

cattle. The principal means of communication between Irkoutsk and Russia is by the stage-coach, relays being established at every twenty-five versts along the route. As the telegraph ends at Irkoutsk, dispatches are sent to this town by postboys on horseback. These perform the journey in three weeks; and, as the distance between Irkoutsk and Irkoutsk is 3,000 kilometers, the dispatches travel from 35 to 40 leagues per day, on a good road. The mail goes more slowly, leaving Irkoutsk every week and reaching Irkoutsk in thirty days. Travelers move more slowly yet, notwithstanding their outcries, their menaces, and the foolish pourboires that they give the station superintendents. In summer the postal service as far as Irkoutsk is performed by boats, hauled by horses up the river, but rowed by the postillions down the stream.

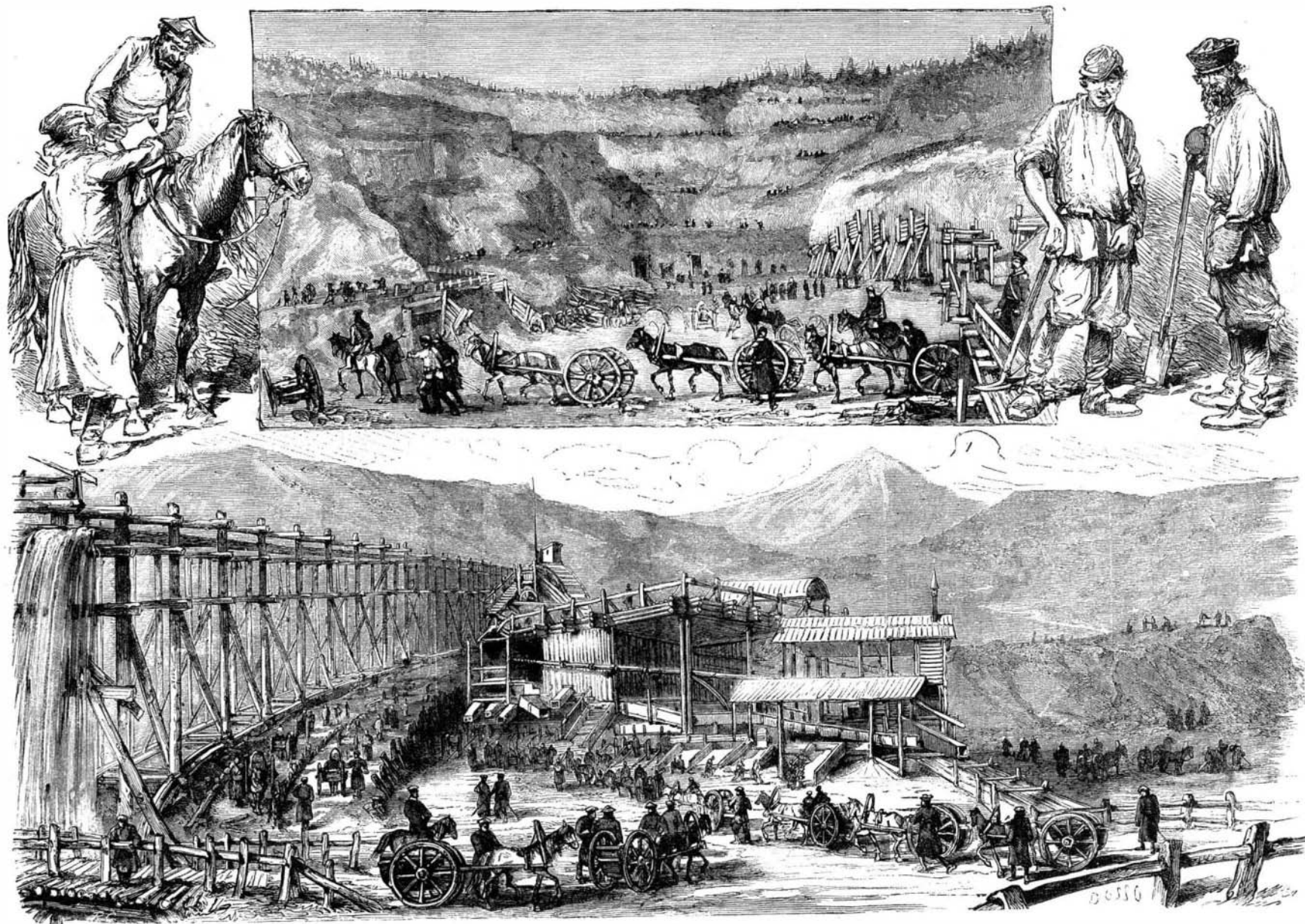
As will be seen from this, means of locomotion are still very primitive on the imperial route which puts the capital of the empire and that of Eastern Siberia in communication. And what must it be then when the highway is left in order to penetrate to the interior of the country? However, a few steamboats have already troubled the limpid waters of the Lena. One of them is La Lena, which made part of the expedition of Prof. Nordenskiöld, and reached, under the Swedish flag, the mouth of the river whose name she bears. The banks of the Lena are very beautiful and picturesque, especially above Irkoutsk. The river itself presents a phenomenon which is curious, and perhaps unique, in Russia. Notwithstanding the enormous mass of water that it carries at the time of the melting of the snow, and the immense cakes of ice that float upon it toward the Arctic

der pierced with holes. This, in revolving, divides the mass, and pours the earth out on to an inclined plane in the form of a stairway, each step of which retains the more heavy sand, which is the portion containing the gold. This sand is afterward washed by hand by the laborers, and then the gold is weighed, stamped, and entered on the official registers, and carried to the laboratory of Irkoutsk, where it is cast into ingots. From thence it is transported by a caravan each year to St. Petersburg. It is only then that the proprietors of the mines receive the part of the precious metal belonging to them; for, in Russia, the exploitation of gold is a government monopoly. The proprietor of a mine is not permitted to appropriate the least speck of gold found on his land without special permission of the chief of the imperial section of mines. It is difficult to conceive of the richness of the gold mines of Eastern Siberia. Each year there are discovered new placers or alluviums containing gold dust. I am positive that a large number of valleys contain auriferous deposits of exceptional richness, but which cannot be worked because of the want of the resources necessary to life and the need of means of exploitation. It is especially during summer that the workmen and condemned persons are employed at out-of-door work, but in winter they are set to work in the subterranean galleries. The horses used in the mining operations are brought from Tomsk, since the Irkout animals are not strong enough to endure labor of this kind.

It must not be forgotten that at the mines a *poud* (about 16 kilogrammes) of hay costs 10 to 15 francs. And so it is with everything, especially with European products.

capable of being operated by any one, which, when used, would automatically inform the fire department of the number of the indicator, seemed to be the most effective means of preventing large fires. These were not only placed in the most important thoroughfares, but also in the most important and readily combustible buildings. In large public buildings, factories, theaters, and the like, it is particularly advisable to have special arrangements by means of which it is possible to locate the position of the fire in the building itself, so that one can immediately concentrate the attention on the spot where the fire originates, without being obliged to hunt it up. Toward the numerous apparatus devised for the purpose of calling the fire department, for dropping an iron curtain in the theatres, for manipulating reservoirs of water, for opening ventilators in order to permit the escape of smoke, Dr. Siemens was not favorably inclined, for the reason that all such devices were apt to be found ineffective just when they were about to be used. Signals were generally given just too late, for the fire must spread to a certain extent before the action of the apparatus takes place.

The transmission of power, however, might be utilized in such cases, as it can be used for operating the means of safety, when these are distributed at certain points in the building. The introduction of electrical illumination in theatres was especially commended by the speaker. There can be no danger from the employment of the electric light. The tension in electrical illumination amounts to but a few hundred volts, and even with a tension of one thousand volts, it would be impossible to produce a measurable spark, and hence the passing of a spark between two wires or with



1.—The Courier. 2.—Working a Surface Gold Mine. 3.—Types of Miners. 4.—Gold-Washing Machine.

## THE GOLD MINES OF SIBERIA.

Ocean, and notwithstanding the terrible shocks of these floating cakes, its banks remain exempt from all damage. When the waters retire again to their bed the banks of the river are found just as they were before the inundation. This is evidently due to the fact that the banks are covered with species of trees having strong and somewhat spreading roots. When civilization arrives and denudes the soil, things will change their appearance.

It now remains for me to give a few details as to the work of opening up the places of this part of Siberia.

Up to the present day the miners had searched for auriferous deposits by digging pits in the soil, and which soon became filled with water, and impracticable. On my arrival, I introduced into the exploitations the method of boring, which is much more economical and much quicker. I likewise taught the miners how to use dynamite for blasting and for breaking up rocks. They had, up to that time, employed blasting powder for the purpose, and I had no little trouble in persuading them to abandon this routine process. I also succeeded in causing them to adopt a few other new methods.

The exploitation of the gold mines is sometimes performed in open air, and sometimes in galleries. The auriferous deposits in the beds of old water courses are sometimes located at such a depth that it would be impossible to remove the whole incumbent mass of earth in order to work them. The reader will obtain an idea of the general appearances of the gold mining operations by consulting the accompanying engraving, which represents the mine of the Memchikoff-Bazanoff-Siberiakoff Company. The earth containing gold is carried in carts to the place where the mining operations are prosecuted, and is there thrown into a cylin-

This permits me to assert that Nordenskiöld's expedition had its *raison d'être* and its practical side. For, in proving that there exists in the glacial ocean a practicable route between Europe and the Lena, it opened up Eastern Siberia to European commerce; and the fruits of this bold enterprise may prove immense.

### ELECTRICITY A PRECAUTION AGAINST FIRE.\*

By DR. WERNER SIEMENS.

THE lecture commenced by Dr. Siemens, in speaking of the Vienna disaster, calling the attention of his hearers to the fact that, since the general introduction of illuminating gas during the past few decades, the extensive use of petroleum at the present time, the general employment of readily inflammable fabrics, and other similar materials, the use of friction matches, etc., the danger of conflagration, notwithstanding the increased use of fireproof materials in construction, has undoubtedly increased. The losses by fire have been diminished rather than increased; still, this is attributed to the greater experience which has been acquired in the continuous battle against fire. The many improvements which modern science has brought about for the purpose of preventing the spread of conflagrations have had considerable influence toward this end. In 1852, Dr. Siemens said, a system of fire telegraphs was introduced in Berlin. It consisted of a series of underground wires, which were spread over the entire city and connected the fire depots with the police stations. By this means it was possible, in case of a conflagration, to call together the entire fire department. The construction of numerous simple indicators,

other objects, is impossible. The newspaper criticisms in opposition to this are not borne out by the facts. The dangers of the electric current to life and health have, likewise, been greatly exaggerated. An electric illumination, which has been carefully and scientifically made, will produce no danger from fire, nor is it injurious to life and health. As being specially adapted to the illumination of theaters, the lecturer recommended the incandescent lights. These have the special advantage for the stage of not giving a white or more like a faintly yellow light, like the electric arcs, but a reddish light, similar to that of gas light. The different forms of such incandescent lamps were then practically shown by a series of Chanzy, Edison, Swan, and Siemens lamps.

In conclusion the lecturer expressed the hope that the largest possible extension of electro-technic knowledge would take place, and that chairs of electro-technics would be introduced in the leading universities.—*Zeitung des Vereins der Deutschen Eisenbahn-Verwaltungen*, vol. xxii., p. 2, 1882.

### DETECTION OF ADULTERATIONS IN ASPHALT.

THE following method is recommended by D. Claye: The solution of the mass in carbon disulphide is, after filtration, evaporated to dryness and heated until it can be ground to a powder in a mortar. One-tenth of a gramme of the substance thus obtained is treated with five cubic centimeters of fuming sulphuric acid for twenty-four hours. It is then mixed with ten cubic centimeters of water with continuous stirring. Pure asphalt may be recognized by the colorless or light yellow solution that is obtained, while when pitch, coal tar, etc., are present, the solution is of a dark brown or blackish color.—*Geo. Bl. Wurttemberg*, 33, 502.

\* A lecture before the Electro-Technic Society of Berlin.