

the sea *via* the St. Lawrence, and the results of the surveys of the Georgian canal will be awaited with interest.

The Soulages canal, which we visited, forms part of the St. Lawrence navigation. It is 14 miles long and has five locks, with a total rise of 84 ft. The locks are 280 ft. by 45 ft., with 15 ft. of water on the sills. The locks and sluice-gate mechanism are operated by electric motors, and the locks can be filled in five or six minutes, through cast-iron pipes 30 in. in diameter, passing through culverts in the side-walls. The breadth of the canal at the bottom is 100 ft., and at the water-surface 164 ft. About £1,350,000 has been spent upon its construction and equipment. The electrical equipment is worked by water-power, the head being 20 ft.; the total output is about 530 k.w. The canal is lit by 219 2,000-candle-power arc-lamps, placed 480 ft. apart, so that the navigation proceeds night and day. Electric power is also used to operate locks and bridges. There are seven bridges of 180 ft. span, each weighing about 100 tons.

Another work of which we had particulars given us by the Resident Engineer as we passed near its route, was the Richelieu and Trent canal, which will join Georgian bay on Lake Huron to Lake Ontario. The route is about 200 miles long, about 20 miles being canal. It embraces a hydraulic lift-lock, 140 ft. by 33 ft. by 8 ft., the rise being 65 ft. The fundamental idea of the promoters is to bring grain and other freight in large lake steamers to Georgian bay, then to tranship into barges of considerable size which will pass through the canal to a sheltered port on Lake Ontario, from which place groups of barges would be towed to Montreal, and their cargoes transferred to ocean-going ships.

As to the St. Lawrence itself the navigable channel to Montreal for large ships has a minimum width of 300 ft., extending to 550 ft. at the curves; and it is expected that a depth of 30 ft. throughout will be obtained next summer. Extensive works are also in progress for the improvement of the port and for increased accommodation for large ships.

#### The Traveling Engineers' Convention.

The Traveling Engineers' Association held its thirteenth annual convention at the Cadillac Hotel, Detroit, Mich., on the four days from September 12 to 15, inclusive. The attendance was 210 members, the largest in five years. President J. D. Benjamin was in the chair, and in his address urged that the closest co-operation be maintained between the traveling engineers and the engineers and the officers of the transportation department in order to secure the maximum results from each and every locomotive. Referring to new devices to improve the performance and efficiency of locomotives, special mention was made in favorable terms of superheated steam and of mechanical stokers. The association was declared to be in healthy condition and steadily growing.

The Secretary reported 71 additions during the year and a present membership of 532. The Treasurer's report showed total receipts for the year of \$2,531, and a balance on hand of \$500.

Hon. John B. Corliss, Congressman from Michigan, addressed the convention during its first session.

Abstracts of some of the papers discussed at the convention will be found in this issue, and others will be given from time to time. The present officers were re-elected. A committee on subjects for the next convention was appointed, and will report during the year. The next meeting will be at Chicago.

#### EXHIBITS.

American Locomotive Equipment Co., Chicago.—Blueprints, catalogues, etc., showing the Wade-Nicholson hollow-arch for locomotives, the Sarver valve, etc.

Webb C. Ball Watch Co., Cleveland, Ohio.—Ball official standard railroad watches.

S. F. Bowser & Co., Fort Wayne, Ind.—The Bowser oil cabinet, self-measuring pump-tank, etc., and prints and catalogues showing proper equipment of oil houses.

Crandall Packing Co., Palmyra, N. Y.—Samples of throttle-valve and air-pump packing, catalogues, etc.

Crane Co., Chicago.—The Crane locomotive safety valve and removable spring disc; also globe and angle valves.

Detroit Lubricator Co., Detroit, Mich.—Three sizes of bull's-eye type lubricators, Nos. 21, 31, and 41, of three, four and five feeds; also sectional lubricator to show construction.

Detroit Seamless Steel Tubes Co., Detroit, Mich.—Samples of locomotive boiler tubes.

Joseph Dixon Crucible Co., Jersey City, N. J.—Dixon graphite products for locomotives, including air-brake and triple valve grease; also polishing graphite for locomotive front-ends and lubricating graphite.

Fuel Protector Co., Jackson, Mich.—Catalogues showing the application of this company's fuel protector.

Garlock Packing Co., Palmyra, N. Y.—Air-pump and throttle-valve packing. Metal packing for locomotive piston rods.

Jenkins Bros., New York.—Jenkins gasket tubing for steam joints, Jenkins' 96 packing, etc.

Michigan Lubricator Co., Detroit, Mich.—"The" Bull's-eye five-feed lubricators for superheater boilers for balanced compound locomotives; also four-feed, triple-feed and double-feed lubricators.

Steel Mill Packing Co., Detroit, Mich.—Samples of "Safety" plastic metallic packing for locomotives and stationary engines.

The longest railroad route in India, from Bombay to Calcutta, is 1,401 miles long, made up of parts of different railroads. Over this route there is one through train daily, which takes 45 hours, going thus 31 miles an hour. The fastest Indian train runs from Calcutta to Allahabad, 564 miles, in 16 hours, or 35 miles an hour.

#### The Chicago Freight Terminals of the Chicago & North-Western.

(Continued from page 252.)

It is easy to see that to assemble the cars from the different freight houses into trains and to get the trains out of Chicago and on their respective divisions is no simple matter. The task is further complicated at present by track elevation which is under way in the Western avenue yards. Ordinarily these are the classification yards for the Galena division and trains over that division are made up there, but owing to the elevation work this for the past few months has had to be done at 40th avenue, though in a few cases trains run directly out of Wood street. As already explained, the State street house and the Grand avenue house which are in the same general section of the city, handle practically all l. c. l. freight in and out for the Galena division, and for the Wisconsin and Michigan divisions respectively. Loaded cars from State street run straight west, normally to Western avenue, at present to 40th avenue, where they are made up into trains. From Grand avenue, on the other hand, loaded cars run out via Clybourn Junction and the Wisconsin division to Mayfair, thence south (except three trains which run solid from Grand avenue) to 40th avenue, where they are classified into trains for the road. This seems a roundabout course but is necessary in order to relieve the most crowded section of the road.

Cars are transferred between all the different yards and freight houses in the Chicago terminal by transfer trains. Each of these has a crew of five men, engineer, fireman, conductor or, as he is called, engine foreman, and two brakemen. There are 16 such transfer crews. The transfer trains cover all parts of the terminal. All transfer switching is reported on the accompanying form (Fig. 7).

There are seven regular time freights westbound on the Galena division: first 119, second 119, 117, 121, first 127, second 127 and 113. First 119 is the Denver and Pacific Coast freight, and runs directly out of Wood street. It takes merchandise, perishable freight and livestock from Chicago for Peoria, Ill.; merchandise for the Anamosa line and from Carroll to Audubon, and merchandise, perishable freight, livestock and coarse time-freight for and via the Union Pacific. Second 119 is made up at State street yard and takes the cars from State street and the surplus from Wood and Sixteenth streets. It carries merchandise, perishable freight, livestock and coarse time-freight for and via Carroll, including the Sioux City division west of Carnarvon and Arcadia to Logan inclusive, for and via Council Bluffs, and for and via Missouri Valley, including Omaha local. No. 117, the Iowa Time Freight, runs out of Wood street. These three trains and No. 121, the Illinois & Northern Iowa Freight, are given not to exceed 1,050 tons out of Chicago. They are due to leave 40th avenue for the road between 6.39 (first 119) and 7.25 (121). The other three time-freight trains on the Galena division are first and second 127, Iowa Time Freights, which leave 40th avenue at 12.10 and 12.20 a.m., and 113, a new train created August 20, another Iowa Time Freight, which leaves at 12.45 in the afternoon and takes cars for points west of the Mississippi river from Chicago, taking coarse time-freight in preference. Before finally making up 113 in the 40th avenue yards the yardmaster at Chicago is advised by the dispatcher of the number of tons of time-freight to be picked up at "J. N." tower (between Melrose Park and Elmhurst) where there is interchange with the Chicago Junction, Chicago Terminal Transfer and Indiana Harbor belt lines, and at West Chicago and De Kalb. He then makes up the train so that the tonnage, including cars picked up at those points, will not exceed 1,350 tons. With the exception of the two trains which run out of Wood street, all Galena division trains are regularly made up at Western avenue, but at present at 40th avenue, owing to the track elevation work.

On the Wisconsin division, 581, the Minnesota Time Freight, corresponds to 119 on the Galena division. It runs directly out of Grand avenue, leaving at 8.09 p.m., and takes time-freight for points on the Madison division between Elroy and Winona and for all points west of Winona, and local merchandise for points on the northern Wisconsin division between Janesville and Oakfield and fills out if necessary with through loads for this territory. At Mayfair, No. 581 picks up cars of perishable goods from the 40th avenue yards. The first St. Paul Time Freight, 1st No. 583, takes time-freight from Grand avenue, Wood street, Sixteenth street and 40th avenue for and via Elroy, Wis.; also time-freight for Madison or points west. Second No. 583 takes all time-freight for or via Elroy that cannot be handled on first No. 583, local merchandise for Beloit, Harvard and points on the Kenosha division between Harvard and Kenosha, and fills out with through loads for this territory. It also takes time-freight for points west of Elroy received too late for No. 581 or which that train cannot handle. There is another time-freight (No. 585) on this division. With the exception of No. 581, all these trains are made up at 40th avenue, whence they run north to meet the Wisconsin division at Mayfair.

On the Milwaukee division, 287, the Iron Range Time-Freight, which runs directly out of Grand avenue, is the corresponding fast train to 119 and 581 on the other two divisions. Like all the

forces to return to Western avenue, leaving the 40th avenue yard for the Wisconsin and Milwaukee divisions alone, as before. In considering the present arrangement of the yard it will be simpler to speak of these two divisions together as the Wisconsin division, which, as already explained, they are called on working time-tables. The plan shows the normal operation of the yard when it is occupied by the Wisconsin division only. As the plan shows, the yard is built on a double curve, at the south end of which is the junction with the Galena division and at the north end the beginning of the freight connection to Mayfair. West of this, but not shown on the plan, are the yards of the Belt Railway of Chicago. On the southwest side of the yard are the extensive West Chicago shops, one of the largest railroad shop plants in the country. The odd numbered tracks are on the north side and the even numbered on the south side of the yard. Under the present temporary arrangement the Galena division occupies tracks 41 to 85 (odd numbers), the Wisconsin division retaining tracks 1 to 39 (odd numbers) and 2 to 70 (even numbers). Tracks 67, 69 and 71 are Galena division receiving tracks for road trains and transfers. Tracks 1, 3, 5 and 7 serve the same purpose for the Wisconsin division. Tracks 48 and 50

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are used for cars coming to or going from the Belt Railway. The car-to-car transfer tracks are used for shifting coal, lumber, furniture and other freight from disabled cars to other cars, and also for transshipping certain freight destined for the far west from cars of eastern roads, which it is not desired to send so far away from home. When a train from the road runs in onto one of the receiving tracks it is chalk-marked by a marker according to the destination of each car on the waybill. This is done at 40th avenue by a number system. Instead of writing "Wood St." on a car, the marker simply writes the figure 4. Similarly the figure 2 stands for the delivery to the Belt and the figure 5 for Western avenue. In general, cars for the following roads are delivered to the Belt Railway at 40th avenue: Atchison, Topeka & Santa Fe; Chicago & Eastern Illinois; Chicago Great Western; Monon (C. I. & L.), Erie, Grand Trunk, Michigan Central (except perishable), Wabash and Wisconsin Central. Cars for other Chicago trunk lines as a general rule go to Wood street for transfer. At the west of the plan are shown two main tracks which may be used in emergencies as passenger main tracks. In such a case Galena division





passenger trains would be sent out of Chicago by way of Clybourn Junction and Mayfair.

The Wood street yard, shown in Fig. 9, was built in 1892 when poling yards were in vogue. At that time the north track shown in the plan next to the C. & N.W. westbound main track was used as the poling track. At present, poling no longer being used, the yard is an ordinary "break-up" yard. The plan shows the situation of the yard relative to other railroads. On the north are the main tracks and a yard of the Chicago Terminal Transfer Railroad and on the south the main tracks and a yard of the Chicago, Burlington & Quincy. This relative position of tracks continues east two miles to the Sixteenth street freight house. The markings on the plan show the general arrangement and operation of the yard. The method of handling cars through the freight house has already been described. A special track is set aside for the cars of each interchanging foreign road. When there are enough cars for a foreign road for a trip, they are handled by transfer train to the foreign road. For example, a train for the Baltimore & Ohio is usually hauled out of the yard every night. The Wood street yard has a capacity of 2,200 cars and about 17 miles of track.

Between Melrose Park and Elmhurst a new yard (Fig. 10) is being built as part of a much more extensive future plan. This is on a straight and level stretch of track about a mile and three-quarters long. The yard shown on the plan represents the work which will be done this year. With the exception of the two original main tracks, this is all new work since this spring. Melrose Park station is a short distance east of the end of the map and Elmhurst is about a mile west of the west end. At the east end of the yard there is to be a connection on each side with the Chicago Junction Railway and the other two belt lines which run over its tracks. This is a road yard and in considering its plan it must be remembered that the North-Western runs its trains left-handed. The entrance to the westbound yard is a ladder track running into 19 yard tracks. At a point not very far west of the ladder track these divide into two groups of 10 and 5 tracks respectively. At the crossing of the present highway, which is to be sufficiently elevated, it is proposed to build eventually a westbound hump and fill the space to the west, south of the present main line, with a large westbound classification yard. The proposed plan for the eastbound tracks is similar. The eastbound hump will probably be placed near the scales shown on the plan near the middle of the yard. The receiving tracks at the west end will then be added to and a number of additional classification tracks built at the east end. When the yard is finally completed according to the proposed plan it will have a capacity of at least 4,000 cars. These plans, of course, are not all definitely decided on, but suggest possible developments. The yard which is being built this year is to have 17 miles of track and a capacity of 2,000 cars. Here will be set out empty cars for the three belt roads already mentioned and dead freight awaiting delivery. The eastbound yard will also relieve the congestion within the city by handling the large shipments of grain from the west which often come very much bunched together, as many as 1,200 cars of grain sometimes coming in over the Galena division within two days' time. A mechanical interlocking plant is to be erected at the Elmhurst end and a Taylor all-electric plant in the middle of the yard. It is desired to finish the work shown in the plan before the first of October. A force of 1,250 laborers is at work and every effort is being made to hurry the yard to completion.

The yard forces employed in the Chicago terminal district include about 700 men. Of these, about 250 are enginemen (switching). On

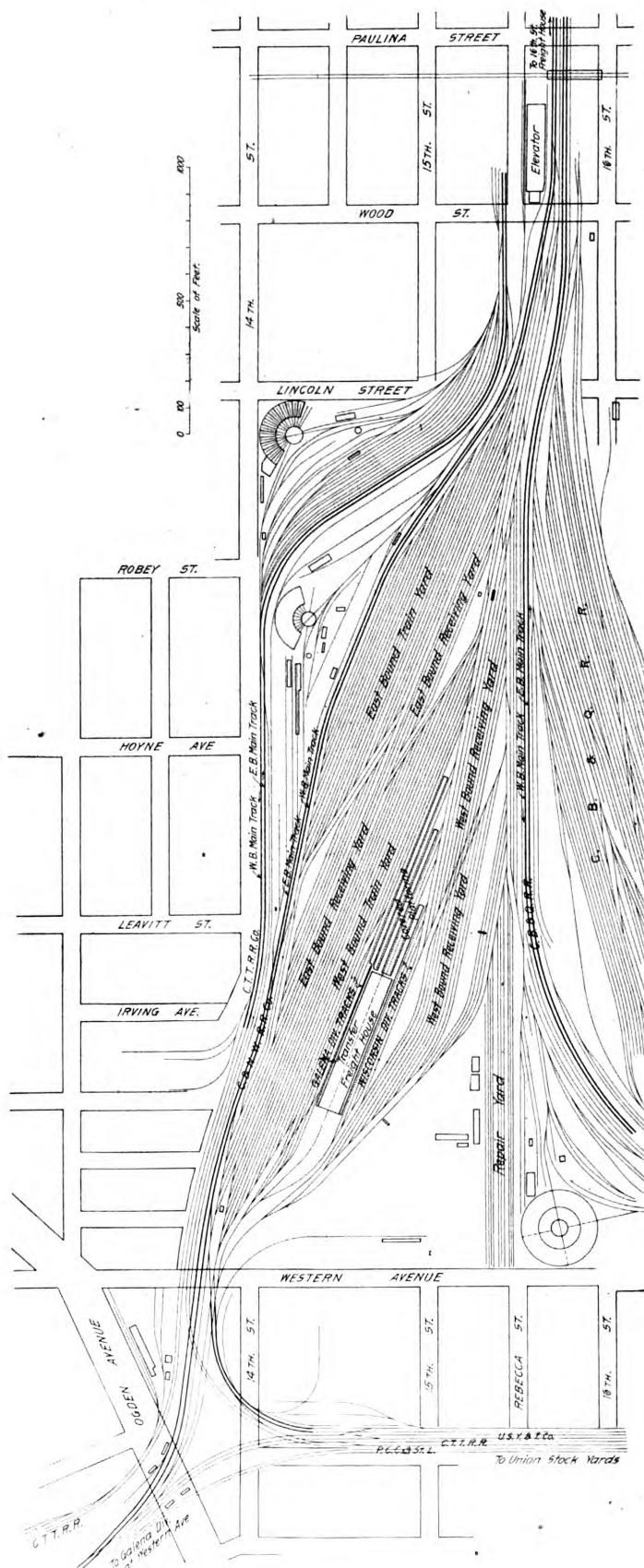


Fig. 9—Wood Street Yard, Chicago; Chicago & North-Western.

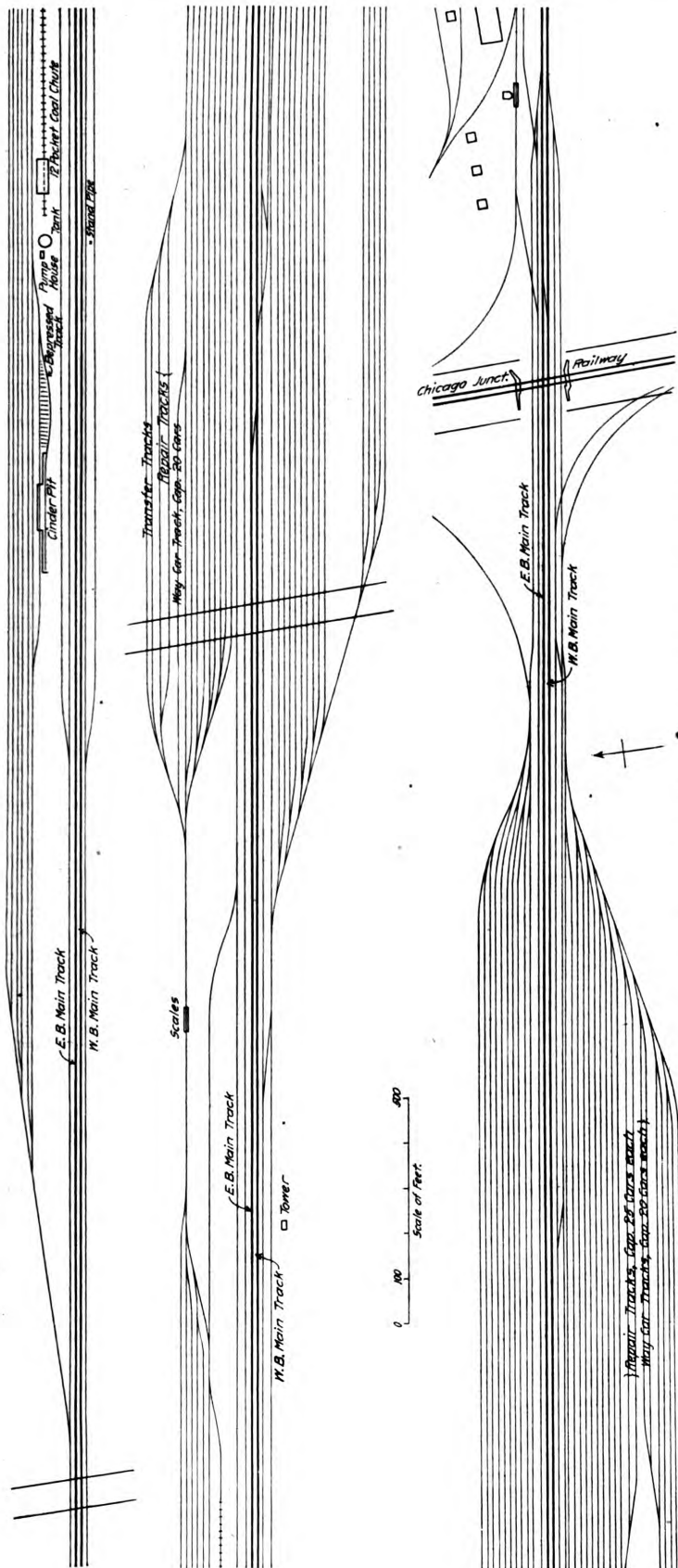


Fig. 10—New Yard at Melrose Park, Galena Division; Chicago &amp; North-Western.

a basis of ten hours' service equaling an "engine," there are 105 engines worked in the terminal territory. Of these, 60 work days and 45 work nights. This requires about 70 actual engines, including those in the shops at any one time. The engine crews consist of an engineman, fireman and three or sometimes four switchmen to each engine. There are 24 yardmasters employed (including general yardmasters, yardmasters and assistant yardmasters), 40 switch tenders and 80 yard clerks or markers. In the 40th avenue yard there are 34 engine crews, 17 working days and 17, nights. Eight of the 16 transfer crews work out of 40th avenue. The Wisconsin division yard force there is composed of one general yardmaster, 11 yardmasters and assistant yardmasters, 24 yard clerks, four train clerks and eight switch tenders. This includes both day and night forces. It does not include the office force (five men) of the Trainmaster of Freight Terminals, whose office is in the former 40th street depot shown on the map at the junction of the 40th avenue yard with the Galena division, nor the agent's force at 40th avenue, which includes 18 general (bill) clerks, whose whole time is taken up in billing out the cars.

In the Chicago territory the Chicago & North-Western participates in the reciprocal switching agreement. This is an arrangement between the railroads on non-competitive business for a uniform switching charge of \$3 a car. For instance, the North-Western will switch a car from New Orleans for the Illinois Central to one of its industries at that rate. If, however, the Illinois Central delivers to the North-Western a car from some point in Iowa reached by the North-Western, the reciprocal rate does not apply, but a rate of from \$6 to \$8 a car is charged. Thus the location of industries determines the routing of much competitive business. A Milwaukee firm, for example, which ships to an industry in Chicago reached only by the North-Western would hardly find it profitable to ship by any other line. If it should ship by the Chicago, Milwaukee & St. Paul, the \$6 to \$8 switching rate would apply, and this would make the total rate very much higher than the rate by the North-Western. The favorable situation therefore of the North-Western, which was the first road into Chicago and in a sense had its choice in locations, is effective in directly giving to it a large amount of what would otherwise be competitive business. Ordinarily there are regular published switching rates between all points in the terminal district, from a minimum of \$3 a car between nearby points to \$8 a car for switching to Des Plaines. In such service the Chicago & North-Western does not receive freight as a common carrier, but acts simply as the agent of the company or party from whom the property is received to perform the switching service only. Just at present, owing to the extra congestion caused by the track elevation, these regular switching rates have been annulled and the company endeavors to do as little switching service as possible. To take the place of the switching tariff between points such as Des Plaines, Mayfair or Evanston, a regular freight tariff was issued July 16, giving the rates per 100 lbs. for car load lots of different commodities between Chicago and 30 such outlying switching points. These vary from 5¼ cents per 100 lbs. on granite and marble, with a minimum weight of 28,000 lbs., to 1 cent per 100 lbs. for cinders, slag and paving brick, with a minimum weight of 60,000 lbs. The rate of \$3 a car for car-load freight between the railroads in the reciprocal switching agreement and industries which have their own private tracks on the North-Western's terminal, still applies. When such interchange is with belt lines there is an additional charge of \$3 a car to cover the belt charge on loaded and empty cars.

With the completion of the final plan for the Melrose Park yards the Chicago & North-

Western will have, although probably a crowded, yet an effective system of terminal arrangements in Chicago. Unfortunately, in the central part of the city it is almost impossible to handle the existing business. Land is so costly that the present arrangements will probably be used until such time as increased traffic makes it absolutely necessary to increase facilities at whatever cost. The completion of the track elevation work and of the Melrose Park yard should greatly relieve most parts of the Chicago terminal. It is then planned to make up and separate all Galena division freight trains, with the exception of the regular time-freight trains, outside the city, thus relieving to a very great extent the Western avenue yard. The 40th avenue yard, relieved of its temporary occupancy by the Galena division, seems capable for some time at least of handling the business of the Wisconsin and Milwaukee divisions. The completion of the air line low-grade third and fourth tracks all the way to Milwaukee will divert most of the freight and through passenger traffic from the present Milwaukee division, which will be left free to handle the increasingly large suburban business. If all freight trains from those two divisions had to run directly into Grand avenue it is doubtful if the road could be successfully operated, but by the present system of bringing such trains into the city by the back door, the situation has been greatly relieved. What will happen to the terminals of any of the Chicago roads if the city and the traffic keep on growing as they have for the past 20 years is problematical, but whatever changes are to come, the Chicago & North-Western cannot fail to profit by its present exceptionally favorable terminal situation.

#### American Locomotive Company.

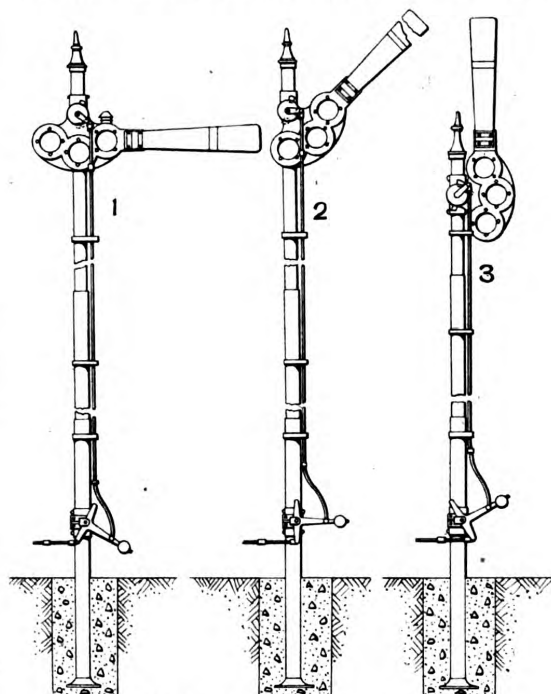
The report for the year ending June 30, 1905, being the fourth year of the company's existence, shows gross earnings of \$24,150,201, a decrease of \$8,918,550 as compared with 1903-1904. This falling off was expected, and, indeed, warning was given of it in the report for last year. The reason is the depression in general business which existed throughout the country from the fall of 1903 to the fall of 1904, this affecting particularly the amount of railroad equipment ordered during that period. It must be understood that up to June 20, 1904, the company was working on old orders received prior to this depression, so that the effects of it did not show in the report for that year, but are evident in the diminished output during the fiscal year just closed. The manufacturing, maintenance and administrative expenses, \$19,796,533, show a corresponding decrease, \$7,608,452, making the net earnings \$4,353,668, a decrease of \$1,310,098. As in former reports, this figure for expenses includes, besides the direct cost of manufacture, all indirect charges against production, a depreciation charge of 20 per cent. of the book value of patterns, dies, etc., and an adjustment of the original price of material in stock to its present market value. The interest on bonds of constituent companies, bills payable, etc., amounted to \$112,186, and the regular 7 per cent. dividend on the \$25,000,000 preferred stock, to \$1,750,000, leaving a surplus of \$2,491,481. The investment in the Montreal works amounted to \$1,883,557, which sum was charged against income. Instead of capital account, although it resulted in a permanent addition to property. The net surplus was, therefore, \$607,924. During the year there were additions and betterments to the amount of \$598,204, which have been charged against the extraordinary improvement and betterment fund of \$1,000,000 created in 1904 out of the current surplus of that year. The general balance sheet shows as assets: Cost of property, \$45,657,081; securities owned, \$3,448,131; convertible assets, \$14,680,611; liabilities: preferred stock, \$25,000,000; common stock, \$25,000,000; bonded debt, of constituent companies, \$1,237,500; current liabilities \$6,851,507; extraordinary improvement and betterment fund, \$401,796, and profit and loss, \$5,420,019. The most important financial transaction of the fiscal year just ended was the purchase in January of \$1,962,706 of the \$2,000,000 capital stock of the Rogers Locomotive Works at Paterson, N. J. This cost is to be met from income account and is at present carried in the investment account on the general balance sheet. The report shows that the company proposes to devote a separate shop at the Brooks Works exclusively to the manufacture of the electric shovel, and particular attention is being made to the possibilities of the development of the electric locomotive, trucks for electric service, motor cars and other power vehicles.

It is now some years since the French Parliament ordered an investigation preliminary to a proposed acquisition by the state of two of the six great railroad systems of the country, the Western and the Orleans. The present little state system, consisting chiefly of lines which threatened to become bankrupt, between these two systems, is not a very good field for testing state management; and the acquisition of the Western and the Orleans would be looked upon as a preliminary to a union of all the railroads under the government. Those who advocate this policy, when they reach

positions of responsibility, apparently are frightened by the dangers which it would involve, and this accounts, in large part at least, for the numerous postponements. The present Minister of Public Works, Gauthier, has recently promised to report on the result of his negotiations with the companies next October.

#### The Loree-Patenall Semaphore.

The Loree-Patenall semaphore, which is spoken of in another column of this paper, and which is of interest at the present time by reason of the active discussion of the upward inclination which is now going on, was designed two years ago (patented July 21, 1903), by Messrs. L. F. Loree, then President of the Baltimore & Ohio, and F. P. J. Patenall, Signal Engineer of that company. The spectacle casting, as shown in the accompanying engraving, is so designed as to cause the signal to return to the stop position whenever it is released or disconnected or broken, without the aid of a counterweight. Accumulations of snow or ice on the blade or casting will,



The Loree-Patenall Semaphore.

of course, increase the tendency of the arm to turn to the horizontal position, a stop being provided to prevent it from falling below that position. While the signal is designed to be inclined upward from the horizontal the inventors call attention to the practicability of turning it downward also, thus making possible the use of five indications.

#### The Condition of British Shipping.\*

We are now well into the second half of the shipbuilding year, and the prospects of the industry are not so bright as they were six months ago. The amount of new work actually on hand on the stocks is not much above that of last year, while the number of orders booked during the last four or five months have been few. This means that as the vessels now on the stocks leave the berths the builders will have nothing like as many to put in their place. Nor is much contracting, even at the best of times, usually done in August, so that unless there is a revived demand in September and October there will be a considerable shortfall of shipbuilding work with which to face the winter. If often happens that when merchant-ship building is slack some of the yards on the Admiralty list are able to give plenty of employment on war-ship building; but at present, excluding the Government dockyards, there are only 150,000 tons of warships in various stages of construction at private yards, and as regards the Clyde there is only one warship actually on the stocks. The total output of the shipyards this year will be very large, perhaps larger than last year; but prospects of the near future are not bright, however busy many of the yards and relative industrial establishments may be just now.

The pause in the demand for new shipping, which was so active

\*Extract from a paper in *The Statist*, London.