greatly consolidate Russia’s position on the shores of the Pacific, facilitating the transport of important military forces thither at any time.

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The outlay of the immense sum of four hundred million roubles for the construction of the railway obliges Russia to do her utmost to recompense herself for this outlay by developing the economical forces of Siberia and attracting as much traffic as possible to the railway. Therefore, from the moment when the railway is completed, Russia's principal task in the Far East will be, not the encouragement of political and territorial aggrandizement, but a ceaseless effort to promote peace and tranquility, those main factors which will enable the Siberian Railway to play its economical part as the vital artery of Siberia and all the Old World.

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The Railroad Systems of Asia

Scientific American
June 16, 1900

392

THE total length of the railroads in Asia is 30,000 miles, of which two-thirds are represented by British India. The Trans-Siberian alone has 5,800 kilometers. In Chinas the different European and American syndicates have obtained concessions for about 3,000 miles of railroad, and these are for the most part in construction. The Chinese Government possesses also about 300 miles of lines whose operation is now being carried out under good conditions, especially for the lines uniting Pekin to the port of Tientsin.

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Japan has no less than 3,100 miles of railroad, and the French colonies, which now possess but 250 miles, have more than 2,500 miles in construction in Cochin-China, Annam and Tonkin. The Dutch East Indies have a well developed system. Java alone having 1,000 miles. These figures are far surpassed by those for British India, whose system has a total length of 21,000 miles.

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Persia has as yet no railroad systems, but the Russian syndicates appear to be ready to profit by the monopoly which they have secured for the construction of railroads in that country. Turkey is adding a number of important lines of road to the 1,600 miles already possessed in Asia; the Franco-German line, of Bagdad, is one of the largest of these systems.

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Trans-Siberian Train Lighting

Scientific American
December 29, 1900

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THE trains which are now running over the section of the Trans-Siberian from Moscow to Irkutsk are pro- vided with a complete electric system which serves for the lighting and heating of the cars, as well as for the water and milk heaters in the dining car. In the baggage car has been placed an installation consisting of a boiler, a steam turbine and a dynamo of 5 horse-power, which gives the current at a tension of 65 volts; the plant is under the supervision of an engineer appointed for the purpose. Under one of the cars is disposed a battery of accumulators, which assures the lighting for four hours in case an accident should happen to the dynamo plant, and the latter may be stopped during the night when only a few lamps are in use. Electric cigar-lighters are placed in each compartment.

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The lighting is carried out by globes placed in the ceiling, by brackets and portable lamps. The globes of the sleeping compartments, corridors, etc., contain two lamps provided with a switch; the others have one lamp. The portable lamps, which are usually suspended from the partitions by. brackets, may, if necessary, be placed upon the tables. The lamps are from 5 to 16 candle-power, according to their position; the whole number of lamps in a train represents 1,000 candle-power. The circuits are so arranged that most of the lamps are turned off after midnight. In the sleeping compartments the lamps which illumine each has an automatic switch by which it is extinguished or turned on as the curtains are drawn or opened.

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Part 4

1904

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Military Aspects of the Trans-Siberian Railway
Scientific American
April 16, 1904

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ALTHOUGH the Trans-Siberian Railroad is just now the most valuable asset of the Russian government in prosecuting its war with Japan, this vast system was not originally planned for military purposes – not, at least, if we are to believe the original proclamation or “rescript’ of the Emperor Alexander in which the construction of the road was authorized. It is given herewith, and the reader may judge for himself. This rescript is dated the 14th of May, 1891, and was received by the Grand Duke Czarevitch on his landing in that year from an important tour of inspection of the Far Eastern countries.

401

“Having given the order to build a continuous line of railway across Siberia, which is to unite the rich Siberian provinces with the railway system of the interior, I entrust to you to declare my will upon your entering the Russian dominions, after your inspection of the foreign countries of the Far East. At the same time I wish you to lay the first stone at Vladivostok for the construction of the Ussuri line forming part of the Siberian Railway . . . Your participation in the achievement of this work will be a testimony of my ardent desire to facilitate communications between Siberia and the other countries of the empire, and to manifest my extreme anxiety to secure the peaceful prosperity of this country.” - Alexander

402

Thus was inaugurated a railroad which, in point of continuous distance covered, is altogether without a parallel even among the large railroads of the United States. It had been under advisement and more or less an object of solicitude on the part of the Russian government for a third of a century past. Actual construction was commenced on the 19th of May, 1891, when the Grand Duke Czarevitch filled a barrow with soil and emptied it on the railroad embankment.

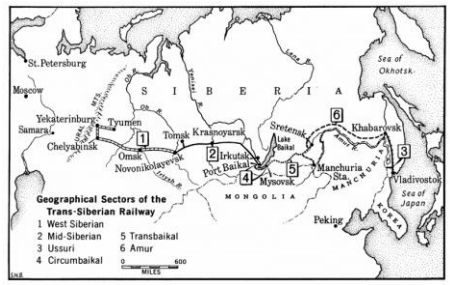
403

The longest continuous line on the North American continent is the Canadian Pacific Railway, whose main line from Montreal to Victoria has a total length of 2,990 miles. The line of the Siberian Railway from Cheliabinsk to Vladivostok measures 4,776 miles. The branch from Harbin to Port Arthur measures 1,273 miles, so that the main line system, independently of its feeders, covers over 6,000 miles of track. From Vladivostok to St. Petersburg is about 6,700 miles, and from Port Arthur to the various harbors of the North Sea is about 6,900 miles by the nearest route.

404

The road may be divided into six sections. The first or western section extends from Cheliabinsk, which is on the European frontier, to Pochitanka, a distance of 1,180 miles. It runs for about 900 miles over a highland plateau that is practically level. For over 600 miles it traverses an excellent agricultural country, while 300 miles west of Tomsk the line is laid through a good stock-raising district. The central division extends from Tomsk to Irkutsk, through upland country, whose climate and soil are both unsuitable for agricultural settlements. The third section includes Lake Baikal, and in this section the road reaches its utmost elevation, from which it drops to the Pacific slope, running through country rich in minerals, from which some $15,000,000 worth of gold is annually exported. The fourth section is that of the Amur, which extends toward the Pacific for a distance of 1,000 miles. This is the district which gives the greatest promise of future agricultural development. It is richly timbered and contains large sections of alluvial land and is favored with a more temperate climate. Then follows the Ussuri section, which extends to Vladivostok, on the Pacific, running through a hilly country suitable for agriculture and stock-raising, and containing an excellent bituminous coal. The branch through Manchuria from Harbin to Port Arthur is laid through a thickly-settled farming country.

405



406

Although much of the country traveled by the Siberian road is inhospitable and barren, a competent authority has estimated that the valuable territory tributary to this great system that will be suitable for agriculture, is equal to the combined area of Germany, Austria, Belgium, the Netherlands, and Denmark, an area that when once populated, will be fully capable of sustaining the railway out of local traffic alone. The only stretch of country which must be regarded, from the standpoint of railroad operation, as altogether unpromising is the 1,500 miles extending from Tomsk to the head waters of the Amur.

407

It is a military road, however, that the great Siberian enterprise is just now vested with its chief interest. There is a popular belief, which seems to have grown by the relating thereof, that the road has been hastily and wretchedly built, and that under the severe strain of the war, it will be subject to continual breakdown, and probably fail to perform the military duties for which it was supposed to have been built.

408

This impression we do not at all share, and the accompanying illustrations, most of which were furnished by Mr. Lodian, of this city, formerly for several years a resident of Siberia, show at a glance to any railroad man that in many respects the road is built in accordance with modern ideas and with structures that are well up to the very latest railroad practice.

Caption: "The depot at Kraknotarck, Central Siberia – a most important mobilizing and forwarding station at the present juncture. Showing substantial character of the buildings"

409

In the first place, the construction of the Siberian Railroad has been under the care of Prince Khilkoff, who was for several years a resident of the United States, and acquired a thoroughly practical knowledge of the construction and operation of American railroads. Consequently, it is fair to assume that the Siberian road has been built on carefully considered and well-ordered plans, and that if there has been economy it has been of a judicious kind and exercised under the restraining hand of Prince Khilkoff, who is thoroughly familiar with roads of the same type in the United States, that have been built under the same restrictions of economy as this Siberian enterprise.

410

As a matter of fact, the road corresponds very closely to a pioneer American transcontinental system. It is single-track, and built for comparatively light loads and engines which characterize a new railroad through an undeveloped country. In some respects, it is considerably better built than were our own early Western railroads, as witness the invariable use of stone piers and abutments, masonry culverts and steel superstructures.

Caption: "Bridge over the Ishim"

411

The weakest point in the construction of the line is, or rather was, the very light rail that was used. The first 600 miles from Cheliablinsk was laid with rail that was 54 pounds-to-the-yard. This was found to be too light for the trains, and a heavier section, more suited to modern rolling stock was adapted and has been laid over a majority of the road. The gage is the standard 5-foot gage of all Russian roads.

412

413

The road is hampered by want of sufficient sidings at the stations. On the stretch of road from the European frontier to Lake Baikal, the track is laid over a country that permits of long tangent. Thus for a continuous stretch of 880 miles in the western section, from Cheliablinsk to Pochitanka, the road is so straight that its total distance exceeds an air line by merely 2-1/2 per cent, and in this division there are three stretches of absolutely straight line, one of which is 59, another 62, and another 86 miles in length.

414

The most troublesome portion of the line is the section that includes Lake Baikal, which lies in an exceedingly mountainous and rough country. For the present, the freight and passengers are disembarked at the western end of Lake Baikal and ferried across to the terminus of the railroad at the eastern end. When the location of the line was made, it was found that the work of constructing the road around the lake would be of such magnitude and would consume so much time that it would be impossible to await its completion. In about eighteen months' or two years' time from now it is expected that this circum-Baikal route, as it is called, will be finished. The country is extremely difficult, and we are assured by one who has been over the route and is very familiar with it, that it is even more difficult of construction than the heaviest stretches of work on our own Colorado Midland road. This location is laid through a country which is so mountainous and precipitous that it is called by the Russians themselves the Switzerland of Siberia.

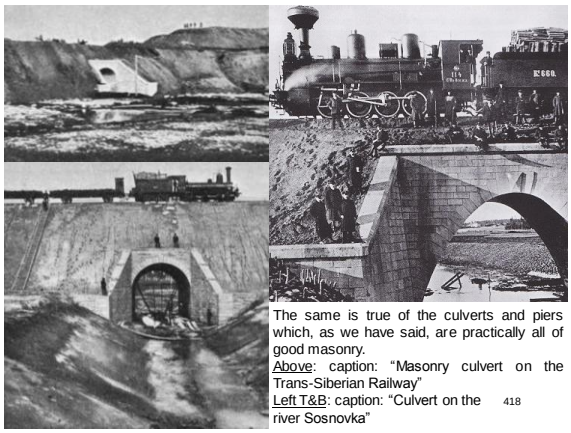
415

The impression that the Siberian road is poorly built and is liable to break down under the stress of military service is based upon the early condition of the line, before the heavier steel was laid and time had been given for ballasting and bringing up to standard such portions of the lines as were hastily laid in the endeavor to get the line pushed through to completion. We understand that an enormous amount of filling in and ballasting has been accomplished during the past year, and today the road is equal to taking care of trains and locomotives of the kind that have been supplied to the line.

416

One advantage which this line has over some of our pioneer Western roads, is that the Russians have made very free use of embankments, preferring these to the more-hastily-built and less permanent pile trestles, which form such a conspicuous feature of our own Western roads. The earth or rock embankment, once made, requires very little subsequent care, and consequently the great amount of time spent in maintaining ordinary trestle construction will be saved on the Trans-Siberian road.
Caption: "Workers carrying timber sleepers to be laid atop earthen embankment in a section of the Trans-Siberian Railway traversing dense rolling woods known as 'taiga'"

417



The same is true of the culverts and piers which, as we have said, are practically all of good masonry.
Above: caption: "Masonry culvert on the Trans-Siberian Railway"
Left T&B: caption: "Culvert on the river Sosnovka"

418

We think, however, that it would have been a wiser policy if the engineers had adopted a better class of track tie. As will be seen from our engraving, many of the tie consist merely of soft-wood trees cut to length and split in two. These are laid with the flat face down and a notch is adzed in each to receive the rails. The weak features of this type of tie are that it presents but small bearing surface for the base of the rail, which quickly cuts down into the tie that is hewed on opposite faces. In one of our illustrations showing the laying of the track, the latter form of tie is used, in another the half-round split tie, and the difference in stability and in bearing surface will be readily appreciated by comparing these two pictures.
Left: caption: "Track-laying on the Trans-Siberian Railway; note the cheap, half-round ties"
Right: caption: "Grooving the ties for rails"

419

Probably it will be found, as the war proceeds, that one of the elements of weakness in the line, for operation purposes, is that the sidings are not of sufficient length. These, however, can readily be lengthened so as to accommodate several trains at a time, and with ample provision of this kind, the road should be able to land at the set of war a minimum of 800 troops-a-day with their supplies of food, ammunition, etc., and it might be able by excellent management and good luck in the matter of breakdowns to place as many as 1,200 troops-a-day at the front.

420

We are informed by an eyewitness, who has just arrived from Lake Baikal, that 1,000 troops-a-day were being transported during the latter part of February, and, and it is likely that the lengthening of the sidings that is now going on, coupled with the experience that is being gained, will enable Russia to place troops at the front during the summer months at the rate from 20,000 to 40,000-a-month.

421

Caption: "Trans-Siberian Railway, ca. 1904"

422

Russia vs. Japan

423

"…This military conflict was the first significant outburst in the Russo-Japanese rivalry that started during the construction of the Trans-Siberian Railway…"

Eva-Maria Stolberg,* Associate Professor of Russian history at the *University of Duisburg-Essen

RE: excerpt from her scholarly work entitled: "The Russo-Japanese War Cannot be Understood Without the Siberian Background." The TSR was the cause of a major war between Russia and Japan, which turned into one of Russia's most humiliating defeats. Begun in 1904, the *Russo-Japanese War* marked the first time a non-Western power defeated a Western power in the modern era, and helped give rise to the U.S.-Japanese rivalry that culminated in the *Pearl Harbor* attack.

424

Caption: "Map of the Russo-Japanese War with a chronological sequence of major events. June 10, 1904."

425

"…As long as Russia's center-of-gravity remained well to the western, European part of its territory, it posed no threat to Japan's territorial ambitions. But when Russia embarked on the construction of the Trans-Siberian Railway . . . Japan was alarmed…"

RE: excerpt from: "Railways and the Russo-Japanese War: Transporting War." The TSR was the pet project of *Sergei Witte,* an influential minister in the Russian government. Witte believed that political power came from economic power and saw Siberia as an under-exploited region of the *Russian Empire*. A railway, he believed, would allow Russia to settle Siberia, harvest its natural resources, and expand trade with East Asia. Witte's ideas dovetailed with those of *Czar Alexander III,* who saw the growth of a Russian population in Siberia as a way to secure the country's eastern border. Thus, in 1891, Russia broke ground on the railroad that would connect its European and Asian halves. From the Japanese point-of-view, this was quite alarming. Prior to the TSR, Russia was mostly focused on European affairs. The more the country turned its eyes east, the more worried Japanese policy-makers became about Russian intentions.

426

Caption: "Japan Tramples Korea. In this illustrated postcard, printed in Russia ca. 1905, Japanese soldiers heading toward Russia march over a prostrate Korean man." 427

"…***Before the construction of the Trans-Siberian Railway, Siberian infrastructure for a military and economic expansion to the Pacific shores was poor. Especially in Eastern Siberia, roads were impassable and, therefore, could not be used for troop transfers. Only with the construction of the Trans-Siberian Railway by 1891 could Russian geopolitics in Northeast Asia be realized…"***

Eva-Maria Stolberg, **Associate Professor of Russian history at the *University of Duisburg-Essen***

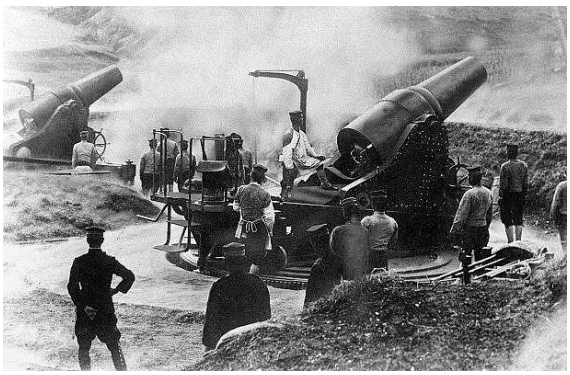
RE: excerpt from her scholarly work entitled: "The Russo-Japanese War Cannot be Understood Without the Siberian Background." In 1896, Witte made things worse when he negotiated a deal with China to expand the railroad into the northern Manchuria region. The proposed expansion, called the *Chinese Eastern Railway* (CER), would shorten the length of the TSR by 800 miles. It would also make it easier for Russia to trade in Manchuria. Japan interpreted this as a sign that Russia had designs on Manchuria; territory Japan wanted for itself. This suspicion turned into a certainty in 1900 when Russia sent 170K troops into Manchuria and occupied the entire province (in response to the *Boxer Rebellion*). This strategic move would not have been possible without the TSR. 428

Caption: "The cheers from the civilian Russians show that to Russia, there was no doubt of victory in the war. They called the Japanese 'yellow monkeys,' and believed that Japan was too weak to dare to attack." 429

"…In the face of Russia's strong need for Manchuria, the years from 1901 to 1903 were filled on both sides with a growing sense of impending doom. It was becoming increasingly clear that finding any negotiated solution to the impasse would be difficult…"

Dale Copeland, **Political Scientist at the *University of Virginia***

RE: the Japanese became concerned that the Russians would keep expanding throughout East Asia, even into Korea. The Russians, who saw their presence in Manchuria as an essential bulwark against a Japanese attack on Siberia, refused to budge. This created a slow-motion crisis, one that both sides came to believe would end in war. Late in the evening of February 8, 1904, Japan launched a surprise attack against the Russian-held *Port Arthur,* along the coast of Manchuria, beginning the *Russo-Japanese War.* A siege ensued starting August 1, 1904 and Port Arthur finally surrendered on January 2, 1905. Russia faced many defeats as it battled Japan while also fighting a revolution on the home front. In September 1905, POTUS *Teddy Roosevelt* negotiated a peace treaty between the two warring countries, earning him the *Nobel Peace Prize* in 1910. 430



Caption: "The Siege of Port Arthur, the deep-water port and Russian naval base at the tip of the Liaodong Peninsula in Manchuria, was the longest and most violent land battle of the Russo-Japanese War" 431

"…After Russia's disastrous debacle, Russian war minister Aleksei Kuropatkin recognized that the technological condition of the Trans-Siberian Railway contributed to Russia's weak defense in Northeast Asia…"

Eva-Maria Stolberg, **Associate Professor of Russian history at the *University of Duisburg-Essen***

RE: excerpt from her scholarly work entitled: "The Russo-Japanese War Cannot be Understood Without the Siberian Background." The *Russo-Japanese War* was a devastating defeat for the Russians due, in part, to the incomplete state of the TSR. The poor state of the railway made it difficult for Russia to transfer troops and supplies from the west, thereby allowing Japan to overwhelm the Russians. The war killed between 130K and 170K soldiers and transformed East Asian geopolitics. Russia ceded significant amounts of territory to Japan and its Pacific fleet was devastated at the *Battle of Tsushima* (May 27-28, 1905). This led to the emergence of Japan as the dominant military power in East Asia, which allowed Japan to seize more territory in East Asia and expand its imperial ambitions. Japanese imperial growth created great tensions with the U.S. (an Asian power in its own right as a result of the *Spanish-American War*) that saw Japanese imperialism as a threat to its own ambitions. 432

Caption: "A contemporary lithograph of Japan's triumph over the Russians at the Battle of Tsushima"

433

The Commerce of the Siberian Railway
Scientific American
April 30, 1904

434

THE total distance from St. Petersburg to Port Arthur by the Russian Trans-Siberian Railway and the Russian: lines in Manchuria is 5,913 miles, or practically twice the distance from New York to San Francisco. This is one of the numerous interesting facts about Russia and her railway and commercial systems presented in a monograph just issued by the Department of Commerce and Labor through its Bureau of Statistics, entitled "Commercial Russia in 1904." The publication, which occupies more than 100 large pages, discusses in detail present commercial and financial conditions in Russia and other subjects closely allied therewith. Area, population, railways, water transportation, methods of communication, agriculture, manufactures, commerce, and many other subjects of this character are among those discussed. Agricultural conditions, and especially Russia as a rival of the United States in wheat production; mining conditions, and especially Russia as a rival of the United States in mineral oil production; manufacturing conditions, and Russia as a possible competitor of the United States in the markets of the Orient for manufactures are discussed in detail.

435

Regarding the railways, which are a subject of especial interest at the present time, in view of present conditions in Russia and the Orient, the report says: The importance of railways as means of communication is now greater than that of the rivers and other water routes, as is shown by accompanying tables. The building of the trunk lines, with the exception of the St. Petersburg-Warsaw-Vienna, built during the years 1845-1848 and 1853-1862, respectively, and the St. Petersburg-Moscow (Nicholas line), constructed between 1843 and 1851, dates back to the decade between 1860 and 1870. These years witnessed the construction of the entire group of railways, with Moscow as their common starting point, viz.: Moscow-Nijni-Novgorod (1861-62), Moscow-Voronezh (18-62-1869), Moscow-Volodga (1862-1872), Moscow-Kharkov (1866-1869), with its branch to Kief (1868-1870), and Moscow-Warsaw (1866-1871).

436

Next in point-of-time comes the construction of roads connecting the black-soil region with its natural outlets, the ports of the Baltic and Black seas: Riga-Tsaritsyn (1861-1871), Kief-Konigsberg (1870-1873), Libau-Rommy (1871-18-74), and Samara-Viasma (1866-1871), all of which lead to the Baltic. Simultaneously lines were built connecting each one of the more important southern seaports with the agricultural provinces. Chief among them are: The Odessa line, with its branch to Yelisavetgrad (1867-1869), and its Bessarabian branch (1871-1874), Kharkov-Nikolaiev (1869-1873), Kharkov-Taganrog (1869), Voronezh-Rostov (1861-1876), and, finally, Kharkov-Sevastopol (1869-1875).

437

The Russo-Turkish war of 1878-79 caused an almost entire suspension of railway building. It was only during the decade beginning with 1880 that activity in this field was again resumed, but the character and method of construction of the newly-built roads changed abruptly.

438

In place of the former trunk lines, connecting either the black-soil area with the seaboards of the Baltic, Azov, and Black seas, or with the central industrial region around Moscow, these years witnessed the construction of great strategic railroads, such as the Trans-Caspian, the Polessie system, besides roads primarily destined for the service of relatively small though important industrial regions (Catherine line, Ivangorod-Dombrovo).

439

Moreover, the system of granting franchises (concessions) was superseded by the building and working of roads directly by and on account of the state. At the same time the redemption by the government of great railway systems was going on, so that for some time it seemed as if all private roads were going to be acquired by the state.

440

Although of late greater latitude has been given to private initiative, by for the greater part of Russian railways is in the hands of the government. Out of 36,673 miles under the control of the ministry of communication on January 1, 1904, 24,436 are worked by the state, and 12,237 miles only by private companies.

441

The adverse years, 1891 and 1892, gave a new impetus to railways. “In order to give employment to the starving peasantry” the government undertook and encouraged the construction of new roads. A new era of railway building began with these years, which, in its vigor, soon surpassed anything seen not only in Russia itself but anywhere else in Europe. Thus, while during the above years the number of versts opened for traffic was but 123 and 419 respectively, the succeeding years mark the beginning of an exceedingly energetic expansion of the railway system, whose termination does not seem to be at hand even in the near future.

442

According to official figures there were opened for traffic during:

Year.	Miles.
1893	1,043
1894	1,147
1895	1,277
1896	1,953
1897	1,190
1898	1,897
1899	3,297
1900	1,647
1901	2,235

These figures include roads built not only by the state, which has its hands full with the construction of the grand trans-Siberian railway, but also by corporations whose activity now almost surpasses that of the early years of the decade beginning with 1870, the first period of great railway construction, when the building of roads, for some time at least, became the monopoly of a few private companies. At present franchises are eagerly contested by competing corporations, a fact unheard of until recently in Russia, where the state, not so very long ago, had yet to guarantee the interest on the stock and bonds of the chief railroad corporations.

443

The ministries of finance and transportation have, during the latest years, been literally swamped with petitions coming not only from railroad and construction companies, but also from representatives of “local interests,” as mining, manufacturing, and agricultural groups. The length of Russian railways in Europe alone has thus considerably increased during the last ten years, and surpasses now that of France and Great Britain, respectively, being inferior only to that of Germany.

444

Simultaneously with the redemption of the greater part of Russian railways the government undertook the difficult task of regulating the railway tariffs for both passengers and goods. The principles adopted were those of the "zone" tariff, and the results of the innovation have been very encouraging, for both passenger and freight traffic have increased considerably since the introduction of the new tariffs.

445

The present state of the Russian railways, according to the recently published returns of the ministry of communications, is stated as follows: At the beginning of 1902 the total length of all Russian railways (exclusive of railways in Finland) was 35,187 miles, of which 28,982 miles were in European Russia, 5,138 represented the length of railways in Asia (exclusive of the Manchurian Railway), and 1,067 were secondary railways of local character. Of this total of over 35,187 miles, 23,557 miles, or over 67 per cent, were owned and operated by the government.

446

The value of this system, exclusive of the local secondary roads, is given as 5,149,399,000 rubles, or about 99,000 rubles per verst. Of this grand total expended in the construction of railways the government's share is 4,914,805,000 rubles, or about 95 per cent. This amount includes the value of all corporate securities, both stocks and bonds, the income from which was guar-anteed by the government, those of the bonds amounting to 2,920,428,000 rubles, which are held by the treasury, and the total amount of subsidies granted for the construction of railways.

447

For January 1, 1904, the length of the entire Russian railway system, exclusive of 1,944 miles of railroad in Finland and 1,555 miles of the eastern Chinese road, is officially stated as 36,673 miles. Of this total, 31,493 miles were in Europe and 5,180 miles in Asia. Of the European railways, the government operates 19,256 miles, while 10,954 miles of railway of general interest and 1,312 miles of railways of local interest were operated by private corporations. The total length of double-track roads was 6,830 miles. The length of miles opened for operation during the year 1903 was 446 miles. The total number of miles under construction was 3,931.

448

For the five years 1897-1901 the net earnings per mile of the American railways and railways in European Russia compare as follows:

	American railways.	Russian railways in Europe.
1897	$2,016	$1,789
1898	2,325	1,778
1899	2,435	1,705
1900	2,262	1,664
1901	2,854	1,493
Average	$2,378	$1,686

It is seen that the net average per mile earnings of the American railways for the period in question are over 40 per cent higher than those of the Russian railways. Still more unfavorable comparisons might be drawn if the financial accounts of the Russian railways were set side-by-side with the same accounts of European railways having a much larger density of traffic than the United States railways.

449

Siberia and the Trans-Siberian Railway

Scientific American
November 12, 1904

450

ANNALES DES SCIENCES POLITIQUES, in its issue of September 15, says that the construction of the Trans-Siberian Railway was undertaken mainly to develop the resources of Siberia, although there were political and strategical reasons also.

451

In 1857 an American named Collins first proposed a railway from Amur to the village of Tehita. Later, several plans were formulated, but it was not until March 17, 1891, that the Trans-Siberian Railway was definitely determined on and projected by an imperial order. On May 19, 1891, the first stone was laid.

452

The line covers 3,562 miles in Russian territory and 1,604 miles in Chinese territory. In ten and one-half years 5,166 miles of rails were laid. In the Canadian Pacific, constructed under similar conditions, it took ten years to lay 2,921 miles of rails.

453

It is true that in order to construct the Trans-Siberian with such rapidity it was necessary to employ simpler means than those usually employed on Russian railways. Lighter rails were used; less ballast was put under the ties; the ties were shorter; fills, instead of being made 18-feet-wide, were limited to 16.4-feet; and the grades and curves were accentuated.

454

The government thought thus to reduce expenses, but it was quickly perceived that this would not answer the exigencies of the case. The government therefore proceeded immediately to replace the light rails, to lengthen the ties, and to perfect the roadbed. This, of course, meant double work and a corresponding increase of expenses.

455

Freight trains cover the distance from Moscow to Vladivostok in fifty to sixty days, traveling at the rate of about 8 miles-an-hour; passenger trains make a speed of about 13-1/2 miles-an-hour. It is hoped that when the road has been perfected the freight trains will make 13-1/2 miles-an-hour and passenger trains 22 miles-an-hour. The total expenses to date exceed $391,400,000. There are yet two lines to be completed – one around Lake Baikal and the other to Khabarovk.

456

Before the construction of the railway the commerce of Siberia with Russia passed almost entirely through the two towns of Toura and Tioumen. In 1891 there were exported from Toura 87,662-tons of Siberian products, and 41,565-tons imported from Russia; 80 per cent of the exports were cereals.

457

From 1896, the commencement of regular traffic on the railway, until 1899 the number of travelers transported had increased from 417,000 to 1,075,000, and the number of tons of merchandise transported had increased from 206,452-tons to 728,939-tons, but it must be remembered that these figures include some goods destined for the railroad and for the state. The products exported are cereals, tea, beef, pork, butter, leather, hides, wood, salt, wool, eggs, game, cattle, poultry, charcoal, and cedar nuts.

458

By means of the Trans-Siberian Railroad, a regular communication has been established with the different rivers of Siberia, and this is particularly important for the movement of cereals, since 365,887-tons, or one-half of the total exports, were cereals.

459

This railroad has rendered the most appreciable services to the colonization of Siberia. This colonization has been aided by the creation of a "Trans-Siberian Committee," which sent out literature on Siberia and also established a number of supply houses and medical depots. The efficacy of the latter may be judged from the mortality figures of the emigrant *en route* – in 1894, out of 56,000, 3,000 died, while in 1899, out of 220,000, only 300 perished. From 1893 until 1899 the number of emigrants increased from 65,000 to 223,918, while the total number amounted to 968,440. The fare for emigrants is one-fourth of the regular rate.

460

In 1900 a special commission was formed for the purpose of laying off lots for the colonists; since that time 15,506,997 acres have been laid out and 11,-629,707 acres are now occupied. Every emigrant with the proper authorization receives 40.5 acres. During the first three years of residence the emigrant pays no taxes, and for the three following years he pays only one-half the legal rate. Emigrants without resources are furnished money for expenses of travel, etc. Wood is furnished them from the imperial forests. At localities here wood can not be obtained direct from the forests, depots have been established where it can be obtained at first cost. The average annual crop of Siberia amounts to from 3,280,000 to 4,100,000-tons, of which three-fourths come from western Siberia.

461

It is also interesting to note the development of the commercial relations of Siberia and Japan. From 1896 until 1900 the imports from Japan had increased from $86,440 to $1,763,418. During the same period the exports had increased from $656,000 to $2,846,568.

462

Part 5

Gateway to Asia

463

World's Longest

464

The world's longest line of 5,400 miles built by Russia at a cost of $200,000,000
***Popular Mechanics,* May 1904**
RE: introduction to an article entitled: "The Great Trans-Siberian Railroad"

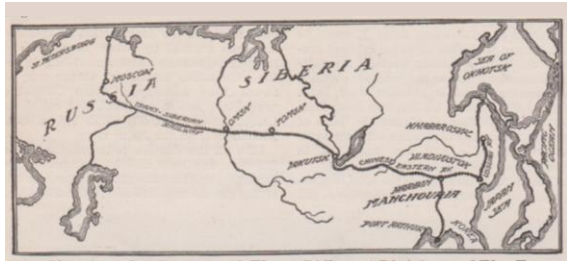
465

Moscow to the Pacific

466

"STRETCHING 5,400 miles from Moscow to Port Arthur, the Trans-Siberian railroad connects the heart of Russia with its far eastern possessions and is the longest, costliest and most remarkable railroad ever built. In the 5,400 miles of its distance from Moscow to Port Arthur, there are 100 miles of bridges, some of which span streams more than a mile wide and are imbedded in treacherous, shifting sands…"
***Popular Mechanics,* May 1904**

467



Map Showing the Route and Three Different Divisions of The Trans-Siberian Railway

"…At Harbin, in Manchuria, the road divides, one line extending east to Vladivostok and the other south to Port Arthur. That part of the road in Chinese territory, about 1,600 miles, is called the Chinese Eastern Railway. What is known as the Trans-Siberian Railroad, proper, extends from Moscow to Irkutsk, Siberia, which is 45 miles west of Lake Baikal, and is 2,672 miles from Moscow…"
***Popular Mechanics,* May 1904**

468

East of Baikal

469

"…The Chinese Eastern Railway is but another name for that part of the Trans-Siberian Railway east of Lake Baikal, just as the Texas line of the Rock Island road is called the Chicago, Rock Island and Texas, instead of the Chicago, Rock Island and Pacific. The concession for the construction of this section was granted by China in return for Russian diplomatic and financial help in settling the issues arising out of the war between China and Japan…"

***Popular Mechanics,* May 1904**

RE: it's owing to the *Chinese Eastern Railway* (CER) that the Russian city of Harbin was established in the late 19th century to house those who built and maintained the CER, the construction of which began in 1897. In 1900, the *Russian Empire* (in cooperation with other nations) participated in suppressing the *Boxer Rebellion* and took advantage of the opportunity thus afforded to occupy the northeastern Chinese province of *Dai Qing-Guo,* thereby accruing additional benefits by their presence in the region. Later, the Chinese and Russian Government/s held unsuccessful negotiations to settle the dispute, leading in 1903 to the creation of the *Far East Viceroyalty* to bring the matter to a conclusion. Russia's defeat in its war with Japan (1904-05) had an impact on the future prospects of the CER. According to the *Treaty of Portsmouth* (1905), a large part of the southern branch of the CER, which had fallen to the Japanese, was officially transferred to Japan. This put an end to the Russian Government's plans to use the CER to trade in the markets of the Asia-Pacific region.

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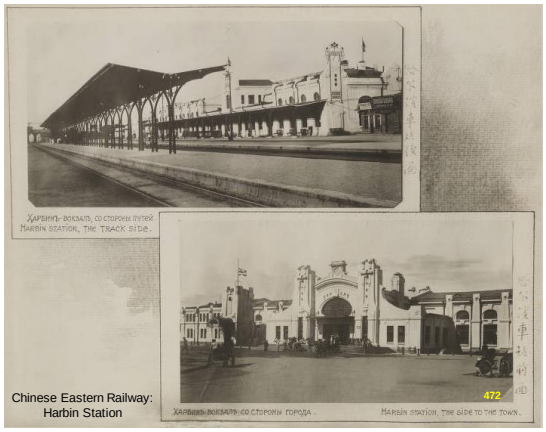
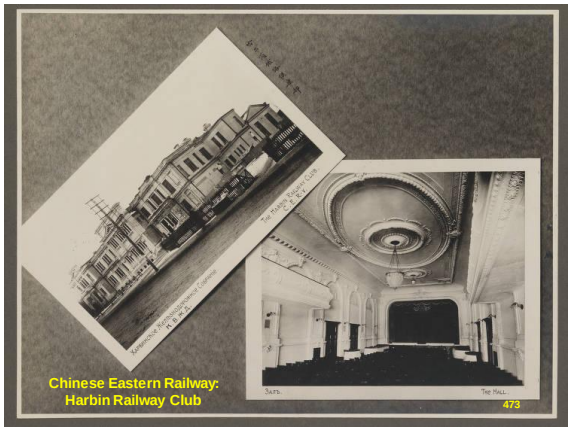
"The Chinese Eastern Railway runs through the richest section of all Asia, and covers, like a hand, the whole 400,000 square miles of territory comprised in Manchuria. It begins in Kidalova, in Siberia, fifty-three miles east of Chita, where it leaves the Trans-Siberian road and runs southeast in a straight line 600 miles to Harbin…"

RE: excerpt from an 1899 magazine article entitled: "The Chinese Eastern Railway"

471

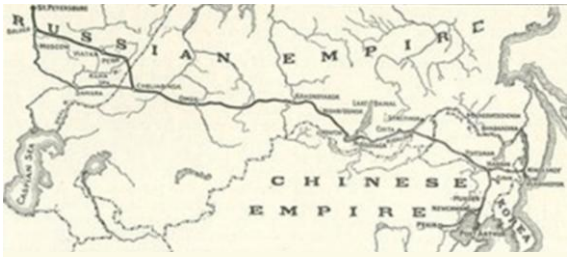


Chinese Eastern Railway: Harbin Station



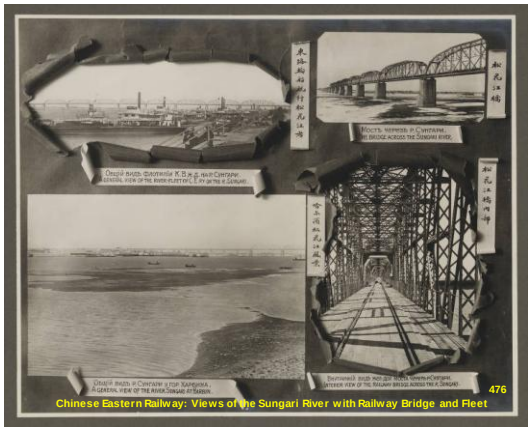
Chinese Eastern Railway: Harbin Railway Club

Chinese Eastern Railway: Harbin Railway Works



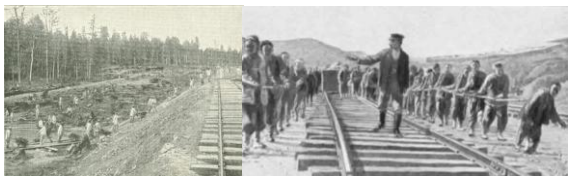
"…There, 500 miles from Vladivostok, it crosses the Sungari River, and what is now really the main line turns almost due south, and con-tinues on 650 miles to Port Arthur, while southeastward from Harbin runs the line, or branch, to Vladivostok…"
RE: excerpt from an 1899 magazine article entitled: "The Chinese Eastern Rail-way"
Caption: "A map of the Trans-Siberian and Chinese Eastern Railway, showing the line from St. Petersburg to Port Arthur. Where the line is broken, the construction is still more or less incomplete."

475



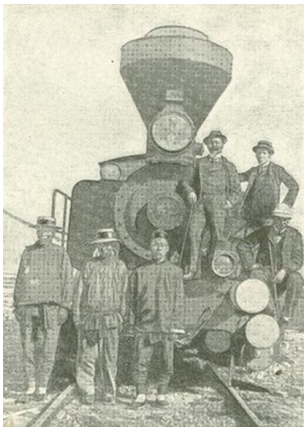
"…From the main line, south of Harbin, a branch will be con-structed southeastward to Girin; and an-other, farther south, is about completed south-westward to Newchwang. And the latter branch - to the final triumph of Rus-sian diplomacy and the perfection of Russian dominance in China is to be pushed on, when the road will connect with Pekin, the capital of China…"
RE: excerpt from an 1899 magazine article entitled: "The Chinese Eastern Railway"
Left: caption: "A map of the Chinese Eastern Railway and the connecting parts of the Trans-Siberian Railway"
Right: caption: "The Summer Palace near Pekin"

477



"…A year-and-a-half ago the very locations of the various lines of the Chinese Eastern were in doubt; to-day the road is all but completed. Through the great wheat-growing valleys of central and southern Manchuria the engineers had an easy way prepared for them…"
RE: excerpt from an 1899 magazine article entitled: "The Chinese Eastern Railway"
Left: caption: "Russian convicts at work clearing trees and building a railroad embankment on the Nikolakoy section of the Trans-Siberian Rail-way"
Right: caption: "Hauling heavy material for the construction of the Chinese Eastern Railway out of Port Arthur"

478

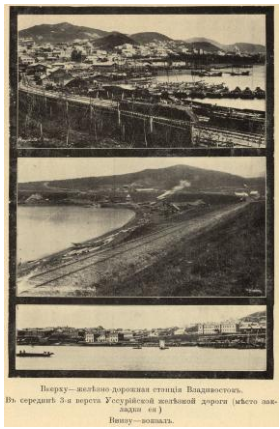


"…From Kidalova to Tsit-sikar, however, the country is repeatedly crossed by ru-gged mountain chains. But for this inhospitable and al-most insurmountable sec-tion, trains would be run-ning through from St. Pet-ersburg to Port Arthur be-fore next Christmas…"
RE: excerpt from an 1899 mag-azine article entitled: "The Chin-ese Eastern Railway"

479

"…To finance this undertaking, the expense of which no man's brain could compute beforehand, the Russo-Chinese Bank was organized, with headquarters at St. Peters-burg. It now has branches in every city of the Far East, and honors all requisitions of the rail-way officials for however large a sum. The engineers have orders to build the road, and draw money as it is needed…"
RE: excerpt from an 1899 magazine article entitled: "The Chinese Eastern Railway"

480



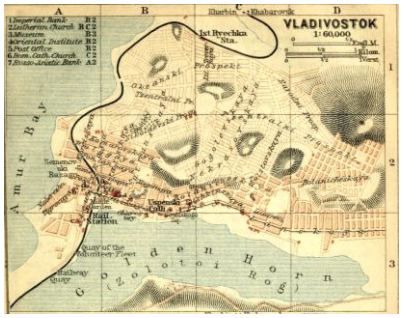
"…While practically the Chinese Eastern Railway is altogether a Rus-sian enterprise and the final sec-tion of the Trans-Siberian Railway itself, the greatest care is taken to keep the two companies outward-ly, at least, separate and distinct. Thus the docks at Vladivostok, built at enormous cost, were originally the terminus of the Trans-Siberian Railway; but now they have become practically the property of the Chinese Eastern Railway…"

RE: excerpt from an 1899 article entitled: "The Chinese Eastern Railway"

RE: Vladivostok, Russia's Far Eastern port city on the Pacific, was founded in 1860 by military officers tasked with creating a new city on *Golden Horn Bay* (Bukhta Zolotoy Rog). To build the city, the soldiers brought construction materials with them from their base at the inland city of Nikolayevsk-on-Amur.

Caption: "Top: Railroad Station in Vladivostok. Middle: Third Verst of the Ussuri Railroad (Dedication Site). Bottom: Main Station"

481



Map of Vladivostok, 1914

482

"…We have already seen how, under the original compact between China and Russia, the president of the Chinese Eastern is always to be a Chinaman. It has throughout its own separate officers and management. It has a flag of its own, half Chinese, half Russian; and the Cossacks who guard its lines have been compelled to adopt a uniform which, like the flag, is part Rus-sian and part Manchurian, and they are no longer even known as Cossacks, but as the Manchurian Ochana (guards)."

RE: excerpt from an 1899 magazine article entitled: "The Chinese Eastern Railway"

RE: the flag of the CER is a combination of Chinese and Russian flags and has changed several times corresponding to political changes

Left: caption: "Flag used from 1897–1915"

Right: caption: "Flag used from 1925–1932"

483

Caption: "Cossacks guard the CER bridge over the Sungari River in Harbin during the Russo-Japanese War (1905)

484

The Ussuri Railway

485

"…From Nikolskoe, near Vladivostok, a branch line called the Ussuri railway extends north 375 miles to Khabaroosk, on the Amur river…"

***Popular Mechanics,* May 1904**

RE: Russia acquired the *Ussuri Krai* in 1860 under the terms of the *Treaty of Peking,* concluded in that year with the *Qing Dynasty* of China.

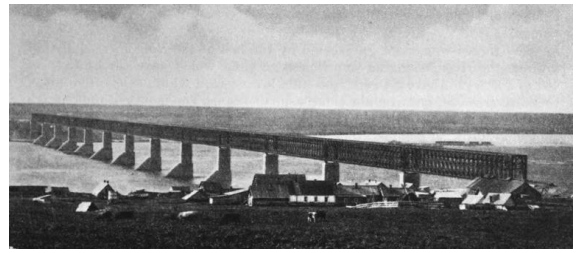
Left: caption: "Forced labor on the Ussuri Railroad construction project"

Right: caption: "Dedication of the Ussuri Railroad in the presence of His Royal Highness Nikolai Aleksandrovich, happily now the reigning Emperor"

486

The Beginning of the Beginning

487



"…Like all the Russian railways, the Trans-Siberian was built and is operated by the Russian government. The first tie was laid at the Pacific terminal of Vladivostok, May 12, 1891, by the present Czar, Nicholas II, who was then Czarowitz. Preliminary work on the line began early in the '70s. The great bridge over the Volga was completed in 1880…"

***Popular Mechanics,* May 1904**

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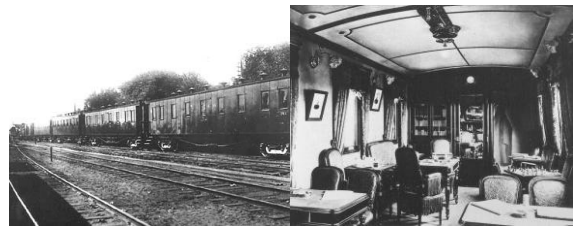
Caption: "Great bridge over the Volga"

Finest and Fastest

489



"…Noted throughout Russia are the famous trains de luxe, which leave Moscow once a week. This is the finest and fastest train on the Trans-Siberian road. It makes the run to Vladivostok in 18 days. At Harbin the through cars for Port Arthur are cut-off and reach their destination two days later. Port Arthur is 210 miles further from Harbin…"

***Popular Mechanics,* May 1904**

RE: in 1898, the TSR reached Irkutsk and in 1900, a line east of *Lake Baikal* to Sretensk was completed. Initiated by Prince Chilkov on March 20, 1898, the first Moscow to Omsk express service began, a/k/a the "State Train."

490

Left: caption: "The regular 'State Train,' Moscow – Omsk"

Right: caption: "Library aboard the 'State Train'"

Time and Distance

"…To show the superiority of American traffic, it should be remembered that the run from New York to San Francisco, 3,250 miles, is accomplished in four days and ten hours. Slower passenger trains on the Trans-Siberian require a month to make the trip, and freight trains two months…"

***Popular Mechanics,* May 1904**

491

492

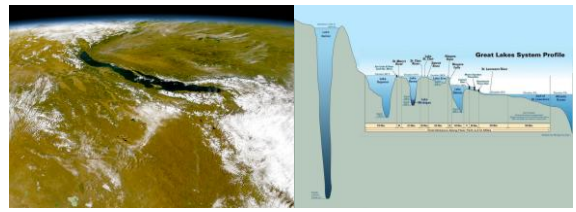
The Czar's Domain

493

"…All the railroads of Russia, of which there are 25,000 miles, have a 5-foot gauge, which being different from that of any other country, makes it impossible for any alien rolling stock to be used on this or any other lines of the Czar's domain. The standard gauge of all other continental railroads is 4-feet 8-1/2-inches. More than $200,000,000 was required to build the road and the cost will be increased by $20,000,000 when the line around Lake Baikal is completed…"
Popular Mechanics, May 1904
RE: the first railway built in Russia was built in 1837 to a 6-foot (1,829 mm) gauge for a 17 km long "experimental" line connecting St. Petersburg with Tsarskoye Selo and Pavlovsk. The choice of gauge was influenced by I.K. Brunel's *Great Western Railway*, which used 7-foot (2,134 mm) "Broad-gauge." The second railway in the *Russian Empire* was the 1840 Warsaw-Vienna railway, which was built to the "Standard-gauge" (4-foot 8-1/2-inches or 1,435 mm). For the building of Russia's first major railway; the St. Petersburg-Moscow railway, engineer *Pavel Melnikov* hired, as consultant, *George Washington Whistler,* a prominent American railway engineer. Whistler recommended 5-foot (1,524 mm) on the basis that it was cheaper to construct than 6-foot while still offering the same advantages over "Standard-gauge" and that there was no need to worry about a break-of-gauge since it would never be connected to Western European railways. Colonel *P.P. Melnikov,* of the *Construction Commission* overseeing the railway, recommended 6-foot gauge, following the example of the first Russian railway and his study of U.S. Railways. Following a report sent by Whistler, the head of the *Main Administration of Transport and Buildings* recommended 5-foot gauge and it was approved for the railway by *Tsar Nicholas I* on February 14, 1843. The next lines built were also approved with 5-foot gauge, but it was not until March 1860 that a Government decree stated all major railways in Russia would be 5-foot gauge. It's widely (and mistakenly) believed that Imperial Russia chose a gauge broader than standard-gauge for military reasons, i.e. to prevent potential invaders from using the rail system (railways can easily be made dysfunctional by retreating forces).
494

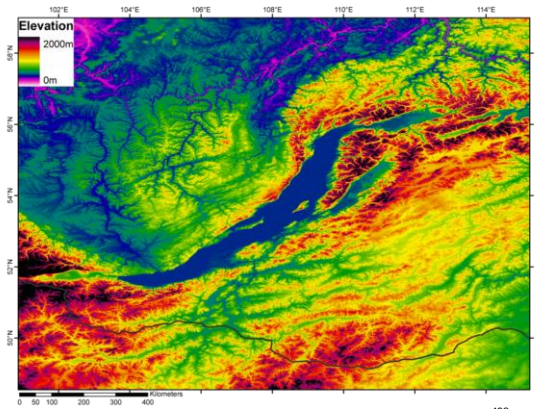
The Holy Sea of Siberia

495

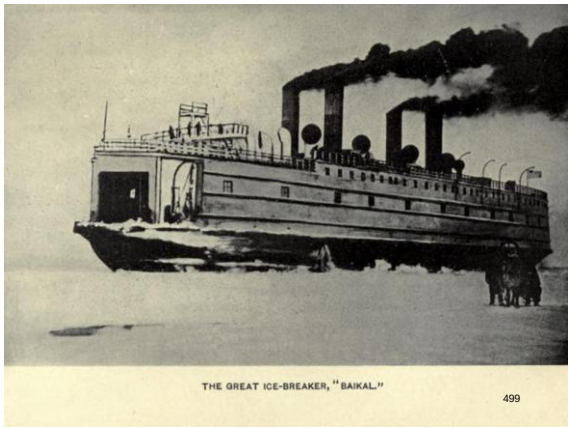


"…Lake Baikal is the mysterious Holy Sea of Siberia and furnishes the only break in the entire distance of the line from Moscow to the Pacific coast. This is the only body of fresh water in the world that is inhabited by seals. It is the deepest body of fresh water in the world, reaching the enormous depth of 5,000-feet. The lake's level is 1,500-feet above the sea level, while the bottom is 3,800-feet below the sea level…"
Popular Mechanics, May 1904
Left: caption: "Lake Baikal, as viewed from space aboard NASA's OrbView-2 satellite. Lake Baikal is the 7th largest lake in the world, but holds more fresh water than any other lake by a large margin."
Right: caption: "A comparison for the amount of water held by Lake Baikal with the water held by the Great Lakes system"
496

"…Lofty mountains wall it in on every side and the rocky shores are seamed by innumerable torrents that have to be bridged. The lake has an area of nearly 15,000 square miles. It is 500 miles long and is 42 miles wide at the point where it is crossed by the Trans-Siberian railroad ferry. An ice-breaking ferry boat, the largest in the world, built at a cost of $4,500,000, is operated across the lake in winter…"
Popular Mechanics, May 1904
RE: while more than 300 rivers flow into it, and the surrounding mountains can exceed 2K-meters in elevation, the lake itself goes down to depths well below sea-level. It is the deepest continental rift valley on the planet Earth.
Caption: "Lake Baikal is located between two high-elevation regions in Siberia"
497

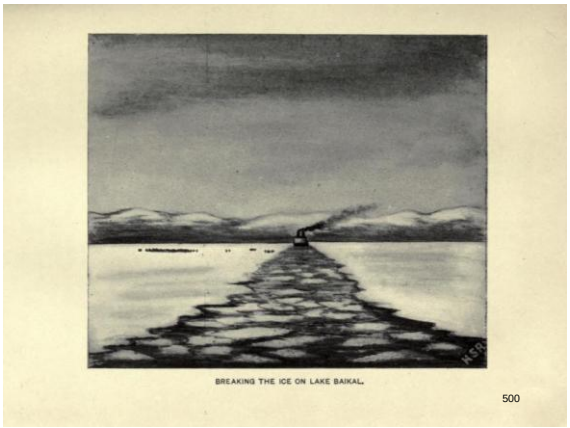


The topography of the region surrounding Lake Baikal
498



THE GREAT ICE-BREAKER, "BAIKAL."

499



BREAKING THE ICE ON LAKE BAIKAL.

500

Critical Review

501

"…Henry C. Rouse, president of the Missouri, Kansas & Texas railroad, who made a trip over the Trans-Siberian a short time ago says: 'The Trans-Siberian road is today in about the same condition for actual service as was the Northern Pacific Railroad a few years before I became receiver of it. It was built by methods akin to those by which out great transcontinental roads were built. The bridges, with the exception of those on the old road in level country west of Samara, are up to the requirement of the modern American motive power'…"
***Popular Mechanics*, May 1904**

502

"…'Some of the track now in use on the greater part of the Trans-Siberian line, especially on the east end, is still laid with 56-pound rail, which is rapidly being re-laid with 65-pound rail. Much of this track is still unballasted and some of it is not even properly surfaced in Manchuria, where, however, the ties are the worst feature of the work, few and far between, and many of them round on top, having not more than a 4-inch face, being made by splitting a pine log in two, laying the flat face in the ground and adzing off the spot to receive the rail on the round side'…"
***Popular Mechanics*, May 1904**
Caption: "Track laying on the Trans-Siberian Railway"

503

504

"…'To all appearances the road is well located with good alignment and slight curvature and modern grades, save for the Ural mountain division where the trains reach an altitude of 3,600-feet, about half that attained by the trains on crossing the Great Divide of the United States. Sidings have been built at intervals of 12 or 15 miles along the line'…"
Popular Mechanics, May 1904

505

"…'Much has been said of the Trans-Siberian railway's inefficiency on account of its having a single-track line, but the fact is seemingly overlooked in this criticism of the Trans-Siberian system that the great trunk lines of America are mostly single track west of Pittsburg and that barely seven per cent of all the main line mileage in the United States is double tracked'…"
Popular Mechanics, May 1904

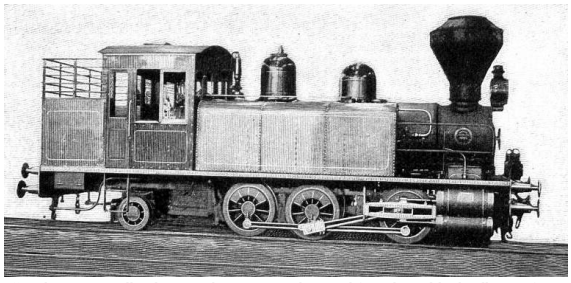
506

"…'The efficiency of the entire Trans-Siberian road depends on its efficiency to transport passengers and merchandise across Lake Baikal. The railway now being built around the lake involves much more tunneling and other heavy work. Such a lake shore line will do much toward bringing the road up to the efficiency of some of our own trans-continental systems'…"
Popular Mechanics, May 1904

507

Russian-Built

508



"…The Trans-Siberian road connects the Ural frontier with the lines of European Russia and now affords unbroken railway communication between the Pacific coast and the capitals of Europe. The road was built entirely by Russian engineers, though many of the rails and some of the rolling stock came from the United States…"
Popular Mechanics, May 1904
Caption: "Type of locomotive manufactured in the U.S. for the Trans-Siberian Railway"

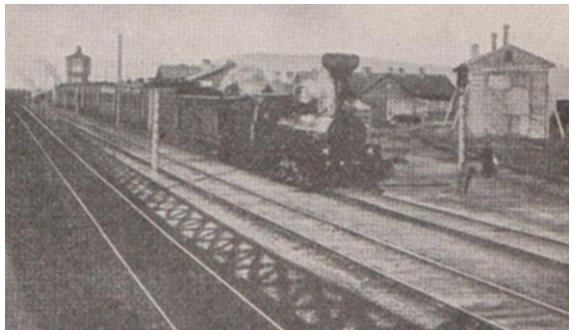
509

"…The rapidity of construction of the Canadian Pacific Railway, averaging 300 miles annually for 10 years, is often cited as marvelous; but of this Russian line 5,166 miles were built in 10-1/2 years, or at the rate of nearly 500 miles-a-year. Moreover, a change of plan to secure a firmer railbed and safer and more adequate service necessitated reconstruction after a considerable portion of the line had been completed…"
Popular Mechanics, May 1904

510

Shortcut

511



"…When the section around Lake Baikal is finished, the time of passage from St. Petersburg to Port Arthur or Vladivostok will be reduced to about 12 days…"
***Popular Mechanics*, May 1904**
Caption: **"Trains approaching Lake Baikal"**

512

Rest and Pray

513

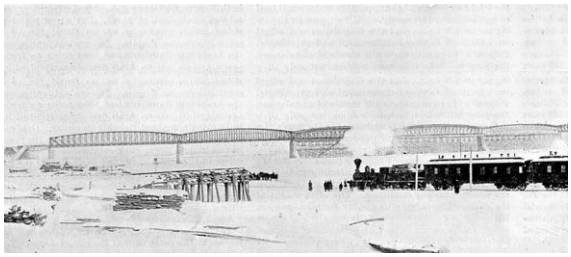
"…The railway stations along the Trans-Siberian are, as a rule, superior to those of the rural districts of the United States. No two of them are exactly alike in style. At every station the government has built a church; even at the smallest depots, where the place of worship is 10 by 12-feet…"
***Popular Mechanics*, May 1904**
Caption: **"A typical Siberian railway station"**

514

515

To Get to the Other Side

516



"…Bridges along the route are built of steel and substantial masonry and their construction is especially commendable. The bridge over the Irtish at Omsk is one of the finest in the world. With its approaches it is nearly four miles long and has an opening of 2,100 feet…"
Popular Mechanics, May 1904
Caption: "Movement of trains on the ice near the bridge over the River Irtish"

517

"…A bridge 3,000-feet-long spans the Yenisei, the grandest river of Siberia. The Amur river at Khabarovka is crossed by a bridge nearly 5,100-feet-long. Forty-six bridges, none less than 200-feet-long cross tributaries of the Old River between Irkutsk and Lake Baikal, a distance of only 41 miles…"
Popular Mechanics, May 1904

518

God's Country

519

"…For 600 miles the western section of the road runs through a splendid farming country, producing an abundance of grains of all kinds; 300 miles is through a well-watered grazing district, and for 200 miles east of the Old the surface of the country, through broken by hills, is heavily-timbered and well-drained…"
Popular Mechanics, May 1904

520

"…The central division, between Tomsk and Irkutsk, traverses on the whole a barren upland of unknown mineral possibilities, but whose climate and soil forbid settlement. East of Lake Baikal the road rises gradually to the crest of the Yablonol mountains, there reaching its highest elevation, 3,412-feet, and thence descending the Pacific slope to the valley of the Amur…"
Popular Mechanics, May 1904

521

"…Alfred S. Johnson, Ph.D., says: 'This trans-Balkalian section traverses one of the wildest and most romantic tracts ever penetrated by railroad engineers, a section of untold wealth in gold, silver, copper and iron, which is already attracting a rapidly growing population. The Amur division, as projected, has its route for about 1,600 miles through a well-timbered alluvial land, enjoying a climate tempered by proxymity to the Pacific; while the Ussuri section, extending up the valley of the river of that name, from its junction with the Amur at the point where the latter turns abruptly northward on its final rush to the sea, runs through a hilly country, well adapted to agriculture and stock-raising and rich in bituminous coal'…"
Popular Mechanics, May 1904

522

"…Both the branches through Manchuria tap a rich and thickly settled farming country. The road crosses the four great rivers, the Old, Yenisei, Lena and Amur, over their upper waters at about the point where they begin to be easily navigable, thus facilitating communication throughout the entire length of their valleys. This is of special importance in aiding the movement of cereals, which comprise one-half the total exports of Siberia. The annual grain crop amounts to about 4,000,000 tons…"
Popular Mechanics, May 1904

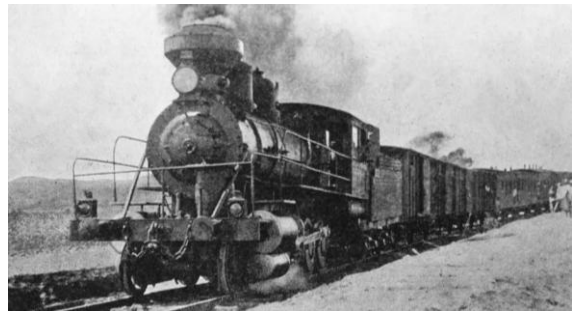
523

"…The Technical World says: 'The facilities of communication offered by the road will also stimulate development of the arable plains and the cattle-breeding districts of the Steppes now roamed by the Kirgiz race, the finest of the Tartars. For Siberia has the largest grazing ranches in the world and is the original home of the whole granivorous stock'…"
Popular Mechanics, May 1904
Caption: "Kirgiz removing their camp"

524

To Run a Railroad

525

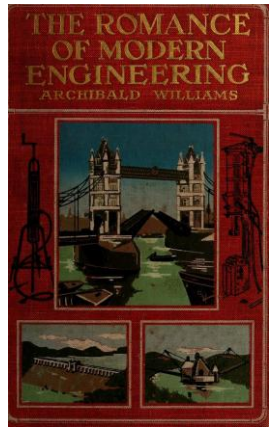


"…Last year the Trans-Siberian road carried 1,000,000 tons of freight and in all 1,300,000 passengers. The locomotives, while in good operating condition, are for the most part wood-burning and of the type in common use in this country during the '80s…"
Popular Mechanics, May 1904
Caption: "A Trans-Siberian Railway train delivering supplies to Russian troops during the Russo-Japanese war"

526

"…Passenger accommodations are divided into first, second, third or fourth class. A fourth-class car will accommodate 12 cattle or 40 persons, and is used interchangeably."
Popular Mechanics, May 1904
Above: caption "Fourth-class cars on the Trans-Siberian railway"
Left: caption: "Immigrant car on the Trans-Siberian railway"

527



The Romance of Modern Engineering

Chapter VII
The Trans-Siberian Railroad
1904

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On the 9th of November 1901, the following telegram flashed along the wires from M. Witte to his Imperial master, the Czar:

"On May 19, 1891, your Majesty at Vladivostock turned with your own hand the first sod of the Great Siberian Railway. Today, on the anniversary of your accession to the throne, the East Asiatic Railway is completed. I venture to express to your Majesty, from the bottom of my heart, my loyal congratulations on this historic event. With the laying of the rails for a distance of 2400 versts, from the Transbaikal territory to Vladivostock and Port Arthur, our enterprise in Manchuria is practically, though not entirely, concluded. Notwithstanding exceptionally difficult conditions, and the destruction of a large portion of the line last year, temporary traffic can, from day-to-day, be carried on along the whole system. I hope that within two years hence all the remaining work to be done will be completed, and that the railway will be opened for permanent regular traffic."

To which the Czar replied:

"I thank you sincerely for your joyful communication. I congratulate you on the completion within so short a time, and amid incredible difficulties, of one of the greatest railway undertakings in the world."

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"…He bought up nearly all the privately owned railroads in the empire, and after getting them under State control proceeded to improve and systematize the organization of this vast system with remarkable effect…"

The New York Times

RE: excerpt from Witte's 1915 obituary. *Count Sergei Witte,* who oversaw construction of the system during his time as the Russian Empire's finance minister (from 1892 to 1903), was a major force in the development of the TSR. Witte was one of Russia's most influential and efficient public officials during this period, and he proved instrumental in consolidating the infrastructure needed for the railway and expediting work on the extensive network. Witte was also responsible for the creation of many new lines within the system.

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Ten years. Four thousand miles of railway laid down. More than a mile-a-day: a record.

Europe and Western civilisation at the one extremity, China and Eastern civilisation at the other. In between the greatest of the continents, and across that continent the unbroken (save for a few miles) band of iron.

A huge country - covering five million square miles - of swamp and forest and rich corn land, and mountains, and deserts. A country of intense cold and great heat. A country outwardly wretched, but hiding in its bosom treasure incalculable. A country of mighty rivers flowing from the central mountains of Asia to the Arctic Ocean, frozen solid half the year, but at certain seasons among the most magnificent waterways of the world. A country that was once inhabited by a great population, and then for ages the abode of a few wandering tribes; now receiving fresh life from tens of thousands of emigrants, who pour into it from Russia over the iron way. A country, in short, of which, but a few years ago, we knew little whatsoever; even less that was enticing, or creditable, or propitious. We regarded it as a mere dumping-ground for Muscovite criminals, chained to the deadly labour of the mines, or cast abroad to fare as best they might in the great solitudes. But now it has suddenly leapt into notice as a new Land of Promise, to which are turned the eager and inquiring eyes of half the world.

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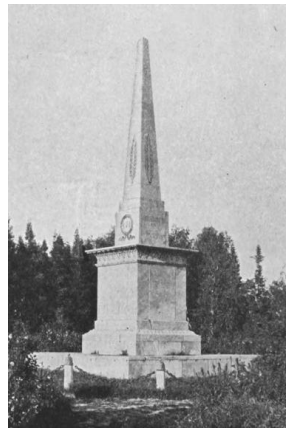

The story of Siberia begins with the picturesque figure of Yermack - "the Mill-stone" - a boatman who plied his trade on "Little Mother Volga" as the Russians fondly term their mightiest river. He fell into a bad habit of piracy, and after a series of murders was forced to flee for his life to the Urals, where he met a family of traders who were preparing an expedition to Siberia, the land of the precious sable. He entered their service as trapper, and in 1581 started for hunting-grounds far away in the heart of North Asia. Many doughty deeds were wrought by Yermack and his followers in their struggle with the Tartar tribes, and his victories over the savage tribes brought him pardon and great honour. But his enemies killed him at last, and other leaders took his place, penetrating further and further westwards in search of sable, suffering terribly at times, but still pushing on the limits of the Empire to Tobolsk, Yeneseisk, Irkutsk.

Caption: "Monument to Yermack, conqueror of Siberia"

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In 1650 the gallant Khabaroff conquered the territory of the Amur, and brought the Russian standard to the Pacific Ocean. Then followed a period of rest for 200 years, at the end of which General Mouravieff formally annexed the district, which by the Treaty of Pekin, 1861, passed into Muscovite hands for ever.

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The Russians now had an important province in the Far East, washed by the waters of a great ocean, and traversed by a noble river. They determined that it should be joined to their European possessions by something more commodious and more safe than the ill-made, bandit-infested post-road that wound its muddy or frozen length across the steppes and mountains.

America had been spanned by the iron way. Why not Siberia? The engineering difficulties arising from natural configuration would not be insuperable.

Jogging the Russian elbow was the Anglo-Saxon engineer. It is interesting to note that the scheme of laying a ribbon of steel across the Asiatic continent first matured in English and American brains. As far back as 1857 an American named Collins offered to connect Irkutsk to Chita, some hundreds of miles east of Lake Baikal. The following year an English syndicate proposed a railway from Moscow to the Sea of Japan, and undertook its construction for a price. But the Russians preferred to wait until such time as their own engineers could cope with the Herculean task. For forty years they planned and surveyed, gathering experience from the great railway pushed eastward to Merv and Sarmakand. So strong was their faith in the potentialities of the Great Lone Land of Asia as a dwelling-place for their teeming millions, that when at last the work was taken in hand they faced an enormous expenditure despite the financial straits in which their country was sometimes involved.

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The sum of £40,000,000 was voted for the construction of the line. In order to expedite its progress, its total length, from Cheliabinsk, on the European frontier, to Vladivostok on the Japan Sea, was divided into the following divisions:

1. Cheliabinsk to Obi, the *Western Siberian* section, 800 miles long.
2. Obi to Irkutsk, the *Central Siberian* section, 1137 miles.
3. Irkutsk to Myssovaia on the south-east shore of Lake Baikal.
4. Myssovaia to Stretensk, the *Trans Baikal* section, 686 miles.
5. Stretensk to Khabarofsk on the Ussuri River, the *Amur Section,* 1326 miles.
6. Khabarofsk to Vladivostok, the *Ussurian Railway,* 478 miles.

The first sod was cut and the first barrow-load wheeled at Vladivostok by the present Czar, who in 1891 as Czarewitch made a grand tour of the East. A start was made at the Cheliabinsk end in the following year. Ever since construction has steadily progressed in the face of physical and other difficulties at a pace which eclipses the laying of the great trunk lines of the United States and Canada.

In December 1895 the Trans-Siberian was completed to Omsk; in 1896 to Obi; in 1896 to Irkutsk, 3371 miles east of Moscow. Simultaneously the Ussurian section had reached Khabarofsk, so that in seven years 2503 miles of rail had been opened to traffic.

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Stretensk was reached in July 1900, and there the original scheme terminated. To avoid carrying the line along the Amour an arrangement was come to with the Chinese Government in 1896, by which the engineers were given rights to drive the track across North Manchuria in an almost straight line to Vladivostok; and in 1898 the Russo-Chinese Bank (*alias* Russian Government) obtained a concession to make a branch due south from the Manchurian section to Port Arthur on the Gulf of Pecluli. These sections were pushed forward with the greatest possible speed, owing to political events in the Far East, which demanded the presence of large bodies of troops to protect - or extend - Russian interests.

The Trans-Siberian Railway, as measured from Cheliabinsk, has a length to Vladivostok of 3967 miles, and to Port Arthur of 4242 miles. If we add to this the Ussurian system, and the section running north-east from Cheliabinsk to Kotlass on the Northern Dwina, we arrive at the grand total of nearly 6000 miles, or about double the mileage of the “Canadian-Pacific.” The railway in its course crosses the upper waters of the Obi, Yenisei, Lena, and Amur at points where they begin to be easily navigable by vessels of considerable size. These rivers, each between 2000 and 3000-miles-long, exclusive of tributaries, are being connected by canals, which will form the most splendid system of water communication in the world, and act as feeders to the great railway at many points. Their utility during the construction of the latter has been incalculable.

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Three names are conspicuous among the many connected with this gigantic undertaking: those of the Czar, who is President of the Railway Committee; of M. Witte, the Minister of Finance; and of Prince Hilkoff. Of these the second was once a stationmaster on the Southern Russian railways: and the third worked under an assumed name as a paid employee on the railroads of the United States, where, in the shops and elsewhere, he gained the great store of practical knowledge that he is now turning to such good account.

The chorus of admiration evoked by the successful termination of their labours has been unanimous. Yet questions have been raised about two points, on which criticism has laid a finger. To the outsider it is a matter of surprise that the railway should have given a wide berth to Tobolsk, the capital of Western Siberia, and to Tomsk, the capital of the Central Provinces. These towns will be served, by branch lines, but it is open to doubt whether in the future their importance will not decline, and new towns situated on the main track take up the mantle that has fallen from their shoulders. Engineers of other nations also wonder why rails of such lightness at 18 lbs. to the foot have been used, while 20- to 25-lb. rails are the common practice in Russia, and 28- to 33-lb. rails the rule in Europe and other countries.

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We must, however, remember that the need for economy was most pressing, and that in using the lighter rails the Committee have precedents in the United States, where in many instances heavy metals are laid down only when traffic has assumed certain proportions. Already sections are being re-laid with 70-lb. rails, those they replace being relegated to the sidings which occur at frequent intervals throughout the system.

To gain an adequate idea of the immensity of the “Great Siberian” we should undoubtedly travel over it. A map, even on a large scale, is but a poor aid to the imagination. Omsk and Obi, to take an instance, seem but a few miles apart on paper, whereas a journey equal to that from London to Edinburgh separates them. Place one point of a pair of compasses at Cheliabinsk, and the other at Berlin. Describe a circle, and it passes through Lake Baikal, some 1500 miles from the journey’s end.

We will, nevertheless, endeavour to gain some conception of what the traveller sees, by calling Aladdin’s genie to our aid, and transporting ourselves to the terminal station at Moscow - the finest station of the old capital - from which a train is about to start on its 4000-mile trip.

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A fashionable throng fills the waiting-rooms and buffets, for the departure of the Siberian express is still a novelty, and attended by more than the usual amount of bustle and leave-taking connected with a long journey. Russians are very proud of their express, which is indeed worthy of our close attention. In it the travellers will be confined for a fortnight at least, so we will see how their comfort has been provided for. First we notice that the train is lit throughout by electric light, generated in a special compartment by a separate boiler and engine. Even the head- and tail-lights are fed from this source. One car is fitted up as a drawing-room, with luxurious chairs and couches, upholstered in soft leather, writing-tables, a piano, maps; another contains a restaurant, where a first-class meal may be had at all hours of the day, a beautifully fitted bathroom and an exercising machine. When you wish to retire for the night press the electric bell button, and a servant appears to make up the comfortable bed that is cunningly folded away during the daytime. Above the bed are levers to admit fresh air or hot water to the heating apparatus as you wish. The corridors that traverse the train from end to end are provided with filter ventilators which keep out the dust and let in oxygen. This train de luxe is put on by the International Sleeping Car Company; a guarantee for everything being all that the heart of traveller could wish.

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At nine p.m. the engine gives a deep whistle, and draws out into the night, and on to the rolling steppes that stretch away monotonously east and west and south and north for hundreds upon hundreds of miles. Yet these are some of the greatest granaries of Europe. Large stretches are chequered with the green of the growing crop, or the gold of the harvest, or the grey of the stubble. Giant straw-stacks proclaim an abundant harvest past; threshed by the trampling ponies of the peasant, and winnowed after the manner of the Israelites.

On, on, over the steppes to Batraki, where a splendid bridge, named in honour of Alexander II., crosses the Volga, with thirteen spans of 350-feet each - a total of nearly a mile. Then we roll into Samara, a city of 90,000 souls, whence a branch line runs south to Orenburg, with Tashkend as its ultimate objective. This region some years ago was swept by a fearful famine that carried off the population like flies, and covered the steppes with their graves.

Two hundred miles and we reach Oufa, a town of many churches and schools, hospitals and asylums for poor and aged, libraries and museums: a town of which the poorer classes are sunk in deep ignorance like their fellows in the rest of the empire. This is one of the anomalies of Russia - utter illiteracy hand in hand with splendid equipment for learning.

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The train has now begun to taste the Urals, which heave themselves up between the vast plain of Russia, and the vaster Siberian plain beyond. The hillsides bristle with broad expanses of fir and birch forest, but the grey rock breaks through at the summit. We pass Zuleya, the famous iron district whence have come millions of tons of metal, and reach Zlatoust on the summit of the range. A few miles further on is the far-famed Stone of Parting - one of the most pathetic landmarks ever reared by the hand of man: a simple triangular obelisk, on one side the word “Europe,” on another “Asia.” How many tear-stained, heart-broken partings has this dumb stone witnessed! How many thousands of chained convicts have defiled here, urged by the whip of Cossack, torn from the arms of the friends that gaze sorrowfully after them from beyond the limit of Europe.

We are soon on the down grade; the scenery merges once more into that of the steppes, here covered with high grass, birch trees, and small swampy lakes.

Cheliabinsk. The first station on the Siberian Line proper: the junction for the line that runs northwards through Ekaterinburg, Perm, Viatka, to Kotlass on the Dwina, from which port goods are sea-borne to England. This outlet of Siberian trade will be hugely developed in the future.

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Before passing into Siberia let us endeavour to form an idea of that country, hitherto of darkness, now being brought to the light by the magic of the engineer. Physically, Siberia is divided into three great zones: the Tundra, or frozen swamps of the north, abode of almost perpetual frost; the Taiga, the most wonderful belt of forest on this earth, stretching for a thousand miles and more east and west between the Tundra and the most valuable belt of all - the Steppes, deeply covered by stoneless, dark earth, which with proper cultivation will become one of the greatest granaries of the world. Were Siberia but blest with a warmer climate, there would be no land to compare with it, such is its extent and variety. So intense is the cold, reaching to 50-degrees below zero in many places, that even during summer the earth is still frozen hard but a few feet below the surface, while crops wave above. In winter the rivers are not merely covered with ice but actually frozen solid.

On account of the climatic conditions the engineers met with many and great hardships and difficulties. While constructing the Trans-Baikal section they had to blast the cuttings with dynamite, as the earth was congealed to the consistency of rock. At the stations water-supply pipes had to be laid in culverts provided with a heating apparatus, and masonry could be built only in artificially warmed shelters.

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The Ussurian railway was driven with the greatest difficulty through virgin forests of cedar and larch, intertwined with wild vines and creepers; and when made the track often suffered severely from the heavy floods that occurred during the best working season. Plague wrought havoc among the beasts of burden, and fever swept off many of the workmen. In the Kirghiz steppes, too, water and cold taxed the utmost exertions of the constructors. No less than 30 miles of bridges cross the many rivers over which the railway passes, and for hundreds of miles the track is protected from flood only by being raised on a 5-foot embankment above the surrounding country. In the mountainous districts of the Altai and Yablonoi the engineers had to overcome difficulties comparable to those encountered in the Rockies and Andes.

To return to Cheliabinsk, the quarantine station where all emigrants must show a clean bill of health. Our train progresses at a leisurely 15 miles-an-hour through the monotonous landscape, which the iron way traverses with mathematical straightness for several leagues at a stretch. Every verst we see the watchman - an ex-convict - step from his little hut and wave his flag to show that all is right on his “length.”

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Every twenty versts or so we pass a wayside station - generally on a loop to give a clear passage to express traffic. As a rule the stations are well-built and clean, surrounded by neat palisades; each with its water-tower and storehouse, earthed up to the roof to keep out the cold. Now and then in the sidings we see a third- or fourth-class train full of settlers on the way to their new homes, crowded like sheep into windowless trucks. Or perhaps there are windows, gridded with bars, from behind which peer the faces of convicts bound for the prisons and mines of the interior.

A fine bridge, 2400-feet-long, leads us across the Irtish into Omsk, founded by Peter the Great. It has been prophesied of Omsk that some day it will be the chief town of Siberia, as the centre of a great system of water-ways, and near important gold-fields and copper mines, and the even more valuable coal deposits of Pavlodar, where is said to be a seam *300-feet-thick* extending for miles. “Vast quantities of coke will be produced here, shipped down the Irtish to Tiumen, and thence transported to the Urals for the ironworks - a supply the importance of which will be appreciated by those who know anything about the iron industry” (from “All the Russias,” by Henry Norman, M.P., p. 155).

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A railway has been projected to run from Omsk southwards to join the system of Central Asia, which is also being pushed forward vigorously by the Russian military authorities. This would complete an enormous triangle, with corners at Samara, Omsk, and Tashkend.

Three hundred miles of track through the great corn-growing steppes bring us to Obi, the end of the W. Siberian section - opened in October 1896 - which in three years has sprung from zero to a population of 14,000. Our next stopping-place is Taiga, another example of rapid growth, owing to its being the junction for Tomsk. This latter town, despite its fine University, electric light, and 50,000 inhabitants, may in a few years be eclipsed by its southern new-born neighbour.

The word Taiga tells us what to expect in our progress. The scenery changes. The steppe gives way to mile after mile of forest, one of the most valuable assets of the Czar in an age when the world’s timber supply has sensibly diminished. We drop down into Krasnoiarsk - the city of the Red Rock - the chief town of the Yenisei Government, possessed of the finest gardens in Siberia, where imported trees fare badly. Like Omsk it is situated on a mighty river, the Yenesei, which rises in Mongolia and takes its broad course for 2500 miles to the Arctic Ocean. Ships come hither direct from London. On the east of the town a fine bridge of six spans, each span 474-feet, clears the river. The separate spans were put together on the bank, and launched into position by means of rollers and a special crane.

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We now rise to breast the Altai Mountains, which passed, we soon reach Irkutsk, the terminus of the Central Siberian.

Irkutsk, on the Angara, the great tributary of the Yenesei, is a curious mixture of new civilisation and barbarism. It owns a fine theatre that cost £30,000, and a good museum; a telegraph office, whence messages may be sent all over the world; an organised telephone service, stretching fifty miles into the country; an excellently equipped fire service; a noble cathedral; shops in which you may buy all the luxuries of the West; and a bank. It is also one of the three centres to which all gold mined in the district must be sent for tests in the Government laboratories. Since its erection in 1870 the laboratory has passed £60,000,000 worth of gold.

But, owing to the presence of escaped convicts, Irkutsk has been described as “the one place in the Russian Empire where a man cannot feel safe.” To go alone in the streets after dark is risky, as the police cannot cope with the ruffians of the place. Consequently people retire indoors early, closely bar their doors, and before going to bed fire a revolver out of the window to warn would-be marauders and housebreakers what to expect.

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A short journey from Irkutsk brings us to the most interesting spot on the railway — Lake Baikal. The “Holy Sea,” as the Russians call it, is one of the largest fresh-water lakes of the world, yielding place in size only to Superior, Huron, Michigan, and Victoria Nyanza. It has an area of 14,500 square miles, and so great is its profundity that, though its surface is 1500-feet above sea-level, its lowest depths descend several thousand feet below the bosom of the Pacific Ocean. On all sides mountains gird it in with frowning cliffs and indent it with eighty capes. For the native it is an object of worship and superstition, since on the island of Olkon dwells Begdozi, the Evil Spirit, who must be appeased by sacrifice. From the north end flows out the Chilka, a tributary of the Lena; from the south-west the Angara, the main feeder of the Yenisei.

The waters are much vexed by storms, which raise waves 6- or 7-feet-high. In November the lake begins to freeze, and for four-and-a-half months is held in the grip of Winter under an ice coating 9-feet-thick, traversed by huge cracks that make sleigh traffic risky and uncertain.

The lake is the most serious obstacle that the engineers had to face; for the mountainous nature of its setting renders the circuit of the south end a very arduous and costly task that will not be completed for several years to come.

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For present purposes the gap in the line is served by a train-carrying steamer - the *Baikal* - specially built for forcing a passage through the ice. Jetties supported on caissons project into the lake at the termini, separated by 42 miles of water, and, by means of a platform adjustable to the varying level of the lake, transfer the train to the boat, where it is accommodated on one of the three tracks that are laid along the axis of the middle deck. The *Baikal* is a vessel of 4000 tons, driven by three engines of 1250 horse-power each, working two screws in the stern and one in the bow. The vessel was built by Sir William Armstrong, Whitworth, & Co. at the Elswick Works, Newcastle-on-Tyne; then taken to pieces and the parts delivered at St. Petersburg. Waggons transported the pieces - the heaviest weighing about 20 tons - to Krasnoiarsk, and sleighs continued the journey to Irkutsk, whence the parts were floated down the Angara to the lake. Russian workmen, superintended by English engineers, there assembled the parts and added the boilers, pumps, and other machinery.

The ice-breaker is 290-feet-long, and of 57-foot beam. Ballast tanks, distributed in the double bottom, hold 580 tons of water. At the water-line she is protected by a belt of steel plates, reinforced with heavy wooden beams 2-feet-thick. On the upper deck are spacious and comfortable saloons for the accommodation of 150 passengers.

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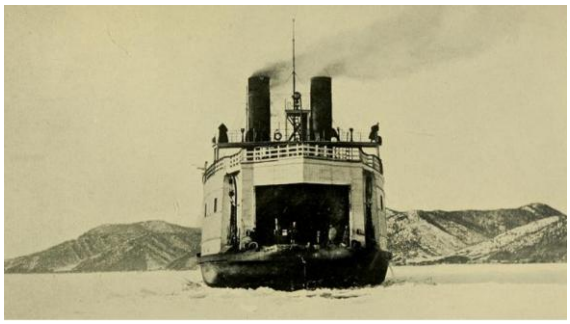

In clear water the *Baikal* makes 13 to 14 knots-an-hour. Ice 3-1/2-feet-thick gives way to her. The forward screw scoops out the water ahead, and the stern propellers force the vessel up on to the ice until her weight breaks through, her advance being 3- to 6-miles-an-hour.

Caption: “The *Baikal* ice-ferry, used on the lake of the same name to transfer trains of the Trans-Siberian Railway from one shore to the other” 549

A second ice-breaker, the *Angara,* is 195-feet-long and 34 in beam, and of equal speed but smaller ice-cleaving power. Like the sister vessel, she was transported to the lake in pieces and there assembled.

While on the subject of ice-breakers - among the most interesting of steam vessels - we may glance at the *Ermack,* built in 1898 for service in the Baltic. She has a displacement of 4000 tons; length, 305-feet; beam, 71-feet; depth, 42-1/2-feet; 8000 horse-power; speed, 15 knots. Her shape is such that, when pinched in ice, she tends to rise, after the manner of Nansen’s *Fram*. On her trial trip among Arctic floes she easily dealt with ice many feet thick; and in the Baltic she has been of the greatest use in extracting frozen-in vessels, including a warship.

East of Lake Baikal the line rises into the Yablonoi Mountains, attains a maximum elevation of 3412-feet, and descends to Naidalovo, the junction of the Stretensk branch and the main line, which reaches the Russian frontier at Magadan. This is a little-explored country, inhabited by Mongols, of which the chief traffic is the tea-carrying trade. The line is well laid here on heavy rails, supported by ties bedded in cement.

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Beyond Kailar, a town of 3000 inhabitants, it crosses an elevated plateau to the great Kinghan range, and then drops once more to Kharbin on the Sungari river, which is the engineering headquarters of the Chinese railway. To this district legend assigns the birthplace of Ghenghis Khan, who, in his many wars and invasions, is said to have destroyed five or six mllion human beings. In the beginning of the thirteenth century he overran Western Asia with steel and fire; and today the same elements have invaded his land in turn. But the steel is in rails and the fire in the furnaces of mighty locomotives.

At Kharbin we can take our choice of Port Arthur or Vladivostok, the former 500, the latter 350 miles away; though on the map we appear almost at the end of our travels. Selecting Port Arthur, we jog slowly along past Mukden, the largest town yet encountered, with its 200,000 souls. A short branch of 20 miles links it with the main-line.

Dalny, on the Gulf of Korea, is our next halting-place, and a unique city. For though streets and squares have been laid out, schools and churches provided, electric light and cars installed, there is as yet no population. It is a town quickly built for the future: one that may become a great port, thanks to its situation on an open harbour which never freezes.

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At Port Arthur we end our roaming on the iron way. Here we see the “mailed fist” of Russia in the batteries bristling with cannon of all sizes, from the 12-inch monster to the 4-inch quick-firer; in the barracks to shelter large bodies of troops; in the torpedo boats darting in and out of the harbour under the shadow of the huge men-of-war; in the dockyards; and in the military carriage and accoutrements of every one we meet.

A hundred miles north of Port Arthur the Pekin branch diverges. Russia has thus a hold on the very throat of China. Today a regiment may be in Moscow; in three weeks’ time its officers may issue their orders within the walls of Pekin. This, then, is one of the real issues of the Siberian Railway - the immense leverage that it will give to the Muscovite in any struggle with the Mongolian. Over the iron track will roll all the martial arts and engines of the West. Is the time ever coming when the Mongolian will reverse the order of things and pour his countless hordes again towards Europe, now so much nearer than in the time of great Ghenghis?

The Russians have spent, or will have to spend, upwards of 100 million pounds before their great line is in first-class running order.

Honour to whom honour is due - the railway is a magnificent scheme, carried through with indomitable perseverance.

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SHORTENING THE TRANS-SIBERIAN RAILROAD

The many improvements being made and about to be made on the trans-Siberian railroad will place this line in first-rate condition for heavier traffic and shorten the route considerably. Steep grades and sharp curves are being reduced, and one section has been shortened 99 miles by complete rebuilding. A 994-mile road, on which work has already commenced, will connect Pekin with the trans-Siberian road at a point south of Lake Baikal. When this line is finished, the distance between Paris and Pekin will be but 6,307 miles, instead of the 7,456 miles by way of Karbin and Mukden. The journey will take 9½ days, instead of 14 days, as at present.

(*Popular Mechanics*, March 1911)

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But will it pay? This is the question asked by Russians, English, Germans, Americans - the world. There are those who are ready to utter Cassandra prophecies of broken finances, climatic deterrents to immigration, frontier troubles with the Chinese. But a far larger number see in the railway returns a promise of a bright future. It has been mentioned that the line was laid with light metals; this because the initial traffic was expected to be but moderate. What happened? Scarcely were the sections declared open than a rush set in. In 1898 100,000 tons of goods accumulated on the western and central lines, waiting months to be forwarded to their destination. The line was utterly unable to cope with the immense body of merchandise thrust on to it. In 1899 the same thing recurred, 7,000 waggons blocking the line. Consider these figures. In 1896 the Western Siberian carried 160,000 passengers, 69,000 emigrants, 169,470 tons of merchandise. In 1897, 236,000 ordinary passengers, 78,000 emigrants, 242,000 tons. In 1898 the figures increase respectively to 535,000, 133,000, 449,000.

The Central Siberian in the first year named carried 14,700 passengers; in 1898, 407,680. Merchandise increased from 16,350 tons to 250,816 tons.

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Since 1898 the augmentation has continued. How could it be otherwise? On the one hand a new country, richer in gold than the Transvaal; richer in coal than any other country; richer in graphite than Ceylon and Cumberland; the greatest timber-growing country; a great future granary; bountifully stocked with valuable fur animals; a Midas treasure-house of iron, copper, tin, lead, silver, salt, precious stones; the coming paradise of the hunter and tourist; a present well-developed grazing and cereal country.

On the other hand, a vigorous Government bent on making room for the millions that in European Russia live in a wretched state of semi-starvation; capitalists of all nations eager to invest their wealth in enterprises that may yield a huge return; a world that finds in the Trans-Siberian the shortest and quickest route from Europe to the Pacific.

The Russians promise that, when their grand line is in full working order, the journey from London to Shanghai will be possible in fifteen to sixteen days, made up as follows :

London to Moscow . . . . . .3 days
Moscow to Vladivostock . . .10 "
Vladivostock to Shanghai . . .3 "

555

This at a cost of about £50 food included. By sea the same journey costs at present nearly double this sum, and occupies rather more than double the estimated time.

"The following will then be the shortest route between the United States and the Far East via Siberia, New York, Havre, Paris (London passengers will go via Dover and Ostend to Cologne), Cologne, Berlin, Alexandrovo, Warsaw, Moscow, Tula, Samara, Cheliabinsk, Irkutsk, Stretensk, Mukden, Port Arthur; and the total length of this journey (excluding the Atlantic) about 7,300 miles, of which 297 miles will be in France, 99 miles in Belgium, 660 miles in Germany, 2310 miles in European Russia, and about 4,000 miles in Asiatic Russia. These are the official figures." (from "All the Russias," by Henry Norman).

Another quotation bears on the same subject:

"From January 1905 a *train de luxe,* composed solely of first-class carriages, will be run by the company from Warsaw to Moscow and Port Arthur; the train will be run as many times weekly as the Company may deem advisable. The value of the new concessions obtained by the Company may be inferred from the fact that its northern express, its southern express, its eastern express, &c., unite all the capitals of Europe and Warsaw, where passengers will find Trans-Siberian carriages."

556

"The reason why a more thoroughly effective service of international *trains de luxe* will not be commenced by the company before 1905 is, that it is not until that year that a line running round Lake Baikal will be completed. When this line has been opened for traffic, and when the permanent way of the Trans-Siberian line has also been improved, an acceleration of the train service will be practicable. The Trans-Siberian line will not only be a means of transit between Western Europe and Japan and the north of China, but it will also be the shortest route between England and Australia. It is expected, indeed, that it will eventually be possible to reach Australia from London via Siberia in twenty-two days." (*Engineering,* May 2, 1902).

557

Part 6

An All-Rail Route

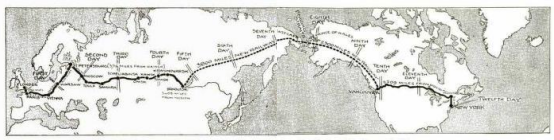
558

London to New York

559

Submarine Tunnel of 30 Miles to Connect England and France - Another Tunnel of 38 Miles Between Siberia and Alaska
***Popular Mechanics,* September 1906**
RE: introduction to an article entitled: "All-Rail Route, London to New York"

560



From London to New York by Rail in 12 Days' Time

TUNNEL UNDER BERING STRAIT

American Syndicate Is Making Plans for an Enormous and Interesting Possible Project.

Plans Are Nearly Completed and Attempt Is Being Made to Get the Permission of Russia.

Would Be of Immense Importance to Both Countries, America and Russia.

Railroads and Telephones Planned—Cost Would Be Something Like 1,250,000,000 Francs.

"From New York to London by 12 days' travel in a palace car without change is the dream of ambitious railway engineers. Moreover, the dream is likely to come true before many years, as the best expert engineering minds in the world, after exhaustive study, have pronounced the daring conception not only possible, but involving less serious problems in tunnel construction than others which are already built and in daily use…"
***Popular Mechanics,* September 1906**
Left: *Omaha Sunday World-Herald,* July 8, 1906

561

No Great Difficulties

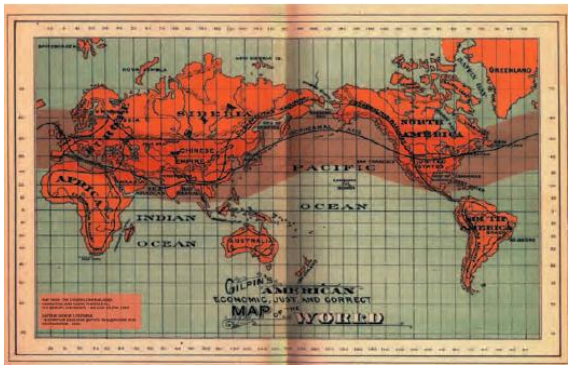
562

"…The idea of a submarine tunnel between Siberia and Alaska has recently received much attention in Russia. In spite of the distractions that government has experienced of late. Neither is the plan as new as generally supposed, for it was discussed nearly 30 years ago, and in 1886 our own geological survey reported on the subject to the United States Senate…"
***Popular Mechanics,* September 1906**
RE: as recently as 11K years ago, the Asian and North American continents were connected by a land bridge
Above: caption: "U.S. Coast and Geodetic Survey, J.E. Hilgard, Supt. Alaska and adjoining territory, 1884"

563

Prior to the *Russian Revolution* (1917), relations between the U.S. and Russia were congenial. Czarist Russia had sold its Alaskan lands to the U.S. fifty years earlier, in 1867, in part as a hedge against British seizure of the territory. The *Suez Canal,* linking the *Mediterranean Sea* with the *Indian Ocean,* was built in 1869. The *Panama Canal* was completed in 1914. The *Bering Strait* is similar in width and depth to the *English Channel* thus, an undersea tunnel was proposed there, as in the Channel, during the 19th century. In keeping with these ambitious projects, a bridge or tunnel across or beneath the Bering Strait has long been suggested. During the early years of the 20th century, a rail line across the *Bering Strait* was negotiated but languished due to the depletion of Russian capital owing to the *Russo-Japanese War* (1904-05).

564



Above: caption: "Gilpin's American Economic, Just and Correct Map of the World. From 'The Cosmopolitan Railway: Compacting and Fusing Together All the World's Continents,' by William Gilpin, 1890."

565

"…Mr. Powell, who made the report, stated the undertaking involved - at that time - no greater difficulties than those which existed during the construction of our first trans-continental railway, and since then great improvement has been made in tunnel work. The original idea was to bridge the straits, taking advantage of the several islands which are directly in the route selected…"
***Popular Mechanics,* September 1906**

566

The Only Way

567

"…The advance in tunnel work has taken the bridge feature out of the conditions, and all engineers now agree on the tunnel as the only way…"
***Popular Mechanics,* September 1906**

568

"…From East Cape, Siberia, to Prince of Wales Cape, Alaska, is 38 miles, passing through the islands of Diomede and the island of Kruaenstern. The prime mover in the enterprise is a French engineer, M. de Lobel, who has studied the subject for years, and who only recently received an interested hearing at the Russian court…"
***Popular Mechanics,* September 1906**

569

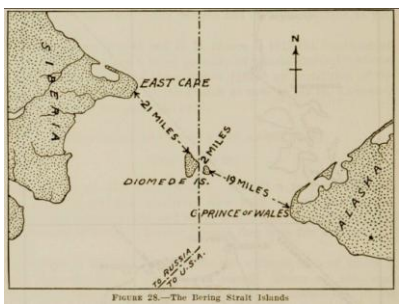


FIGURE 28.—The Bering Strait Islands.

570

The Tunnel Under the Channel

571

"…The tunnel under the English channel would be about 30 miles long. This project also dates back 30 years and the company which has a concession from the French government some years ago bored 5,900 ft. of test tunnel and has spent over half-a-million dollars. Little work has been done since 1894, during which year the British government raised such strenuous objection to the work that boring was discontinued…"

***Popular Mechanics,* September 1906**

572

The Proposed Route

573

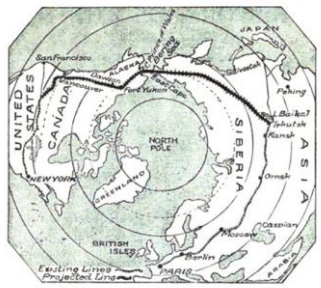
"…The proposed route and distances are;

	Miles
London to Paris	230
Paris to Vienna	625
Vienna to Warsaw	350
Warsaw to St. Petersburg	650
St. Petersburg to Moscow	400
Moscow to Irkoutsk	3,405
Irkoutsk to East Cape (Behring Sts.), to be built	3,800
Across Behring Straits	38
Cape Prince of Wales, Alaska, to Vancouver, B.C., to be built	2,300
Vancouver to Montreal	2,209
Montreal to New York	310
Total	14,317

***Popular Mechanics,* September 1906**

574

LONDON TO NEW YORK BY RAIL.



TO LINK UP EUROPE, ASIA AND AMERICA: THE ROUTE OF THE PROJECTED TRANS-ALASKA-SIBERIAN RAILWAY.

575

The Lost Cause

576

"…For years past the English Channel has been to engineers as was an unconquered nation to Alexander, it offered a field for brilliant achievement; the lure of Progress rose like a sea siren out of its seething waters and beckoned them to dare great deeds. And again and again that weird call has stirred to restiveness the hearts of the English and the French peoples; but ever the cautious islanders, feeling themselves doubly fortified against foreign invasion because of their insular position, hesitated to link themselves by a land route with the European continent, and in their trepidation the cause was lost…"
***Popular Mechanics,* September 1906**

577

Feasibility and Amicability

578

"…But the great achievements of the present age, the assurance given by the world's best engineers that the project is wholly feasible and the amicable relationship now existing between England and France have aroused a great enthusiasm for the enterprise on both sides of the channel waters, and the English government is taking measures to authorize its execution - the French government, with all the 'sang-froid' of that race, has long been ready to take it up at a moment's notice…"
***Popular Mechanics,* September 1906**

579

sang·froid

säNG□frwä/

noun
noun: sang-froid

composure or coolness, sometimes excessive, as shown in danger or under trying circumstances.

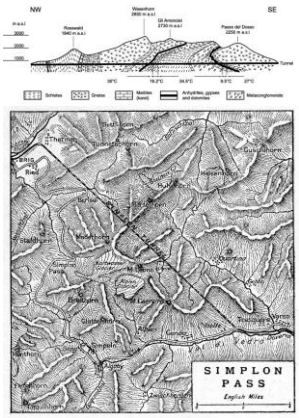
580

According to M. Sartiaux

581

"…As an engineering enterprise, according to M. Albert Sartiaux, General Manager of the Northern Railway of France, the construction of a channel tunnel presents no greater difficulties than did the construction of the Simplon tunnel. The channel tunnel would be longer, but there would be no danger from infiltration and no such high temperatures to be dealt with as there were in the Simplon. However, the difficulties of removal of waste would be greater. M. Sartiaux discusses the project at length…"
***Popular Mechanics,* September 1906**
Left: caption: "Opening of the Simplon tunnel 1906, by Leopoldo Metlicovitz"

582



Providing a shortcut under the *Simplon Pass* route, the *Simplon Tunnel* is a railway tunnel connecting Switzerland and Italy through the *Alps*. Consisting of two single-track tunnels (64,097K and 65,039K-feet-long respectively (built nearly fifteen years apart), for most of the 20th century (1906-1982) it was the longest railway tunnel in the world. Work on the first tunnel commenced in 1898 and it was opened in 1906. Work on the second tunnel began in 1912 and it was opened in 1921. With up to 7,054-feet of rock over the tunnel, temperatures of up to 42-deg. C (108-deg. F) were expected. Thus, a new building method was developed. In addition to the single-line main tunnel, a parallel tunnel was built, with the tunnel centers separated by 56-feet through which pipes supplied fresh air to the workmen in the main tunnel (the parallel tunnel would be upgraded to a second running tunnel).

Top: caption: "Temperature profile in the Simplon tunnel (Switzerland). As in many other tunnels, thermal anomalies have been recognized in carbonate environments."

Bottom: caption: "Map of the Simplon Pass and Tunnel, 1906"

583

584

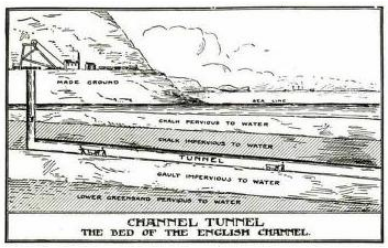
Above: caption: "A monument in memory of the deceased workers of the Simplon Tunnel was erected next to the Iselle di Trasquera railway station on 29 May 1905"

585

"…'Soundings and borings made in 1876 and 1877 gave assurance of the regular succession of strata under the bed of the channel, as they are visible upon the opposite cliffs, that they were without 'fault' at any point, and these assurances were confirmed by the test boring. The several strata are superimposed in curves of large radius and without fissures. The thicknesses of the several strata are practically constant as they appear upon the exposed cliffs'…"

***Popular Mechanics,* September 1906**

586



587

"…'The Cenomanian stratum is clearly marked as suitable for tunnel construction. It is about 170 ft. thick and about 140 ft. of the upper part is impermeable. This depth is sufficient for a circular tunnel of from 15 to 20 ft. in diameter without danger from the pressure above and at a sufficient distance from the water bearing strata below. From the information afforded by the test galleries opened in 1883 at Sangatte and Folkstone it appears that the entrance of water would not exceed the capacity of a moderate pumping outfit. In the coal mines of the north of France the least inflow of water is found in this stratum'…"

***Popular Mechanics,* September 1906**

588

"…'It is more difficult to lay out the course of the tunnel than to bore it. It must be done by feeling the way, keeping constantly at a certain distance from the treacherous strata above and below. The task is much facilitated by the fact that the use of electricity would permit the adoption of sharper curves and heavier grades than would be possible with other motive power'…"
***Popular Mechanics,* September 1906**

589

"…'The tunnel should be built In two independent galleries. Even with the favorable conditions anticipated it might not be prudent to construct a single tunnel 27 to 30 ft. wide and 18 to 21 ft. high. It is infinitely preferable to adopt the plan of two passages 16 to 18 ft. in diameter each and perhaps 50 ft. apart, which would thus have no effect upon each other, while the tubular form would afford the greatest resistance to external pressure. However, the two passages should communicate every 300 ft., for example'…"
***Popular Mechanics,* September 1906**

590

"…'For the longitudinal profile there are two possibilities: One assuring drainage by the double passage which will serve for two tracks; the other making the drainage gallery independent of the railway tunnels'…"
***Popular Mechanics,* September 1906**

591

"…'To the first plan there is a fatal objection. It forces the adoption of a hump profile; that is, making the highest point in the tunnel at the middle with the lowest points at the ends, whence the water would be pumped. These are precisely the points at which the level of the tunnel should rise or be subject to a material prolongation and grades which would reach the maximum compatible with the adoption of electric traction'…"
***Popular Mechanics,* September 1906**

592

"…'The second plan is the one that has been considered from the first with all the more reason that the drainage gallery would serve during the construction of the tunnel for the removal of waste material. For this purpose this gallery should be made about 10 ft. in diameter, and from it would lead branches to the tunnel proper, as described further on'…"
***Popular Mechanics,* September 1906**

593

"…'Once provided with a suitable passage for drainage the tunnel proper would require a hump profile only for its middle section of only a few thousand yards in length; from this section it would rise upon a gently increasing slope to the portals'…"
***Popular Mechanics,* September 1906**

594

"…'The work would begin with the drainage passage, having its lowest point in and sloping toward a well or pit upon the bank from which waste material would be hoisted and water pumped. In brief, the course of the work would be as follows'…"
***Popular Mechanics,* September 1906**

595

"…'The drainage tunnel having been constructed to approximately the middle of the channel, the boring of the tunnel proper would proceed from this point toward the shore. As the course of the latter inclines upwardly as it progresses, water of infiltration would flow back and into the drainage tunnel, and as the amount of water would increase with the progress of construction, this should be taken into consideration in estimating the capacity of the drainage tunnel'…"
***Popular Mechanics,* September 1906**

596

"…'With a fixed section, the capacity can he varied by giving a greater inclination toward the point of discharge upon the shore. In order to follow closely the direction of the strata of gray chalk in which the work would be carried on, the line of the drainage tunnel and of the tunnel proper would diverge from the starting point in the middle of the channel'…"
***Popular Mechanics,* September 1906**

597

"…'In the lack of absolute knowledge as to the conformation of the strata, the drainage tunnel would serve for test purposes, from which the thickness of the strata above and below could be ascertained at intervals of from 300 to 500 ft., or about once a week at the estimated progress of boring. If the result of any tests should prove unsatisfactory the actual course of the tunnel could be varied without departing from the theoretical profile, making the tunnel more or less sinuous'…"
***Popular Mechanics,* September 1906**

598

"…'In this manner the actual character of the stratum through which the tunnel is to pass would be reconnoitered, and this knowledge would he further increased by the transverse passages which would be constructed to intersect the course of the tunnel proper at as many points as might be deemed necessary, and from each one of which work could be carried on independently, working in each case toward the shore. According to the number of these branches and consequently the number of points from which the work could be carried on consecutively, the time required for the piercing of the entire tunnel is estimated at from five to eight years'…"
***Popular Mechanics,* September 1906**

599

"…'From the traffic standpoint the relations between England and the continent are developed to a very slight extent. It amounts only to about 1,200,000 passengers by all routes, although there is upon one hand the population of 42 millions of Great Britain and upon the other over 100 millions, counting only France, Italy and Central Europe. This smallness of traffic is attributed almost wholly to objection to the water passage, since between France, with 40 millions of inhabitants, and Belgium, Holland and that part of Germany served by way of Cologne, with hardly 50 millions, the annual traffic amounts to over four millions'…"
***Popular Mechanics,* September 1906**

600

"…'If the tunnel were ready for operation today, it is evident that it would divert nearly all passengers from the lines to Boulogne and Calais, but it is possible that it would have little effect upon the lines from Southampton to Saint Main. If it Is admitted that it would carry 90 per cent of those now traveling by way of Calais and Boulogne, 70 per cent of those by way of Dieppe, 50 per cent of those by Ostend, 20 per cent of those by Flessingue and 5 per cent of those by other lines, there would be at once a patronage of 900,000 passengers for the tunnel. But by the time within which the tunnel could he completed, this figure, with the proper allowance for natural increase based upon previous statistics, would amount to 1,200,000 passengers. This is the minimum. It is not a matter of doubt that the number would reach five to six millions in a very few years'…"
***Popular Mechanics*, September 1906**

601

"…'In the matter of freight, estimates vary from 1,500,000 to 5,500,000 tons per year. This would include most of the merchandise denominated as fast freight, but there would probably be little effect upon slow freight. It is certain that the traffic would support the operation of the tunnel, but it is also certain that at least at first the traffic would be far from dense, amounting to 20 or 30 passenger trains and 30 to 40 freight trains per day in both directions'…"
***Popular Mechanics*, September 1906**

602

Far from Probable

603

"…The military objection so long raised by Great Britain would be met by keeping a considerable force of men at the tunnel entrance at all times, and it is far from probable that an enemy could succeed in sending troops through, even unexpectedly - as in times of profound peace…"
***Popular Mechanics*, September 1906**

604

The Great Advantages

605

"…The great advantages of unrestricted international intercourse involved in the question are hardly to be overemphasized. The dread of seasickness has kept traffic at its lowest point: but with an electrically lighted tunnel and electric cars, the tourist and the Londoner and the Parisian will think nothing of the little ride between the two shores. Then, too, the shipment of merchandise now entails two additional handlings going in either direction which would be rendered unnecessary with a tunnel route at an estimated saving of $1.25 per ton…"
***Popular Mechanics*, September 1906**

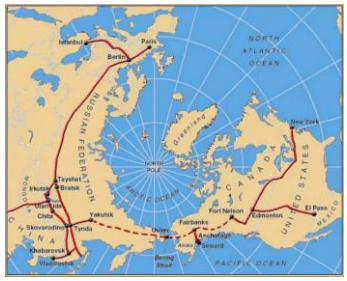
606

The Longest Journey

607

"…The next link to be forged In the international route is a 3,800-mile railway line across Siberia's frozen interior. That Russia in her time of stress and with her fear of political intrigue and her disapproval of American independence should consider linking the two continents is, to say the least, unexpected. The new railway would be an extension of the Trans-Siberian line which now terminates at Irkoutsk. The difficulties of construction owing to rigorous climate and lack of facilities for transporting material would be great, but not prohibitively so. This part of the journey, probably the least enjoyable, would occupy only a little more than three days…"
***Popular Mechanics,* September 1906**

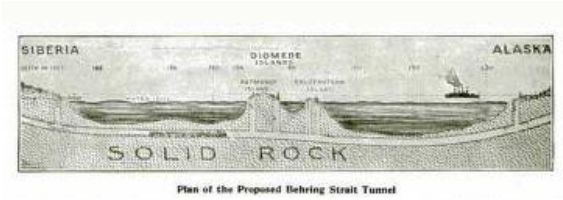
608



609

New and Improved

610



Plan of the Proposed Behring Strait Tunnel

"…As stated previously, the old plan of bridging Behring Strait, using the Diomede islands as central points of support, has been abandoned entirely with the improved methods of tunnel construction. This undersea tunnel would be 38 miles in length, pierced through solid rock and with a depth of 192 ft. of water above it at one point, yet the time required for construction is estimated at only four years and the cost would be about $250,000,000…"
***Popular Mechanics,* September 1906**

611

"…It is said the excavated material would not exceed that taken out for the New York Underground. Naturally both Russia and the United States would establish military stations at their respective entrances to the tunnel…"
***Popular Mechanics,* September 1906**

612

At a Glance

613

"…From Behring Strait to Vancouver, B.C., is a distance of 2,300 miles to be covered by a steam railway line which will connect with our transcontinental routes and make them a part of the international line. The advantages accruing to the United States from such a line are apparent to the American, at a glance…"
***Popular Mechanics,* September 1906**

614

Trail of Civilization

615

"…The most northerly railway in Alaska at present is the Council City and Solomon River road which has been built over the frozen ground and serves the transit of gold-miners, but the new line will go far north of this, forming a trail of civilization through a now almost inaccessible region…"
***Popular Mechanics,* September 1906**
RE: the long-abandoned C*ouncil City and Solomon River Railroad* operated from 1903 to 1907. The route was from a point near the mouth of the *Solomon River* (adjacent to Solomon City) to a point adjacent to Council City.
Above: the remains of the railroad (at Mile 31 of the *Nome-Council Highway*), comprising three locomotives, two flat cars and a boiler, were listed as an historic district on the *National Register of Historic Places* in 2001

616

Sharing the Burden

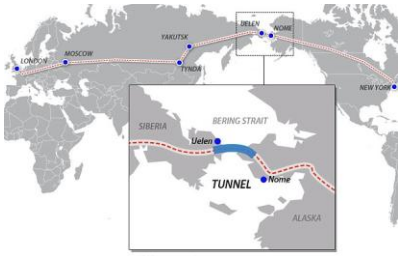
617

"…It is estimated that at a speed of 50 miles-an-hour, the distance of 14,317 miles between New York and London could be covered in just 12 days. One of the great difficulties is the carrying of supplies for the trip into the frozen interiors of Alaska and Siberia. Not only would it be necessary to provide for the round trip, as it would be impossible and prohibitively expensive to procure supplies in these regions, but it would also be necessary to establish supply stations for relief in case of protracted blockades from heavy snows. But as the lines would he operated independently, both the Russian and the American systems would share this burden."
***Popular Mechanics,* September 1906**

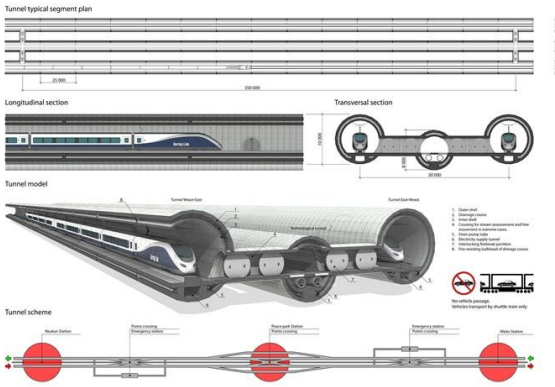
618

"If you're keen on visiting the Big Apple but not on air travel, making the journey by rail could one day be a possibility. Russia has given the thumbs up to a £60 billion project which would see a 65-mile tunnel dug under the Bering Strait, connecting Asia with North America. If plans go ahead, the journey from London to New York could take a mere three weeks, covering three continents along the way…"
***dailymail.co.uk*, August 22, 2011**

619



620



621

Part 7

East of the Urals

622

Overcoming Obstacles

623

Despite enormous difficulties imposed by the nature of the country, which included steppes, rivers, lakes, mountains and desert, engineers at last succeeded in linking East and West with a steel highway across the largest stretch of unbroken land in the world
***Wonders of World Engineering*, June 8-15, 1937**
RE: introduction to an article entitled: "The Trans-Siberian Route"

624

Come Together

625

"THE vast territory of Siberia was little known and virtually undeveloped until late in the nineteenth century. The soil of that country was known to be suitable for agriculture and to have considerable mineral wealth; but without rail transport Siberian agriculture was dormant and the mineral wealth of Siberia was unexploited. There were also political considerations. Thus, several factors contributed to the importance of railway building in Russia's great Asiatic possession…"
***Wonders of World Engineering,* June 8-15, 1937**

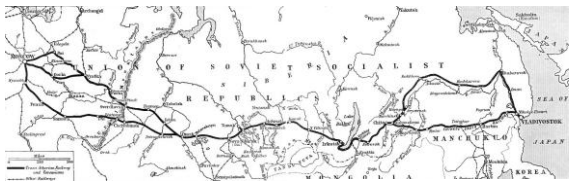
626

Troika

627

"…As far back as 1851 a governor of Eastern Siberia had suggested the building of a transcontinental railway. Between 1872 and 1874, during the reign of Alexander II, surveyors sent out by the Russian Government covered three possible routes for future railway lines designed to open up Siberian territory. These ran as follows: Kineshma-Vyatka-Perm-Ekaterinburg (now Sverdlovsk)-Tyumen; Nizhni-Novgorod (now Gorki)-Kazan-Krasno Ufinsk-Ekaterinburg-Tyumen; and Samara-Ufa-Chelyabinsk…"
***Wonders of World Engineering,* June 8-15, 1937**

628



Caption: "THE TRANS-SIBERIAN RAILWAY SYSTEM starts at Cheliabinsk, in the Ural Mountains, although access to the system from the west can now be effected by the line through Sverdlovsk (formerly Ekaterinburg) to Omsk. On July 19, 1892, operations began on the first, or West Siberian section, of 883 miles, from Cheliabinsk to Obi (now Novo Sibirsk). This section was completed on October 27, 1896. Meanwhile, engineers had started to build the Mid-Siberian section from Obi to Krasnoyarsk and from Krasnoyarsk to Irkutsk, a total distance of 1,137½ miles through densely wooded country, or taiga, and undeveloped territories. On January 13, 1899, the first through train from the West steamed into Irkutsk. The route was completed in further sections to Lake Baikal and Vladivostok. The building of the Chinese Eastern Railway from the frontier station of Manchuria (now Manchouli) to Vladivostok through Harbin made possible a through route from West to East. Later an all-Russian railway route was completed. This went round the north of what is now Manchukuo."

629

Progress Delayed

630

"…Then followed a great deal of delay, aggravated by the war between Russia and Turkey in 1877-78. Despite this delay engineers in European Russia were gradually linking up strategic points along the boundary, with railways that were to prove of additional value once Siberia was penetrated…"
***Wonders of World Engineering,* June 8-15, 1937**

631

Trans-Ural

632

"…The engineers reached Orenburg in 1877, and completed a mining railway between Ekaterinburg and Perm in 1878. They thus crossed the Ural Mountains and entered Siberia, though they were still a long way from opening up the country…"
***Wonders of World Engineering,* June 8-15, 1937**

633

"…The year 1880 saw the completion of the great bridge across the River Volga, connecting the Orenburg line with the main European Russian system. Later in the same year railway builders in Siberia, helped by the Government, pushed the Ekaterinburg line forward to Tiumen. But another two years passed before anything more was done towards opening up the recesses of Siberia…"
***Wonders of World Engineering,* June 8-15, 1937**

634

"…Fresh proposals were made, but the building of the Trans-Siberian Railway did not progress. The Government contented itself by backing a relatively short line connecting the Orenburg and Ekaterinburg routes…"
***Wonders of World Engineering,* June 8-15, 1937**

635

EMPEROR ALEXANDER III,
TSAR PACIFICATOR.
MOST AUGUST FOUNDER OF THE GREAT SIBERIAN RAILWAY.

"…By 1886, the Tsar Alexander III was exasperated with the lack of progress. 'I have read many reports of the Governors-General of Siberia,' he said, 'and must own with grief and shame that until now the Government has done scarcely anything towards satisfying the needs of this rich but neglected country'…"
***Wonders of World Engineering,* June 8-15, 1937**

636

"…Active and courageous engineers chafed at the delay; people pointed at transcontinental lines in North America, especially the Canadian Pacific, which was then attracting a great deal of attention. Under the cloud of Imperial displeasure, the Government at last allowed the surveyors to go out into the wilds, and the future route of the great highway was plotted by them across the lonely steppes, through the mountainous forest land beyond Lake Baikal, and in the farthest regions of the Ussuri country, the uttermost part of Siberia where it is flanked by the North Pacific…"
Wonders of World Engineering, **June 8-15, 1937**

637

"…Far too little record has been left of the experiences undergone by those plucky men. Once they were east of the Urals they had before them an enormous stretch of country without towns, without roads, sparsely dotted with settlements which were too mean to be dignified by the name of villages, and subject to one of the cruelest climates in the world…"
Wonders of World Engineering, **June 8-15, 1937**

638

False Economy

639

"…Even then, the State backing given to the engineers was meagre. They were told to build their line as cheaply as possible. They were allowed to build a road bed thinner and more primitive than that standard in Russia, and the Russian State criterion was not then high. For their transcontinental railway they were obliged to use light rails weighing no more than 54 lbs. to the yard. Thus they had to build one of the greatest main lines in the world on a light branch line standard. They did their best, but years later, in the war with Japan (1904-05), Russia was to pay dearly for this false economy…"
Wonders of World Engineering, **June 8-15, 1937**

640

Completely Inadequate

641

"…From the first the road and equipment proved completely inadequate. Enormous traffic poured into the new railway, and lines of wagons were kept waiting for months on end in the insufficient siding accommodation provided…"
Wonders of World Engineering, **June 8-15, 1937**

642

Earliest Access

643

"…Though the present western entry to the Trans-Siberian system is effected through the Ekaterinburg (Sverdlovsk) and Tiumen line, the earliest access was from Samara in the south, whence the line reached Ufa in 1888 and Zlatoust in 1890…"
Wonders of World Engineering, **June 8-15, 1937**

644

Starting Point

645

Privy Councillor K. Y. Mikhailovsky, Engineer, Constructor of the West-Siberian Railway.

"…By 1892 this line had reached the Siberian town of Cheliabinsk, and the building of the Trans-Siberian Railway began. For constructional and operating convenience the line was divided into a number of sections, the first being the West Siberian section from Cheliabinsk to Obi (now Novo Sibirsk), on the River Ob. K.J. Mikhailovski was appointed engineer, and he and his men began operations on July 19, 1892…"
Wonders of World Engineering, **June 8-15, 1937**

646

Water Obstacles

647

"…It was not an inviting country that they had before them, though its undulations were slight and called for no great earthworks. It consisted of steppe, covered with a high growth of grass, lightly wooded with stunted elm and willow trees, innocent of springs but boasting a number of brackish lakes, relics of the sea which, at a period geologically recent, covered this region. Through it there flowed four major rivers: the Tobol, the Ishim, the Irtish, and the Ob, of which the first three are important tributaries…"
Wonders of World Engineering, **June 8-15, 1937**

648

Overcoming Adversity

649

"…Steadily the engineers pushed eastwards with their embankment and roadbed. The embankment was essential in certain parts because of the liability of floods in the plains of the steppes, but the average height was not more than 5-feet, and the volume of soil did not exceed 23,400 cubic-feet-a-mile…"
Wonders of World Engineering, **June 8-15, 1937**

650

"…Constructional difficulties, however, were many. There was no native stone, and the engineers had to build all the minor bridges in the form of timber trestles. Even the necessary timber had to be brought to the seat of operations from immense distances, for the local dwarf trees were useless. There were no roads for the carriage of heavy material. In few places could the permanent way men dig pits for ballast…"
Wonders of World Engineering, **June 8-15, 1937**

651

Caption: "CONSTRUCTION TRAIN, drawn by two wood-burning locomotives, with a trainload of materials for the laying of the Trans-Siberian Railway. The train is crossing over one of the early types of bridge used for spanning smaller waterways. In the Mid-Siberian section of line alone 574 bridges had to be built."

652

"…There was little good water, and even this was frozen solid for the greater part of the year. Artesian wells afforded a certain mitigation, though the water thus obtained was exceedingly hard, and had, in six places, to be treated chemically before it was of any use. Moreover, the water from these artesian wells, though it came from a great depth and was subjected to considerable natural pressure on that account, never came near the surface. The railway builders had therefore to bring powerful and heavy pumping machinery to each well by the best transport arrangements they could improvise…"
Wonders of World Engineering, **June 8-15, 1937**

653

"…As winter closed down, the difficulties imposed by Nature increased considerably. The steppes have a short, hot summer, succeeded by a long and cold winter. The winter temperature averages -5.8-degrees to -13-degrees Fahrenheit, but sometimes the mercury goes down to 58-degrees below zero. Such temperatures are severe enough in themselves, but the builders of the line across the steppes were assailed by tremendous winds in addition…"
Wonders of World Engineering, **June 8-15, 1937**

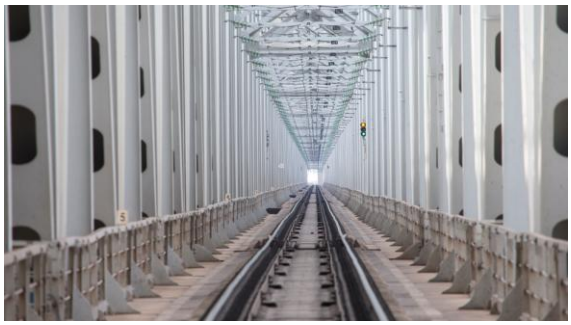
654

"…During calm weather the cold can be invigorating, for the air is perfectly dry, and less trying than the moderately cold damp winds experienced in England. But when the icy wind blows on the Siberian steppes, then is the time to take cover. There are other peculiarities. A sudden rise in the temperature, accompanied by calm, means not an agreeable change in the weather but an impending blizzard, sufficient to hide the engineers' camp under a thick white blanket and to block the way with enormous drifts…"
Wonders of World Engineering, **June 8-15, 1937**

655

Four Great Bridges

656

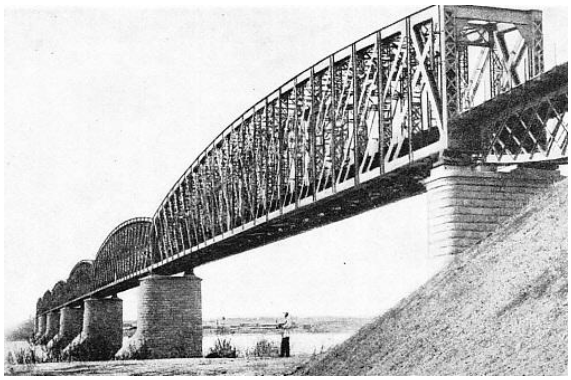


"…Month after month and year after year the railway pioneers pushed on, carrying their embankment and culverts across the vast tract of the steppes. For the design of the four great bridges across the intervening rivers, Professor N.A. Bieleoubski was called in. For the first three bridges he used box girders and a uniform span of 350-feet…"
Wonders of World Engineering, **June 8-15, 1937**

657

"…Across the Tobol, 170 miles from Cheliabinsk, he erected four spans over the 1,400-feet waterway. The waterway of the Ishim, 320½ miles eastwards, and 700-feet across, he overcame with a bridge of two spans. The Irtish, 492½ miles from Cheliabinsk, demanded a bigger bridge, and six spans were necessary to cross its width of 2,100-feet…"
Wonders of World Engineering, **June 8-15, 1937**

658

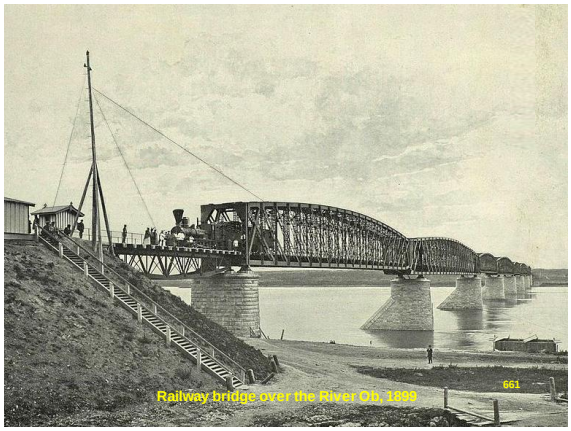


Caption: **"ACROSS THE RIVER IRTISH, near Omsk, the Trans-Siberian Railway is carried by a bridge of six spans designed by Professor N.A. Bieleloubski. The bridge is built of steel box girders with spans of 350-feet. The river at this point is 2,100-feet-wide."**

659

"…The final major crossing which the builders of the West Siberian section of the line had to make - that of the Ob - involved a waterway 2,607-feet-wide. Over this, from a point about 880 miles from Cheliabinsk, Bieleloubski used the Gerber cantilever principle for his bridge, which had seven spans altogether, four of them 281-feet-long, and the remaining three 486-feet 7-inches-long each. This was the greatest work on the section…"
Wonders of World Engineering, **June 8-15, 1937**

660


Railway bridge over the River Ob, 1899

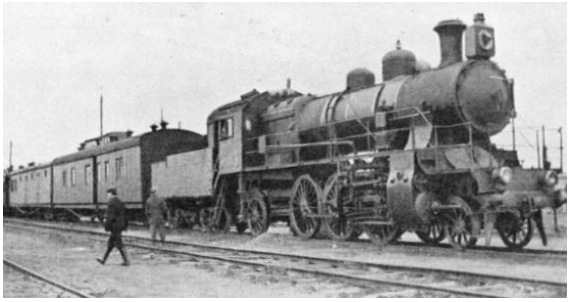
661

West Siberian Complete

662

"…Track builder and bridge builder finished their task in 1896, having accomplished it at a cost of £4,042,018. On October 27, 1896, the West Siberian section, of 883 miles, was opened throughout, and the first regular train from Cheliabinsk, headed by a wood-burning locomotive, with its huge spark-arresting chimney, steamed into Obi…"
Wonders of World Engineering, June 8-15, 1937

663



Caption: "A TRACK GAUGE OF 5-FEET and a generous constructional or loading gauge make possible the building of exceptionally tall locomotives in Russia. A Russian engine may be built to a height of 17-feet from rail-level to chimney top. The 2-6-2 locomotive at the head of the train illustrated has a peculiarly Russian characteristic. This is a railed-in gallery extending from either side of the cab round the smokebox. The 5-foot track gauge is peculiar to Russia and to some bordering countries formerly Russian. Through running from other countries is therefore impossible, but within the Soviet Union enormously long through train journeys are possible."

664

Mid-Siberian Section

665


Actual State Councillor N. P. Mashinirov, Engineer Constructor of the Mid-Siberian Railway.

"…While construction of the West Siberian line was being carried out, engineers under the leadership of N.P. Mejeninov were busy on the Mid-Siberian section, which was to run eastwards from Obi. This, in its turn, was divided into two subsections. The first, between Obi and Krasnoyarsk, was 471½-miles-long, and the second was between Krasnoyarsk and Irkutsk, a distance of 666 miles…"
Wonders of World Engineering, June 8-15, 1937

666

"…Thus the whole section had a length of 1,137½ miles through virgin country. The same climatic conditions had to be faced here as on the West Siberian line across the steppes, but the country to be traversed was far different, and grew more difficult the farther the railhead was pushed…"
Wonders of World Engineering, June 8-15, 1937

667

"…On May 16, 1893, the builders started operations at Obi and began to carry their line eastwards through rolling-wooded country. The farther they went the denser the country became. There were no settlements and no clearings. As they progressed they had to cut their way through the miles of forests before levelling and grading the track. These endless Siberian woods are known as the 'taiga,' a name which they gave to one of the towns on the way. The town of Taiga was made the junction for an important branch line leading to Tomsk, which lies some way off the main track…"
Wonders of World Engineering, June 8-15, 1937

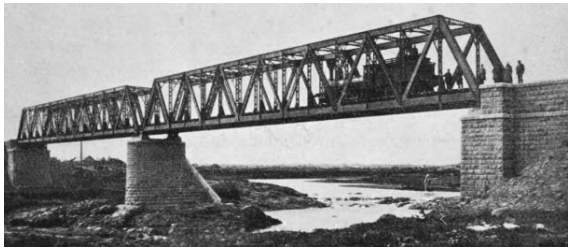
668

"…On the Obi-Krasnoyarsk line a large number of bridges and culverts had to be built, especially on the final hilly stretch, 107-miles-long, from Achinsk to Krasnoyarsk. Six of the bridges were built of timber on a masonry foundation. There were also four more ambitious structures to be erected over the chief rivers of the district. The first of these encountered by the engineers going east from Obi, 103½ miles along the route, was the River Tom, farther down which Tomsk is situated. This river was overcome with six steel spans, each of 280-feet, across the 1,680-feet waterway…"
Wonders of World Engineering, June 8-15, 1937

669

Caption: "SIX STEEL SPANS carry the Trans-Siberian Railway across the River Tom, 103½ miles along the route from Obi. The river here is 1,680-feet-wide, and the six spans of 280-feet rest on masonry piers. The piers are reinforced by triangular buttresses pointing upstream, to break up ice that floats downstream in winter."

670



"…For the laya River, 181½ miles towards Krasnoyarsk, two 175-foot spans sufficed, and four similar spans were thrown across the Kya, some 56½ miles farther on. Finally, a little over 360 miles east, the engineers met the Chulym, across which they threw two spans of 280-feet and one of 350-feet…"
Wonders of World Engineering, June 8-15, 1937
Caption: "Bridge over the Yaya"

671

"…Although the designers of bridges along the route of the Trans-Siberian Railway had to adopt the simplest forms compatible with durability, they were still obliged to incorporate a number of special features. They had to make full allowance for the expansion and contraction of the girders under climatic extremes, and to reinforce the piers against floating ice…"
Wonders of World Engineering, June 8-15, 1937
Caption: "Ice-drift on the Yenisei"

672

"…For the reinforcement of the piers they introduced triangular buttresses pointing upstream, on which the ice broke and divided, instead of piling up and causing serious damage to the structure as a whole…"
Wonders of World Engineering, June 8-15, 1937
Caption: "ONE OF THE MANY BRIDGES which are a feature of the Trans-Siberian railway. Note the reinforced pier which breaks-up ice flows in the river."

673

674

"…Apart from the bridges, too, the going was generally heavy through the undulating taiga, and when completed the line had ruling gradients of a little under 1 in 66…"
Wonders of World Engineering, June 8-15, 1937

675

"…Those responsible for the Obi-Krasnoyarsk line completed their task in 1895, and a provisional train service, mainly for the benefit of the pioneers themselves, was inaugurated on it on December 13 of that year, nearly a year before the opening of the West Siberian line…"
Wonders of World Engineering, June 8-15, 1937

676

The Yenisei

677

"…From the first Krasnoyarsk has been a centre of supreme importance, by virtue of its position on the Yenisei River, which flows out into the Kara Sea, far to the north of the Arctic Circle. The Yenisei is some 3,300 miles long, and is navigable for steamers right up to Krasnoyarsk. Today there is considerable traffic on its waters, considering the country through which it flows, and in the 'nineties the builders of the Trans-Siberian Railway cut-off as they were from through railway communication with the west, found in it an invaluable waterway…"
Wonders of World Engineering, June 8-15, 1937

678

"…In the depth of the winter of 1894, the steamship Stjernen, commanded by Captain Wiggins, and carrying material for railway construction, sailed up the Yenisei to Krasnoyarsk, having made the terrible passage of the Kara Sea without accident Wiggins sailed alone, not in a convoy, and there was no State icebreaker to guide him through the North-East Passage, such as is found today. On his return trip, he was wrecked in the Yugor Strait, between the Kara Sea and the Barents Sea, but there was no loss of life, and in the following year the brave skipper led another expedition bearing steel rails from Tyneside to Krasnoyarsk…"
Wonders of World Engineering, **June 8-15, 1937**

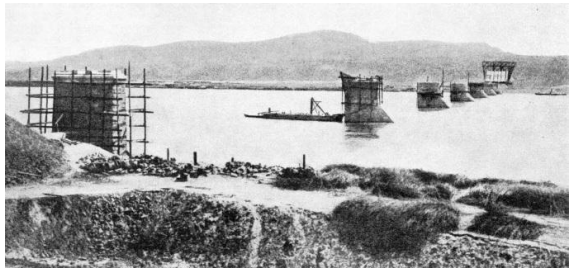
679

"…While the first subsection of the Mid-Siberian line was in progress the engineers began work on the second sub-section, beginning operations on June 23, 1894. The first big task was the spanning of the Yenisei. Professor L.D. Proskouriakov was responsible for this…"
Wonders of World Engineering, **June 8-15, 1937**

680

"…The river at Krasnoyarsk is normally 2,800-feet-wide, and the designer produced a simple structure of steel girders containing six spans each 474-feet-long, the height above low-water level being 65-feet. All the major bridges on this stretch were delayed by lack of materials, and in some instances those responsible for the track had completed long stretches of it on either side of the river before the gap was ready to be filled in…"
Wonders of World Engineering, **June 8-15, 1937**

681



Caption: "BRIDGING THE RIVER YENISEI was one of the biggest tasks in the building of the second subsection of the Mid-Siberian line. Professor L.D. Proskouriakov was responsible for the bridge, which has six spans, each 474-feet-long, of steel girders. The bridge is at Krasnoyarsk, where the Yenisei is normally 2,800-feet-wide. Lack of materials delayed the work for some time, and when masonry piers were set up in winter they had to be protected from the cold by wooden sheaths until the concrete and mortar had set."

682

"…Where masonry piers were set up during the winter months, the builders had to protect the unset concrete and mortar from the intense cold by huge wooden sheaths as they progressed. Sometimes they even kept the sheathing artificially warmed…"
Wonders of World Engineering, **June 8-15, 1937**
Caption: "Construction of the Yenisei bridge in winter"

683

Bridge over the Yenisei

684

A Formidable Country

685

"…The whole of this second part of the Mid-Siberian line was beset by difficulties in construction. It was a problem to obtain subcontractors; stay-at-home Russians fought shy of Siberia, a country they did not understand, and Siberians in their turn knew nothing about railways. The country to be traversed was formidable, being mountainous and covered with the inhospitable woods of the taiga. Those who carried the way forward had to chop their path, through every yard of the projected route. The forest was diversified by the spurs of three considerable mountain ranges, those of the Altai, the Alataou and Sayan groups, and it was crossed by great rivers…"
Wonders of World Engineering, June 8-15, 1937

686

"…Through this dark-green Waste the engineers forced their way, as long winter followed short summer, and belated spring followed winter. Among the larger bridges of the many they had to build were those over the Ouda and over the Oka, 822 and 985 miles respectively from Obi. The Ouda bridge had two spans of 350-feet and two of 280-feet across the 1,260-feet waterway; that over the Oka crossed a waterway 1,540-feet-wide by two 350-feet spans and three of 280-feet…"
Wonders of World Engineering, June 8-15, 1937

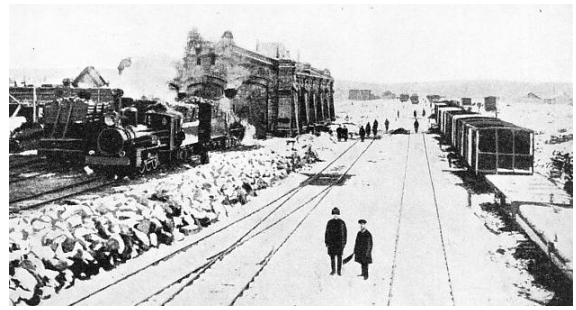
687

"…By 1898 the engineers had completed most of the Mid-Siberian line, and were running over it a service of five trains daily in either direction. Two of these trains were devoted to construction and ballasting, and a third one was for immigrants. By the beginning of 1899, Mejeninov, with his divisional engineers, overseers and navvies, had completed the whole of the Mid-Siberian section, and on January 13, 1899, Irkutsk, destined to become the metropolis of Middle-Asiatic Russia, saw the first regular train steam in from the West…"
Wonders of World Engineering, June 8-15, 1937

688

"…The most important offshoot of this Mid-Siberian line, the Tomsk branch, was only a little over sixty-two miles long, but its construction was difficult. The builders had to carry their line northwards through the hilly woods of the taiga. The course was switchback, and the branch contributed thirty-seven bridges to the total of 574 built in the course of the Mid-Siberian line. Altogether the sixty-two miles took some eighteen months to build, for work was begun on it in the summer of 1896 and completed in January 1898…"
Wonders of World Engineering, June 8-15, 1937

689



Caption: **"ENGINE SHED AND SIDINGS at the town of Taiga, the junction for the branch line to Tomsk, sixty-two miles away. This branch line, though short, involved great constructional difficulties. Thirty-seven bridges were built along the line, which was completed in January 1898."**

690

Far-East Section

691

"…All this time construction work had been going on in the Far East, but it will be simplest if we treat each successive section in geographical order…"
***Wonders of World Engineering,* June 8-15, 1937**

692

Baikal Line

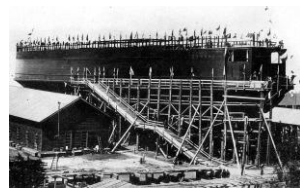
693

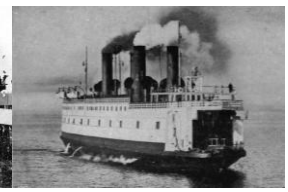
"…The Baikal line, beyond Irkutsk, was the shortest section of all. Here the engineers simply extended the route from Irkutsk down the valley of the River Angara to the shores of the great inland sea of Lake Baikal. But for the passage of Baikal itself a train ferry was necessary…"
***Wonders of World Engineering,* June 8-15, 1937**

694

Floating Railway

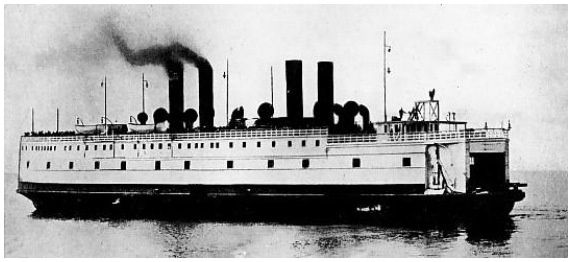
695





"…The 'Baikal,' as the vessel was appropriately named, was built at Elswick, Northumberland, and sailed thence to St. Petersburg, now Leningrad. There she was taken to pieces and transported by train, by wagon and finally by sleigh across Russia and Siberia to Irkutsk. At Irkutsk the sections were loaded on to a river steamer and shipped down the Angara to the shores of the lake where the ship was reassembled…"
***Wonders of World Engineering,* June 8-15, 1937**
Left: caption: "*SS Baikal* on the day before launching"
Right: caption: "The icebreaking steamer *SS Baikal* on Lake Baikal"

696



"…The 'Baikal' was an ice-breaking train ferry, with three tracks on the main deck and a normal displacement of 4,200 tons. She was 290-feet-long and 57-feet-wide, with a steel hull and three triple-expansion engines giving a total output of 3,750 indicated horse-power. The transport of this vessel across hundreds of miles of steppe and taiga was among the feats of Trans-Siberian engineering…"
Wonders of World Engineering, **June 8-15, 1937**
Caption: "THE FERRY STEAMER LAKE BAIKAL It plies across Lake Baikal, in connection with the trans-Siberian Railway. It is an ice-breaker as well."

697

"WHEN the Russian Transcontinental Railway was driven across the steppes of Siberia, the advance of the engineers was disputed by Lake Baikal. The first proposal was to swing around the southern end of the lake, but the country was so forbiddingly mountainous, and the work of the engineers was certain to be so slow and tedious, that, in order to secure through railway communication with the East, it was decided to establish a floating railway section upon this inland sea…"
Railway Wonders of the World, **ca.1937**

698

"…This was a somewhat startling proposal, seeing that the lake during the winter is completely and thickly frozen over, the low prevailing temperature keeping it firmly locked in this condition for about half the year. Thus it seemed at first sight as if the ferry service would have to be restricted to the summer months only, unless an icebreaker were provided as well, so as to plough the channel for the ferry. Thereupon a combination of the two types of vessels was evolved…"
Railway Wonders of the World, **ca.1937**

699

"…The contract for this ice-breaking ferry was awarded by the Russian Government to Sir W.G. Armstrong, Whitworth and Company. A special design was elaborated, the lines being of such a character as to offer the least resistance to the ice, and yet at the same time to present the maximum smashing effect…"
Railway Wonders of the World, **ca.1937**

700

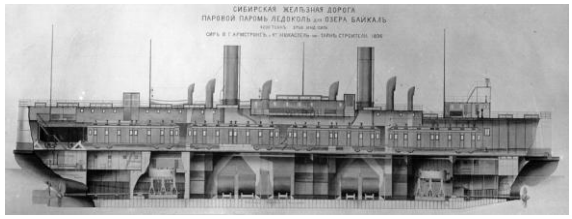
"…The Lake Baikal, as she is called, is somewhat unique, and probably represents one of the strongest ships that ever has been built. She measures 290-feet in length by 57-feet in width, and under normal working conditions draws 181-feet of water. The hull is built throughout of steel, closely subdivided into watertight compartments, the result being that several compartments must be pierced before the safety of the vessel is imperiled, while the provision of a double bottom ensures greater security…"
Railway Wonders of the World, **ca.1937**

701

"…In addition, there is a belt of 1-inch steel, 9-feet-wide, extending from stem to stern at the waterline. The cars are run on to the main deck, and are secured by special devices to hold them steady during the journey of some 40 miles from bank-to-bank. The vessel is fitted with three screws, two at the stern, as usual, and one at the bow…"
Railway Wonders of the World, **ca.1937**

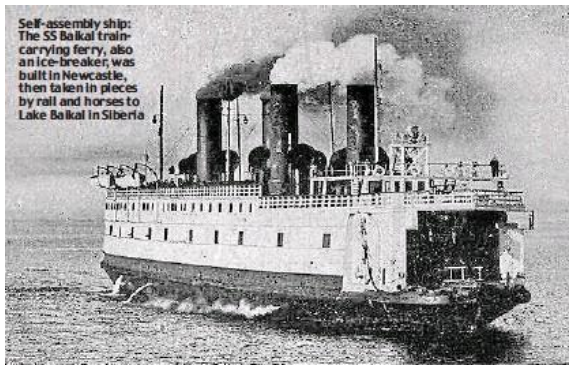
702

"…One of the most interesting features in connection with this craft was the fact that she had to be sent in pieces from the Tyne to the distant inland sea. To divide and pack up a vessel weighing 4,200 tons in this manner was no light task. The dismembered ferry was shipped in a steamer to St. Petersburg, where the load was transferred to railway trains and dispatched to the railhead in Siberia, which at the time was some distance from the lake shore. There the packages were transferred to sledges and hauled by horses over the snow-covered steppes to the water-side, where the parts, as they arrived, were reassembled, and the vessel in due course consigned to the bosom of the lake…"
***Railway Wonders of the World,* ca.1937**
RE: the *BAIKAL* was ordered November 29, 1895 at a contract price of £79,890. She weighed 4,200 grt, and measured 290.0 x 57.1 x 19.0-feet. *Wigham Richardson & Co.* provided three reciprocating steam engines with a total horsepower rating of 3,750. Made of steel, she had two propellers aft and one forward. 703

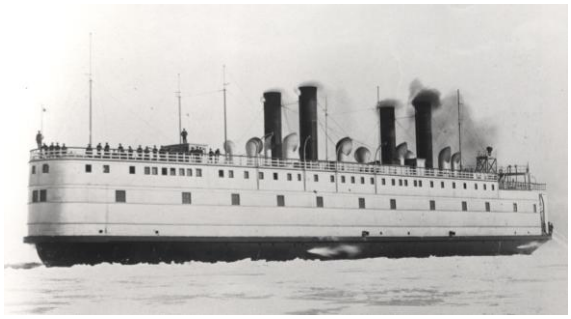


Above: built to bridge a gap in the *Trans-Siberian Railway* at *Lake Baikal,* the icebreaking train ferry *BAIKAL* was built by *Sir W.G. Armstrong, Mitchell & Co. Ltd.,* Newcastle-on-Tyne, England. Completed and launched in 1899, she had three railway tracks on her main deck accommodating 25 carriages (with passenger accommodations above). Erected in 1896 at the *Low Walker* shipyard, she was dismantled for delivery in 6,900 pieces. One side of the ship was painted white, the other black and every part was stamped. 704

A team of engineers from England led the work of rebuilding the vessel at *Lake Baikal.* On June 29, 1899, she was launched into the lake.
Above: caption: "Photograph shows the frames being erected"
Upper Left: caption: "Engines ready for shipment"
Lower Left: "Boilers ready for shipment" 705



In 1918, the *BAIKAL* was armed with machine-guns and canons by the *Red Army*. In August 1918, she was damaged by field artillery fire and burnt out at Mysovaya. 706



"…The ferry has given complete satisfaction, and has demonstrated her capacity to cope with the thickest and heaviest ice peculiar to this lake…"
***Railway Wonders of the World,* ca.1937**
RE: in 1920, the damaged hull was towed to Baikal, water pumped-out and she was laid-up. In 1926, she was broken-up and dismantled. 707
Caption: "The icebreaking train ferry BAIKAL"

"…The cars being run on at the stern and made fast, and the signal given to go ahead, the vessel steams slowly out of her dock. The nose of the vessel, owing to its peculiar shape, does not cut into the ice, but lifts as with a glancing blow, until it rests upon the surface. Simultaneously, the front screw in its revolutions displaces the water beneath the ice, so that the full weight and force of the hull press down heavily. The ice has to give way, being broken into huge mas-ses, which are flung hither and thither in the open channel behind by the ferry's wash…"
***Railway Wonders of the World,* ca.1937**

708

Caption: "The ice-breaking steamer the SS Baikal doing what it did best: churning through ice in freezing temperatures on Lake Baikal, in Siberia, ca. 1900"

709

"…Although the railway since has been completed around the end of the lake, giving continuous railway communication, the floating section is still in operation, as the trip across the lake saves considerable time, and is accordingly used for the through fast mail traffic…"
***Railway Wonders of the World,* ca.1937**

710

"…The Lake Baikal has been in constant use since 1897, and even after some fifteen years' battling with the winter and ice on this inland sea is as efficient as ever. It is a moot point, in view of the Lake Baikal's achievements, whether the ferry ever will disappear from the trans-Siberian railway service. It is more probable that, as the traffic develops, the system will be extended…"
***Railway Wonders of the World,* ca.1937**

711

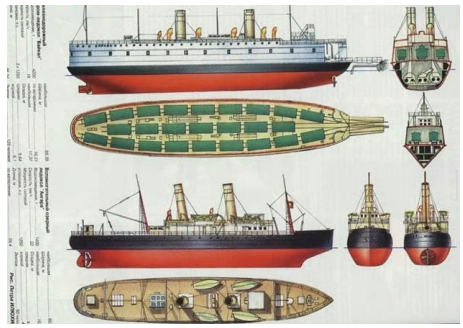
Ice Road

712

"…Even so, not even an icebreaking ferry steamer could maintain a through service throughout the winter, in spite of the services of an auxiliary icebreaker called the 'Angara' …"
***Wonders of World Engineering,* June 8-15, 1937**

713

Caption: "The *Angara* was launched in 1900 and is one of the oldest surviving icebreakers"



The passenger icebreaker *ANGARA* - built at Armstrong shipbuilders, Newcastle

714

"…An alternative had therefore to be found. To carry the way across the frozen Lake Baikal in the depth of winter, the engineers laid the railed and sleepered track on the surface of the ice itself, using exceptionally long sleepers to distribute the weight of passing rolling stock as evenly as possible…"
Wonders of World Engineering, **June 8-15, 1937**

715

"…This serious gap in the railway system was a terrible handicap to the Russian army during the war which broke out with Japan in 1904, and efforts were made to skirt the great, lake. The engineers carried their track round the mountainous southern shore, blasting away huge outcrops of rock, tunnelling through the cliffs and banking up between them…"
Wonders of World Engineering, **June 8-15, 1937**
Caption: "Military trains crossing Lake Baikal on rails laid on the ice"

716

"…Today this line round the southern side of Lake Baikal, brought into being by a national emergency, is the finest piece of engineering on the whole vast length of the Trans-Siberian. It was opened on January 14, 1905…"
Wonders of World Engineering, **June 8-15, 1937**

717

718

Trans-Baikal

719

"…On April 11, 1895, a start was made with the Trans-Baikal section. 686½ miles in length, which was to carry the route into farthest Asia. It stretched to Sryetensk, on the River Chilka, with a branch to the Chinese frontier to join the Chinese Eastern Railway, which Russian engineers later built across Manchuria to link up with the Port of Vladivostok. This branch had a total length of more than 215 miles…"
Wonders of World Engineering, **June 8-15, 1937**

720

"…East of Irkutsk, a radical change took place in the location of the line. The last part of the taiga had indeed been mountainous, but now great crags were encountered by the plodding engineers. In the short stretch down from Irkutsk to Baikal alone they had had to build no fewer than ninety bridges and culverts…"
Wonders of World Engineering, **June 8-15, 1937**

721

"…Eastwards from Baikal, A.N. Pouchetchnikov undertook the planning and building of the line, first following the shores of the lake for thirty-three miles and then striking up through the Selenga Valley, crossing the pass through the Tzazan Da Mountains within 138 miles of his starting point..."
Wonders of World Engineering, **June 8-15, 1937**

722

"…The climate was appalling, with temperatures down to 92-degrees of frost at times, yet without snow. All watercourses except the largest rivers were frozen hard for a large part of the year, and the subsoil was perpetually frozen below a certain level, so that continuous blasting became necessary. Roughly half-way up to the summit the engineers had to cross the Selenga River, 1,680-feet-wide at that point; the bridge had six spans of 280-feet each…"
Wonders of World Engineering, **June 8-15, 1937**

723

"…The course lay over the Yablonoi Mountains to Petrovsk, with its great iron workings, 391 miles from Baikal, and then through the successive valleys of the Chita, Ingoda and Chilka until the end of the section was reached. In the course of the route Pouchetchnikov built seven notable bridges, including the Selenga spans mentioned above and one of five 210-foot spans over the Nerucha, 610½ miles from Baikal. The gradients were severe, with a maximum of 1 in 57.5, though 1 in 107 was a fairer average for much of the line…"
Wonders of World Engineering, **June 8-15, 1937**

724

"…Altogether the builders of the East Siberian or Trans-Baikal section of the line threw up 27,764,994 cubic-yards of earthwork. In addition to the seven principal bridges on the main line they erected three large structures on the Chinese frontier branch, over the Ingoda, the Onon and the Boroia. They completed the section by July 1900…"
Wonders of World Engineering, **June 8-15, 1937**

725

Crossing Manchuria

726

"…Though the Trans-Siberian Railway proper now passes round the north of Manchuria (Manchukuo today), and never leaves Russian territory, the first through service between Russia and the Far East involved the crossing of Manchuria. This service was inaugurated on January 13, 1903…"
***Wonders of World Engineering,* June 8-15, 1937**

727

The Chinese Eastern Railway

728

"…The shortening of the route was made possible by the Chinese Eastern Railway, built by Russian engineers to the standard Russian 5-foot gauge across northern Manchuria from the branch on the Sryetensk line, through Harbin to Vladivostok. The Chinese Eastern Railway, which is now under Japanese control, is 950 miles long. Its builders had not such a difficult task as some of their colleagues in Siberia, who had been faced with labour shortage, for Chinese labour was cheap and plentiful. Across the Eastern Gobi Desert, however, the going was arduous and the climate terrible…"
***Wonders of World Engineering,* June 8-15, 1937**

729

An All-Russian Route

730

"…The final link in the all-Russian route joined the East Siberian section of the Trans-Siberian Railway to the Ussuri line running northwards from Vladivostok. On the Ussuri line Russian engineers had begun work in May 1891, first under A.J. Oursatti and then under O.P. Viazemski. They had a strange district to penetrate, half temperate and half tropical in aspect. The Ussuri line, 721-miles-long, was open for traffic by November 9, 1901…"
***Wonders of World Engineering,* June 8-15, 1937**

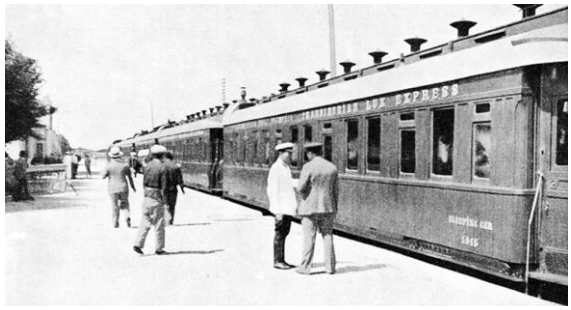
731

"…Having established through communication between Moscow and the Far East by the Chinese Eastern connexion the Russian Government felt inclined to rest on its laurels. It was not until after the disasters of the war with Japan, which were aggravated by insufficient transport, that the Russian Government allowed its engineers to fill up the gap between the Amur and Ussuri lines, giving through communication on purely Russian territory…"
***Wonders of World Engineering,* June 8-15, 1937**

732

"…Thus, in spite of all difficulties the engineers carried their steel highway across the greatest stretch of unbroken land in the world, bringing Japan within less than three weeks of England and making it possible, as was boasted at the time, to travel round the world within a space of thirty-three days."
***Wonders of World Engineering,* June 8-15, 1937**

733



Caption: "A TRANS-SIBERIAN EXPRESS at Manchouli, the frontier station between Manchukuo and the Soviet Union. The journey from Moscow to Vladivostok takes about ten days. Before the Russian Revolution of 1917 the sleeping cars were supplied by the International Sleeping Car Company but now the rolling stock is under the direction of the Ways and Communications Commissariat."

734

Part 8

Before and After

735

Before the War

736

From Europe to the Far East by the world's most cosmopolitan train
***Railway Wonders of the World,* ca. 1937**
RE: introduction to an article entitled: "The 'Trans-Siberian Express'"

737

The Eye of the Beholder

738

"OPINIONS differ about the 'Trans-Siberian Express,' particularly among people who have never seen it. Those who dislike Russia talk about a slow, patched, dirty old train that creeps from Europe to the Ear East, while its progress is interrupted by breakdowns. Those who have an extravagant admiration for the land of the Soviets maintain that it is the most magnificent train in the world. It is neither; but it is one of the most remarkable trains in the world, and is more spectacular than the great transcontinental trains in the United States of America…"
***Railway Wonders of the World,* ca. 1937**

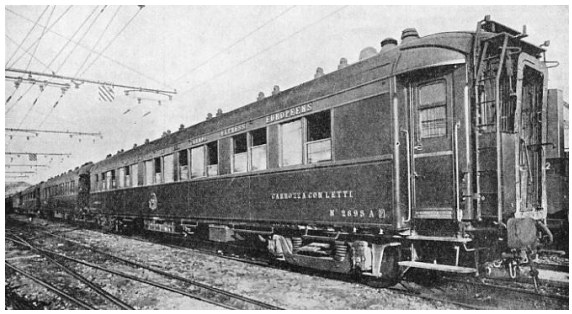
739

High-Style

740

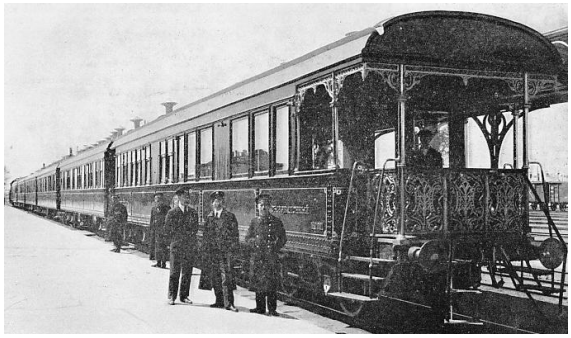
"…Before the war there were two Trans-Siberian services, one in which the cars were provided by the International Sleeping Car Company, and one conducted by the Russian Government…"
***Railway Wonders of the World,* ca. 1937**

741



"…The rolling-stock of both trains was superb; perhaps the International cars were the more comfortable, though they were distinguished by that degree of ornateness - peacock-blue plush, scroll work and gilding - which is now out of fashion…"
***Railway Wonders of the World,* ca. 1937**
Caption: "MODERN CARRIAGES owned by the International Sleeping Car Company, and built in 1930. The company was formed in Brussels in 1876."

742

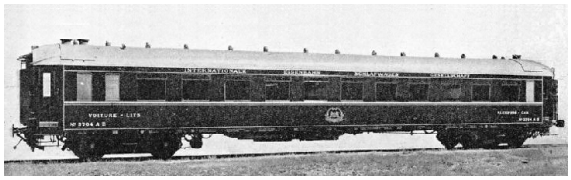


"…In 1901 the company extended its operations for the first time beyond Europe. The 'Trans-Siberian Express,' from Moscow to Irkutsk - later extended to Vladivostok - was run for the first time. Europe and Asia were traversed in ten days…"
***Railway Wonders of the World,* ca. 1937**
Caption: "IN THE ORIENT. A luxury train containing sleeping cars at the station of Harbin, in the State of Manchukuo. At Harbin the company possesses repair shops for its rolling-stock."

743

"…In those days there was a church on the train, or, rather, a carriage fitted as a Russian Orthodox chapel. During the Revolution of 1917 the International Sleeping Car Company's rolling-stock was confiscated by the Soviet…"
***Railway Wonders of the World,* ca. 1937**
Above: caption: "Church Car on Trans-Siberian Railway"
Left: caption: "Chapel in the Church Car"

744

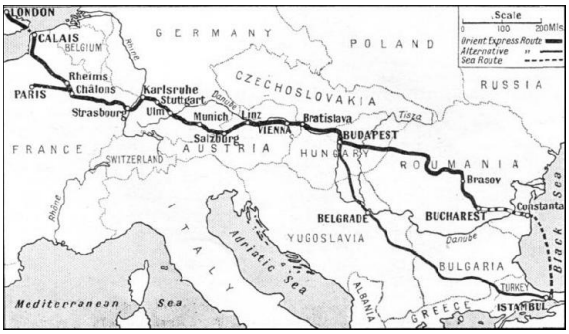


"…Under its present owners it still does duty on the main lines of Russia and Siberia, though in recent years the Ways and Communications Commissariat have introduced a number of modern vehicles not unlike those of the Mitropa Company in Germany…"
Railway Wonders of the World, ca. 1937
Caption: "AN ALL-METAL MODERN COACH built for the company. Standard measurements have been adopted for the construction of the cars. The overall length is 76 ft. 11 in.; the distance between bogie centres is 52 ft. 6 in., and the distance between wheel centres 8 ft. 2½ in. The interior arrangements vary according to the service in which the cars are employed."
745

Above: caption: "THE 'MANCHURIAN EXPRESS,' running from Harbin to Chang Choun, a distance of 147 miles, on the Chinese Eastern Railway, was inaugurated in 1906, and operated with coaches of the International Sleeping Car Company. By 1914 the Company had thirty-two luxury trains in service, covering a mileage of 35,003."
Left: caption: "FAR EASTERN ROUTES over which the International Sleeping Car Company's services are in regular operation can be seen on this map."
746

Express Service

747



"…A previous chapter described how the 'Orient Express' connected Western Europe with the Near East…"
Railway Wonders of the World, ca. 1937
Caption: "THE ROUTE OF THE ORIENT EXPRESS and the towns through which it passes are clearly seen in the map"
748

The Way East

749

"…Russia is not Western Europe, but it is still European, and from it the Trans-Siberian goes out to the Middle East of Central Siberia and Northern Tartary, and the Far East of Mongolia, Manchukuo and across a strip of water - Japan…"
Railway Wonders of the World, ca. 1937

750

"…Some years ago it was said that the railways and steamers of the CPR took one 'westward to the Far East.' The 'Trans-Siberian,' with the steamship lines across the North Pacific, will equally well take one eastward to the Far West. The railway journey from Moscow to Vladivostok takes from nine to ten days at the best…"
Railway Wonders of the World, ca. 1937
Above: caption: "Map of the Canadian transcontinental railway system in 1906, soon after the construction of the Canadian Pacific Railway"

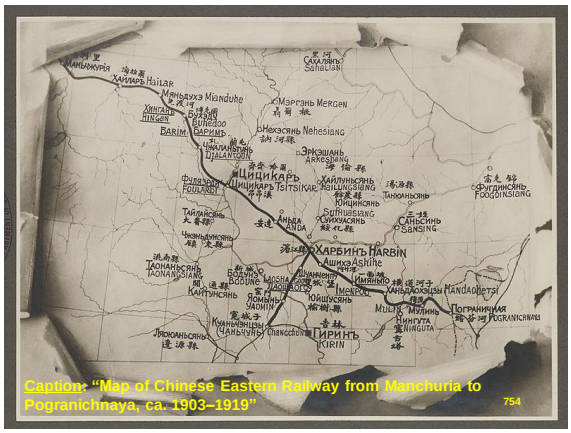
751

CER

752

"…Time could then be saved by travelling southward from Karimskaya through Harbin on the Chinese Eastern Railway (sold in 1935 by Russia to Manchukuo), rejoining Soviet territory just before reaching Vladivostok. The Chinese Eastern, however, besides being a bone of contention for a number of years between Russia and Japan, was rather afflicted by train bandits and wreckers. If a traveller wanted to feel safe, he went all the way round by Khabarovsk. If he wanted a more interesting journey, he risked the Chinese Eastern…"
Railway Wonders of the World, ca. 1937

753



Caption: "Map of Chinese Eastern Railway from Manchuria to Pogranichnaya, ca. 1903–1919"

754

"…Now the CER connexion is for China only. This Chinese Eastern Railway was built by the Russians, and was maintained by them for years. It is constructed to their own broad gauge (five-feet), and the locomotives and rolling stock are of typically Russian design…"
Railway Wonders of the World, ca. 1937
Left: caption: "Chinese Eastern Railway workmen at mealtime, ca. 1903-1919"
Right: caption: "Railway in Manzhouli"

755

Above: caption: "The routing of the main line of the CER (Manzhouli to Harbin to Suifenhe, labeled the Trans-Manchurian Railway) and its southern branch (Harbin to Dalian). After 1905, most of the southern branch (from Changchun to Dalian) became the Japan-run South Manchuria Railway."
Left: caption: "A CER executive car at the Russian Railway Museum"

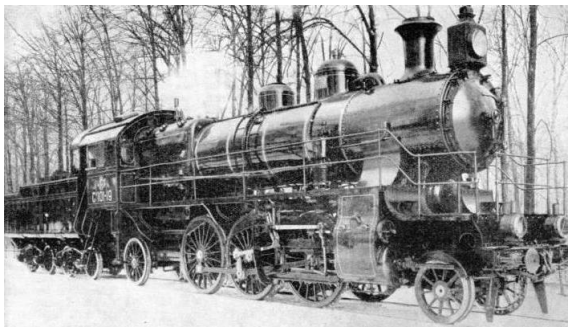
756

Similar, But Different

757

"…Russian locomotives look most unusual to British eyes. Not only is the rail-gauge a few inches wider than that of the British, but the construction gauge is also much greater, permitting the building of wide, roomy coaches and locomotives with a height of no less than 17 ft. from rail to chimney-top. The biggest British engines are 13 ft. 6 in. high…"
Railway Wonders of the World, ca. 1937

758

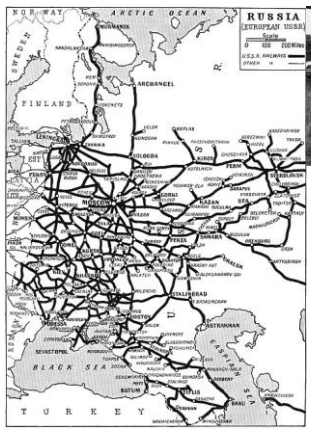


Caption: "A SOVIET LOCOMOTIVE. One of the most striking features about Russian engines is their unusual height. They are 17 ft. from rail to chimney top. The biggest British engines are 13 ft. 6 in. high. This photograph shows a standard 2-6-2 express locomotive, built for the Russian 5 ft. gauge."

759

"…Another feature of Russian locomotives is the railed-in gallery communicating with the cab by 'front doors' in the weather-board, which runs round the boiler and smoke-box. The cabs are closed in against the rigours of the northern winter, all modern engines and many old ones having a covered flexible 'vestibule' between the cab and the tender, so that the enginemen are completely shut in. Some of the locomotives, too, are of strange appearance, with balloon smoke-stacks and an assortment of gadgets all over their exteriors…"
Railway Wonders of the World, ca. 1937

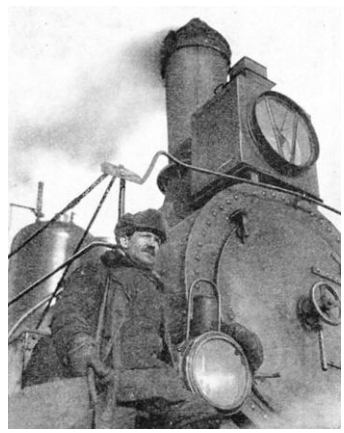
760



Above: caption: "FUTURE DEVELOPMENTS are foreshadowed by this electric train which runs along on balls instead of wheels. This novel device was the idea of a young Soviet inventor. Experiments are reported to have given satisfactory results. The picture shows the experimental track."

Left: caption: "72,000 MILES OF RAILWAY in Russia are now under the control of the People's Commissariat for Transport. The chief gauge is 5 ft. The system is separated into 22 divisions, the largest of which has its headquarters at Perm, and has some 3,746 route miles built to the 5-ft. gauge. Big schemes of electrification are in progress."

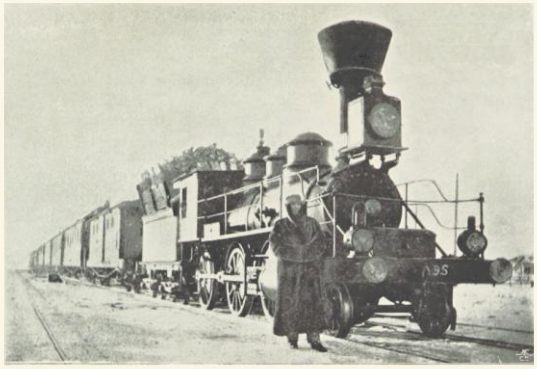
761



"…The modern express engines, however, when the traveller becomes accustomed to their tall, spread-out aspect, are rather striking, especially if they are kept clean by enthusiastic enginemen. A driver with an excellent record in Russia may be rewarded by having his engine named after him…"
Railway Wonders of the World, ca. 1937

Caption: "A DRIVER with a good record in Soviet Russia is sometimes rewarded by having his engine named after him. This photograph shows a typical Russian engine-driver. Several types of locomotives operate on the Soviet railways, and among them is a Garratt engine built in England."

762



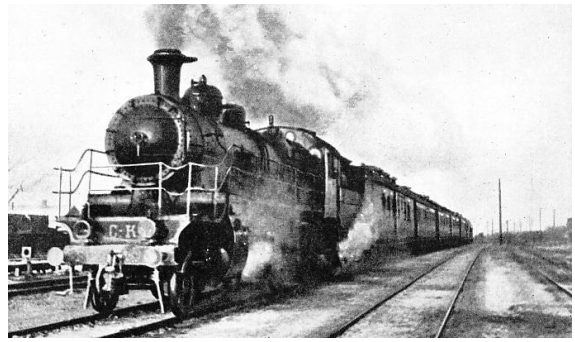
A TRAIN ON THE TRANS-SIBERIAN RAILWAY. 763

Deep in the Unfamiliar

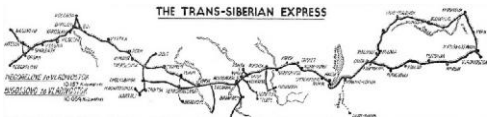
764

"…The quickest way to join the 'Trans-Siberian Express' is to travel through Germany and Poland, but if the traveller wants to see a little more of the people, he should take a Russian ship from London to Leningrad, and travel down the October Railway to Moscow…"
Railway Wonders of the World, **ca. 1937**

765



Caption: **"ON THE MOSCOW-LENINGRAD ROUTE. An express train on the main line, which is practically straight and level throughout. The greatest gradient is a twenty-miles section at 1 in 1,660. The 'October Express,' one of the best Russian trains, covers the journey of 404½ miles between the two cities in ten hours, calling at Tver and Bologoe."** 766



"…At Moscow one is deep in the unfamiliar. The city, with its domed Byzantine buildings alternating with ultra-modern workers' flats and offices, is an extraordinary blend of East and West. Sometimes it reminds one of the squalid splendour of old Bagdad, and sometimes it seems more like some caricature of America with a little of Germany included. Everywhere it is crowded to desperation. The old buildings are dirtily picturesque; the new ones, emblems of a new age. At Moscow the 'Trans-Siberian' waits to begin the first lap of the long journey, which will be concluded at the Sea of Japan many weeks before the steamship…"
Railway Wonders of the World, **ca. 1937**
Caption: **"THROUGH SOVIET RUSSIA and on to China, the Trans-Siberian express takes from nine to ten days to complete its journey."** 767

"…On the platform surges a cosmopolitan crowd. Bearded, woolly-capped Russians of the old school; lean, unsmiling and desperately earnest Communist students, about to travel out to some Siberian industrial or research centre; a sprinkling of curious tourists, some from England, some from Germany, and some from America; birdlike, observant Japanese; inscrutable Chinese, and the heavy, Mongolian types of Siberian Tartary. The women are as widely differing as the men, and may vary from sharp-featured young Communists, off to study collective farming, to queer old women with shawls over their heads, returning to some country district in which, up till now, they have spent all their lives…"
Railway Wonders of the World, **ca. 1937**

768

Keeping Up Appearances

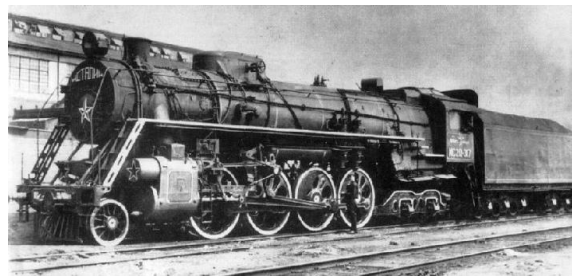
769

"…The train consists not of first- and second-class, but of 'hard' and 'soft' coaches, all of which have sleeping-berths. Those of the 'hard' class have wooden berths, but a mattress and bedding can be hired from the conductor. If, however, the traveller dislikes crowding, noise, smells and insects, he will be advised to travel 'soft,' less interesting as it may be. There he will find tourists, specialists, and what has been called the 'portfolio class.' For in Russia, 'class' is a forbidden word, and young men travelling in cushioned ease are nervous and offended if asked why they are not travelling 'hard' with their fellow-citizens. So if the traveller wants peace and quiet, he will be wise not to discuss politics…"
***Railway Wonders of the World,* ca. 1937**

770

Motive Power

771



"…Before the train moves off at 5:45 pm on a Monday evening, a glance at the locomotive is worth while. At the head of the train she stands, a rather long-legged 2-6-2, with the usual gallery all round, painted green, and perhaps bearing a large ornamental star on the smoke-box door. This is the standard express passenger type of the present Soviet railways, though there are many smaller 4-6-0 engines, and larger machines of the 4-8-0 and 2-8-4 wheel arrangement. The last-mentioned are the finest in appearance in the Union, though the 2-6-2 has something of the aspect of a very tall coach horse. …"
***Railway Wonders of the World,* ca. 1937**
Caption: "Class IS 2-8-4 passenger engine, a type first built in 1932 with many American features, with "J. Stalin" carried on the smokebox door"

772

"…On the heavy coal trains from the Donetz Basin will be found the largest locomotives in Russia - among the largest in the world - one class having the 4-14-4 wheel arrangement, while there is also the great 4-8-2 and 2-8-4 Garratt engine built at Manchester, the largest yet constructed in England. But such engines as these will not be found on a Trans-Siberian passenger train…"
***Railway Wonders of the World,* ca. 1937**

773

Caption: "EUROPE'S MOST POWERFUL GOODS ENGINE. This is the claim made for the large freight engine, seen here on its arrival in Moscow in January, 1935. It was designed for hauling coal trains of 3,000 tons from the Donetz mines to Moscow."

774

Here Comes Everybody

775

"…If the train is in good condition, the traveller will find the 'soft' compartment very comfortable. It contains two berths, the lower one of which is placed transversely, as in Great Britain, and the upper, on the side away from the corridor, longitudinally, as in America. It is a good arrangement, as it gives more headroom. The whole compartment, too, is much more spacious than is possible with the restricted loading gauges of Western Europe…"
***Railway Wonders of the World,* ca. 1937**

776

"…One peculiarity of Russian travel, however, is apt to be embarrassing, for the traveller never knows who may be sharing the compartment for days and nights. The writer heard of an Englishman who had to travel half-way across Siberia with a lady he had never seen before. When she left the train, the Englishman was greeted by a Russian, who kissed him on both cheeks and thanked him 'for taking care of my wife on the road'…"
***Railway Wonders of the World,* ca. 1937**

777

"…The 'Trans-Siberian' is not a fast train. Those who run it know that it has plenty of time in which to beat the fastest liner, that goes by way of Ceylon and the Straits. The very long waits at some of the cities give a respite from the rolling of the cars. Usually, the traveller feels very tired after the first thirty-six hours, after which he gets his 'train legs' and enjoys the rest of the journey…"
***Railway Wonders of the World,* ca. 1937**

778

"…The first meal in the restaurant car is interesting. In addition to the strange food, which can be very good, the traveller is cheek-by-jowl with a representative selection from the cosmopolitan crowd seen on the platform…"
***Railway Wonders of the World,* ca. 1937**

779

"…He may share a table with a Chinee, a mining engineer bound for the Lena Basin, and someone whose activities are devoted to the extermination of wolves. If he passes one of the 'hard' cars, he will have another surprise. A gangway runs down the side, like a corridor, but not divided from the rest of the car. Each division has six transverse berths, three on each side. Into such a division may be seen a family of ten crowded with their bundles and cooking utensils. In the side gangway, passengers may be squatting, drinking tea, eating or sleeping. Also, it is not unlikely that the entire car may be lighted by candles, stuck on to shelves or mouldings by their own wax. In recent years, however, electric lighting has made considerable strides on the Russian railways, though before the war candles were the standard lighting on all but the very best cars…"
***Railway Wonders of the World,* ca. 1937**

780

Come Together

781

"…After dinner the traveller returns to his compartment and, sooner or later, turns in while the train rumbles into the valley of the Volga. The river is crossed about two-thirds of the way from Moscow to Kazan by the old direct route to the Urals, or before reaching Bui on the Viatka line, which is now always traversed. The through Leningrad-Vladivostok cars join this main line at Bui, and most passengers travelling by way of the sea route from England arrive by them. This northern line passes through Perm, and the two are united at Sverdlovsk (formerly Ekaterinburg), the capital of the Ural district and the first important Siberian town…"
***Railway Wonders of the World,* ca. 1937**

782

Mountain Scenery

783

"…The first stretch from Moscow has, perhaps, been a rather dreary progress over endless, plate-flat prairies, when night travelling is to be welcomed; but the crossing of the Urals is remarkably beautiful, especially in late spring, with the great hills rising in majestic folds above the wonderful woods of fairylike silver birch. Later on, when passengers are getting tired of the pines and larches of Central and Eastern Siberia, they will think of, and hanker after, those lovely birch-woods in the Urals through which the train creeps so gently as it climbs the western slopes…"
***Railway Wonders of the World,* ca. 1937**
RE: the *Ural Mountains* form the traditional boundary between Europe and Asia. The Urals are about 1,550-miles-long. They extend from the *Kara Sea,* in the north, to the *Ural River*, in the south. At 6,217-feet, the highest peak is *Mount Narodnaya*. The Ural's northern slopes are mostly covered with forests. Common trees include *oak, linden, elm, fir, pine* and *spruce*. Treeless land (*alk*/*a* "tundra") is found in the far north, especially at high elevations. Arctic foxes, reindeer, brown bears, lynx, wolverines and elk are native to the range.

784

785

"…Although, on the other side of the range, Sverdlovsk is the capital of a new industrial area, these untouched Ural forests are just as they were before the dawn of civilization; utterly wild, leafy, and inhabited by deer, bears and wild pig; a green paradise in late spring and summer, a golden paradise in autumn, and a white 'ghost land' in winter. In altitude, the Urals are reminiscent of parts of the Scottish Highlands. It is hard to realize that the range is considerably in excess of a thousand miles in length…"
***Railway Wonders of the World,* ca. 1937**

786

787

Beyond the Urals

788

Czar and his family massacred in a cellar

The ex-Czar with his daughters.

July 16. Russia's Bolshevik rulers cold-bloodedly wiped out former Czar Nicholas II and his family today in revenge for the past and in fear for the future.

The Romanovs were shot and bayoneted to death in a cellar in Ekaterinburg, a fiercely pro-Bolshevik town in the Urals where the Imperial prisoners were taken on May 30. Also killed in the bloodbath were the family's doctor, valet, cook, parlourmaid and dog. The bodies were taken away to be dismembered and destroyed.

After his abdication last year the Czar had been living in fairly comfortable conditions in Tobolsk, a small town in northern Siberia. His move to Ekaterinburg has been a confusing tale of intrigue, cross-purposes and indecision, but the end result was that the family finished up in the wrong place at the wrong time.

With the Western Allies uninterested in his fate, it was decided by local Bolsheviks. They were aware of the advance of the Czechs and Whites towards Ekaterinburg, and so, alarmed that the town might become a major objective, asked Moscow what they should do about the family. They were told to take their own measures.

Factory-worker guards were replaced by Cheka executioners; the family were told they were going to be moved, and taken to the cellar. There the leader of the squad said: "Your relations have tried to save you. They have failed and we must now shoot you."

"…At Sverdlovsk, 1,300 miles from Leningrad, there is a long wait, and the exploring passenger has a chance of examining life in the first Siberian city. Since it lost its old name it is apt to be forgotten that this is Ekaterinburg, where Nicholas, Tsar of All the Russias, and his family were killed in a cellar on July 16, 1918…"
***Railway Wonders of the World,* ca. 1937**

789

"In the evening of 16 July, between seven and eight p.m., when the time of my duty had just begun; Commandant Yurovsky, (the head of the execution squad) ordered me to take all the Nagan revolvers from the guards and to bring them to him. I took twelve revolvers from the sentries as well as from some other of the guards and brought them to the commandant's office. Yurovsky said to me, 'We must shoot them all tonight; so notify the guards not to be alarmed if they hear shots' . . . During my presence none of the Tsar's family asked any questions. They did not weep or cry . . . Yurovsky ordered chairs to be brought, and his assistant brought three chairs. One chair was given to the Emperor, one to the Empress, and the third to the heir . . . Yurovsky ordered me to leave, saying, 'Go on to the street, see if there is anybody there, and wait to see whether the shots have been heard.' I went out to the court, which was enclosed by a fence, but before I got to the street I heard the firing. I returned to the house immediately (only two or three minutes having elapsed) and upon entering the room where the execution had taken place, I saw that all the members of the Tsar's family were lying on the floor with many wounds in their bodies. The blood was running in streams. The doctor, the maid and two waiters had also been shot. When I entered the heir was still alive and moaned a little. Yurovsky went up and fired two or three more times at him. Then the heir was still."
RE: recollection of *Pavel Medvedev*, a member of the squad of soldiers guarding the Tsar's family

790

"…Leningrad brings a welcome change from the restaurant-car food to eatables that can he bought from the stalls on the platform. The traveller can drink Russian tea from the great samovars and enjoy a cheap luxury in the form of caviar. After a time he will have eaten enough caviar to be surfeited. Now that he is in Siberia it is possible that bear-steaks will figure on the next menu…"
***Railway Wonders of the World,* ca. 1937**

791

"…From Sverdlovsk the old main line strikes southwards to the city of Cheliabinsk, but nowadays the Trans-Siberian Express keeps northwards, calling at Tiumen at 2:50 in the afternoon of the third day, counting the evening of the departure as the first day on the journey. Here the train waits but five minutes. Late in the afternoon it crosses the River Tobol, about 160 miles south of Tobolsk, and runs to Omsk, 558 miles on from Sverdlovsk, at 3:42 am on the fourth day…"
***Railway Wonders of the World,* ca. 1937**

792

"…Omsk is a fine and important city, with a population of over 135,000, and a cathedral, in the bulb-towered Russian style, which acts as a landmark for many square miles of the surrounding Steppe country…"
Railway Wonders of the World, ca. 1937
Caption: "THE STEPPES are vast grassy plains, and seem an almost endless part of the Trans-Siberian journey. They are not, however, uninhabited, and at one part of its trip across the Steppes, the Trans-Siberian stops at Omsk, an important city with a population of more than 135,000."

793

Banishment

794

"…The place owes most of its development to people banished to Siberia in Tsarist days, for they included many who were allowed their freedom on condition that they never returned over the Urals. Mere banishment to Siberia was not such a terrible thing as condemnation to a convict life in the salt mines. Those banished were so treated usually because they held opinions of which the Government disapproved…"
Railway Wonders of the World, ca. 1937

795

The Endless Steppes

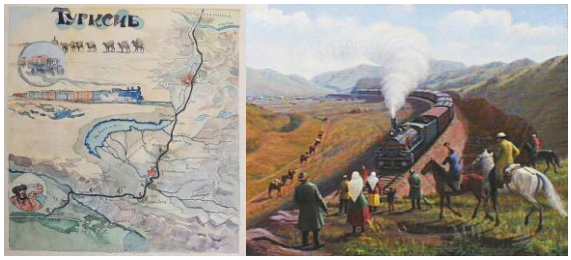
796

"…It is at Omsk that we finally rejoin the old main line across the Urals, which has come through Cheliabinsk and Petropavlovsk…"
Railway Wonders of the World, ca. 1937
Caption: "BITTER COLD AND TROPICAL HEAT are met with on the Trans-Siberian journey. This picture shows a wintry scene near Omsk, in Siberia."

797

"…Hereafter comes a dull stretch across the seemingly endless Steppes. The Irtish River is crossed, and the train plods away over the great, flat lands until at six minutes past four in the afternoon, just over twelve hours after having left Omsk, it rolls into the Steppe town of Novosibirsk. Novosibirsk might be dismissed as dirty, but it is not so bad as Krasnoyarsk, farther on. Also, it is interesting as the junction with the Turksib Railway, which runs right down into Turkestan…"
Railway Wonders of the World, ca. 1937

798



"…The Turksib was opened throughout in 1929, to the accompaniment of considerable enthusiasm; but, as a matter of fact, a good part of it, including that which runs into Novosibirsk, is quite old. If the Turksib train is in the station the traveller will probably see a line of crammed but otherwise undistinguished coaches, headed by an antiquated 4-4-0 locomotive…"
Railway Wonders of the World, ca. 1937
Left: caption: "Map of the Turksib Railroad"
Right: caption: "'Turksib,' A. Kasteev, 1929"

799

"…As the Trans-Siberian rolls out into the Steppes again, it crosses the Turksib line by a lattice girder bridge forming a fly-over junction. At Taiga, reached at 9:37 pm, we are at the junction for Tomsk, the branch line running off to northwards. After leaving Achinsk, the next important halting place after Taiga, the train crosses the Chulim, a tributary of the great River Obi, which it passed just before Novosibirsk, and at 9:21 on the morning of the fifth day we are at Krasnoyarsk…"
Railway Wonders of the World, ca. 1937
Caption: "THE FIRST STATION-MISTRESS in Soviet Russia was Nina Maljarenko. After seven months' intensive training on the Tomsk railway in Siberia, she was appointed station-mistress at Kolonija, on the Omsk line."

800

"…This is not a praiseworthy place, but it is, for all that, an important centre, and there is a good deal of interchange traffic with the river steamers which paddle down the mighty Yenisei into the desolate tundra country of the far north…"
Railway Wonders of the World, ca. 1937

801

The Heart of Siberia

802

"…All day and all the next night the Trans-Siberian rumbles on through the grand primeval forests which lie to the north of the Altai Mountains, calling at Nizhne-Udinsk last thing at night, and running into Irkutsk at 12:22 in the middle of the next day…"
Railway Wonders of the World, ca. 1937

803

"…Irkutsk is worth exploring, even in the forty minutes during which the train waits. It is, perhaps, the finest city in Siberia, and has something definitely metropolitan about it, with a magnificent cathedral and streets and an opera house which have been described as 'worthy of Paris'…"
Railway Wonders of the World, ca. 1937
Caption: "Clockwise, from the upper right corner: Clock Tower, Picture Gallery, Irkutsk panorama from the dam, Local Lore Museum, Khudozhestvenny Cinema, Kazan Church"

804

"…As with Omsk and many of the cities of Siberia, Irkutsk owes its being to the enterprise of those who, in former years, were banished from Holy Russia on account of their opinions. The city has a population of about 822,000, it is a district Soviet headquarters, and is the finest Russian town in Asia. It is also the headquarters of the Middle-Asiatic Division of the Soviet Railways, which comprises 2,773 miles of railroad all built to the 5 ft. gauge…"
Railway Wonders of the World, ca. 1937

805

"…The country here has undergone a change; and a welcome change it is, too, after the interminable Steppes. For after following the River Angara out of Irkutsk, the train reaches that inland sea known as Lake Baikal, over which the trains used to be ferried in the old days before the avoiding line was built…"
Railway Wonders of the World, ca. 1937
RE: "Baikal" - in the Mongolian language, means "Nature"
Caption: "Map of Baikal Lake"

806

"…In winter, rails were at one time laid on the frozen surface of the lake. Now the line is carried through a magnificent series of rock cuttings and tunnels round the southern corner of the lake. It is called a lake, although it is 300 miles in length, from north-to-south. The country is grandly mountainous, with wild, shaggy forests of cone-bearing trees and beautiful forest and Alpine flowers; everything far more spectacular than we have seen hitherto…"
Railway Wonders of the World, ca. 1937
Left: caption: "Mountains on the Svyatoy Nos Peninsula"
Right: caption: "Mongolian gulls on Lake Baikal's clear water"

807

"…The train twists and turns along the shores of the lake, passing on its journey through no fewer than forty-two tunnels, waking the silences with an occasional deep note on her whistle. The traveller watches the scenery until nightfall, feeling that this more than compensates for the past monotony of the Steppes…"
Railway Wonders of the World, ca. 1937

808

East of Eden

"…The line is running roughly parallel to the Chinese frontier on the southern side, and Yablonoi Mountains on the north, when, at a quarter-past one in the middle of the seventh day, the train runs into Chita. Though the Trans-Siberian has been in Asia for days, it has not seemed like it, somehow, up till now. But something about Chita makes the traveller feel that he has travelled very far eastwards…"
Railway Wonders of the World, ca. 1937

809

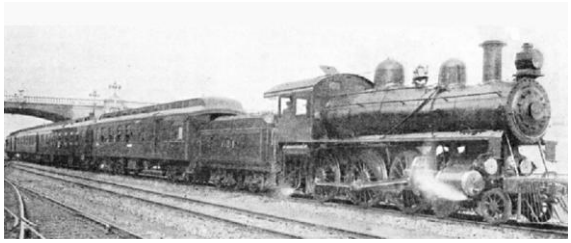
810

"…He is among the Mongolian peoples of Eastern Siberia; yellow-skinned they are, squat nosed and almond-eyed. Chita is 4,049 miles from Leningrad, and the Trans-Siberian has taken roughly a week to reach it. By now, when it is almost in China, the steamer from London may still be in the Red Sea…"
Railway Wonders of the World, **ca. 1937**
Caption: **"ASIATIC RAILWAY WORKERS examining the points on a stretch of track in Manchuria"**

811

"…At Karimskaya, sixty miles farther on, we are at the junction for the Chinese Eastern Railway, and down it, twice a week, the Trans-Siberian makes its way to Harbin, for Pekin…"
Railway Wonders of the World, **ca. 1937**

812



"…The frontier is crossed a little to the northwest of Manchouli, and headed by a Chinese Eastern locomotive, which is an ordinary Russian one so far as appearances go, the train climbs over the Khingan Mountains after having skirted the great Gobi Desert, a vast and desolate waste inhabited by those queer, rabbit-like creatures called prairie dogs, and little else…"
Railway Wonders of the World, **ca. 1937**
Caption: **"THE SOUTH MANCHURIAN EXPRESS passing under the Nippon Bridge. This famous train connects with the Trans-Siberian railway at Harbin. Each compartment has hot and cold running water and can be turned into a sleeper with accommodation for two people."**

813

"…The train takes just two days to reach Harbin, so long as there are no rail-lifting brigands in the way, and on the morning after its arrival the connecting train leaves for Pekin via Changchun and Mukden, taking another twenty-four hours over the journey. It is probable that in the not-too-distant future, the Chinese Eastern Railway will be converted to standard gauge, and a single Japanese-owned train will make the journey from Manchouli right through Manchukuo to the old Chinese capital…"
Railway Wonders of the World, **ca. 1937**

814

Back-o-Beyond

815

"…Back in Soviet territory, the 'Trans-Siberian' moves off from Karimskaya on its long, brigand-avoiding run round the frontier, following the vast valley of the River Amur all the way to Khabarovsk, no fewer than 1,384 miles farther on, and taking another day and a half on the journey. This last part of the journey seems to carry us through a 'Back-o'-Beyond,' and, indeed, we are nearer America than familiar Western Europe…"
Railway Wonders of the World, **ca. 1937**

816

Ninth Day Out

817

"…From Khabarovsk, where, once a week, the train terminates, the through express runs southwards, paralleling the Manchukuo frontier all the way, over the remaining 478 miles of its long journey, calling at Nikolsk-Ussurusk, and finally running into the Pacific port of Vladivostok, which is 5,971 miles from Leningrad, at three minutes past eleven at night on the ninth day out…"
***Railway Wonders of the World,* ca. 1937**

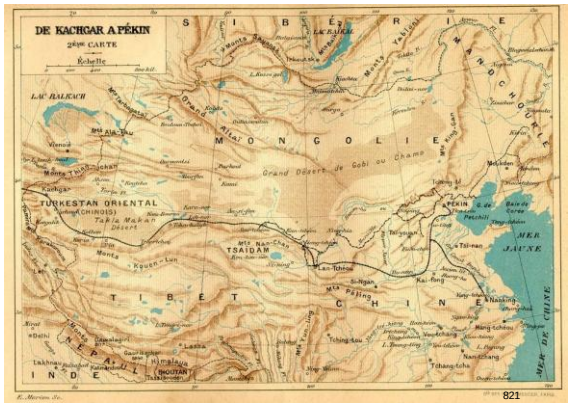
818

"…The Trans-Siberian line has had an interesting and sometimes stormy history. Long before it came into existence, it was imagined by Jules Verne; but he laid its then imaginary course farther south, through Tartary proper, and called it the 'Grand Trans-Asiatic.' Such a line would have been longer, of course, owing to the extra 'bulge' of the earth…"
***Railway Wonders of the World,* ca. 1937**

819

820

Map of the Grand Trans-Asiatic Railway from Jules Verne's "Claudius Bombarnac" (western part)



821

Map of the Grand Trans-Asiatic Railway from Jules Verne's "Claudius Bombarnac" (eastern part)

Essentially Peaceful

822

"…The line assumed great strategic importance in the early part of this century, during the Russo-Japanese War. It was then a poorly laid affair, and when accidents delayed the traffic on its single track, as they frequently did, confusion became worse confounded on the Russian front. In those days, too, everything had to be ferried across Lake Baikal, causing many delays…"
Railway Wonders of the World, **ca. 1937**
Caption: "Military railway across a frozen river"

823

"…Years before, the Tsar said of it: 'The fulfilment of this essential peaceful work, entrusted to me by my beloved father, is my sacred duty and my sincere desire.' In the early days of the line it was anything but an 'essential peaceful work.' The line was completed as far as Irkutsk in the winter of 1897-8, and the coming of the twentieth century saw the first through trains running from the Baltic to the Sea of Japan…"
Railway Wonders of the World, **ca. 1937**

824

"…The Trans-Siberian Railway, as a matter of fact, was not the only 'essential peaceful work' which has had military ambitions mixed up with its inception. Under the former Imperialist regime, more than one Russian general had talked quite openly of the possibilities of invading India which would arise were railway construction pushed far enough in the extreme south of Siberia…"
Railway Wonders of the World, **ca. 1937**

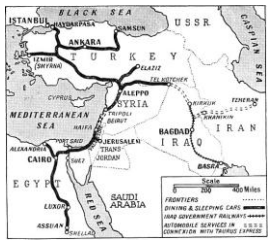
825

Railway Politics

826

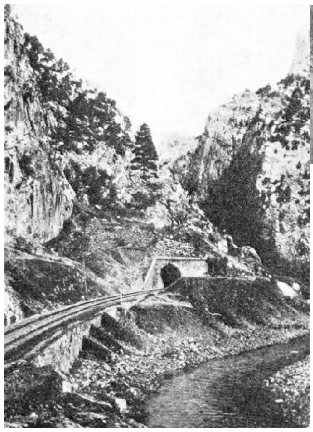
"…Right back in the eighteen-eighties, a strategic line was being quietly driven southwards into the heart of Turkestan, and the Oxus was reached in 1886. No foreigners were allowed to travel on that railway; a number of things were said, and still more were thought, in the high places of the British Government…"
Railway Wonders of the World, **ca. 1937**

827



"…Several years later, it was the turn of the Russian Government to get uneasy, this time at the Bagdad Railway proposals. The Bagdad Railway would provide a shortcut from Western Europe to the Middle East sufficient to head off any attempts at military descent through Russian Turkestan. The Bagdad Railway, too, was being sponsored by Germany, and there was then never any love lost between that country and Russia…"
Railway Wonders of the World, **ca. 1937**
Caption: :The route of the 'Taurus Express'" (a/k/a "Bagdad Railway")

828



Above: caption: "GERMAN ENGINEERS AND GERMAN CAPITAL were largely responsible for the construction of the railway to Baghdad. The section through the Taurus Mountains was completed during the war of 1914-1918. The original idea was to penetrate the range by one tunnel, but a series of twelve tunnels and bridges had to be built."
Left: caption: "A TUNNEL MOUTH IN THE TAURUS MOUNTAINS. Boring had to be carried out mostly through limestone rock. Tunnels were lined only in the sections which required strengthening; but in the majority of places no lining was necessary, as the rock was sufficiently hard and solid."

829

"…When trouble came for Russia, however, it was from Japan, as we know, and a railway invasion of India faded into the background. Today, though the Indian, Burmese and Malayan railways are still physically isolated from those of both the Near East and the Far East, their north-western terminal in the Khyber Pass is near the rail-head of the Soviet Russian Railways at Termez on the Oxus…"
***Railway Wonders of the World,* ca. 1937**

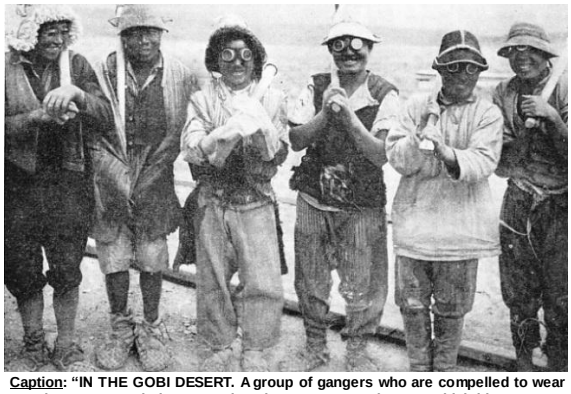
830

The Great Gobi Desert

831

"…Construction and operation of railway lines in Soviet Turkestan has always been hampered by drifting sand, and returning to the Far East we find that the same thing happens in the great Gobi Desert…"
***Railway Wonders of the World,* ca. 1937**

832



Caption: "IN THE GOBI DESERT. A group of gangers who are compelled to wear goggles to protect their eyes against the constant sandstorms which blow across the desert."

833

As a Matter of Fact

834

"…One would not think of the Trans-Siberian Railway, the traffic backbone of the Soviets, as being a link in the communications of the British Empire, but as a matter of fact it provides the sole overland communication between Great Britain and the Crown Colony of Hong-Kong. We have already described how it links up with the South Manchurian and Chinese Government Railways to give access to Peking. From the old capital city, a direct line runs southwards through the heart of China to Canton, whence the Kowloon-Canton Railway, partly owned by British interests, runs directly to the coast opposite the island of Hong-Kong."
***Railway Wonders of the World,* ca. 1937**

835

After the War

836

LIFE writer Richard E. Lauterbach last month traveled across Siberia taking pictures. He is the first correspondent to make this trip since before the war and the first to make a photographic report in even longer. His account follows.
***LIFE* magazine, August 5, 1946**
RE: introduction to an article written by *Richard E. Lauterbach* entitled: "Across the Siberian Railroad"

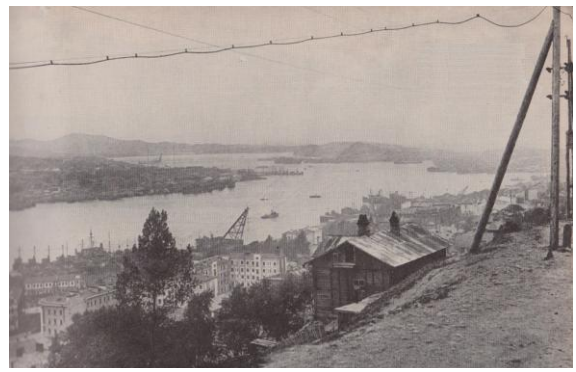
837

Monday, Wednesday & Friday

838

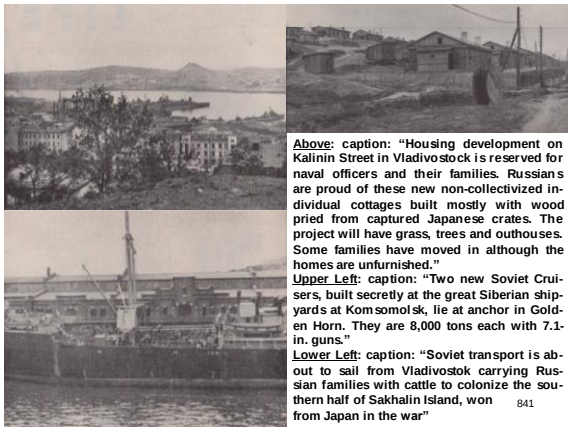
"THE Trans-Siberian express leaves Vladivostok for Moscow every Monday, Wednesday and Friday. Twelve days and more than 250 stops later it finally arrives exactly on time at the Soviet capital after the world's longest continuous train run. This 5,800-mile line is the metal belt which binds European Russia and the Urals to the still-undeveloped reaches of the Soviet Far East…"
***LIFE* magazine, August 5, 1946**

839



Caption: "Vladivostock's all-weather landlocked harbor, the Golden Horn, is anchorage for ships of all sizes. It is four miles long and a mile wide."

840



Above: caption: "Housing development on Kalinin Street in Vladivostock is reserved for naval officers and their families. Russians are proud of these new non-collectivized individual cottages built mostly with wood pried from captured Japanese crates. The project will have grass, trees and outhouses. Some families have moved in although the homes are unfurnished."
Upper Left: caption: "Two new Soviet Cruisers, built secretly at the great Siberian shipyards at Komsomolsk, lie at anchor in Golden Horn. They are 8,000 tons each with 7.1-in. guns."
Lower Left: caption: "Soviet transport is about to sail from Vladivostok carrying Russian families with cattle to colonize the southern half of Sakhalin Island, won from Japan in the war"

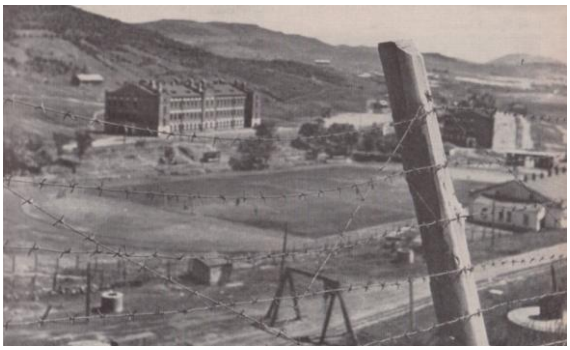
841

Left: caption: "Stalin five-year plan is advertised on Vladivostok's main street. This graph depicts increase in shoes."
Middle: caption: "Only church in Vladivostok area is in this building opened at Easter, 1944. It is always overcrowded."
Right: caption: "Movie theater on Lenin Street is Vladivostok's finest. The picture is the Hollywood-made *Great Waltz.*"

842

Top: caption: "Bathing beach on bay near Vladivostok is popular with Red Fleet men and their girls. They wear bathing suits for swimming but change into them more or less openly."
Middle: caption: "Dancing pavilion at the beach features American jazz. Sailors (left) dance together although this is not permitted by authorities at the only Vladivostok nightclub."
Bottom: caption: "Khabarovsk Station is first major stop on the journey. Sign at upper right indicates where passengers can fill canteens or samovars with boiling water to make tea."

843

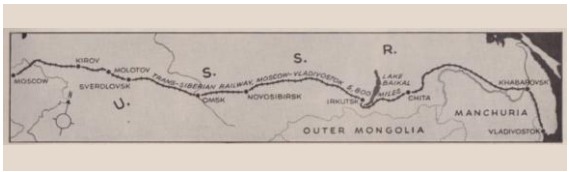


Caption: "American barracks outside Vladivostok are now used for a Red Army infantry school. These solid brick buildings were constructed when U.S. troops under Brig. General William S. Graves were sent to Siberia in 1918 during the Russian civil war to help beat the Bolsheviks. Americans claim the barracks are still the city's finest buildings."

844

The Final Link

845



"…The final link from Cheliabinsk to Vladivostok was built more than 40 years ago by prisoners of the tsar when his empire was threatened by the Japanese. Less than 10 years ago the Trans-Siberian was double-tracked by prisoners of the Kremlin when Stalin foresaw another war with the Japanese…"

***LIFE* magazine, August 5, 1946**

Caption: "Trans-Siberian Railroad covers one-quarter of the earth's circumference. Before the war the quickest but most vulnerable route Vladivostok and Moscow cut across Japanese-held Manchuria. In 1938 the Soviets double-tracked the far eastern section from Lake Baikal to Khabarovsk, making it an all-Siberian line."

846

Caption: "Concentration camp at Second River near Vladivostok is, according to local American observers, crowded with political prisoners and exiles. No Soviet official would affirm or deny this claim for me. Elsewhere in eastern Siberia I saw prisoners-of-war living in similar barbed-wire encampments and working along the railroad under guard."

847

As Far as the Eye Can See

848

"…The Soviet Far East is still a vast, relatively unsettled frontier stubbled with taiga (forest land) as far as the eye can see. The area is rich with unharnessed power, unmined gold and coal, uncharted rivers. Clothing is ragged and shoes are still a rarity among the peasants. But food and jobs seem plentiful and many men demobilized from the Far Eastern Army are settling in the booming Siberian cities…"
***LIFE* magazine, August 5, 1946**

849

Killing Time (and Distance)

850

"…During the long, long ride the Russians looked lovingly at their country and spoke proudly of its future and its power. At night they gulped their vodka and talked chiefly about the atomic bomb, the possibility of war with America, the weather, Winston Churchill and the length of the journey. They said they didn't like any of these things…"
***LIFE* magazine, August 5, 1946**

851

Build it and They Will Ride

852

"…Although the Trans-Siberian performed miracles shuttling men and supplies to the Far East last summer, it cannot now begin to accommodate all those who want to travel on it. The demand for tickets from military men, party functionaries and factory workers going on their first vacations in five years exceeds the supply. And even in a planned society nothing can be done until more engines and cars are built or bought…"
***LIFE* magazine, August 5, 1946**

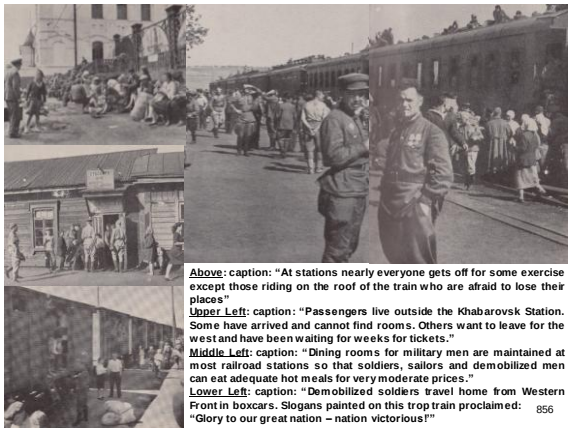
853

Inside and Out

854

"…My train, 'Number 5,' was an old one. It consisted of a locomotive and 10 cars; a mail car, restaurant, one International sleeping car, four 'hard' cars (without bedding), two regular 'soft' cars (with bedding) and one special car for mothers with small children. Every car was crowded, inside and out…"
***LIFE* magazine, Aug. 5, 1946**
Caption: **"Red Army General dressed in Japanese silk pajamas stands on steps of International Car. General wore same pajamas day and night on whole trip."**

855



Above: caption: "At stations nearly everyone gets off for some exercise except those riding on the roof of the train who are afraid to lose their places"
Upper Left: caption: "Passengers live outside the Khabarovsk Station. Some have arrived and cannot find rooms. Others want to leave for the west and have been waiting for weeks for tickets."
Middle Left: caption: "Dining rooms for military men are maintained at most railroad stations so that soldiers, sailors and demobilized men can eat adequate hot meals for very moderate prices."
Lower Left: caption: "Demobilized soldiers travel home from Western Front in boxcars. Slogans painted on this troop train proclaimed: "Glory to our great nation – nation victorious!""

856

"…One young boy, standing on the roof of my car, was looking the wrong way when we went under a low bridge. The train was stopped, a doctor summoned, the bloody body examined. After consultation with the chief engineer and the doctor, a woman, the dead body was left on the roadbed between two tracks. The younger of two porters in my car (he wore four medals and one order for valor) almost missed the train. He ran into the bordering field, scooped up a handful of wildflowers and placed them reverently on the dead boy's breast…"
***LIFE* magazine, August 5, 1946**

857

New Neighbors

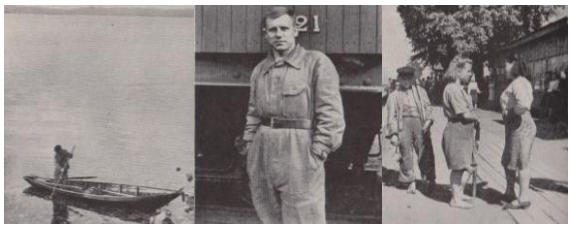
858

"…On the Journey across Siberia I talked freely to more average Soviet citizens than a foreign correspondent meets in Moscow in a year. Some of them are pictured on these pages…"
***LIFE* magazine, August 5, 1946**

859

Left: caption: "Train flirt was this friendly, buxom postmistress from Vladivostok. She wanted me to take her picture but was angry when I snapped it while she held scallions in her hand. The old sleeping-car porter (right) was amused."
Middle: caption: "Sentinel is posted in wooden shack across the street from U.S. Consulate (behind camera) in Vladivostock, keeping tabs on everybody. He watches day and night and telephones his information to security-police headquarters."
Right: caption: "Peasant woman at Siberian station sold me some hard-boiled eggs for four rubles apiece. During the war I had to pay three times as much. The woman told me she loved Americans but hated Winston Churchill."

860



Left: caption: "Lake Baikal fisherman was just poling out from the rocky shore in his boat when our train stopped at Baikal Station at dawn. His young sister was selling his previous day's catch of whitefish to the train passengers."
Middle: caption: "Demobilized flier, traveling in the vestibule of my car, had a ticket for a first-class berth. But he was in such a hurry to get home and get married that he hopped on the train without a berth. He is an artist by profession."
Right: caption: "Two housewives discuss the weather, the bread rations and the slow return of consumer goods. This picture was taken at a station in Birobidjan, the Jewish autonomous region in far eastern Siberia, founded in 1925."

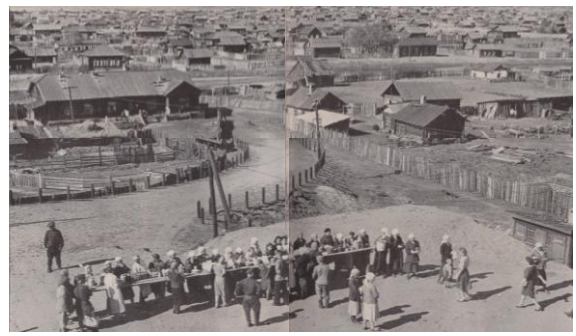
861

Left: caption: "My roommate on the trip, Michael F. Ageev, is deputy Soviet trade representative in China and very likable companion. We talked for a day before he revealed his English was far better than my Russian."
Middle: caption: "A little boy, bored with waiting for his train, plays boats with a stick in a puddle on the concrete platform at Novosibirsk. This city has the largest and finest station in the U.S.S.R. and Russians are very proud of it,"
Right: caption: "American colony in Vladivostok posed for picture in front of consulate. Left-to-right: (standing) Lieut. Commander Ryan, two secretaries, Vice Consul Smith (sitting) Commander Roullard, Chief Petty Officer Grayson."

862

"…The train boasted a restaurant car but a meal in it, consisting of caviar, steak, vegetable, potatoes and a bottle of vodka, cost $60 for two. The only regular customers were demobilized officers who had received their back pay in a lump sum. The other travelers, who had brought along supplies of sausage, bread and sardines from Vladivostok, bought the rest of their food from the villagers. The villagers in turn crowded onto the restaurant car with their accumulated savings to buy the luxuries which they evidently never got in their local stores. At some stations two blonde waitresses in white jackets got off the dining car to sell little pieces of chocolate for five rubles. The same girls walked through the train selling soup and compote at odd hours. The Soviet government is well pleased with this arrangement, which constitutes a kind of legal black market, draining-off excess purchasing power."
***LIFE* magazine, August 5, 1946**

863



Caption: "Siberian village of Zilovno, located between Chita and Lake Baikal, is typical of the frontier-like settlements which cluster around the railroad line in the Far East. The roads are unpaved, the wooden houses unpainted, the peoples' lives pretty dreary either by American or western-Soviet standards. The little market place in the foreground is close enough to the railroad station so that passengers are able to buy sour milk, fish, fowl, vegetables, nuts and berries for reasonable prices."

864

Then and Now

865

"…I found the Russians definitely not so friendly toward America as in 1941. Many are bewildered by reading in the Soviet press that a sudden twist of history has turned America and England, wartime allies, into potential if not actual enemies…"
***LIFE* magazine, August 5, 1946**

866

Russia Today

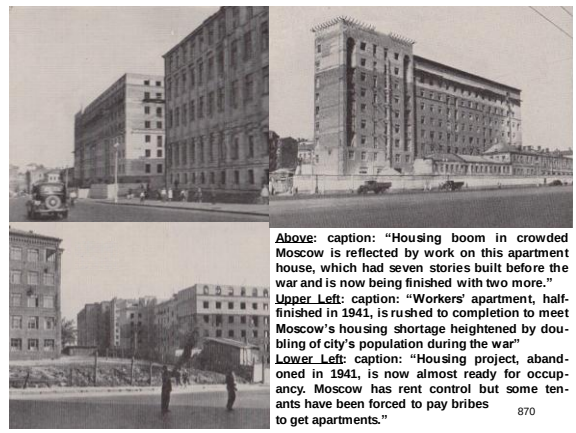
867

"…After a few days my companions, out of boredom, began to discuss politics with me. I gathered that there was considerable grumbling because armament production had not been turned into consumer production fast enough…"
***LIFE* magazine, August 5, 1946**

868

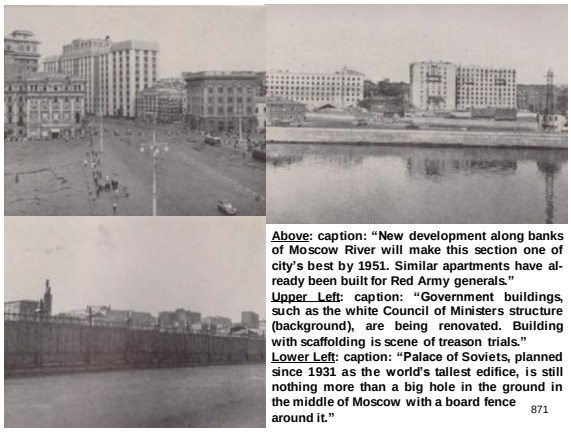
"…But Churchill's Fulton speech, presented to them with editorial comment, ended the complaining, helped convince even non-Marxists that the party leadership was correct and that the socialist motherland must maintain its armed might against capitalist encirclement."
***LIFE* magazine, August 5, 1946**
Caption: "Moscow's biggest jail, the Lubianka, at the top of Teatralny Proyezd, has a brand-new postwar wing, still under scaffolding. The old building housed Russia, the largest Tsarist insurance company, until requisitioned by the *Cheka* (secret police), in 1917. Famed as the prison for political prisoners, the Lubianka also holds petty thieves."

869



Above: caption: "Housing boom in crowded Moscow is reflected by work on this apartment house, which had seven stories built before the war and is now being finished with two more."
Upper Left: caption: "Workers' apartment, half-finished in 1941, is rushed to completion to meet Moscow's housing shortage heightened by doubling of city's population during the war"
Lower Left: caption: "Housing project, abandoned in 1941, is now almost ready for occupancy. Moscow has rent control but some tenants have been forced to pay bribes to get apartments."

870



Above: caption: "New development along banks of Moscow River will make this section one of city's best by 1951. Similar apartments have already been built for Red Army generals."
Upper Left: caption: "Government buildings, such as the white Council of Ministers structure (background), are being renovated. Building with scaffolding is scene of treason trials."
Lower Left: caption: "Palace of Soviets, planned since 1931 as the world's tallest edifice, is still nothing more than a big hole in the ground in the middle of Moscow with a board fence around it."

871

Part 9

Now Voyager

872

4 x 50 x 2000

873

Here's what it was like spending 50 hours on the longest train line in the world
***businessinsider.com,* January 3, 2020**
RE: introduction to an article written by *Katie Warren* entitled: "I Rode the Legendary Trans-Siberian Railway on a 2000-mile Journey Across 4 Time Zones in Russia"

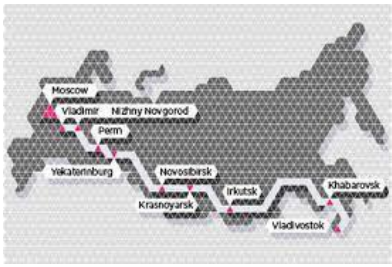
874

Dream Trip

875

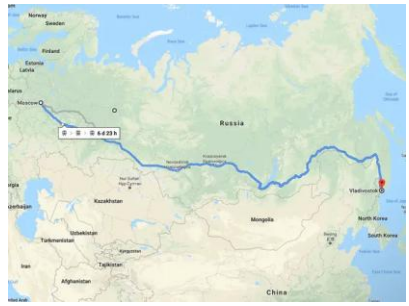
"THE Trans-Siberian Railway is the longest railway line in the world, running from Moscow all the way to Vladivostok, near the border with China. The legendary railway, which is 5,772 miles (9,289 kilometers) long and crosses seven time zones, has become a dream trip for many adventurous travelers. So on a recent trip to Russia, I had to give it a try…"
***businessinsider.com,* January 3, 2020**
RE: with a total length of 5,772 miles, the TSR is the longest in the world, connecting Moscow to Vladivostok in Russia's Far East. The TSR is featured in the *Guinness Book of Records* for three categories:
• total length;
• number of stations, and;
• construction time.
A tourist traveling on the TSR from Moscow to Vladivostok will cross seven time zones. The railway passes through twelve regions, five territories, two republics, one autonomous region and one *Okrug* area, as well as eighty-seven towns and cities. The biggest cities along the railway are Vladivostok, Khabarovsk, Irkutsk, Yekaterinburg, Nizhny Novgorod and Moscow.

876



The Trans-Siberian Railway map with the biggest cities along it

877



878

Novosibirsk to Moscow

879

"…I rode the Trans-Siberian Railway from Novosibirsk, the largest city in Siberia and the third-largest city in Russia, to Moscow. The journey took about 50 hours, so I spent two nights on the train. Here's what it was like…"

***businessinsider.com,* January 3, 2020**

RE: Novosibirsk is a city of 1.6 million people

Caption: "The train station in Novosibirsk"

880

The Great Siberian Way

881

"…Construction on the Trans-Siberian Railway started in 1891 and was completed in 1916. Builders had to deal with hostile weather conditions and building train tracks on permafrost and mountainous terrain…"

***businessinsider.com,* January 3, 2020**

RE: In 1860, Russia's railway network extended to 1K miles. By 1917, it was 45K miles. This huge increase was mainly due to the completion of the TSR. A feat of engineering for sure, but it also represented a triumph over a hostile environment since the route traverses extremely hostile conditions. In 1857, *Murav'yov-Amurskiy,* General Governor of the *Eastern Siberia* region, introduced the concept of establishing a railway in order to develop and populate the region. The military engineer *D. Romanov* was engaged to research and survey construction from the *Amur River* to *DeKastri Bay. Count Sergei Witte,* Minister of Transport, wanted to see the rapid industrialization of Russia and so persuaded *Czar Alexander III* to make his heir, the future *Nicholas II,* Chairman of a *Siberian Railway Committee.* This meant guaranteed royal support and a lowering of bureaucratic delays and obstacles. Appointed finance minister in 1892, Witte paid for the railway by raising loans, increasing taxes and printing rubles.

882

Official construction of the "Great Siberian Way" began in 1891. Construction proceeded rapidly, so fast in fact that track sections were not always properly surveyed and green timber was often used. Higher grade materials were abandoned, foundations were narrowed, the layer of ballast decreased, lighter rails used and the number of sleepers per mile reduced. Bridges that were planned to be built of steel were instead constructed from wood. As a result of this cost-cutting, construction was difficult. Few qualified engineers were hired and a lack of manual labor forced the Russians to import workers, including convicts. About 90K men had to be kept sheltered, fed and supplied. The hostile weather also meant progress was often at a standstill. Large rivers had to be bridged and many areas were either waterlogged or solidified by permafrost.

883

Trans-Siberian Railway under construction, ca. 1903

884

Six Sections

885

The TSR was built in stages and consisted of six sections. The first stage; the *Ussuriysk Railway,* from Vladivostok-to-Khabarovsk is 477-miles-long. It was completed and put into operation six years after the first stone was laid in Vladivostok in 1891. The *West Siberian Railway,* from Cheliabinsk to the *River Ob,* was the second stage. It was 800-miles-long and built in a record time of just four years. The third section; the *Mid-Siberian Railway,* from the *River Ob* to Irkutsk, was 1,137-miles-long. It was built in the six years between 1893 and 1899. From an engineering POV, building the third section was significantly more difficult given the mountainous terrain. It was here that the builders of the TSR first encountered *permafrost* - a natural phenomenon of which little was known.

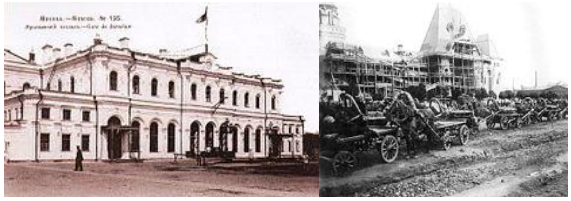
886

Construction of the 161-mile-long *Circum-Baikal Railway* was postponed because of technical difficulties. In 1900, a ferry service for trains began operating on a 45-mile route across *Lake Baikal*. The icebreakers *BAIKAL* and *ANGARA* carried trains across the lake. In the winter of 1903-04, about 28 miles of rail were laid straight onto the ice and wagons and steam locomotives were hauled across it by horses. However the inefficiency of this method of crossing the lake was keenly felt during the *Russo-Japanese War*. Thus, in 1902 construction of the *Circum-Baikal Railway* began. The lake shore between the *Port Baikal* and *Kultuk Station* was a rocky ridge 50-miles-long rising a quarter-mile above the lake. Almost nine miles of retaining walls 445 steel bridges, 6 stone viaducts, 47 rockfall protection galleries and 39 tunnels totaling 4.5 miles in length needed to be built along the route. In terms of cost, scale and difficulty of construction, nothing could match this section. Even so, it was completed in just two years and put into operation a year ahead of schedule.

887

In May 1908, the decision was made to build the last stage; the *Amur Railway*. This is where improved track with gravel ballast was first constructed. It's also where the world's first tunnel through permafrost was built, with an insulating layer between the rock and the lining of the tunnel. Construction of the TSR was officially completed in 1916, during WWI, when the 1,353-mile-long Amur Railway was brought into operation. It cost 1.5 billion gold rubles to build.

888



Almost all the work along the route was completed by hand using axes, saws, shovels, miner hacks and wheelbarrows. Mechanical aids were few and far between. The construction resulted in 100 million cubic-meters of rock moved; +12 million railroad sleepers and +1 million tons of rails laid and more than 62 miles of bridges and tunnels built. *Yaroslavl Station* in Moscow was opened in 1902 (the station takes its name from the ancient *City of Yaroslavl* which, lying 176 miles northeast of Moscow, is the first large city served by the line). The first passenger trains ran from the summer of 1903, though a ferry was needed across *Lake Baikal* until the track around the southern edge of the lake was completed in 1904.

Left: caption: "Historical view of the station (before 1902)"
Right: caption: "Construction of the new building (1902-04)"

889

Despite the difficulties and challenges, manmade and otherwise, the TSR was completed across the endless steppes, over rivers and through forests and swamps in the face of extremes of temperature, permafrost and attacks by tigers and bandits. The original train had marble-tiled bathrooms, a grand piano in the music room, a library and gym as well as caviar and sturgeon in the first-class dining room. By comparison, the third-class carriages were cramped and uncomfortable. It was conceived to proceed at a snails pace of about 20 mph and it took nearly four weeks to complete the journey. Electrification of the line began in 1929, but was not completed until 2002.

891

The Hub

892

"…I'd arrived in Novosibirsk after a three-hour flight from the diamond-mining town of Mirny. Novosibirsk, the largest city in Siberia and the third-largest in Russia, is about 267 miles from the southern border with Kazakhstan…"
businessinsider.com, January 3, 2020

893

Caption: "Novosibirsk is the principal transportation hub on the TSR. The city was built on the Steppes at the beginning of the 20th century. Novosibirsk's historic city center is a collection of soviet-era buildings."

894

Essentials

895

"…I had read multiple blog posts with recommended packing lists for the Trans-Siberian Railway, so I had a pretty good idea of what I needed. Before I got on the train, I had to stock up on some essentials for the journey, so I headed to a grocery store right across the street from the train station. I bought slippers, bottled water, tea, dried noodles, granola bars, baby food (that was not on the lists; I just like it), chocolate, and what I thought was oatmeal but turned out, unfortunately, to be buckwheat. I also grabbed some hand sanitizer, tissues, and baby wipes, which I'd read are essentials on the railroad…"
***businessinsider.com*, January 3, 2020**

896

Bigger Than a Breadbox

897

"…Terrified that I might miss my train, I arrived at the Novosibirsk train station an hour before it was scheduled to leave. The station, at more than 322,900 square-feet, is one of the largest in Russia. I had some trouble finding the correct platform, but after frantically asking multiple people 'Trans-Siberian?' and getting gestures in the right direction, I eventually found it…"
***businessinsider.com*, January 3, 2020**

898

Caption: "Garin-Mikhailovskiy tube station, Novosibirsk. Reputed to be the largest train station in Russia, it takes an area of almost 30,000 m2, and can simultaneously host 4,000 passengers. Novosibirsk Glavniy Train Station is designed like a steam engine, heading East, with interiors which one of the visitors described like: 'Huge and decorated like a concert hall in Vienna . . . high ceiling, big chandeliers, the architecture.'"

899

900

Second-Class

901

"…Train attendants were standing outside each train door, checking tickets. I found my carriage, showed my e-ticket to the attendant, and hauled my small yet deceptively heavy suitcase up the steps and onto the train…"
***businessinsider.com*, January 3, 2020**

902

"…The train corridor was narrow. In order for two people to pass, they'd both have to turn to the side…"
***businessinsider.com*, January 3, 2020**

903

"…I looked for my compartment, No. 26, where I was assigned an upper bunk. The compartment was a bit smaller than I had expected. I had a second-class ticket, which I'd bought about three weeks in advance for $148. I'd considered buying a first-class ticket because it wasn't much more expensive, but first-class tickets either weren't available on this train or were sold out - the website wasn't clear…"
***businessinsider.com*, January 3, 2020**

904

905

"…The three men, one of whom was not wearing a shirt (it was hot), looked at me with alarm as I appeared in the doorway of the compartment. I waved and said, 'Hello!' They immediately stood up, greeted me in Russian, and then headed for the door. One of them helped me put my suitcase up above the door, and then all three went out and stood in the hallway, apparently to give me my space as I got situated. I put my other bag up on the top bunk and then sat down, feeling very hot and wondering if there was air conditioning in this train. After a few minutes, my compartment mates came back in and introduced themselves as Aleksandr, Sergey, and Konstantin…"
***businessinsider.com*, January 3, 2020**

906

"…The bunks in our compartment were a little wider than half the size of a twin bed. Near the door, small ladders unfolded to allow the upper-bunk passenger to climb up. Even with the ladder, clambering up to my bunk wasn't particularly easy or graceful. I hoped I wouldn't have to pee in the middle of the night…"
***businessinsider.com*, January 3, 2020**

908

"…There didn't seem to be any clear etiquette for whether I should be able to sit on the bottom bunk - as it was someone's bed - but my three Russian friends made it clear I could sit there whenever I wanted. After the train got moving, the air conditioning kicked on, though it wasn't very strong. The bottom bunks each had a power outlet. The upper bunks had only USB ports, but that was fine with me, as I only really needed to charge my phone…"
***businessinsider.com*, January 3, 2020**

910

"…A pillow and a blanket were waiting for me on my bunk when I got on the train, and about an hour in, the attendant came around and handed out pillowcases, sheets, and duvet covers. The mattress was about 3-inches-thick and reasonably comfortable…"
***businessinsider.com*, January 3, 2020**

912

913

"…The attendant also handed out a hygiene kit that included a pair of flimsy blue slippers, a toothbrush, toothpaste, and a wet wipe. I already had all these things with me, but it was good to know I had backups…"
***businessinsider.com*, January 3, 2020**

914

915

"…Next to the bathroom was a garbage bag and chute. The bag was emptied and replaced regularly…"
***businessinsider.com*, January 3, 2020**

916

917

"…The bathroom was cramped and far from luxurious. When I flushed, I saw the contents of the toilet fall directly onto the tracks rushing by below. The unspoken rule was that toilet paper should be thrown in the trash instead of in the toilet, but not everyone abided by that…"
***businessinsider.com*, January 3, 2020**

918

919

"…The sink was tiny, maybe slightly larger than an airplane sink. The first time I used it, I squirted soap all over my hands and then tried to turn the red knob. Nothing happened. Assuming it was broken, I rubbed the soap off my hands with a paper towel and went back to the compartment. I alerted my three new Russian friends that the bathroom sink was broken. Looking amused, Aleksandr shook his head and gestured for me to follow him back to the bathroom. As it turned out, to turn on the sink you had to push up on a small lever jutting out from right underneath the faucet, which did not seem obvious at all…"
***businessinsider.com*, January 3, 2020**

920

921

"…While the bathroom was bare-bones, it was cleaned regularly and remained stocked with toilet paper, hand soap, and paper towels throughout my 50-hour journey…"
***businessinsider.com*, January 3, 2020**

922

"…In the middle of the hallway was a power outlet and a sign listing all the stops on the way to Moscow, including the exact time and how long the train would sit at the station. In the smaller towns, stops were often only two to five minutes, just enough time for some passengers to get on and off. Other stops were up to 40 minutes…"
***businessinsider.com*, January 3, 2020**

923

924

"…I wore my trusty mint-green slippers throughout my journey on the train. They were convenient because I could easily slip them off to climb up on my bunk and back on when I went to the bathroom or for a stroll in the corridor…"
***businessinsider.com*, January 3, 2020**

925

926

"…I also wore the same clothes the whole time. Gross? Yes. But I didn't want to change clothes in the cramped bathroom - partially for fear that the train would jolt and I'd fall into the toilet - and as nobody else seemed to change clothes in my compartment, I didn't want to be the weird American exposing myself to everyone…"
***businessinsider.com*, January 3, 2020**

927

"…At the other end of the train car from the bathroom was the most underrated part of the journey: the samovar, or hot-water kettle. The samovar has an endless supply of hot water for tea, noodles, instant coffee, or whatever your heart desires…"
***businessinsider.com*, January 3, 2020**

928

929

"…Throughout my journey, I drank more tea than I ever had in my life, mainly because I was bored, but also because I didn't feel like I'd brought enough drinking water (I brought three liters). As luck would have it, toward the end of my time on the train, a few hours before I got to Moscow, I learned there was a faucet for drinking water near the attendant's compartment…"
***businessinsider.com*, January 3, 2020**

930

"…I was most excited for the scenery I would see on my train journey. After we left Novosibirsk, the landscape turned into picturesque, gently rolling hills and forests…"
***businessinsider.com*, January 3, 2020**

931

"…Here and there we passed small towns and villages…"
***businessinsider.com*, January 3, 2020**

934

"…Siberia is home to about 36 million people, or roughly 25% of Russia's population, according to the multilingual Russian publication 'Russia Beyond'…"
***businessinsider.com*, January 3, 2020**

936

"…Almost every house I saw had a garden in the backyard…"
***businessinsider.com*, January 3, 2020**

937

938

"…At about 6:30 p.m., an hour-and-a-half after I boarded the train, the attendant came around to take orders for dinner. At first, I politely declined because I had eaten just before I got on the train. It was also because I'd heard the Trans-Siberian train food was overpriced and mediocre, but I did plan on trying it at some point. But Aleksandr, Sergey, and Konstantin seemed concerned and told me - via Google Translate - that it was included in the price of my ticket, which I didn't know. I went ahead and ordered the chicken dish because that's what everybody else ordered (the other option was beef). It came with a type of buckwheat, which I learned is a popular Russian dish called grechka…"
***businessinsider.com*, January 3, 2020**

939

940

"…The food was indeed mediocre. It was hot, but the chicken didn't have much flavor, and the grechka was even more tasteless. I subsisted on snacks and instant noodles for the rest of my journey…"
***businessinsider.com*, January 3, 2020**

941

"…Dinner also came with a little box with a water bottle, some packaged salami, a cookie that was something like a knockoff Oreo, and plastic utensils…"
***businessinsider.com*, January 3, 2020**

942

943

"…The salami actually wasn't bad, but the fake Oreo did not appeal to me. I meant to try it later, but it must have gotten thrown away at some point…"
***businessinsider.com*, January 3, 2020**

944

"…While we ate, I chatted with my three new friends through Google Translate. I'd read that I'd have neither cellphone service nor WiFi on most of the train journey, so I downloaded the offline version of Google Translate for Russian. It ended up being a lifesaver. Through our Google Translate conversation, I learned that Aleksandr, Sergey, and Konstantin would be on the train with me for only about eight hours: They were getting off at Omsk, where they lived, at about 1 a.m. I told them I had just come from Yakutia, and they seemed shocked, though Aleksandr said his uncle lives there…"
***businessinsider.com*, January 3, 2020**

945

"…One of the first things they asked me was: 'Why did you not take a plane to Moscow?' I tried to explain that it was for the adventure! The experience! They didn't get it…"
***businessinsider.com*, January 3, 2020**

946

"…I drank some tea with water from the trusty samovar down the hall. The tea mug had a traditional Russian metal tea-glass holder called a podstakannik, which used to be seen in taverns but is now primarily used on long-distance trains…"
***businessinsider.com*, January 3, 2020**

947

948

"…After a day of taking airplanes and taxis, and making sure I made it on the train, I was glad to have some time to relax on my bunk. There wasn't quite enough room for me to comfortably sit up, so I laid down against my pillow to read…"
***businessinsider.com*, January 3, 2020**

949

"…I hadn't planned on going to bed early, but the gentle rocking of the train was unexpectedly soothing, and I was soon asleep. I woke up at about 12:30 a.m. when my bunkmates got up and started packing up their things. At 1 a.m., the train stopped in Omsk, where they were to get off. We said our goodbyes and then I promptly went back to sleep for another seven hours or so. That said, I'm not really sure how long it was because the time zone changed sometime in the night…"
***businessinsider.com*, January 3, 2020**

951

"…When I woke up the next morning, I had three new traveling companions in my compartment, all Russian: two middle-aged sisters traveling together, and a middle-aged man traveling by himself. I said hello and then ate a granola bar for breakfast while reading (what else?) 'Anna Karenina'…"
***businessinsider.com*, January 3, 2020**

952

"…Later, I briefly chatted with my three new companions, mostly via Google Translate, though the man and one of the women spoke a little English. 'You're not afraid to travel in Russia alone?' one of the sisters asked me. I shrugged and said, 'Not really.' 'Because we are,' she said. 'Russia is a dangerous place.' The man said it would be better to travel on the train with a friend, and I thought he was probably right, though more for the company than for safety. I never felt unsafe on the train…"
***businessinsider.com*, January 3, 2020**

954

955

"…I went to check out the dining car, which I'd heard was only two cars over. I didn't plan to eat in the dining car, because I'd read that the food was overpriced and not very good. If it was anything like the chicken-and-buckwheat meal I'd been served the night before, I wasn't too keen to try it. The dining car was nothing fancy…"
***businessinsider.com*, January 3, 2020**

956

957

"…I tried to sit down at one of the tables and read my book, but I was sternly ushered out by one of the train employees, so I deduced that you had to actually order something to hang out there. Beer and wine were sold at the small bar…"
***businessinsider.com*, January 3, 2020**

958

959

"…A quick glance at a menu showed me that I could get the same chicken-and-buckwheat meal from the night before in the dining car. Most of the dishes were some combination of beef, fish, potatoes, cabbage, and buckwheat. Most of the main dishes were 600 to 800 rubles, or about $9 to $12, which I found to be relatively pricey. Most of my meals in Russia so far, even in Moscow, had cost $5 to $8…"
***businessinsider.com*, January 3, 2020**

960

"…The two sisters and the man were on the train with me for about 18 hours total, I believe, but time seemed to have lost all meaning at that point…"
***businessinsider.com*, January 3, 2020**

961

"…In Yekaterinburg, a city about 27 hours from Moscow, many people got on and off the train…"
***businessinsider.com*, January 3, 2020**
RE: 33 hours east of Moscow by train and beyond the *Ural Mountains*, Yekaterinburg is located on the cusp of Europe and Asia. The imaginary dividing-line cuts through twelve very real obelisks that mark the border along the Urals; one of these obelisks is located 10.5 miles from Yekaterinburg.

962

963

"…A tour group of about 10 people arrived in my car in Yekaterinburg, and to my surprise, they were all English-speakers - some from Australia, some from the UK, and others from Canada. I had yet another set of new compartment buddies, this time an Australian couple named Ian and Astrid who appeared to be in their 60s, and a Russian woman named Marina, who told me via Google Translate that she was 60 years old, was retired and living in Moscow, and received a pension of 1,000 rubles (about $15) per month…"
***businessinsider.com*, January 3, 2020**

964

"…After my first night on the train, I was desperately wishing for a shower. Some Trans-Siberian trains have showers in their first-class cars, but as far as I knew, my train didn't even have a first-class car. Each morning and evening, I gave myself a wet-wipe bath and brushed my teeth in the bathroom. It helped a little, but I still felt gross for the majority of the trip…"
***businessinsider.com*, January 3, 2020**

965

Moscow Bound

966

"…My second day on the train dragged by. It didn't help that we crossed four time zones, so it felt like I was going back in time even as I wished for it to move faster. I spent some time talking to Ian and Astrid. It was nice to be able to talk to someone after so many hours of Google Translate-only communication. I learned that they lived on a farm near Brisbane and were two weeks into a 10-week trip across China, Mongolia, Russia, and Europe…"
***businessinsider.com*, January 3, 2020**

967

"…I spent a lot of time on my favorite pastime: pacing up and down the corridor, drinking tea. It was a way to get a tiny bit of much-needed movement, and I got a glimpse into the other compartments…"
***businessinsider.com*, January 3, 2020**

968

"…Each compartment was like a peek into a distinct little world. In one, a woman was lying down reading. In another, a family was eating ham sandwiches and drinking tea out of the same mug I was. I also napped a lot…"
***businessinsider.com*, January 3, 2020**

969

"…Thanks to our train attendant, a middle-aged blond woman who wore a long light-blue dress and glasses, the carriage stayed clean throughout the journey. Every few hours, it seemed, she would vacuum the hallway and the individual compartments, clean the bathroom, empty the trash, and wipe down various surfaces in the hallway. She would also meticulously straighten the pink-and-white-striped rug that spanned the length of the train car…"
***businessinsider.com*, January 3, 2020**

970

"…The scenery eventually got pretty monotonous. Yes, it was beautiful - all greenery, trees, wildflowers, and sunshine. But there wasn't much variety…"
***businessinsider.com*, January 3, 2020**

971

972

"…The second afternoon, there was a brief thunderstorm, which was an exciting change of pace. But then back to trees and sunshine…"
***businessinsider.com*, January 3, 2020**

973

"…But every once in a while, the trees would open up and I'd get a glimpse of something new, like a sparkling river. People were floating down the river and camping and swimming on its banks…"
***businessinsider.com*, January 3, 2020**

974

975

"…We passed some cute riverfront houses. I wondered how much they would cost and who lived there…"
***businessinsider.com*, January 3, 2020**

976

977

"…I didn't sleep as well my second night on the train as I had the first night because Marina snored louder than anyone I've ever heard, and Astrid complained about the snoring louder than anyone I'd ever heard…"
***businessinsider.com*, January 3, 2020**

978

"…A little over six hours before the end of the journey, we had one of our final stops in the town of Danilov, a little over 200 miles from Moscow. A couple of small shops at the station were selling cookies, chips, sandwiches, ice cream, and other snacks…"
***businessinsider.com*, January 3, 2020**

979

"…Local women were selling fresh strawberries and cherries on the other side of the train station's gate. I didn't buy any. After more than 40 hours on a train with little physical activity, I didn't have much of an appetite…"
***businessinsider.com*, January 3, 2020**

981

"…A few stray dogs were hanging out on the platform, soaking up the sunshine and the attention from train passengers…"
***businessinsider.com*, January 3, 2020**

983

"…The last six hours were uneventful. I read a little bit, slept a little bit, and dreamed about sleeping in a real bed. Just before 5 p.m., we arrived in Moscow right on schedule, 50 hours after we departed Novosibirsk…"
***businessinsider.com*, January 3, 2020**

985

986

Once-in-a-Lifetime

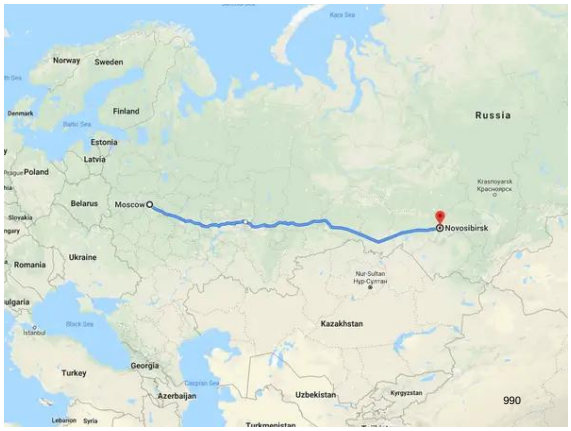
987

"…I had never been so happy to get off a train before - but at the same time, I was sad it was over. It was my first time riding a sleeper train, and getting to travel more than 2,000 miles on one across Russia was a once-in-a-lifetime experience…"
***businessinsider.com*, January 3, 2020**

988

"…By the time I got back to Moscow, my 50-hour train journey had spanned more than 2,000 miles and four time zones…"
***businessinsider.com*, January 3, 2020**

989



990

"…Compared with the rush and constant movement of the other 10 days I spent in Russia, the weekend on the Trans-Siberian was a welcome chance to relax, catch up on sleep, read, and just be alone with my thoughts. Chatting with locals who were absolutely perplexed about why I would take the Trans-Siberian <u>for</u> <u>fun</u> was an added bonus…."
***businessinsider.com*, January 3, 2020**

991

Lessons Learned

992

"…Though the train ride was far from luxurious, I wouldn't hesitate to do it again - with a few key changes. An obvious one is that it would be more enjoyable traveling with a friend (or three, so we could have a compartment to ourselves). I would also bring a better variety of snacks. The Australian couple brought some meat, cheese, and bread to make sandwiches, as well as some fruit. My granola bars and dried noodles got old very quickly…"
***businessinsider.com*, January 3, 2020**

993

"…And finally, I would try to choose a route with more varied scenery if possible - or time my naps better. At one point, the Australian couple told me we passed through the Ural Mountains and got some stunning mountain views. I, of course, was napping."
***businessinsider.com*, January 3, 2020**

994

<u>Part 10</u>

Legacy

995

World Famous

996

The Science Museum Group is set to launch a major new exhibition which charts the global impact of the world's longest and most famous rail journey – the Trans-Siberian Railway
steamdaysmag.co.uk, **October 5, 2020**
RE: introduction to an article entitled: "New Exhibition for World-Famous Trans-Siberian Railway Journey"

997

For the First Time

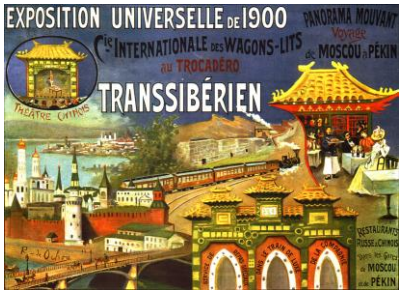
998

"ANNOUNCED on October 5 – the anniversary of the railway's completion in 1916 – a major new exhibition will be unveiled at the National Railway Museum in York with a smaller display opening at the Science Museum in London. Produced in partnership with JSC Russian Railways, the exhibition will showcase priceless artefacts from Russia and the UK, brought together for the first time…"
steamdaysmag.co.uk, **October 5, 2020**
RE: the TSR was officially completed after more than a decade of construction throughout a large stretch of the *Russian Empire*. Thousands of workers helped build the network of railways linking Moscow with the Russian Far East. While formally finished, trains had already been running on some portions of the system; other segments, however, would not be in operation for several more years. The railway, which played a vital role in linking Siberia more closely with an increasingly industrialized European Russia, measures 5,772 miles (9,290 km) in length and encompasses the world's longest railway line. It also has branch lines that connect with Mongolia, China and North Korea.

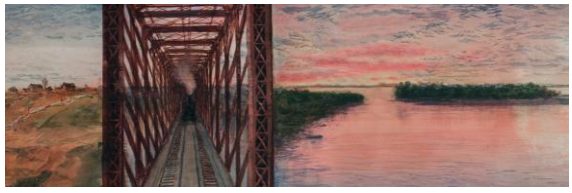
999

"…These include the famous Faberge Easter Egg 'The Great Siberian Railway' to be displayed in York and a section of an almost 1000-metre long panorama painting by Pavel Pyasetsky which appeared at the Paris Exposition of 1900, going on display in London…"
steamdaysmag.co.uk, **October 5, 2020**
RE: by 1900, the TSR was taking on passengers, but western observers continued to hold it in contempt. To counter that POV and to demonstrate its equality among European railways, the Russian government commissioned the operator of the *Orient Express* to come up with an attractive display for the *1900 Universal Exposition* in Paris. Four luxurious carriages were built and equipped especially for the exhibition.
Caption: "The Easter egg of 1900, presented to the Empress Alexandra Fedorovna, celebrated the epic achievement of the Trans-Siberian Railway and was showcased at the Paris World's Fair of 1900"

1000



1001

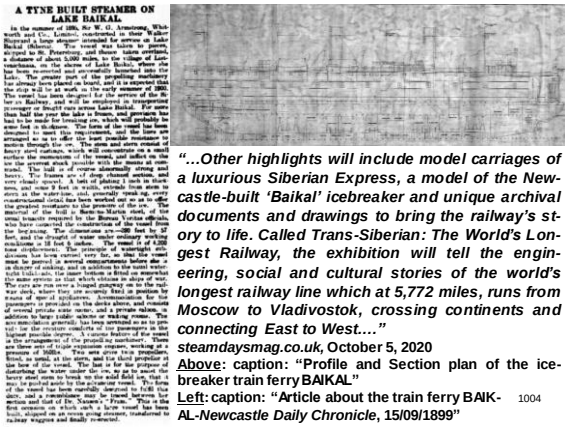


"…The real treat was the exhibit designed by Pavel Pyasetsky, who was specially commissioned by the railway to demonstrate the 'experience' of travelling on the Trans-Siberian. To give a sense of movement to the 'passengers' tucking into their three-course meals, the artist devised an elaborate arrangement outside the windows of the dining car to give the feeling of a virtual train ride. A moving panorama was created by means of an elaborate series of belts moving along at varying speeds. The front one travelled rapidly, carrying mundane features such as sand and rocks, while the next, slightly slower, had plants such as shrubs and brush. Behind that, there was a third, again somewhat slower, showing distant scenery while the fourth, which rolled along the slowest of all, was Pyasetsky's masterpiece, a set of watercolours on lengthy scrolls, with scenes that he had sketched on trips along sections of the railway that had been completed early…"
RE: excerpt from: "To the Edge of the World: The Story of the Trans-Siberian Express, the World's Greatest Railroad," by *Christian Wolmar*

1002

…The watercolours included scenes from the cities of Moscow, Omsk, Irkutsk and Beijing and the idea was to give viewers the impression that they had journeyed along the whole railway. The show actually lasted forty-five minutes and there were nine separate scrolls with a total length of around 900 metres."
RE: excerpt from: "To the Edge of the World: The Story of the Trans-Siberian Express, the World's Greatest Railroad," by *Christian Wolmar*

1003



"…Other highlights will include model carriages of a luxurious Siberian Express, a model of the Newcastle-built 'Baikal' icebreaker and unique archival documents and drawings to bring the railway's story to life. Called Trans-Siberian: The World's Longest Railway, the exhibition will tell the engineering, social and cultural stories of the world's longest railway line which at 5,772 miles, runs from Moscow to Vladivostok, crossing continents and connecting East to West…."
***steamdaysmag.co.uk*, October 5, 2020**
Above: caption: "Profile and Section plan of the icebreaker train ferry BAIKAL"
Left: caption: "Article about the train ferry BAIKAL-*Newcastle Daily Chronicle*, 15/09/1899"

1004

1005

7 x 7

1006

"…Begun in 1891 and fully completed in 1916, a journey along the length of the Trans-Siberian would cross seven time zones, lasting up to seven days…"
***steamdaysmag.co.uk*, October 5, 2020**

1007

"Getting anyone to agree on what is the right time of day can become a frequent debate on the Trans-Siberian. It charts not just a simple measure of your progress, but what you get to see in daylight and what you thunder past in the darkness of the Siberian night. But what actually constitutes the right time on board the train? The answer is interesting from both from a historic and a practical point of view. Stopping off the train to see local life is much more rewarding by the daylight of local time, but having a feeling for Moscow time is also intriguing. It gives an insight into how the local railway stations service trains at all hours of the day and night, whatever the local time. It is also a reminder of the huge distances that creep by almost unnoticed when crossing Siberia by rail. Another very practical benefit of using the local time is that you get to travel across continents without suffering from jet lag. This is especially useful travelling east, where by shortening your day by just an hour at a time you can avoid the onset of the fatigue usually suffered by passengers making the journey by air. Travelling west you find yourself winding your watch back each day, and the possibility of an extra hour in your comfy berth. Of course with more than one time zone, it is even more vital to have a singular 'railway time' to avoid collisions of trains using different times on the same tracks. Thus, India had 'Madras time,' North America had 'railway time' and Russia used Moscow time."
***Matthew Woodward*, Railway Aficionado**

1008

In Equal Measure

1009

"…Judith McNicol, Director of the National Railway Museum, said: 'The very name 'Trans-Siberian' conjures up so many different emotions and images: extraordinary landscapes and forbidding terrain, opulence and luxury. This exhibition - a true blockbuster - will celebrate and inspire in equal measure, bringing together exquisite treasures from Russia and the colossal engineering feats that allowed travellers to cross a continent by railway. It is absolutely not to be missed'…"
steamdaysmag.co.uk, **October 5, 2020**

1010

Behind the Legend

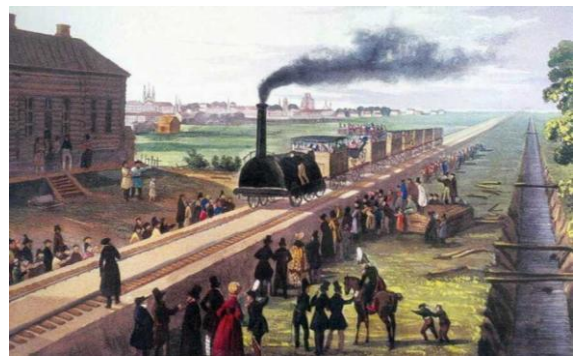
1011

"…Sir Ian Blatchford, Director and Chief Executive of the Science Museum Group, said: 'Trans-Siberian: The World's Longest Railway, is the latest chapter in a richly rewarding partnership between the Science Museum Group and Russia which has made truly ground-breaking exhibitions such as The Last Tsar and Cosmonauts possible. For well over a century, the Trans-Siberian Railway has captured the imaginations of millions across the world. But it is a story known largely through a prism of myth and romance. With the support and cooperation of JSC Russian Railways, and a host of museums and partners in the UK and Russia, we are in a unique position to showcase the authentic objects and untold stories that lie behind the legend'…"
steamdaysmag.co.uk, **October 5, 2020**

1012

"…The exhibition will explore the engineering challenge behind the railway's construction, its social and economic impact on Russia and the experience of travelling onboard. It will also feature original items from the Science Museum Group Collection which help illustrate the beginnings of Russia's railway network…"
steamdaysmag.co.uk, **October 5, 2020**
RE: *Tsar Nicholas I* commissioned Austrian engineer *Franz Gerstner* to build Russia's first railway; an experimental route between St. Petersburg and the royal residence *Tsarskoe Selo.* It was called the "Tsarskoselskii Railway." Steam engines and carriages were transported from England and Belgium and over 3K people constructed the railway over 17 months.

1013



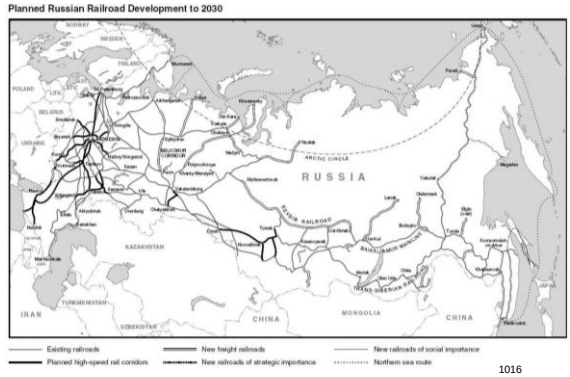
Above: the train's first journey departed in October 1837, reaching speeds never before realized. The railway transported 700K passengers in its first year, and ran independently for 80 years. This railway experiment revolutionized transport in the world's biggest empire. The route still operates today.

1014

The Russian railway network is long enough to circumnavigate the globe more than twice. It encompasses the world's longest train journey - the TSR - taking passengers 9,300 km between Moscow and Vladivostok, as well as running direct links to a dozen different countries reaching from Western Europe to the Far East. Each year, over one-billion passengers and one-billion tons of freight travel across the country. As well, this network has played an important role in Russian history; returning Lenin to Russia on the eve of the 1917 *October Revolution* and transporting supplies over frozen *Lake Ladoga* to the starving citizens of Leningrad during WWII.

1015

Planned Russian Railroad Development to 2030



1016

Story Telling

1017

"…To help tell the story of Britain's involvement in the railway's development, the exhibition will include items lent by National Galleries Scotland, Tyne and Wear Museums and Archive, the British Library, the Imperial War Museum and the Victoria and Albert Museum…"
***steamdaysmag.co.uk*, October 5, 2020**

1018

"…The exhibition will include extensive loans from Russia including the Moscow Kremlin Museums, the State Archives of the Russian Federation, Russian State Library, the State Hermitage Museum and the Central Museum of Railway Transport in St. Petersburg, as well as from the JSC Russian Railways museum network…"
***steamdaysmag.co.uk*, October 5, 2020**

1019

"…Vadim Mikhailov, First Deputy Chief Executive Officer of JSC Russian Railways, who operate the Trans-Siberian Railway, said: 'We are very pleased to partner with the Science Museum Group on the second project, following the success of the 'Last Tsar: Blood and Revolution' (London, 2018). Particularly, as it was during the reign of Nicholas II, who was at the centre of our first joint exhibition, that the Great Siberian Way was completed when the final railway bridge over the Amur river was finished in 1916. It is a special pleasure to announce the exhibition on 5 October to mark the 104th anniversary of this event…"
***steamdaysmag.co.uk*, October 5, 2020**
RE: in Eastern Siberia, the TSR was partly intended to further Russia's imperial ambitions in the Far East and the final stretches were built through Manchuria on land leased from China. This enabled the Russians to build the line directly across Manchuria from the *Transbaikal* region to Vladivostok. This *Trans-Manchurian* line was completed in 1901. When the *Russo-Japanese War* (1904-1905) broke out, troops moved east by rail. Russia feared that Japan would take over Manchuria thus, after the war the *Amur Line* was built to provide a route entirely through Russian territory. This route was long and difficult to construct. It was finished in 1916. The war highlighted issues when using cheap methods and materials and due to high demand, the railway frequently broke down. The situation was further frustrated by the outbreak of the *Russian Civil War* (1917-1922). It wasn't until the early 1920s that all the railway's deficiencies were corrected. Even so, there were frequent, frustrating delays.

1020

Russian commemorative stamp, 2002

1021

"…'We feel privileged to be part of a railway exhibition in the country where railways began, but which also supported the birth of Russian railways, supplying steam locomotives for the first Russian railroad between St. Petersburg and Tsarskoye Selo. In a vast country like Russia, which the Trans-Siberian railway connected, railways have always been of a paramount importance. JSC Russian Railways carefully collect and preserve the Russian railway heritage. There are dozens of large and small museums across the 85,000 kilometres of rail lines that the company manages'…"
***steamdaysmag.co.uk,* October 5, 2020**

1022

"…'In 2017 we opened our main museum in St. Petersburg – the Russian Railway Museum. We are really excited about the joint project with the National Railway Museum in York, which will feature a selection of items from our collection'…"
***steamdaysmag.co.uk,* October 5, 2020**
Caption: "Russian Railway Museum in St. Petersburg"

1023

1024

"…'Trans-Siberian: The World's Longest Railway' opens to the public on 26 March 2021, with an exhibition at the National Railway Museum and a smaller display at the Science Museum in London, until 5 September 2021. Both the exhibition and display will be free-of-charge with pre-booked tickets required to access both museums."
***steamdaysmag.co.uk,* October 5, 2020**

1025

2022 or Bust

1026

Despite our best efforts, the exhibition *Trans-Siberian: The World's Longest Railway,* which was to open in York and London from June this year, has been postponed until 2022. This was a difficult decision, but we believe it's the right one, because of the continued and unprecedented global travel disruption caused by the Covid-19 pandemic.

Ultimately, we want this exhibition to be of the very highest quality, with objects and stories drawn from around the world to bring to life the extraordinary experience and achievement of the Trans-Siberian Railway. By delaying until next year, we give ourselves the best possible opportunity to deliver a fantastic experience for our visitors.

We are currently working with our lenders and principal partners, JSC Russian Railways, and we look forward to the exhibition going ahead in 2022.
railwaymuseum.org.uk

1027

New and Improved

1028

Irkutsk, Russia - Once valued by freight shippers as a cheaper option to the sea route between Asia and Europe but then losing customers in the turmoil after the collapse of the Soviet Union, the Trans-Siberian Railway, Russia's main artery traversing the Eurasian continent, is getting a refit
***Kyodo News,* June 30, 2021**
RE: introduction to an article written by *Yusuke Yagi* entitled: "New Improved Trans-Siberian Railway a Gateway to Asia"

1029

Renewed Attention

1030

"IMPROVEMENTS are rapidly being made to allow both faster train speeds and bigger freight capacity in a bid to revive the line's leading logistical role in connecting Asia, where countries such as China have emerged as the driving force of the world economy, and Europe…"
***Kyodo News,* June 30, 2021**

1031

"…The renewed attention toward the railway, which is the world's longest at about 9,300 kilometers, also comes as the coronavirus pandemic causes a sharp decline in air cargo capacity, congestion at sea freight terminals, and soaring costs for shipments between Asia and Europe…"
***Kyodo News,* June 30, 2021**

1032

"…In late May, construction was under way in Andrianovskaya, southwest of Irkutsk, one of the major cities of the East Siberian economic region, to shave mountainsides in order to straighten the curve of the railway line. Dump trucks came and went raising dust as they crossed unpaved roads, and about 60 workers had set-up camps nearby. The work is part of a project to increase the average speed of the trains from 60 to 80 km per-hour…"
***Kyodo News*, June 30, 2021**

1033

Faster and Longer

1034

"…Sergei Fursov, an engineer for the eastern Siberian branch of the Russian Railways, said, 'Improving speed is indispensable for service expansion. But we also need to reduce the risk of derailments, which tend to happen as trains get faster and longer'…"
***Kyodo News*, June 30, 2021**
Caption: **"Photograph taken on May 23, 2021, shows a Trans-Siberian Railway freight train running in Andrianovskaya, a suburb of Irkutsk, Russia"**

1035

"…The series of improvements will see the number of freight carriages increased by 20 percent, reaching a maximum length of 1 km. The railway is also working to resolve problems such as train delays and cargo damage - issues that have been pointed out for many years…"
***Kyodo News*, June 30, 2021**

1036

Connectivity

1037

"…The total freight transport capacity of the Trans-Siberian Railway and the Baikal-Amur Mainline, which traverses eastern Siberia and the Russian Far East north of and running parallel to the TSR, was 144 million tons in 2020, marking a 50 percent increase from 2012. But under the pandemic, the number of passenger flights connecting Asia and Europe dropped significantly, which resulted in precipitous declines in air cargo capacity. As sea freight charges have also risen, transportation capacity connecting east and west has been under strain…"
***Kyodo News*, June 30, 2021**

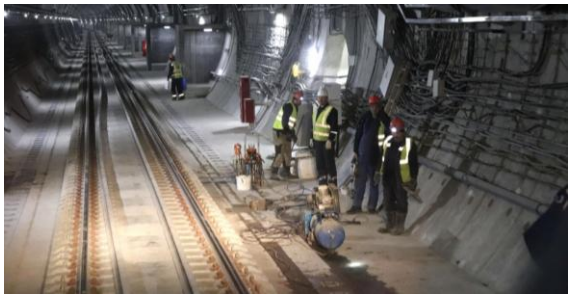
1038

Expanded Capacity

1039

"…With the timetable of the Trans-Siberian Railway suffering from overcrowding, much expectation rests on work to completely remodel the Baikal-Amur Mainline as a bypass to expand freight capacity. With a view to exporting coal, oil, and timber along the line to Asia, construction work will proceed toward complete double-tracking by the end of 2024…"
***Kyodo News*, June 30, 2021**

1040



"…The Baikalsky tunnel, the second-longest railway tunnel in Russia with a total length of under 7 km, has been constructed in the mountains two hours from Severobaykalsk in the Republic of Buryatia. The double-tracking work has reached the final stages there…"
***Kyodo News*, June 30, 2021**
Caption: **"Photograph taken on May 26, 2021, shows workers performing construction on the Baikal-Amur Mainline's Baikalsky tunnel in the mountains near Severobaykalsk in the Russian Republic of Buryatia"**

1041

"…Vladimir Goncharov, deputy director in the department of construction preparation, said the expansion is aimed at supporting exports of resources especially to countries in Asia. 'We will support the expansion of resource exports to China, Japan and South Korea. It will also be useful for the development of areas along the railway line'…"
***Kyodo News*, June 30, 2021**

1042

An Optional Conduit

1043

"…Among companies in Asian countries looking to benefit from the service expansions are two Japanese logistic firms. Hankyu Hanshin Express Co. and Toyo Trans Inc. have begun regular freight services with ships departing from Toyama New Port in central Japan's Toyama Prefecture and docking at Vladivostok, the largest Russian port in the Pacific Ocean and one of the line's terminuses. The two firms ostensibly operate separate services but use the same shipping freight and train line. The cargo is transshipped to the railway in Vladivostok, bonded until arrival in Poland and transported throughout Europe. Since the first shipment left port on Feb. 2, the freights have continued, more or less, at a pace of once every two weeks. A spokesperson for Hankyu Hanshin said there has been steady customer demand and many inquiries…"
***Kyodo News*, June 30, 2021**

1044

"…Isao Takahashi, president of Toyo Trans, said disruption affecting international transportation during the pandemic has resulted in keen interest in the railway as an optional conduit. 'Containers are piling up at major European ports and ships are waiting offshore. There had also been a standstill in maritime routes due to the grounding accident that occurred in the Suez Canal,' said Takahashi. 'As efforts intensify for decarbonization, we are marketing new international logistic routes'…"
***Kyodo News*, June 30, 2021**

1045

The Pearl of Siberia

1046

"…Aside from making improvements to the Trans-Siberian Railway, efforts are also under way to protect the environment from potential hazards that could result from boosting its capacity. There is a section where the railroad tracks meet Lake Baikal, a UNESCO World Natural Heritage site dubbed 'The Pearl of Siberia.' European customers are paying close attention to protection of this cherished natural resource…"
***Kyodo News*, June 30, 2021**
Caption: "Photograph taken on May 28, 2021 shows a passenger train running on the Baikal-Amur Mainline on the shores of Lake Baikal in Severobaykalsk in the Russian Republic of Buryatia"

1047

"…In 2019, an emergency response team base was set-up along the Baikal Amur Mainline. Regular training will be conducted on ships and recovery vehicles to minimize the impact of freight trains derailing and oil reaching the lake. An official in charge estimates that recovery can be conducted within four hours…"
***Kyodo News*, June 30, 2021**
Caption: "Photograph taken on May 25, 2021, shows the Russian Railways' emergency response team conducting recovery drills, assuming an oil spill had occurred at Lake Baikal, in Severobaykalsk in the Russian Republic of Buryatia"

1048

"…The Russian government also plans to tighten its regulations. Vyacheslav Zdor, director for the center for environmental protection, said, 'It is our responsibility to mitigate the environmental impact while developing the railway.'"
***Kyodo News*,**
June 30, 2021
Caption: "The Imperial Russian coat-of-arms on the Zarengold (Tsar Gold) special tourist train"

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