THE NEW CUNARD LINER "CARONIA."

The "Caronia," the latest addition to the Cunard fleet of transatlantic liners for service between Liverpool and this country, is the largest vessel flying the Cunard flag, excelling in length both the "Lucania" and "Campania," the present crack ships of this line, by 58 feet. The "Caronia" was constructed at the shipyard of Messrs. John Brown & Co. on the Clyde, and is incidentally the largest vessel that has ever been launched upon that river.

The principal dimensions of the vessel are as follows: Length over all, 678 feet; molded breadth, 72 feet; depth to sheltered deck, 52 feet; to boat deck, 80 feet; to top of funnels, 144 feet; loaded draft, 32 feet; tonnage, 21,150.

This vessel possesses many notable features. In the first place, although of such large dimensions, and of 18 knots speed, she is more of a passenger than a cargo vessel, although she was designed essentially as an intermediate boat. The vessel is built to the highest class of Lloyd's special survey, and at the same time has been designed so as to coincide with the conditions of the British Admiralty for service as a transport or armed cruiser.

The cellular double bottom is of especially stiff construction. There are fifteen longitudinal girders, each with a depth of 5 feet from margin plate to margin plate. The ballast tanks have a combined water-carrying capacity of 3,450 tons. For about three-fifths of the length of the vessel amidships the frames are of channel section, and angle frames are doubled forward and aft in order to brace the extremities of the hull.

There are twelve transverse bulkheads, all stiffened so as to resist any pressure that may suddenly be brought to bear upon them by flooding. The decks are all continuous, and completely plated from the bridge deck downward. The bilge keels on either side of the vessel are each 18 inches deep, and extend for a distance of half of the vessel's length amidships. The bridge deck is also carried for more than half of the vessel's length amidships, thereby conducing to the strength of the upper structure. This deck for its whole length constitutes a portion of the main structure, with all the main frames carried up to it, the side frames not being reduced in any way.

The "Caronia" is provided with eight continuous decks—the boat, promenade, bridge, shelter, upper, main, lower, and orlop. The first six of these decks are available for the convenience of passengers, and some of the third-class travelers have accommodation on the lower deck. The first-class dining saloon is a spacious and lofty apartment, extending the full width of the boat. The whole of the 300 first-class passengers can be conveniently seated simultaneously in this saloon. The decorations and appointments are tastefully carried out, the prevailing style being eighteenth century with a white color scheme. The carving is carried out in the solid wood, and is not fashioned in a composition and then adhered to a flat-surfaced foundation. The utter absence of the florid and overdone decorations that once found favor is commendable, and the effect is restful to the eye.

The other first-class apartments are also carried out with the prevailing good taste, white being the prevailing color, relieved with pale-green and rose-tinted upholstery. The smoking saloon is a particularly fine apartment and is probably the most attractive on the vessel. It is in the old English style, with walls, ceiling, and flooring all executed in oak.

The second-class accommodation is provided on the upper and shelter decks, and is practically identical with the first-class, the color scheme and decoration being the same. There is sufficient accommodation for 350 passengers of this class.

The main deck fore and aft is entirely given up to the third-class passengers, 1,000 of whom can be carried. The cabins are of two, four, and six persons' capacity, and the whole accommodation indicates a decided improvement in the convenience for this class of traveler. The crew comprises 450 officers and men, which together with 2,650 passengers of all classes gives a total maximum population of 3,100 souls.

Sixteen collapsible life-boats are carried, together with a large number of semi-collapsible boats and other equipment such as life-belts, etc. The vessel is fitted throughout with the Stone-Lloyd system of watertight doors, by means of which all passages through the transverse bulkheads may be closed simultaneously from the bridge if desired, or any individual door opened or closed from the same point as required. Another feature of this invention, which was fully described in the Scientific American Supplement some months ago, is that, even if the controlling mechanism from the bridge breaks down, the doors close automatically directly water enters a compartment.

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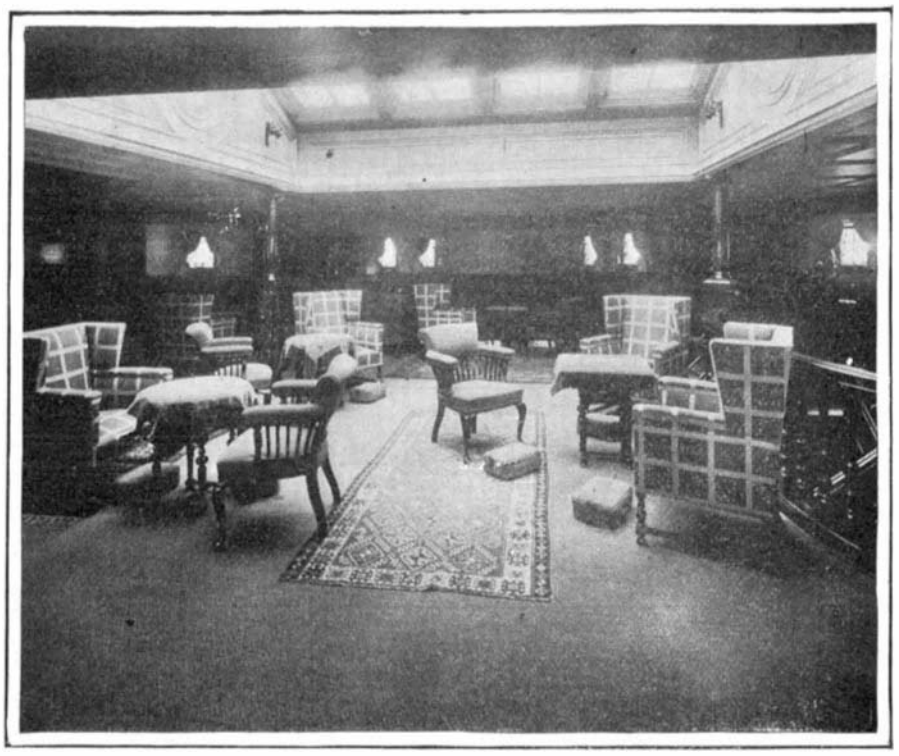
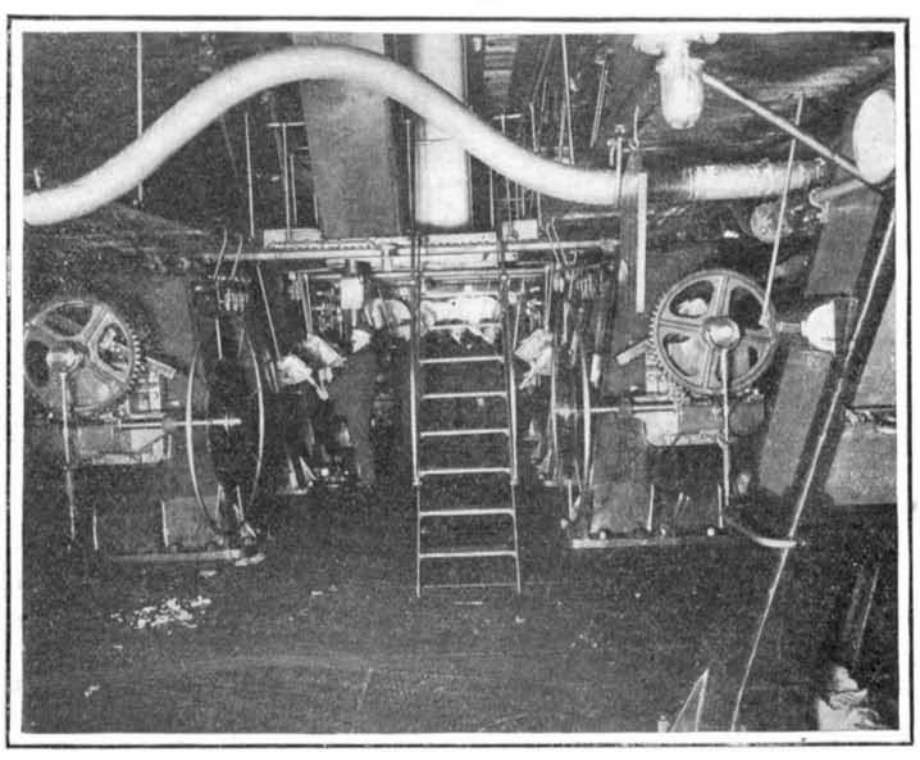
The "Caronia" is propelled by two sets of quadruple expansion engines developing together about 21,000 horse-power and giving a sea speed of about 18 knots. The cylinders are of 39 inches, 54½ inches, 77 inches, and 110 inches diameter respectively, with a stroke of 5 feet 6 inches. The last-named cylinder, it may be pointed out, is with one exception the largest that has yet been adopted for vertical engines. The machinery of this vessel has been modeled upon the lines of the Cunard steamship "Saxonia," which attracted such attention from the British Admiralty Boiler Committee during their investigations, owing to the latter's economy. The "Saxonia's" machinery required only 13.4 pounds of steam per horse-power per hour as compared with the 16 pounds per horse-power hour in the naval vessels that were tested simultaneously.

During the trial runs of the "Caronia" over the measured mile a maximum speed of 19.51 knots was

The Drawing Room.

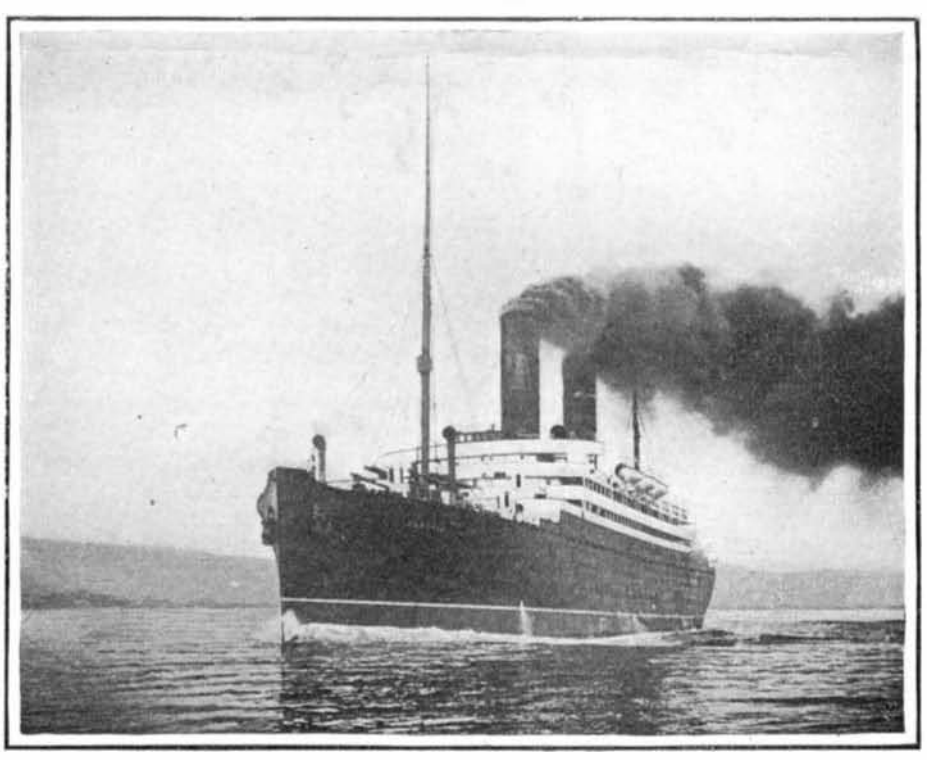


The Lounge.



Two sets of quadruple-expansion engines. Indicated horse-power, 22,700.

View on Platform of the Engine Room.



Trial Speed, 19.51 knots. **Sea Speed,** 18 knots, **Displacement,** 29,800 tons on 32 feet draft.

"Caronia" on Her Trial Trip.

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attained; and during the full-power trials, 89.2 revolutions, 21,870 horse-power, and a speed of 19.62 knots were developed and maintained for 13½ hours. The highest horse-power recorded throughout these trials was 23,500.

A sister ship to the "Caronia" is now in course of construction at the same shipyard. This vessel is of identical dimensions and tonnage, only instead of being propelled by reciprocating machinery, Parsons marine turbines are to be installed. These two vessels are to be run side by side, and comparative data in actual transatlantic practice will thus become available. This vessel, which was recently launched, is rapidly approaching completion.

The equipment of the "Caronia" is completed by an installation of Marconi's wireless telegraphy, a special room for which is provided on the boat deck.

CHICAGO'S FREIGHT SUBWAYS.

In 1899 the Illinois Telegraph and Telephone Company began to build a series of tunnels under the streets of Chicago for the purpose of carrying the wires and cables of the company's automatic telephone system. This network of tunnels is now utilized for a quite different purpose than that for which it was originally constructed. This further use is as a system of electric traction for the handling of freight, express, and mail. The company, now incorporated under the name of the Illinois Tunnel Company, was granted a franchise for this purpose in July, 1903. It is controlled by the leading railroads which enter Chicago. Something of the immense importance of this undertaking to Chicago will be gleaned from the following account. Perhaps similar systems of tunnels will some day be built in other American cities.

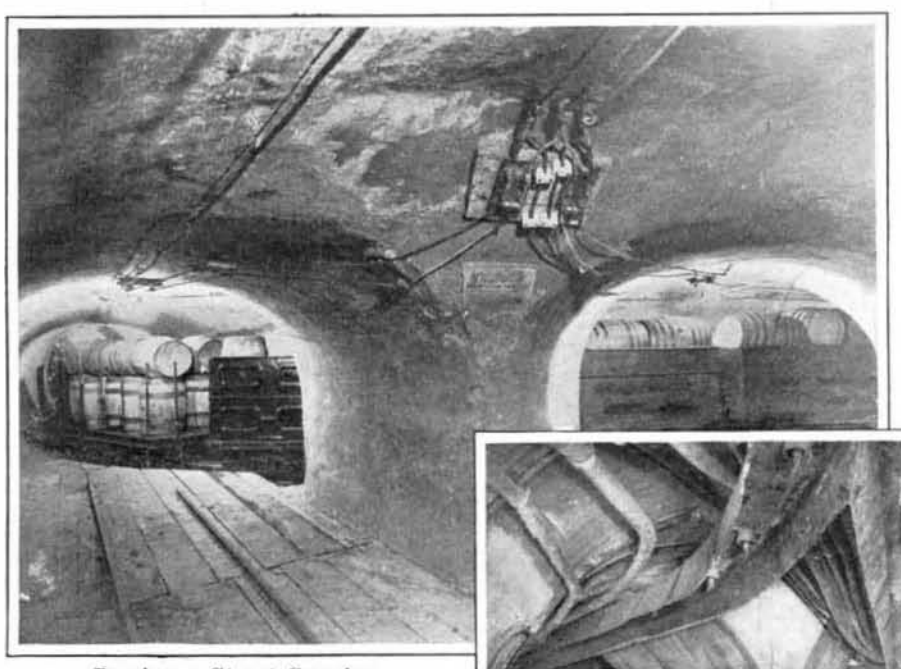
The great advantage of a system of freight haulage of this kind is apparent at a glance. Far below the surface of Chicago's streets scores of electric locomotives are pulling freight trains that are taking thousands of tons of coal into the boiler rooms of skyscrapers, without dirt, noise, or sign of effort in the street. They are removing tons of ashes, and caring for the excavations from the basements of buildings in course of construction. More than this, they are hauling daily many thousands of tons of freight which was formerly carried over the pavements in wagons. On February 15, 1905, the company entered into a contract with the government under which all of Chicago's second, third, and fourth class mail matter will be transferred from the railway stations to the new post office through the tunnels. A further plan to utilize the tunnels for mail purposes involves the building of chutes connecting the street-corner mail boxes with boxes in the tunnel, where the mail can be collected by cars. When the new schemes are perfected and added to the present pneumatic tube service for first-class mail, Chicago will have the most perfect underground mail facilities in the world. Eight hundred and eighty tons of mail will be handled in the tunnels daily, in special locked United States cars The system will be in operation by June 1.

Without noise, dirt, smoke, or the slightest delay to traffic, the central business district of Chicago has been honeycombed with these tunnels. Twenty-eight miles already have been constructed, and extensions are projected.

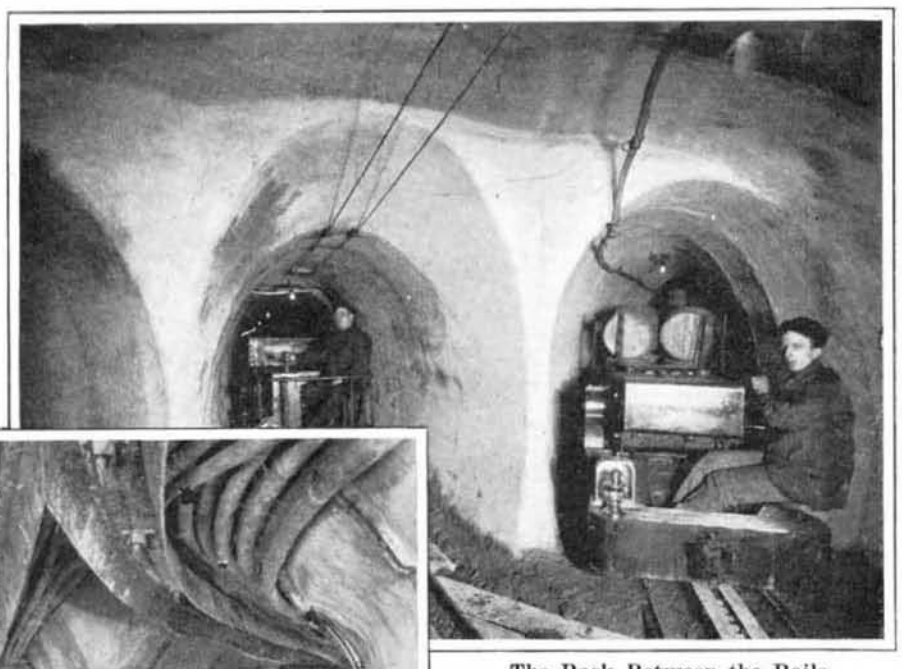
Fourteen per cent of the railway mileage of the world centers in Chicago, and operates to and from a business district one and one-half miles square. This is the territory of the freight subways. In it are thirty-eight railway stations, and every working day more than 112,000 tons of freight are moved to and from them. This situation has caused great congestion in the streets, and this the subways have met and relieved. The cars of the tunnel company are run directly into the railway freight houses, loaded, and run through the tunnels to the consignees. Here the cars are run into the basement of the warehouse through an opening cut in the masonry, raised to the desired floor on elevators, and unloaded. If the goods are not intended for immediate delivery, the cars are run into the company's storehouses and kept there till required. Every building on the route of the tunnel can be connected to it by a lateral shaft for the above purpose.

The work on the telephone tunnels was planned in 1899, but did not actually begin until September, 1901. It was found that the space below the paving was almost completely taken up by water and gas pipes, sewers, and the conduits of other companies. After investigation of the soil underlying Chicago, it was decided to build a deep tunnel conduit system, as this could be done without danger to adjoining property or without interfering with other corporation rights. After considerable difficulty in securing the final municipal permit to construct the system as planned—in fact, numerous alterations were necessary—and in making an accurate survey of the streets, the company was at length allowed to begin work on the undertaking. The trunk line tunnels were to be 12 feet 9 inches by 14 feet, and the branch tunnels 6 feet by 7 feet 6 inches.

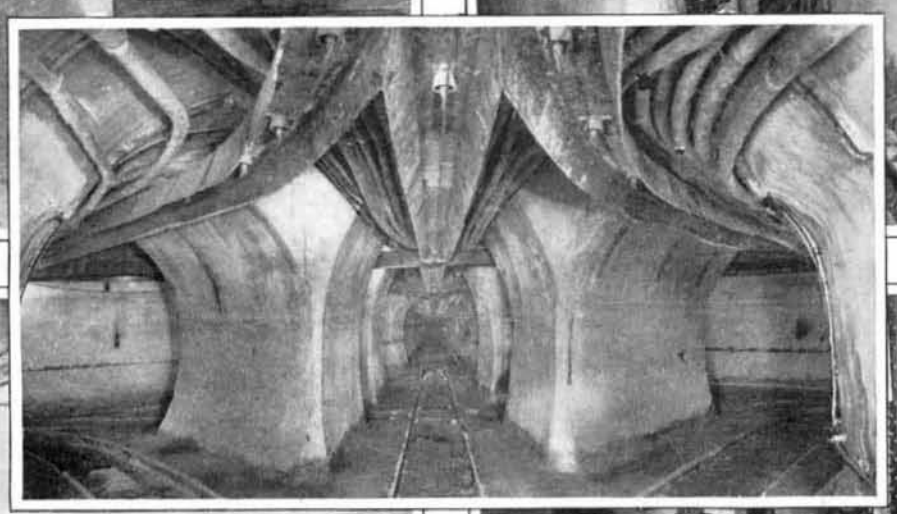
The work was carried on almost entirely in firm clay, which was encountered about 19 feet below the street grade. The pneumatic system was used more for protection against labor troubles than for other reasons, for should the workmen go out on strike, there would be no damage if the work were left for a time in an uncompleted state. The airlocks, placed just outside the seven shafts, had iron doors imbedded in concrete, and were long enough to accommodate the work, in some cases as many as ten cars being in a lock at once.



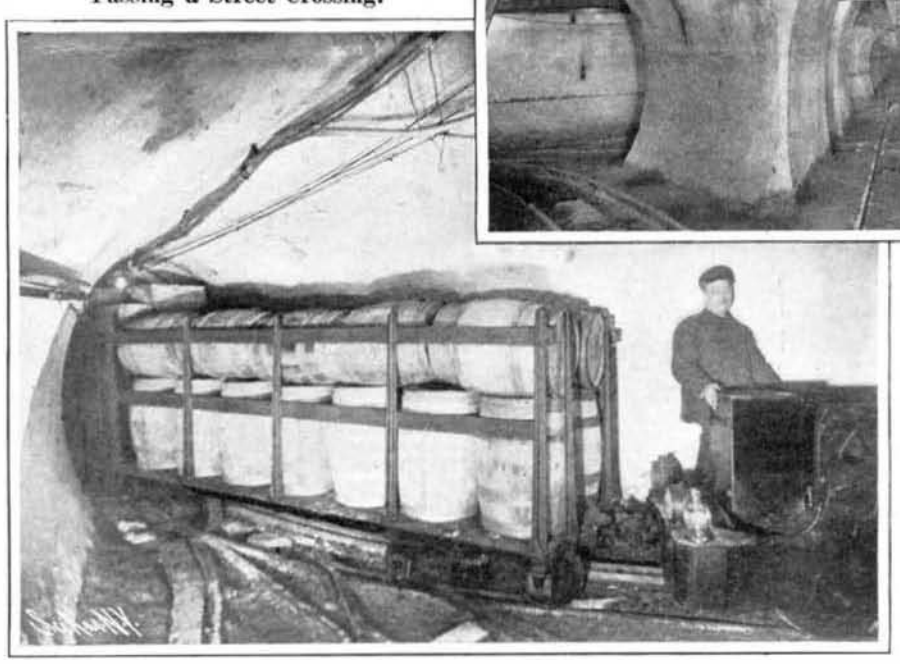
Passing a Street Crossing.



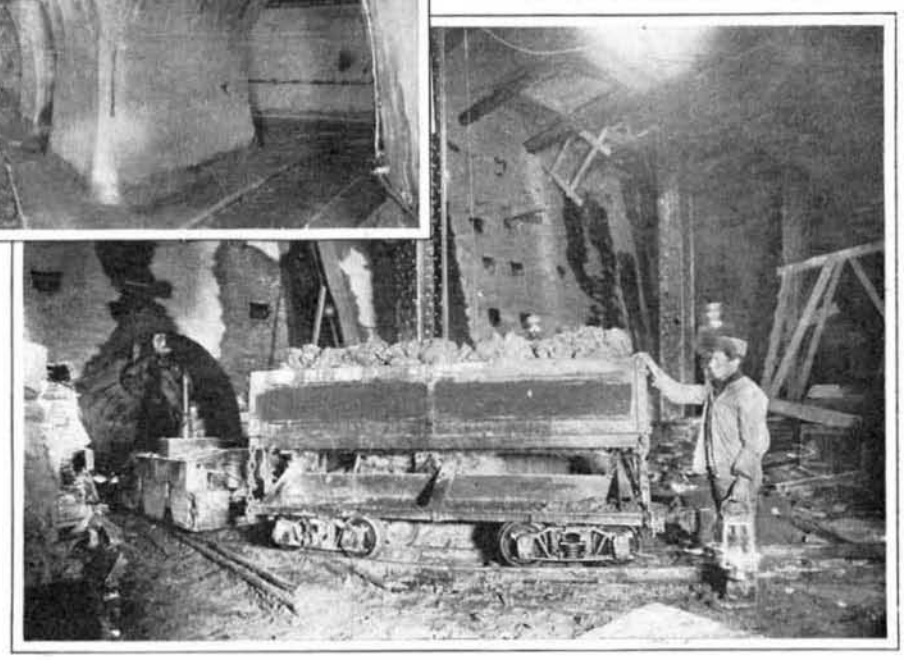
The Rack Between the Rails.



Typical Street Intersection.



Electric Locomotive and a Loaded Freight Car.



Removing Excavated Material from the Basement of a Building under Construction.

CHICAGO'S FREIGHT, EXPRESS, AND MAIL SUBWAYS.

The work was carried on by miners working in three shifts of eight hours each, the nature of the soil permitting the work to be done in this way. The distance excavated averaged about 21 feet at each of fourteen working headings, and 12 miles of tunnels were virtually completed in about ten and a half months.

The concrete was placed in the bottom of the excavation and thoroughly tamped, the lagging placed on top of the concrete, iron ribs made of channel bars being placed on the bottom three feet apart, and the lagging laid at the sides against these ribs. The concrete was then thrown behind the two-inch plank lagging in six-inch layers. The use of concrete absolutely avoided any chance of settlement of the earth, as it was tamped into the entire space between the lagging and the excavation, no matter how irregularly the digging or mining had been done. For part of the work steel lagging plates were used as a special precaution, on account of the extra weight of the concrete. In proceeding with the work, the face of the preceding day's work was cleaned and a plaster coating of cement, made in pro-