

sworn that there was no widow or next of kin in any of the six cases, has effectually shut himself off from getting even a small taste of fees on that \$60,000 which he himself didn't earn, and which no one else is entitled to. It is bad enough when shyster lawyers attempt to hold up corporations with damage suits, but when a public officer attempts in cold blood to follow this course it is infinitely worse. It looks as if the present incumbent was doing all in his power to perpetuate the unsavory odor of the office of public administrator in Cook County.

Seventh Avenue or Broadway?

The latest development in the controversy over the plans for the extension of the New York subway system is of more than passing importance, as it brings the discussion to the point where a decision must be made by the Rapid Transit Commission on two important questions; namely, will the Broadway spur south of Forty-Second Street be abandoned, or will deep-tunnel construction be substituted for the present method? It also suggests at once a reconsideration of the route for the subway through the shopping district, and gives prominence to the oft-repeated claims of Seventh Avenue as a better location for a West Side line.

Mr. Belmont's letter to the Rapid Transit Commission last week practically announced that the contractors for the present work would decline to undertake further extensions under restrictions lately imposed, and that they would not accept additional contracts according to the proposed new plan of construction. At the same time he offered to abandon the Broadway spur. This leaves the field open for the Broadway agitators who offered to build a deep tunnel themselves if the Interborough Construction Company refused to do so. Evidently Mr. Belmont would be satisfied to let them undertake this part of the work, and if the Commission can induce responsible contractors to accept the job the experiment will be made. The Interborough Company expresses a willingness to operate this portion of the system in conjunction with the rest of the underground lines, but it is not considered at all probable that it will be built; in fact, the chances are largely against it.

Under the circumstances the alternative offered the Commission is the substitution of Seventh Avenue for Broadway as a route connecting the upper and lower parts of the city by a West Side line. This plan has long been favored by many who are deeply interested in the development of the service for upper Manhattan, as they recognize the advantages of having the four-track system extend as far south as possible. Broadway is a narrow street for a great part of its length, being only 66 ft. wide through most of the portion under consideration, while it is not more than 75 ft. at any point along the proposed route. Some of the earlier rapid transit projects contemplated a four-track road under Broadway, but it was found that there was scarcely room for four tracks without allowing for the necessary stations. The Commission's plans have been made to conform with this condition, and they provide for only two tracks, involving the abandonment of express service, which is necessarily one of the chief advantages of the underground road. A two-track road under Broadway means only local trains, and would not give satisfactory rapid transit facilities to the people of Harlem.

Another objection is that the plan of constructing a subway under Broadway would not accomplish the best geographical distribution of the facilities for rapid transit. The Broadway extension of the underground road southerly from Forty-Second Street would, for a considerable part of its length, run substantially parallel to the subway already under construction.

This arrangement would provide an East Side line and a central line, leaving the lower West Side of the city wholly without new rapid transit facilities in spite of the fact that there is an immense passenger traffic on existing surface and elevated railways on the West Side. Railroad men know that it is extremely difficult to modify the established habits of the public in transportation matters, and as a great proportion of the residents of upper New York use West Side lines in its daily journeys up and down town, it is necessary that some thoroughfare be selected on the West Side under which the subway might be built, if relief is to be afforded this rapidly growing part of the city. Even though the Broadway spur is built according to the present plans, another underground route for a four-track line will have to be provided for the West Side.

Briefly stated, the claims for the Seventh Avenue route are that the location is much more advantageous from a transportation standpoint, the road is wide enough to permit four tracks with stations to be built, the line would be much more direct and there would not be as many curves as in Broadway, thus permitting higher speeds. The present subway turns out of Seventh Avenue at Forty-Second Street and passes east to the Grand Central Station, where it turns south under Park Avenue. The line proposed for the West Side, south of Forty-Second Street, will continue down Seventh Avenue to Fourteenth Street, then east to Fifth Avenue, and down Fifth Avenue and West Broadway to the Battery. This would take in the dry goods district below Bleecker Street, penetrate the office-building and financial center below Chambers Street, and would be but a block away from the Sixth Avenue shopping district. Cars of a Seventh Avenue subway would deliver passengers at the station of the Pennsylvania Railroad at Thirty-Third Street without transfer, while a Broadway underground line would make it necessary to transfer passengers at Thirty-Fourth Street.

Another feature that should not be lost sight of is the greatly increasing congestion of Broadway throughout the shopping and theater district. It must be apparent that another great avenue of trade will eventually develop in that section, and that the opening of the subway system, the Pennsylvania tunnel and the North River tunnel to Jersey City will make this necessity felt very much earlier than it would otherwise with the ordinary growth of the population of Manhattan Island. Seventh Avenue is a broad thoroughfare, well adapted for a fine retail street, and, it is pointed out, should be selected as the route for the principal West Side underground railway.

Suggestion for Street Railway Associations

The Pennsylvania Street Railway Association at its last meeting introduced an innovation in the form of a "Question Box," which proved a very valuable feature, and might be adopted with advantage by other associations. No claim is made for originality, but the Pennsylvania organization certainly demonstrated the fact that the idea, when properly worked out, could be made one of the most instructive and interesting parts of the programme. With the larger organizations some modifications would doubtless be desirable; for instance, it would not be necessary to prepare so many questions as were included in the list sent out by the Pennsylvania Association, and, in fact, it would not be desirable to do so. Replies from all or a fair representation of the companies in the American Street Railway Association would form a very valuable compendium of American practice on any problem in street railway operation or management. With a very large list of questions it will readily be seen that it would be imprac-

licable to digest all this matter properly and intelligently at one meeting.

A division might be made of the subjects to be considered at the national meetings; for instance, those pertaining to management and operating problems might be discussed by the American Street Railway Association, while the mechanical and electrical features could be left for the "Master Mechanics," as the new organization is commonly termed. It would be carrying out the idea formulated at the Saratoga Convention of the latter body which resolved itself into an "experience meeting" on more than one occasion, and would be much more to the liking of the members than the preparation of long papers upon set subjects. A short paragraph on each topic selected for consideration could be gotten from men who would not under any circumstances write a long communication, especially when it is known that those occupying similar positions with other companies would do the same thing. A little pride, some curiosity and a willingness to exchange information would prompt them to contribute to a symposium of this kind; they would feel as if they were talking among themselves, and, what is of far more importance to most of them, it would require very little time.

Street railway men in all departments are very busy; they haven't time to write long papers, and, besides, very few of them have the inclination to do so. They have plenty of ideas; their experience is valuable, and they will answer questions freely. Right here the "Question Box" comes in as a very valuable adjunct. We do not wish to be understood as advocating the elimination of papers from the programme. They form an essential feature of every convention of this character and are indispensable; but we do believe that in the experience of the Pennsylvania convention last month the national and State organizations may find a valuable suggestion which may be adopted with advantage to their members, and under the direction of capable and zealous committees or secretaries this feature may be developed into a very important factor in awakening and maintaining interest in their work.

Measures for Preventing a Strike

The Public Service Corporation, of New Jersey, averted a strike in its railway department last month by taking vigorous measures to meet every contingency and being prepared for the continuance of the service in spite of any defection in the ranks of the employees. The conditions which confronted the management were exceptional. In the first place, the present owners have been in physical control of the property less than six months, and as the system is a very extensive one, including the city, suburban and interurban service of Newark, Jersey City, Hoboken, Paterson, Elizabeth, Plainfield and other important points in that vicinity, it was necessary to take great precautions to protect the property in all these places as well as the lines extending through the intervening country. The trouble arose over the demands of agitators, who had secured admission to the ranks of the workmen for the purpose of organizing a union and precipitating a strike. The company had granted an increase of wages to the conductors and motormen within sixty days, but in spite of this the agitation for a further advance was continued, and the familiar demand was made for recognition of the union. This the company positively refused to consider, and immediately took steps to protect its interests.

The company has 2500 conductors and motormen on its pay-roll, and requires the constant services of 1950 men to cover the regular runs according to the schedules. To fill their places on short notice is no easy task, especially when the service is

liable to be fraught with danger to the newcomers, and consequently the first step that was taken was to organize a recruiting department to supply new men for the operation of the cars. Before the crisis was reached the company had 1500 experienced motormen and conductors ready to take the places of any of the old employees who might go out on strike.

Realizing that the men would not yield their places quietly in a struggle of this kind, the management also made provision for the protection of the property. At all the depots board fences, 10 ft. high, were built with three strands of barbed wire on the top, and a large number of armed guards were secured to defend the power houses, depots, shops and car houses against any concerted attack. Bunks were arranged in the depots and supplied with mattresses, blankets, etc., so that the men required at each depot could be housed, fed and cared for properly while there was any danger of rioting and intimidation. A commissary department was next organized and completely equipped, and ample provision was made for the comfort as well as the safety of the employees while the trouble should last.

In addition to the regular emergency service twenty-nine new patrol wagons were secured and manned by emergency crews. They were fully equipped for line service and for removing obstacles on the right of way. These wagons were distributed over the system so that each depot had one patrol wagon with a crew of five men in addition to the regular contingent. Precautions were likewise taken against the shutting down of the power plants, new crews being engaged and held in readiness to take the places of the old forces, should the latter determine to aid the motormen and conductors by joining in a sympathetic strike.

As has been mentioned, the service of this company is not confined to the cities, but includes the operation of suburban and interurban lines, and consequently a considerable mileage is through the Jersey meadows and country districts. One of the measures deemed necessary for keeping these connecting lines open and in order to ensure the safe operation of cars between cities was to mow down the high grass alongside the tracks on all lines crossing the meadows, so that the men would not be subject to attacks from ambush.

The effect of these precautions, which were not concealed from the men, was evident, and that they made a profound impression was shown by the reluctance of the older and more conservative employees to engage in any strife or contention against the company. A careful canvass of the situation satisfied the management that only a comparatively small proportion of the men were really in favor of carrying the matter to extremes, and this view was sustained by the result. When the issue was submitted to a vote a very significant feature was developed in the fact that out of 2500 conductors and motormen on the company's pay rolls only 891 were members of the union, and of these 667 voted against a strike and 224 in favor of it—less than 10 per cent of the employees affected being responsible for the trouble, annoyance and expense involved.

Two facts stand out prominently in this experience; namely, the efficacy of a prompt, vigorous and determined policy on the part of the management in preparing for every emergency, and the exaggerated ideas generally entertained of the influence and numerical strength of the men who precipitate these disturbances. The present case is a fair example of the policy which governs labor unions generally, wherein a relatively insignificant number of hot-headed, noisy agitators lead or drive their associates into difficulties.

DENVER TRAMWAY SYSTEM

The new power station of the Denver Tramway Power Company, on the South Platte River, that is now nearing completion, includes every reasonable precaution to insure the continuous operation of the plant, yet unnecessary and expensive

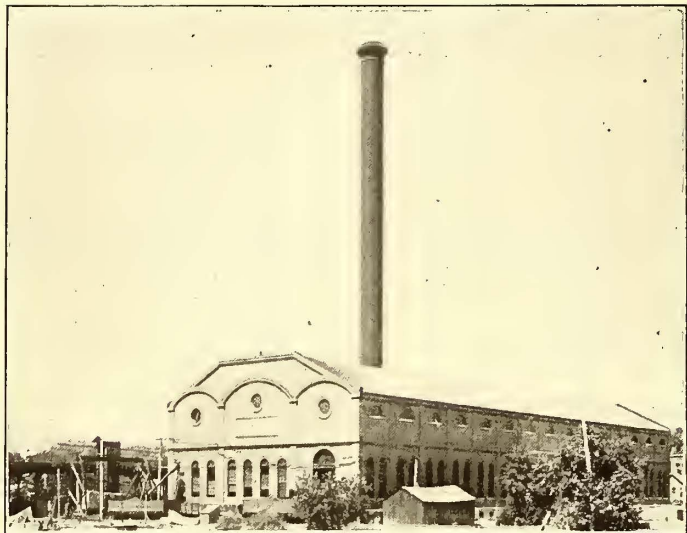


FIG. 1.—EXTERIOR OF MAIN POWER HOUSE

duplication of steam and electrical equipment has not been made. Previous to the erection of this station the Denver City Tramway Company, which receives its power from the Denver Tramway Power Company, was operating its system from five separate power houses located in different parts of the city. These old stations have all been abandoned now with the exception of one on Blake Street, in the east end of the city, which has a capacity of 1400 kw, and which will be operated as a reserve or auxiliary station after the new plant is finished.

The new station, as may be seen from Fig. 1, is a substantial

8 ft. to 16 ft. to bed rock. The pile driver used was operated by an electric motor, as shown in Fig. 2. On the piles was laid a footing course of concrete, 6 ft. wide and 2 ft. thick, and

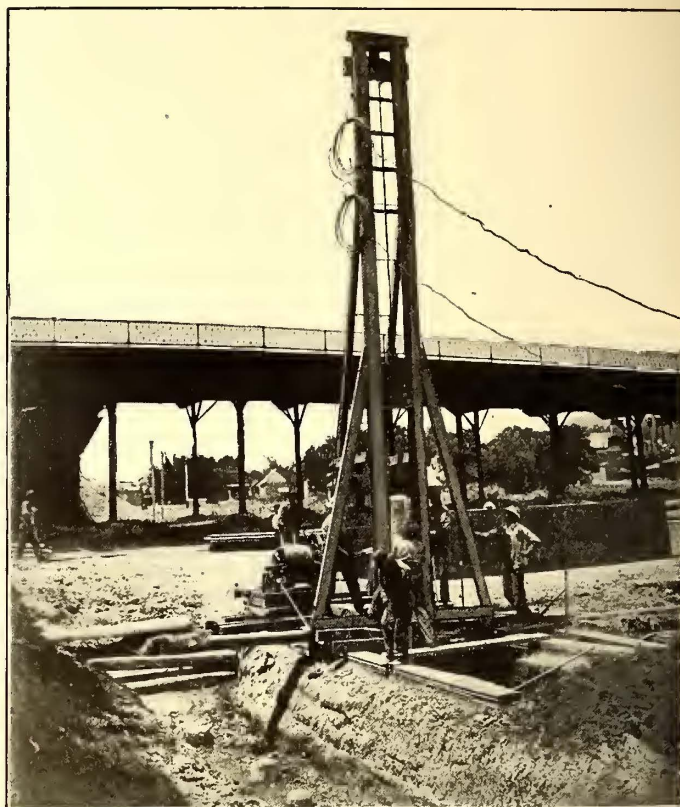


FIG. 2.—ELECTRICALLY-DRIVEN PILE DRIVER USED IN FOUNDATION WORK

another course 4 ft. wide and 1 ft. thick. The concrete foundation walls, 2 ft. wide and 11 ft. high, were then laid, and topped by a water table of concrete 9 ins. thick and 12 ins. wide. From the water table the brick walls rise; they are 17 ins. in thickness and are built of boulder pressed brick throughout.

The walls every 19 ft. are strengthened by 3 ft. x 4 ft. pilasters, on which rest the iron roof trusses. There are two roof ridges, one over the boiler room and one over the engine room, each supported by a separate set of trusses. The partition wall is 21 ins. in thickness, and carries the inner ends of both sets of trusses. It is strengthened on the engine room side with pilasters. The roof was covered by the Western Elaterite Roofing Company, of Denver. On the inner slopes of each roof are skylights for lighting the engine and boiler rooms. All floors are formed on steel girders with concrete top, the economizer floor above the boilers resting on iron plates imbedded in the walls. There is a clear height of 24 ft. in the boiler room and 41 ft. in the engine room. Spanning the engine room is a 25-ton Whiting traveling hand-power crane. The method used in raising this crane to position by jacks and cribs is shown in Fig. 3.

COAL HOUSE

The basement walls of the pump and coal house are 24 ft. deep, and are carried down to bed rock. The walls are 52 ft. high above the basement floor, and are surmounted by a flat roof. The addition is divided into two rooms, as shown in the plan, Fig. 4. The outside room will be devoted to the receiving of coal. In the basement will be a hopper bin with a capacity of 90 tons of coal. The coal hopper cars of the Denver &

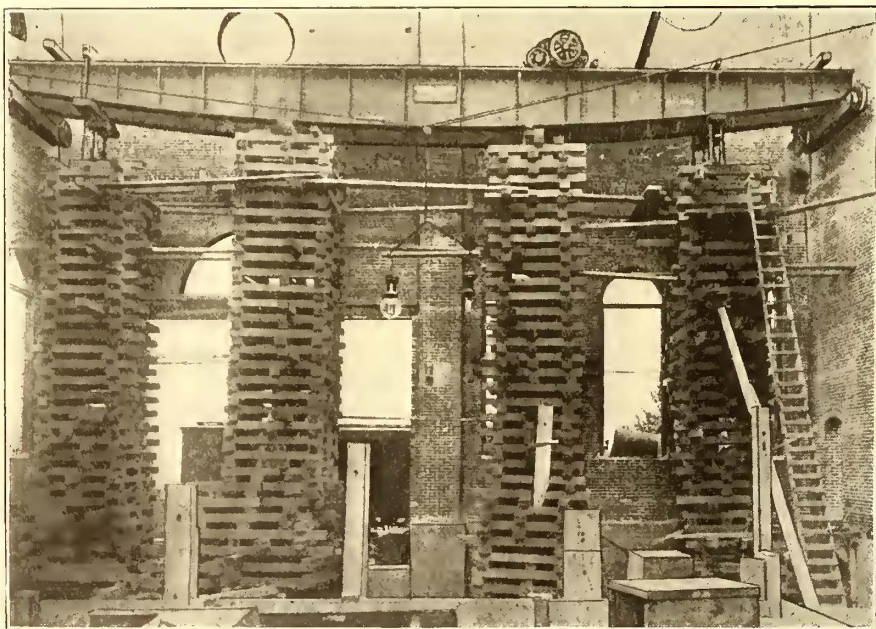


FIG. 3.—RAISING 25-TON CRANE IN ENGINE ROOM BY MEANS OF CRIBS AND JACKS

and well proportioned brick building. It is divided longitudinally by a partition wall into a boiler room, 38 ft. 6 ins. x 283 ft. 6 ins., and an engine room 58 ft. 2 ins. x 283 ft. 6 ins. Adjoining the boiler room on the west is a pump and coal house, 39 ft. wide and 38 ft. long.

CONSTRUCTION DETAILS

The foundations of the building rest on piling driven from

Northwestern Railway, described in the STREET RAILWAY JOURNAL of Aug. 1, 1903, will be run into the building above this bin, and will discharge directly into it. The coal will then

a switchback track outside the building, so that a practically continuous reception of coal and removal of ashes may be provided for. Awaiting the completion of the coal house a temporary track has been built along one side of the boiler room, and coal is being temporarily unloaded through the windows, as shown in Fig. 15.

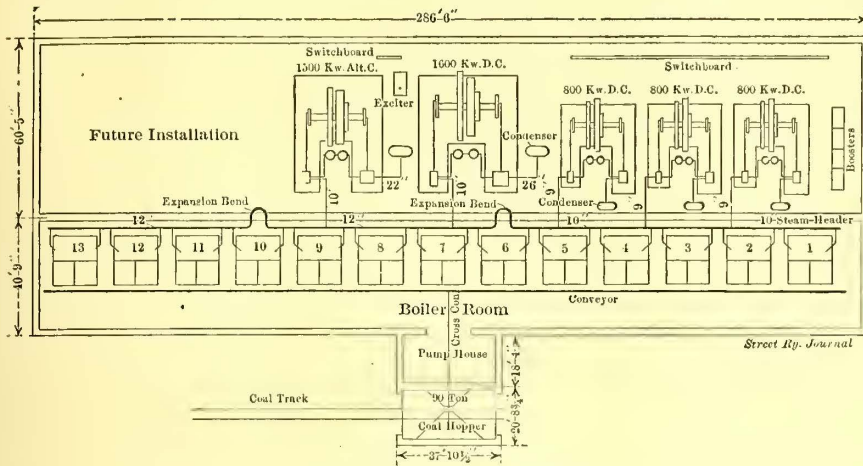


FIG. 4.—PLAN OF POWER PLANT

pass through an electrically-driven coal crusher and be carried by a cross conveyor to the longitudinal coal and ash conveyor in the boiler room, for distribution to the individual boiler bins. Above the track and connected by means of another cross

The plant is now using more than 100 tons of lignite coal a day, 40 tons of which is the Leyden coal, that is brought in by electric dump-cars over the tracks of the Denver & Northwestern Railway. An average of three analyses of this Leyden coal, made by L. L. Summers, gives the following percentages: Moisture, 16.6; volatile matter, 31.26; fixed carbon, 48.92; ash, 3.22. The company pays \$1.41 a ton for the Northern Colorado lignite coal that it has been using, but expects to bring the cost of the Leyden coal down to \$1.00 or less when the workings at the mines are fully opened and the coal-

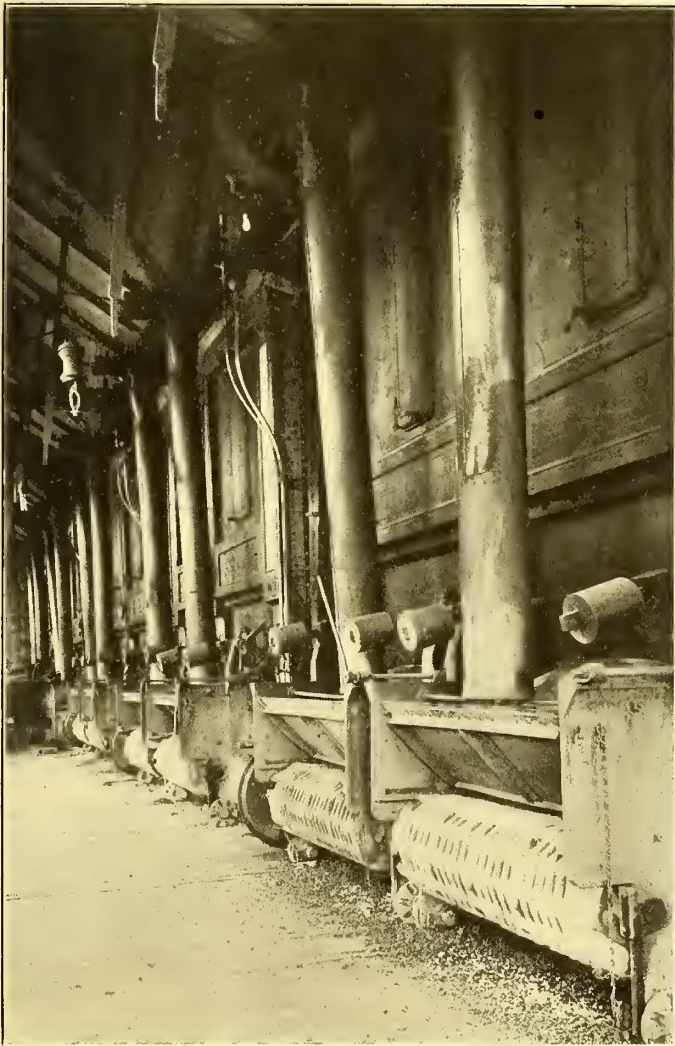


FIG. 5.—BOILER ROOM

conveyor with the longitudinal conveyor in the boiler room is an ash bin with a capacity of 30 tons of ashes, or two car loads. The coal and ash cross conveyors each have a capacity of 40 tons per hour. After the coal cars are emptied they will be filled with ashes from above and run on through the annex onto

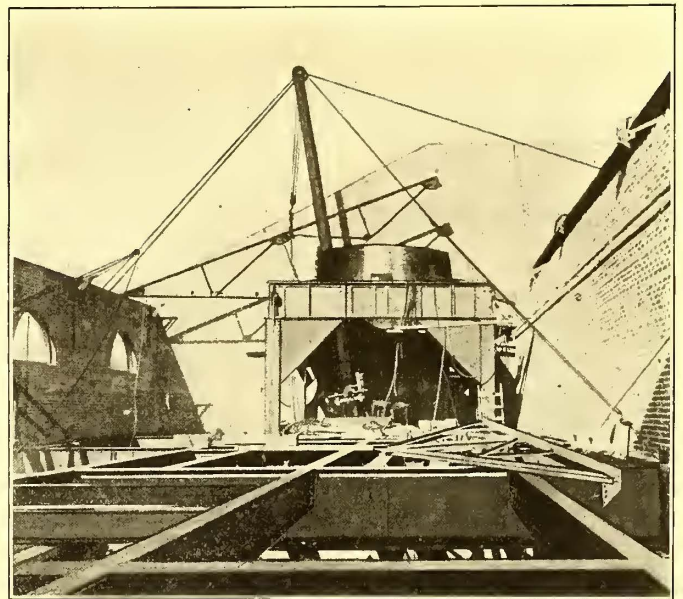


FIG. 6.—METHOD OF SUPPORTING STEEL STACK

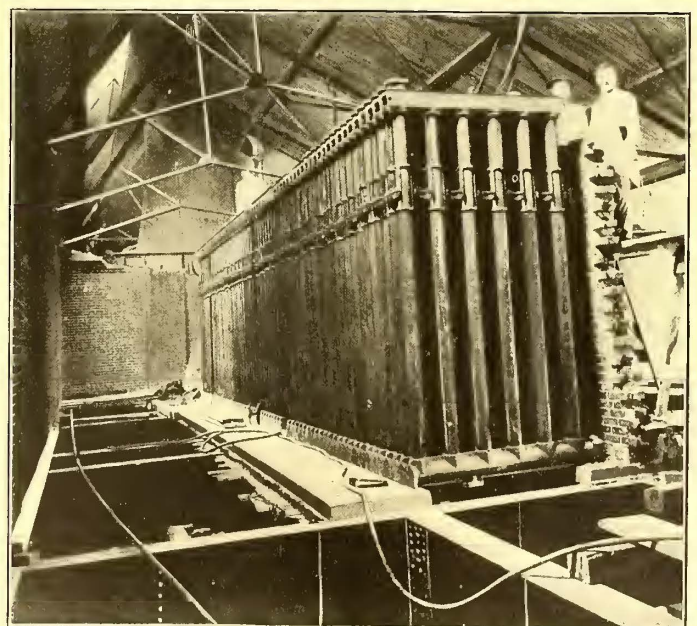


FIG. 7.—INSTALLING ECONOMIZER

handling facilities at the station, which are now being installed, are completed.

BOILER EQUIPMENT

There are thirteen 450-hp Stirling water-tube boilers, with a heating surface of 4500 sq. ft. each. They carry a pressure of

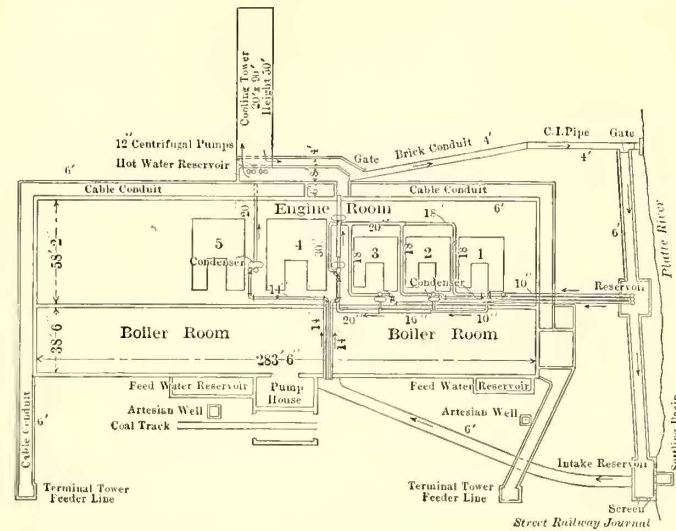


FIG. 8.—PLAN OF CONDENSER SYSTEM

175 lbs., being tested at 300 lbs., and are equipped with Stirling superheaters of the Niclausé pattern for supplying 110 degs. of superheat. The station is located on the bank of the South Platte River, a stream that is apt to carry high water in the spring, and the boiler room has been built so that the fires of the boilers will be 7 ft. above high water mark. Fig. 5 shows the five boilers in the older portion of the boiler room. These

Running above the coal bins and under the boilers is a longitudinal conveyor, 700 ft. long, with a capacity of 40 tons per hour. This conveyor and the coal and ash cross conveyors in the coal house are of the McCaslin overlapping gravity bucket type, manufactured by the John A. Mead Company, of New York city.

CHIMNEY AND MECHANICAL DRAFT

Natural draft is provided by a steel stack 11 ft. in diameter, having a height of 240 ft. above ground, and 230 ft. above the grates. The method of supporting the stack above the boilers with steel girders and columns is shown in Fig. 6, which is a reproduction of a photograph taken during construction. The stack is built of Otis steel, double-riveted, varying in thickness from $\frac{1}{2}$ in. to $\frac{1}{4}$ in., and is lined to a height of 40 ft. with fire-brick.

Mechanical draft is used as an auxiliary, and is furnished by three Sturtevant steel-plate fans, driven by 55-hp motors connected in series. These fans discharge through three 25-ft. stacks, 6 ft., 8 ft. and 9 ft. in diameter respectively.

FUEL ECONOMIZERS

Four fuel economizers, manufactured by the Green Fuel Economizer Company, of Matteawan, N. Y., are installed above the boilers. Two contain forty-eight sections each, and the other two comprise seventy-two sections each. Fig. 7 is a view of one of the large economizers before it was bricked in. This picture also shows the method of lighting the space above the boilers by the roof skylights.

BOILER FEED

The space in the pump and coal house adjoining the boiler room will be used for boiler-feed pumps and air compressors. The equipment of pumps comprises two Knowles 10-in. x 5-in. x 10-in., one Snow 10-in. x 8-in. x 12-in., and one Smith-Vaile triplex 10-in. x 5-in. x 12-in. A 10-in. x 12-in. x 14-in. triplex



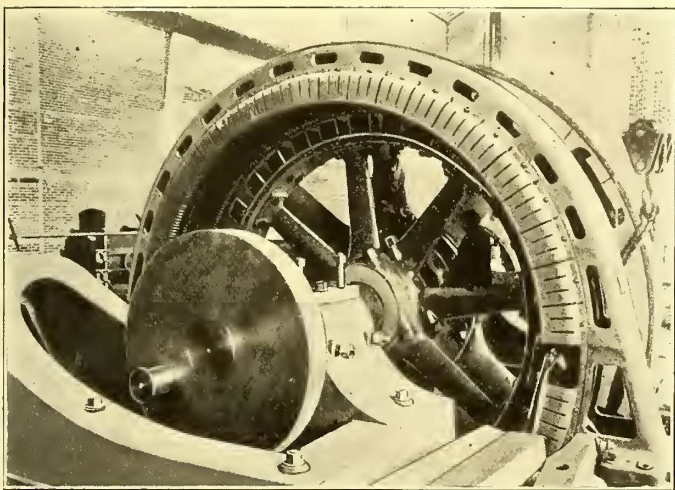
FIG. 9.—GENERAL VIEW OF ENGINE ROOM

boilers are set on solid concrete foundations, while the new boilers rest on foundations of hard brick laid in cement mortar. Chain grates are used, and coal is fed to the hoppers of the stokers through pendulum chutes from the bins above. There are thirteen of these bins, and their total storage capacity is 1000 tons. They are made of sheet steel with 5-16-in. steel angle corners and stiffeners.

pump is to be installed later. These pumps and the other steam auxiliaries exhaust through a Bundy closed feed-water heater into open feed-water reservoirs outside the boiler room, as indicated in Fig. 8. These tanks are built of concrete, the one at the corner of the building being 8 ft. wide, 44 ft. long and 10 ft. deep, and the other one 10 ft. wide, 48 ft. long and 14 ft. deep. Together they have a capacity of over 60,000 gals. of

water. Near each tank is an artesian well 700 ft. deep, from which water is pumped for this supply by an air lift, at the rate of 75 gals. per minute. For this air lift a Norwalk and a Laidlaw-Dunn-Gordon compressor are installed, with respective capacities of 254 cu. ft. and 127 cu. ft. a minute.

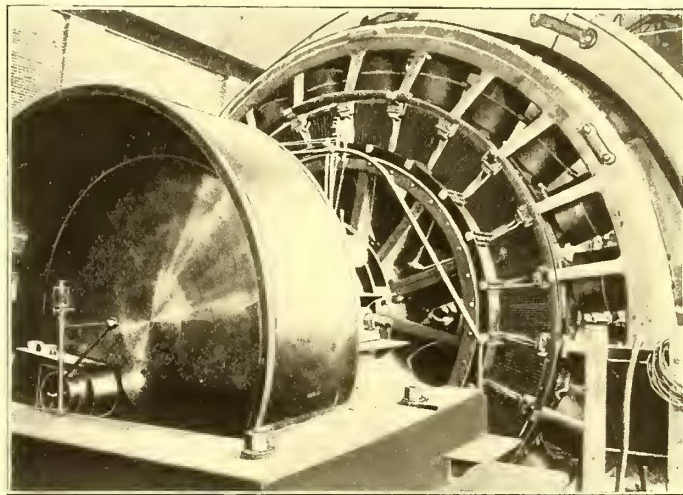
The exhaust from the auxiliaries after passing through the heater reaches these tanks at 110 degs., and heats the water to about 80 degs., at which temperature the water is forced by the pumps through the water side of the heater to the economizers. The water enters the economizers at about 150 degs., and goes to the boilers at from 275 degs. to 280 degs. The tanks feed to the pumps by gravity. By this method the highest efficiency is obtained from the heat of the auxiliary exhaust and of the escaping flue gases. None of the engine exhaust is used in this connection, as jet condensers are employed. The use of artesian water for the boilers is necessary as the river water is not at all suitable and the city water is expensive and also unfit. An excellent grade of water is obtained from the wells, there being a very small quantity of



ders 32 ins. and 68 ins. in diameter and a 60-in. stroke. This engine has a speed of 75 r. p. m., and is rated normally at 2700 hp, with a guarantee for carrying a 50 per cent overload continuously. It is directly connected to a 1600-kw, 575-volt General Electric direct-current railway generator.

The fifth engine, Fig. 11, which is now being installed, is of the Allis-Corliss type, and is similar to No. 4, except that its normal rating is 2400 hp and its cylinder dimensions 30 ins. and 60 ins. x 48 ins., with a speed of 94 r. p. m. This engine will drive a 1500-kw, thirty-two-pole, revolving field General Electric alternator, that will generate a 2300-volt, 25-cycle, three-phase current for use in transmitting power to sub-stations.

All the engines rest on solid concrete foundations, made of the best Dyckerhoff-Hemmoor cement. In forming the foundation for the 1600-kw direct-current unit 800 barrels of cement were used. Bundy oil separators are used on all the engines. Each Greene-Wheelock engine is equipped with an automatic electric stop, manufactured by the Consolidated Engine Stop Company, of Waterbury, Conn., which automatically closes the



FIGS. 10 AND 11.—1600-KW DIRECT CURRENT AND 1500-KW ALTERNATING CURRENT UNITS BEING INSTALLED

suspended matter in it. The water forms no scale whatever, some of the boilers having been run for over fifteen months without a sign of scale. Only a greasy coating has been noticed.

STEAM PIPING AND FITTINGS

Steam from five of the boilers is taken into a 10-in. header and from the eight new boilers into a 12-in. header, connections being made with the engines by 9-in. and 10-in. pipes, as shown in Fig. 4. Expansion in the main header, which amounts to about 9 ins. in 280 ft., is taken care of by two vertical U-bends with 5-ft. radius, 11-ft. centers, 15 ft. high above the center of the header. Extra heavy wrought-iron pipe is used throughout with flange fittings and corrugated copper gaskets. The pipe and all live-steam fittings were supplied by the Crane Company, while some Chapman and Jenkins fittings are used on the other piping. A 4-in. auxiliary header with two horizontal U-bends is used for the pumps. All pipe is covered with sponge-felt, supplied by the H. W. Johns-Manville Company, of New York.

ENGINES AND GENERATORS

There are five generating units installed in the engine room, as shown in Fig. 9. The first three engines are of the Greene-Wheelock cross-compound type, equipped with Hill valves. Each engine is rated normally at 1300 hp, with a maximum rating of 2000 hp, and has cylinder dimensions of 22 ins. and 52 ins. x 48 ins. Directly connected to each of these engines and turning at 100 r. p. m. is an 800-kw, 575-volt General Electric direct-current railway generator.

The engine designated as No. 4 in the plan, Fig. 4, and shown in Fig. 10, is a cross-compound Allis-Corliss engine with cylin-

throttle valve when the speed exceeds the normal rate. The device is also controlled by a push-button on the generator panel of the switchboard.

CONDENSER SYSTEM

A very complete and somewhat unusual system has been adopted for condensing the exhaust from the engines and for cooling the condensing water, the supply being taken from the South Platte River. Admiralty jet condensers have been adopted, the three used for the three Greene-Wheelock engines being of the Worthington type, and having a capacity each of 20,000 lbs. of steam per hour. For each of the two large engines a Prescott condenser is being installed, each with a capacity of 60,000 lbs. of steam per hour. A third Prescott condenser of the same size will also be installed and connected so that it may be used on engine No. 4, or on the smaller engines, namely, Nos. 1, 2 and 3. Much trouble has been experienced heretofore, when the river was muddy, with the sand cutting out the small condensers. The new arrangement, with one large condenser constantly in reserve, will provide against any possibility of shut down from sand troubles. The design of condenser wells, conduits, etc., to be described below, will also tend to increase the reliability and efficiency of the station.

The plan of the condenser water system is shown in Fig. 8. An in-take reservoir, 12 ft. wide and 24 ft. long, is carried down 24 ft. to bed rock, and is provided with screens on the river side and on one end through which water enters from the adjoining sand formation. A settling basin, 8 ft. x 5 ft., adjoins the reservoir, and is also carried down to bed rock. Water that is drawn directly from the river has a chance to settle in this basin, and is then carried into the in-take reservoir through a

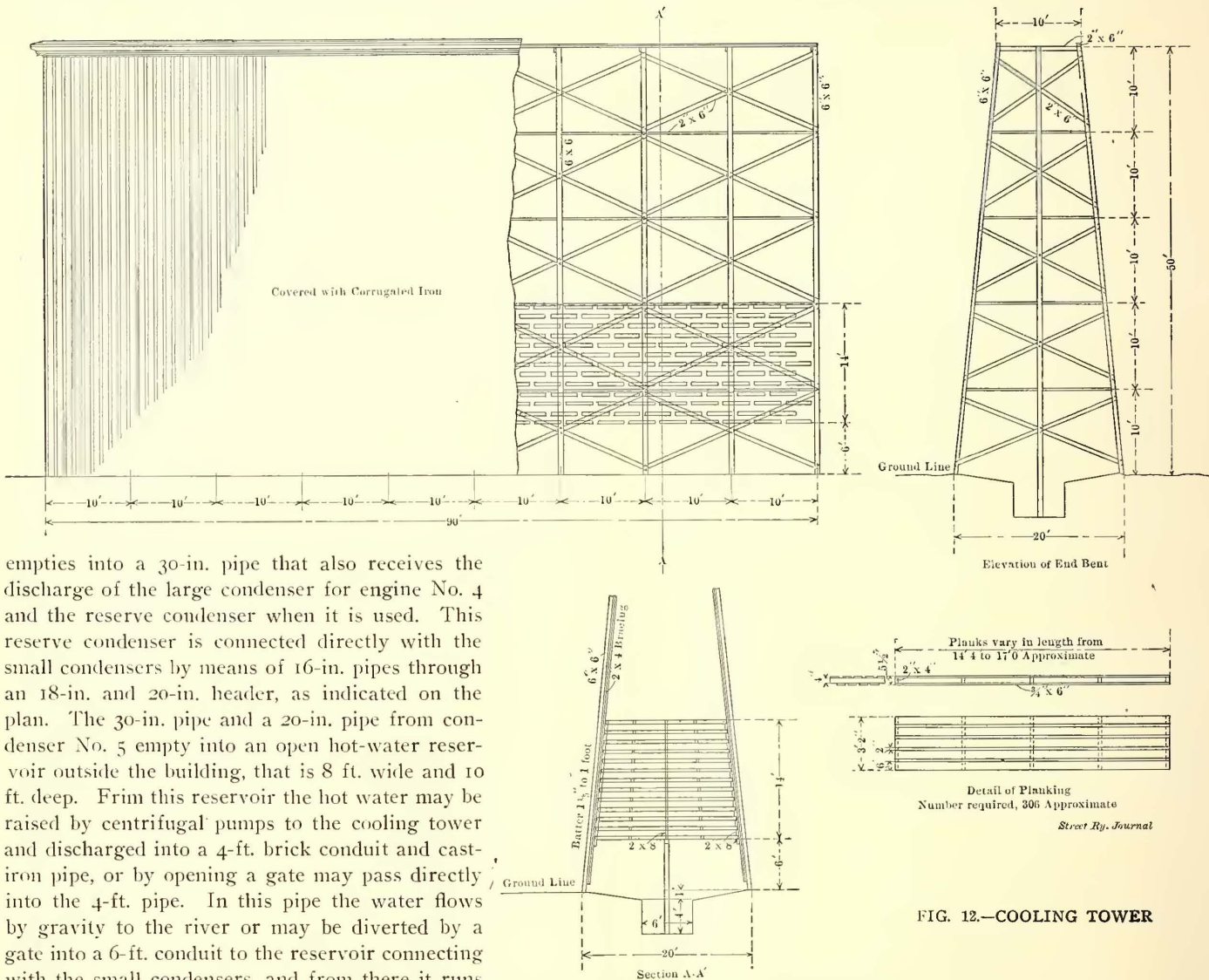
4-ft. x 4-ft. gate. A centrifugal pump with a capacity of 2500 gals. per minute, will pump the sand and sediment from the basin into the river.

From this reservoir the water flows naturally through a concrete conduit, 6 ft. wide and 14 ft. high, resting on bed rock, to the west side of the boiler room basement. From that point three 14-in. pipes carry the condensing water to the engine room, two going to the condensers of engines Nos. 4 and 5, the third pipe being in reserve for a future engine. The small condensers used for engines Nos. 1, 2 and 3 are connected separately by 10-in. pipes with a 14-ft. x 14-ft. reservoir, as indicated in the plan.

The discharge from these three small condensers is carried through a pipe increasing in size from 10 ins. to 20 ins., and it

with end and intermediate 2-in. x 4-in. cross pieces, so that five of the strips form the top of the plank and four the bottom, as shown in Fig. 12. Two-inch pieces are provided between the strips and the top and bottom spaces are staggered.

The hot water from the condensers is raised to the top of the tower, and, falling onto the planks, is broken up into fine spray by the time it drops from plank to plank and reaches the bottom. The hot water entering at the top heats the air in that portion of the tower and thus creates a natural upward draft, cold air entering at the bottom and passing up through the descending water spray. The water thus passes out at the bottom of the tower comparatively cold. The tower is built entirely of wood, except the covering for the sides, which consists of corrugated iron. The two 12-in. centrifugal pumps that will be used to



empties into a 30-in. pipe that also receives the discharge of the large condenser for engine No. 4 and the reserve condenser when it is used. This reserve condenser is connected directly with the small condensers by means of 16-in. pipes through an 18-in. and 20-in. header, as indicated on the plan. The 30-in. pipe and a 20-in. pipe from condenser No. 5 empty into an open hot-water reservoir outside the building, that is 8 ft. wide and 10 ft. deep. From this reservoir the hot water may be raised by centrifugal pumps to the cooling tower and discharged into a 4-ft. brick conduit and cast-iron pipe, or by opening a gate may pass directly into the 4-ft. pipe. In this pipe the water flows by gravity to the river or may be diverted by a gate into a 6-ft. conduit to the reservoir connecting with the small condensers, and from there it runs to the in-take reservoir, thus completing the circuit. By this arrangement when the river water is clean and suitable for condenser purposes the cooling tower may be cut out and the water allowed to discharge directly into the river. In case the sand and dirt in the river water makes it unsuitable for condensing purposes the cooling tower may be brought into service and the same water circulated continuously. The condenser system has a capacity of 10,000 gals. of water a minute, and can be equipped to handle 15,000 gals. a minute.

The cooling tower is Mr. Summer's invention and has a capacity of 15,000 gals. of water a minute. It is shown in detail in Fig. 12. The tower is 50 ft. high and has ground dimensions of 20 ft. x 90 ft. Across the lower portion of the tower and staggered in position are arranged over 300 planks. They are set 6 ins. apart, with 8-in. vertical spaces. Each plank consists virtually of nine 3/4-in. x 6 in. wooden strips, fastened

force the water to the top of the tower will be electrically driven, and each will have a capacity of 4500 gals. per minute.

The power house is constructed with ample water drains, all leading to a sump below the pump house from which the drainage is pumped into the river by a 2500-gal. centrifugal pump. No special attention has to be paid to what becomes of any water used in washing out boilers, etc., or in cleaning in the engine room, as it all flows quickly through concrete and tile ducts to the pump-house sump.

DIRECT-CURRENT SWITCHBOARD

The direct-current switchboard, Fig. 13, is built of black enameled slate, and consists of forty-two feeder panels, four generator panels and three station panels. The equipment for each feeder panel includes a 1200-amp., type-MK circuit-breaker, ground detector lamps, a 1000-amp. ammeter and a single-pole, single-throw quick-break 1000-amp. switch. Each

FIG. 12.—COOLING TOWER

of the generator panels is equipped with a type-CF circuit breaker, voltmeter, ammeter, single-pole, single-throw switch, rheostat and field switch. On the panels for generators Nos. 1, 2 and 3 are push-buttons for operating the electric engine stops. Two of the station panels are provided with ammeters and Thomson recording wattmeters for registering the total output of the station, and the third station panel is equipped for controlling the station auxiliaries. The negative and positive leads are separated as widely as possible on the switchboard, the generator panels being all negative and the feeder panels all positive, with a positive switch brought out to the equalizer stand at the generator. The ground return is connected to the generator bus. The Karas Electric Company, of Chicago, built the switchboard and supplied all the switches and bus-bars, the latter being of especially heavy construction. Weston instruments are used, and the circuit breakers are General Electric. Fig. 14 is a rear view of the switchboard and illustrates its simplicity of construction.

FEEDER DISTRIBUTION

All feeders are protected by lightning arresters grounded to

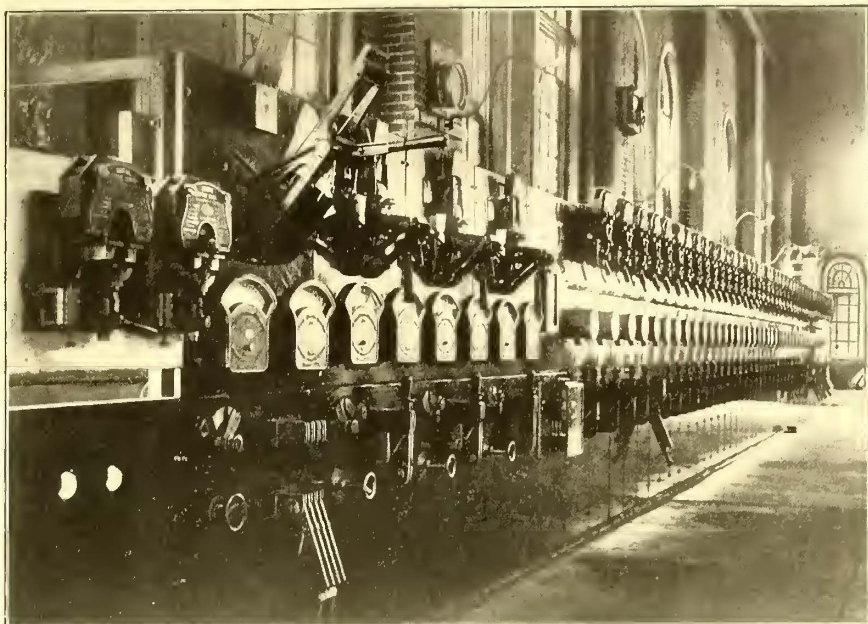


FIG. 13.—SWITCHBOARD IN POWER HOUSE

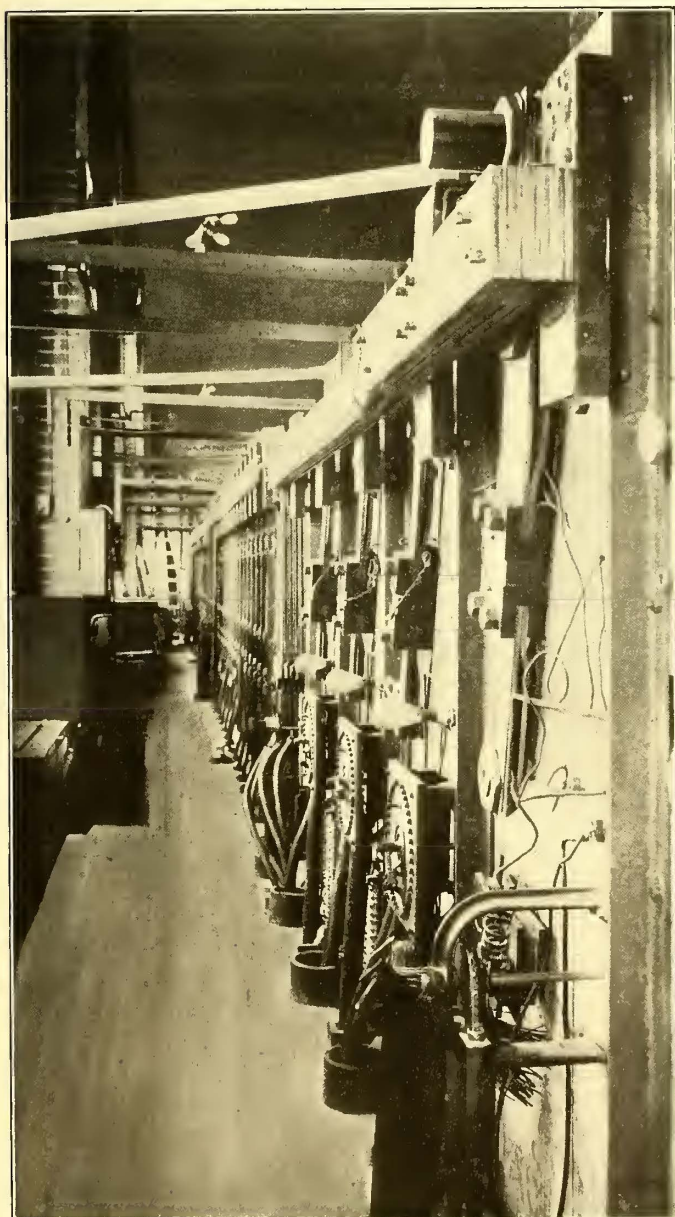


FIG. 14.—BACK OF SWITCHBOARD

copper plates bedded in coke. The feeders are carried in lead-covered cable through an underground conduit to the overhead feeder lines. This cable conduit extends around three sides of the power station, as shown in Fig. 8, and is built of concrete, 6 ft. wide and 7 ft. deep, with expanded metal and concrete top on a level with the ground. The conduit begins and ends at terminal towers, from which are run the overhead feeder lines. In the conduits the lead cables are supported from 4-in. x 6-in. beams imbedded in the side walls. The towers are formed by four 50-ft. cedar poles, set at the corners of an 8-ft. square, and concreted up to the height of the water table of the power house. The towers are roofed over and sided with corrugated iron, and a ladder on the inside gives access to the top. Fig. 15 is an exterior view of the station, and shows the farther tower completed and the poles set for the other one.

On each side at the top of the tower are set four heavy beams, one above the other. The feeder lines are dead-ended at these beams by connection to $\frac{3}{4}$ -in. bolts, which pass through and are headed on the opposite side of the beam. Near the bolt a half connection is made to each feeder, and the connecting wire is carried down the tower on porcelain knob insulators to the level of the water table, where connection is made with the lead cable. Each beam or cross-arm has room for six feeder connections, and the four beams thus give a capacity for twenty-four feeders on each side of the tower. Everything in the cable tower is covered with P. & B. paint, and no opportunity is given for arcing.

At present the feeders extending in both directions from the towers have a total copper equivalent of 18,637,000 circ. mils. There are ten 800,000 circ. mil aluminum cables included in this estimate. A turn in one of the lines is illustrated in the foreground of Fig. 15, the method used being typical of the tramway company's practice for heavy feeder lines. The wires on each side are dead-ended on Brooklyn strain insulators and jumper connections made between the two sides. The strain insulators are fastened to $\frac{3}{4}$ -in. eye bolts, which pass through two 4-in. x 6-in. cross-arms, one on each side of the pole. On the opposite side of each back arm two eye bolts, which also pass through both arms, are connected to strain insulators for guying the pole. In this way no live wires are carried to the pole and everything is thoroughly protected by strain insulators. The cross-arms are supported by a $\frac{3}{4}$ -in. bolt, which passes through the pole. The details of this double cross-arm are shown in Fig. 16. Where a full turn is not made and where a double cross-arm is necessary the construction shown in Fig.

17 is used, the porcelain knob insulators being held in position by $\frac{5}{8}$ -in. bolts and being protected overhead by a $2\frac{1}{2}$ -in. x $\frac{1}{4}$ -in. iron strip.

HIGH-TENSION TRANSMISSION TO ROTARY SUB-STATIONS

As some of the feeder lines have to carry current a distance of 6 miles or 8 miles, and the Arvada-Leyden line of the Denver & Northwestern is about 14 miles long, it has been necessary to use boosters, and three 300-amp. Thomson-Houston machines have been employed for this purpose. Even this provision has not been sufficient to keep up the voltage at distant points, and, therefore, it was decided to install a high-tension alternating-current transmission system with rotary converter sub-stations

station equipment will consist of seven 185-kw, oil-cooled transformers, one being for reserve transforming from 2300 volts to 365 volts, and two 500-kw rotary converters, each with a rating of 50 per cent overload for two hours. This sub-station will feed directly into the Broadway, Myrtle Hill and Fremont lines, and will improve the service in the entire southern part of the city greatly.

The second high-tension feeder line will be carried out to Arvada to feed the Denver & Northwestern road. It is probable that current will be carried at 2300 volts to Berkeley, at the city limits, where a transformer station will be installed. This latter will step-up the line voltage to 26,400 volts for transmis-

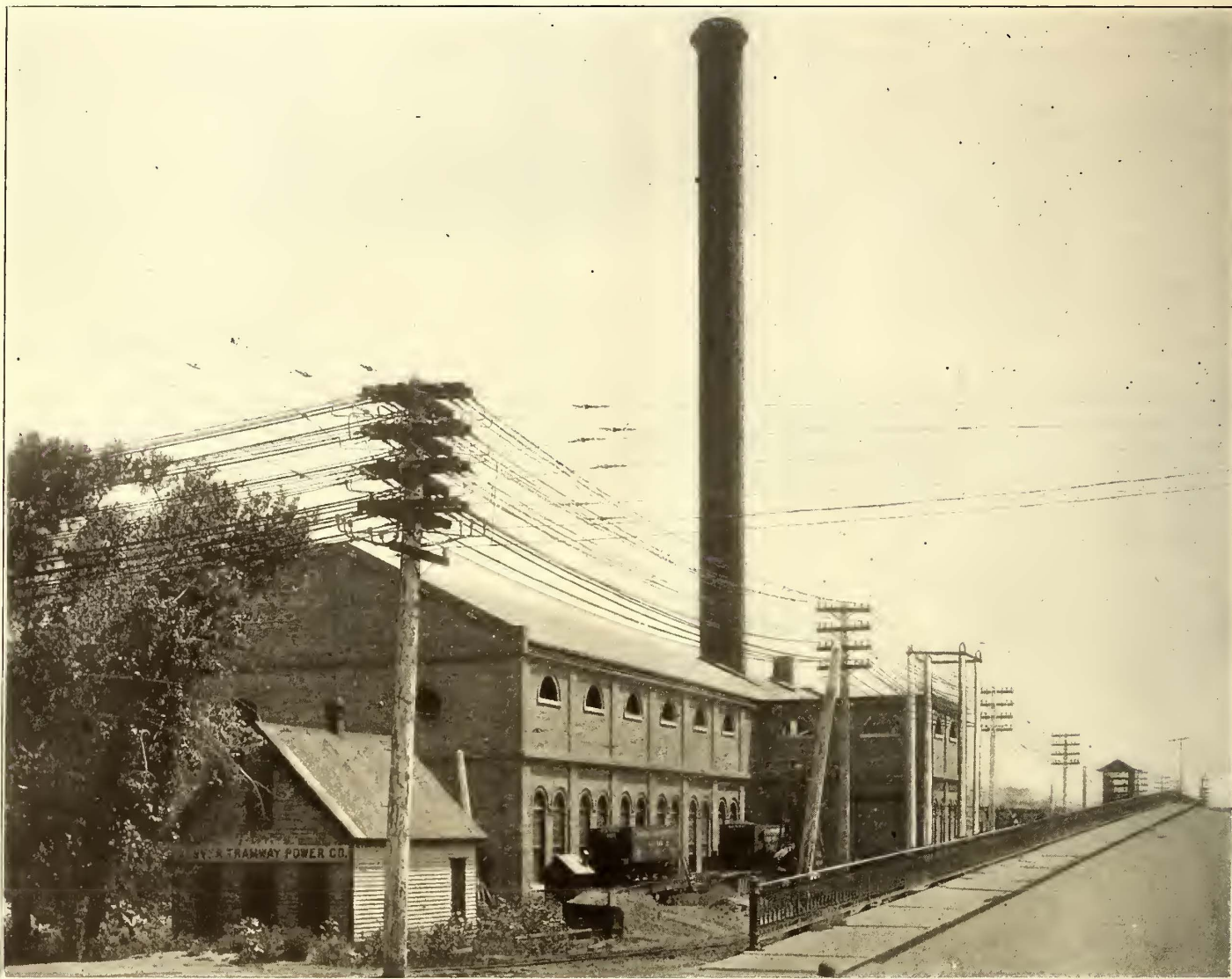


FIG. 15.—EXTERIOR OF POWER HOUSE, SHOWING COAL CARS, PUMP AND COAL HOUSE AND FEEDER LINES

to distribute direct current at the points of heavy load. For this purpose the 1500-kw, three-phase, 2300-volt alternator, already mentioned, was installed. The alternator is excited by a motor-driven exciter consisting of a 45-hp, 550-volt direct-current motor, driving a 30-kw, 125-volt generator. The switchboard comprises two generator and three feeder panels, equipped with the necessary switches and instruments for handling the alternating current.

One high-tension feeder line has been built from the power house to a sub-station installed at the South Broadway shops, about 24,000 ft. distant. Transmission will be made directly at 2300 volts, the generator voltage, over three 300,000 circ. mil cables. These heavy cables are used so that in case of failure of the alternating current supply at any time they may be quickly connected to the direct-current switchboard and used as 550-volt direct-current feeder lines. The Broadway sub-

station to a rotary converter sub-station at Arvada or some other point on the Denver & Northwestern line. When the branch line is built to Golden, 9 miles from Arvada, another rotary station will be placed near its terminal. A branch of the Arvada-Leyden line from Arvada to Boulder of 20 miles, is also contemplated, and when that is completed it will be operated by two rotary sub-stations.

A third transmission line will be carried at 2300 volts to the east side of the city in the vicinity of City Park, where a rotary sub-station will help in carrying the heavy loads that are frequent in that locality. The transformers and rotary converter apparatus for all of these sub-stations will be of the General Electric Company's manufacture.

POLE WORK

One of the heavy feeder lines from the new Denver Tramway power station is carried across the South Platte River and over

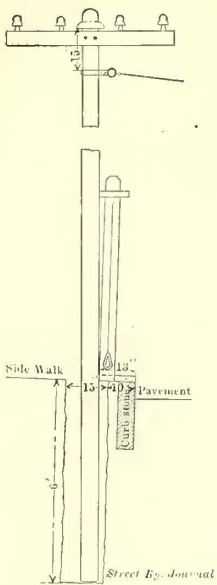


FIG. 21.—DEVICE FOR SETTING IRON TROLLEY POLES

strip, which passes under the collar and thus forms a seat for the pole. The standard method of cross-arm and span-wire support adopted for iron trolley poles is shown in Fig. 20. Two 24-in. braces, made of 1/4-in. x 1 1/2-in. iron, are bolted to the cross-arm at their upper ends, and to a split collar surrounding the poles at their lower ends. The collar is extended on one side, and has an extra hole, into which is bolted the strain insulator that supports the span wire.

Fig. 21 illustrates the device employed by the line department to give the iron poles the proper inclination from the vertical and also to set the pole the proper distance, that is, 13 ins. from the inside edge of the curbstone. The device is provided with a plumb line so that the men may know when it is vertical.

When the cable lines in Denver were changed over for electric operation two years ago, it was necessary to set a large number of trolley poles in as short a space of time as possible. The ordinary methods

Building. This pole-raising apparatus is regularly used by the line department and has been found to be of great service.

PERMANENT RECORDS OF OVERHEAD WORK

A very complete system of permanent records is kept by the line department of all overhead work in the city. The block drawings on cross-section paper that are used by the track department are marked every time any change is made in the overhead equipment. A specimen sheet embracing fifteen blocks of the line, known to the line department as the Fifteenth Street line, and including the downtown loop, is reproduced in Fig. 24. It will be noticed that each pole is numbered and marked if of iron. All feed taps are indicated as well as section insulators, dead ends and new wire put up. Besides this map record the line superintendent keeps a book in which is recorded all new work installed and repairs made. Whenever any trouble occurs on a line, by reference to these records, accurate information is obtained of the existing conditions before the trouble, and orders to the line foreman for the necessary repairs can be made quickly and correctly.

DOWNTOWN LOOP

The possession of a downtown loop, such as that of the Denver City Tramway Company, might be envied by other city systems laid out on a radial plan. A plan of this loop is shown in Fig. 25. The loop is really a double one, inclosing the two quarter blocks between Lawrence Street and Arapahoe Street on the west side of Fifteenth Street. Double tracks are placed on the outer portions of the loop, and all cars going through the

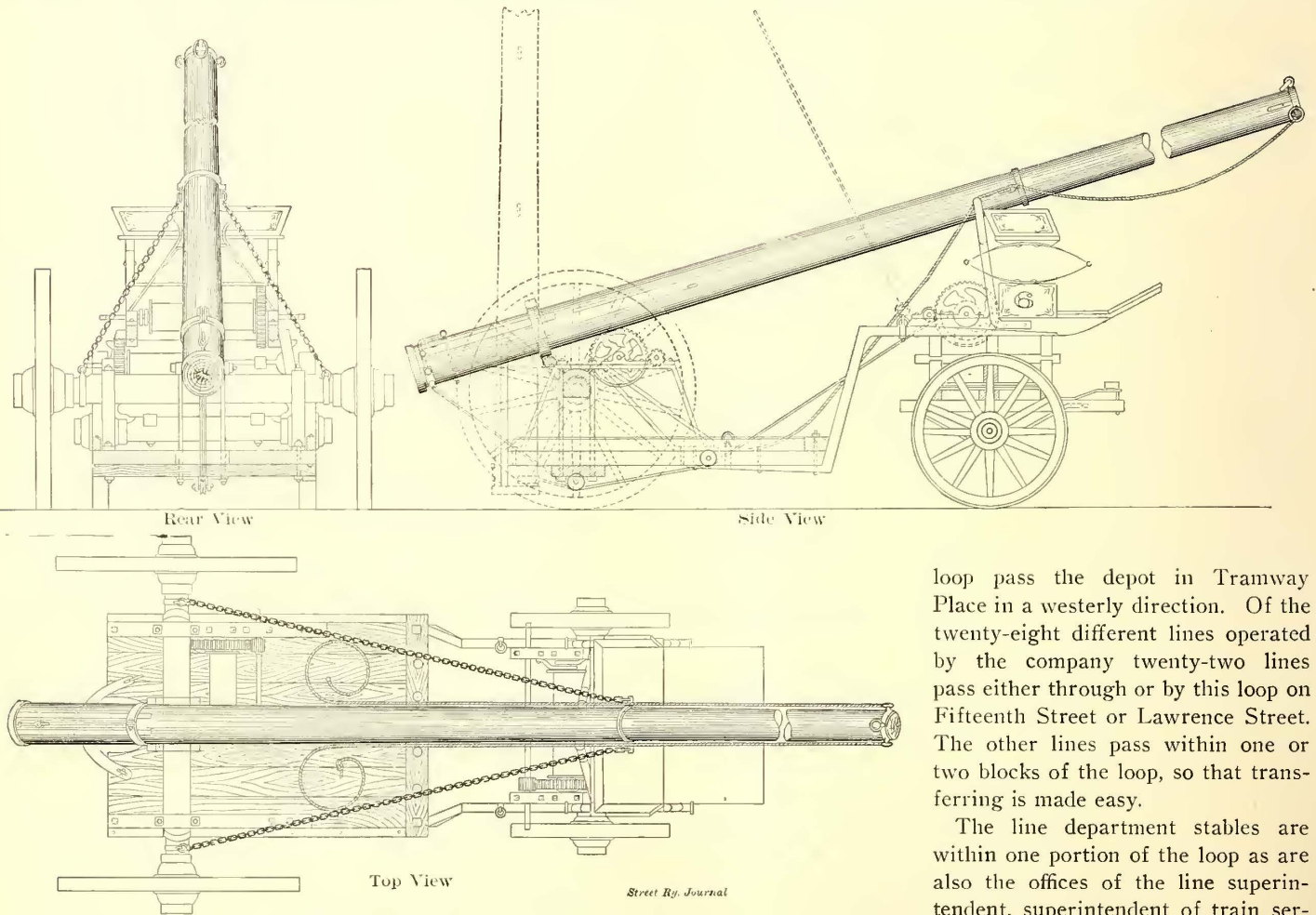


FIG. 22.—POLE SETTING WAGON

of setting poles failing to satisfy the requirements of the tramway officials, the special pole-raising wagon, shown in Figs. 22 and 23, was constructed. The wagon is made with a steel frame, on which are mounted two windlasses for raising the wooden mast arm of the wagon, and with it the pole to be set. Fig. 23 shows the wagon as used in setting a pole on Seventeenth Street, in front of the new Equitable

loop pass the depot in Tramway Place in a westerly direction. Of the twenty-eight different lines operated by the company twenty-two lines pass either through or by this loop on Fifteenth Street or Lawrence Street. The other lines pass within one or two blocks of the loop, so that transferring is made easy.

The line department stables are within one portion of the loop as are also the offices of the line superintendent, superintendent of train service, chief dispatcher and chief surgeon. Until very recently all the general offices were located in the same building, but being cramped for room and conveniences they were moved early in July to the new Majestic Building, on Broadway, where a whole floor is occupied by offices of the president, general manager, secretary, auditor, purchasing agent, claim agent and engineering department.

Returning to a further consideration of the loop it is interest-

ing to note that a spare car is kept in constant readiness on the dead track to take the place of any disabled car. It is planned to keep a line or work car on this dead track nearly all the time for emergency work.

FACILITIES FOR HANDLING LARGE CROWDS

Denver has come to be known as a tourist city, and the street railway system plays an important part in the entertainment of visitors. The tramway company owns no place of amusement, but through its excellent service assists materially in the support of three or four private parks. The most popular of these is Ely's Gardens, where high-class stock companies play in a well-appointed theater during the summer months. Before the close of each play the superintendent's office is informed of the approximate attendance, and enough cars are banked on a loop beyond the gardens to handle the crowds at the end of the performance.

Similar arrangements are made for handling large crowds in a short space of time at the baseball grounds, the Driving Park and City Park. As many as forty-two cars have been used in transporting the crowd at the close of a baseball game, while provision was made for banking eighty cars at the City Park during the Christian Endeavor convention in July. At City Park during the summer months band concerts and moving

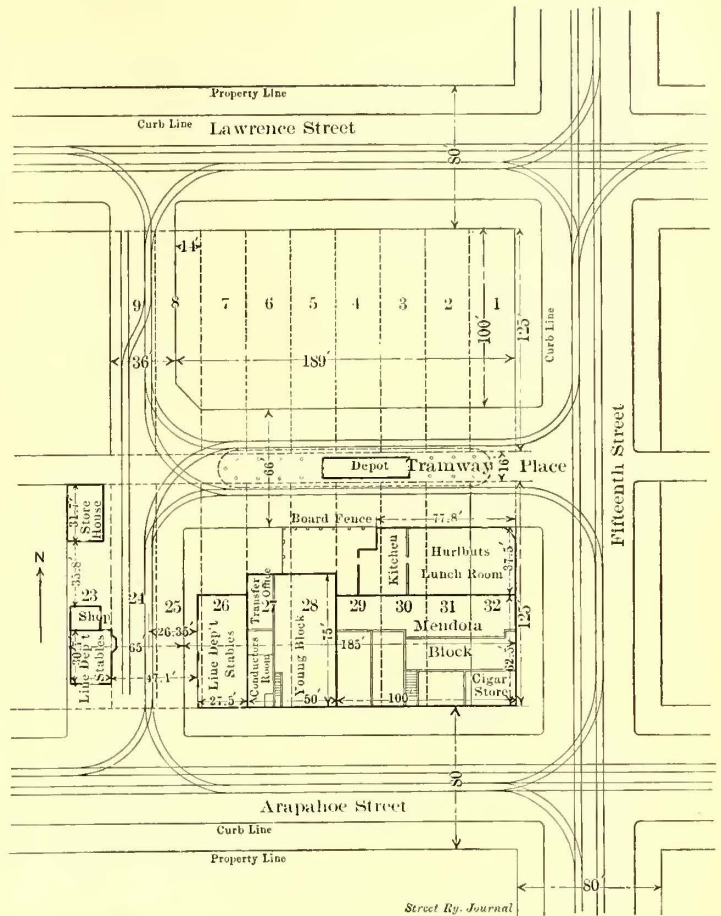


FIG. 25.—PLAN OF LOOP



FIG. 23.—POLE SETTING WAGON

picture entertainments are supported liberally by the tramway company.

There are a large number of invalids in Denver to whom an out-door life is necessary, and they patronize largely the street cars, some individuals riding for hours during the day and as long as the cars run at night. This, together with the fact that the amusement parks are located on the outskirts of the city itself, is spread over a large area, tends to make the passenger traffic high as compared with the systems of Eastern cities. The population of Denver is now estimated at between 160,000 and 180,000, and there is hardly a day that the tramway company does not move the population once at least during the twenty-four hours of service. On last Memorial

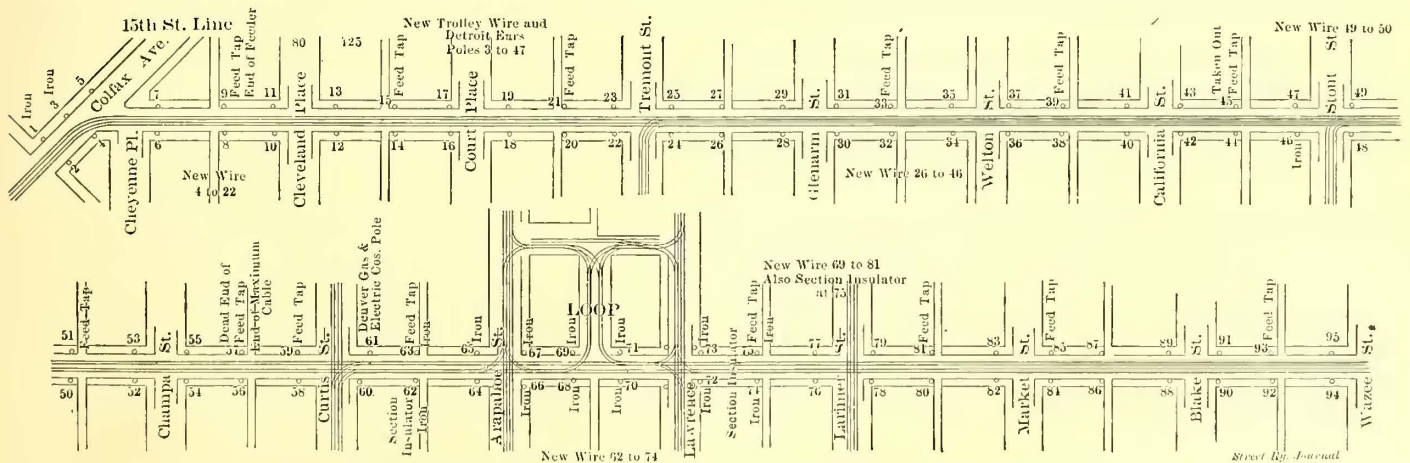


FIG. 24.—SPECIMEN SHEET OF PERMANENT RECORD OF OVERHEAD WORK

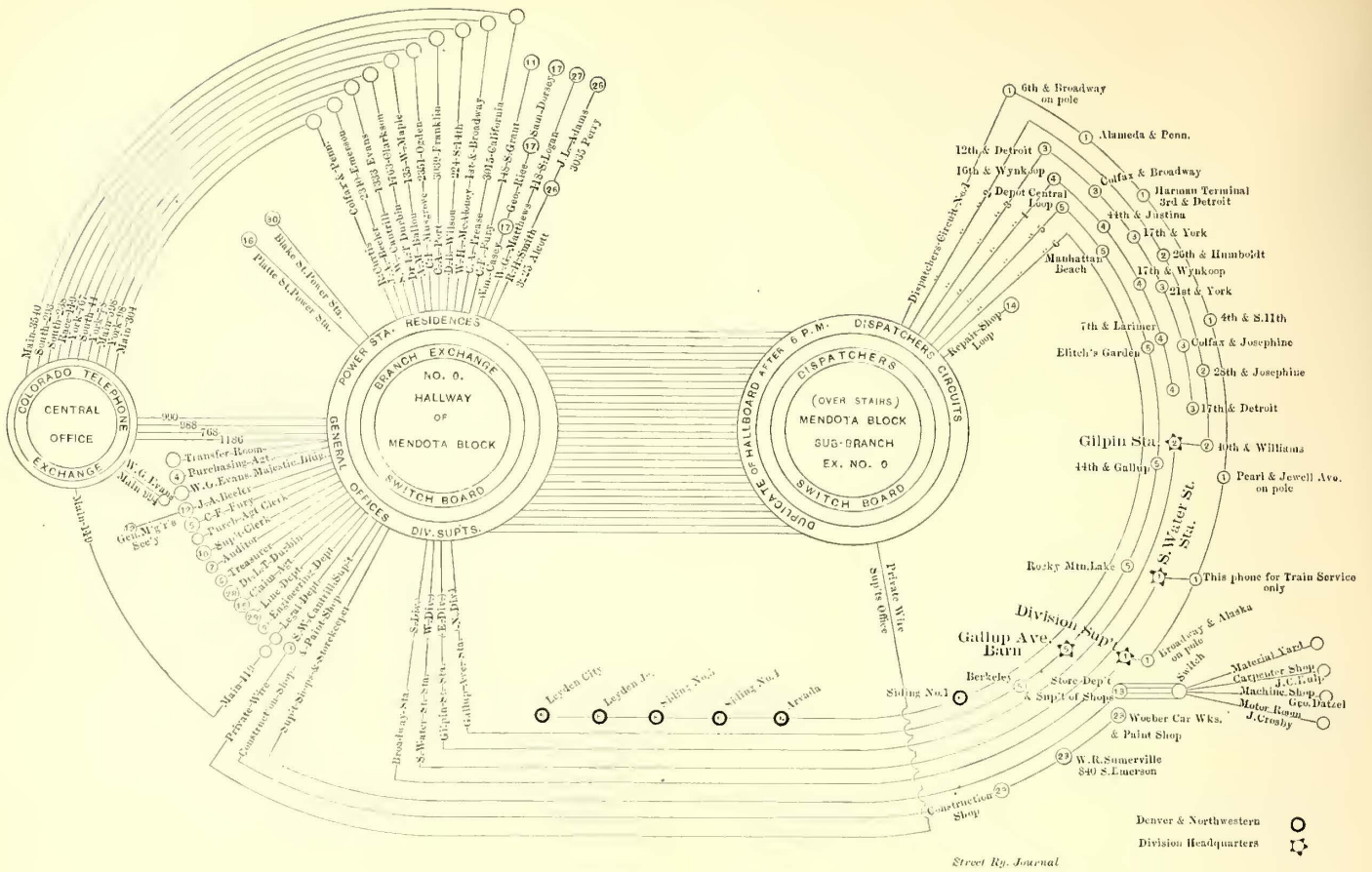


FIG. 26.—TELEPHONE AND DESPATCHING SYSTEM

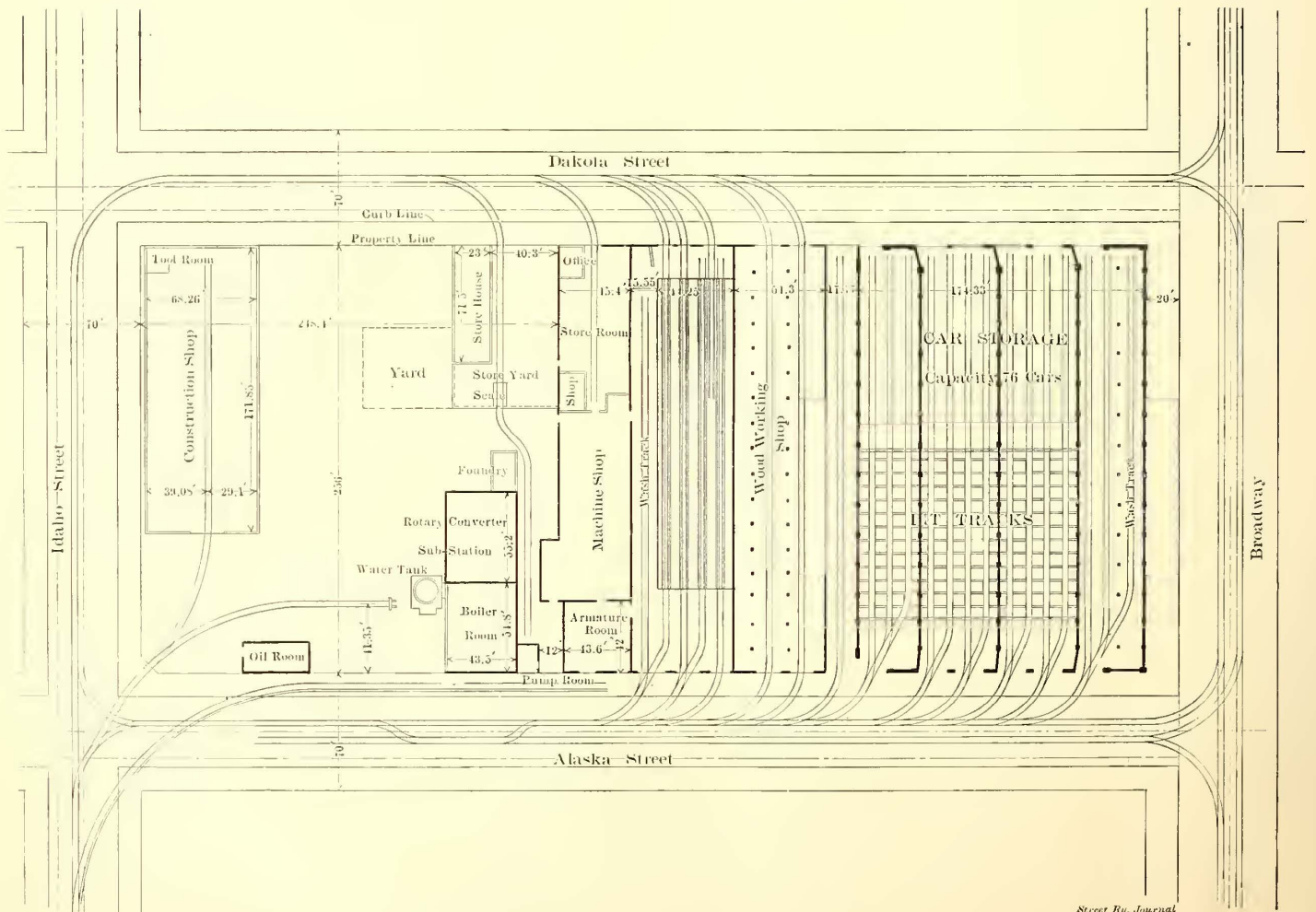


FIG. 27.—PLANS FOR SHOPS AND CAR HOUSE

Day the company carried 200,000 people, while its highest record was made on the Fourth of July, when a total of 281,000 passengers was carried.

DESPATCHING SYSTEM

As has been stated in these columns the Denver City Tramway Company, through its constituent companies, was a pioneer in the adoption of a telephone train despatching system for the handling of its cars. The system has been extended from time to time to take care of the growth of the lines, and now two operators are required. As shown by the accompanying diagram, Fig. 26, there are six circuits connected with the dispatcher's switchboard in the office in the downtown loop. On five of these circuits there are located thirty-one stations, while the sixth circuit takes care of the new Denver & Northwestern line, with six stations. The instruments and switchboard equipment are furnished by the Colorado Telephone Company, which also supplies service to the tramway company's office through a private branch exchange. After 6 p. m. there are not apt to be many calls on the branch exchange, so the connections of that board are switched over to a duplicate board in the dispatcher's office, and all calls during the night are handled by the dispatcher. All cars are operated from the dispatcher's office, including special cars and work trains. In case of delay on any part of the system the cars can be properly spaced through this means, thus doing away with the bunching. All lightning or other trouble on the line that comes within the conductor's observation is reported to the dispatcher, who notifies the proper official. A private wire connects the superintendent's office with the dispatcher, so that in case of serious trouble or any unusual incident the latter may receive his instructions promptly.

LOW PERCENTAGE OF DAMAGE CLAIMS

The Denver system has a very low record for expenditures paid out in damage claims. During 1902 the company paid on the average only 2 per cent of its gross earnings for damage claims, and during the present year this figure has been brought down gradually, month by month, until it reached 1.2 per cent in June, the lowest in the history of the system. This low record is due to a combination of circumstances, such as an efficient corps of trainmen, careful train despatching, a good claim department and an efficient general management and operation.

EXTENSIONS AND IMPROVEMENTS

The tramway company has extended two of its lines during the last four months and has also pursued a general policy of improving its track and overhead work throughout the city. A mile and a half of new track has been laid as a part of a new Washington Park line in the southern part of the city, the construction consisting of 65-lb., 60-ft. steel T-rail, laid on Texas heart-pine ties. The extension is single track and completes a line 5½ miles in length from the loop. Another extension of 1¾ miles has been made on East Thirty-Fourth Avenue, and is known as the North Capitol Hill line. This line consists of

1½ miles of track, and the new locality reached is given a 15-minute service.

On South Broadway a double track has been put in for 1½ miles, and on the Argo line the double track has been extended for a mile. The West Twenty-Ninth Avenue line has been reconstructed, the double track being extended, and 2 miles of light 35-lb. rail being replaced by 65-lb. rail. A mile of light rail on the West Thirty-Eighth Avenue line has similarly been replaced, and half a mile of the Berkeley line has been reconstructed. On Seventeenth Avenue the city changed the grade and curbing and surfaced the street with gravel, so the double track was lowered 2½ ft. for two blocks, the old cable



FIG. 28.—SPECIAL WORK FOR NEW CAR HOUSE; POLE RAISING EQUIPMENT

track removed and replaced by 72-lb. rail in 62-ft. lengths. Before winter 1¼ miles of new track will be laid on South Downing Avenue for the new Washington Park line, the construction including a new steel truss bridge over Cherry Creek.

STANDARD TRACK CONSTRUCTION

The result of all these extensions and improvements is that out of a total trackage of 148 miles the company has in service only 15 miles of 30-lb. and 35-lb. rail. The standard rail adopted for all paved streets is a 72-lb. 6-in. T-rail, laid in 60-ft. and 62-ft. lengths. This rail was first designed in 1892 by John A. Beeler, now vice-president and general manager of the company, but at that time chief engineer of the Denver Tramway Company and the Metropolitan Railway Company. The rail was designed to do away with the old chair construction, and is to-day what is used, with slight modifications, throughout the country. The adoption of the rail in Denver has been advantageous for the local system as shown by the good wearing qualities of the track, compared with records of other cities where side-bearing grooved rails are used.

For unpaved streets the tramway company uses a 65-lb. A. S. C. E. section T-rail laid in 60-ft. lengths. All rails are laid on Texas heart-pine ties, 6 ins. x 8 ins. x 6½ ft., laid 21 ins. center to center. The ties are laid on a gravel ballast, 8 ins. deep, and the space between ties is filled with gravel to a depth of 6 ins., except in paved streets, where concrete is used. In preparing the trench for the tie care is taken that the ground is settled, it being usually flushed with water and rolled. All ties are first shovel-tamped from end to end, and then a man goes over each tie with an iron tamping bar. All track is laid in cool weather with tight joints, as it is found the joints give out much sooner if expansion is allowed for. The rails are painted with asphaltic paint, as the soil in Denver is impregnated with alkalis and mineral salts, and the paint retards indefinitely any corrosion or electrolysis. With the construction here described it is estimated that the 72-lb. rails will last thirty years, the ties being renewed every six years or seven years.

MUTUAL AID ASSOCIATION AND PENSION DEPARTMENT

In the *STREET RAILWAY JOURNAL* of June 13, 1903, the plans were published for the mutual aid and pension benefits that

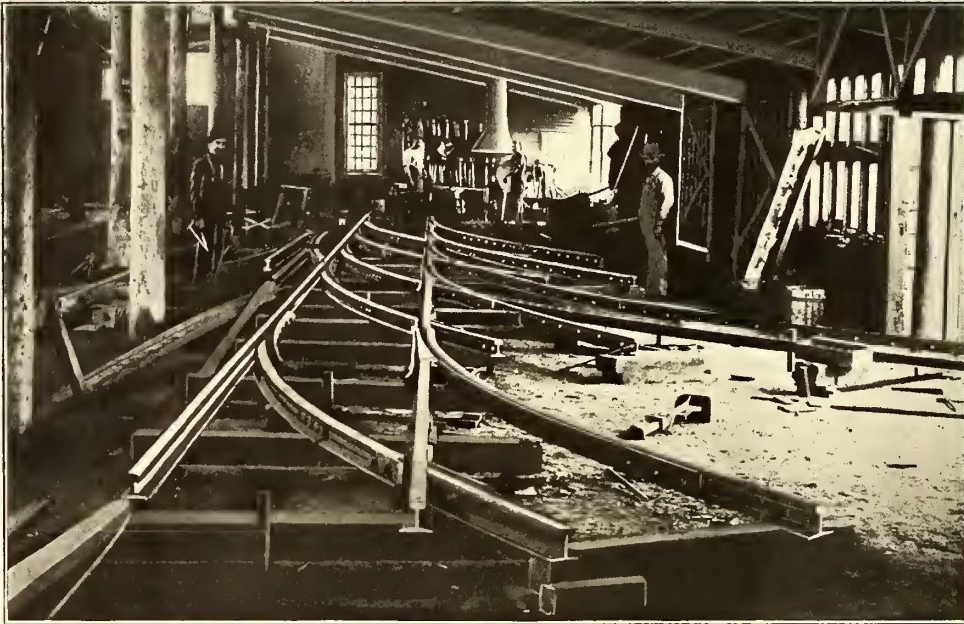


FIG. 29.—LAYING OUT SPECIAL WORK IN CONSTRUCTION SHOP

were about to be adopted by the Denver City Tramway Company, and the preliminary rules were printed in full. On July 1 the rules were put into effect by the incorporation, under the laws of the State of Colorado, of the Tramway Mutual Aid Association and the adoption of articles of association, by-laws and contract with the Denver City Tramway Company. The management of the association is vested in a board of trustees, made up of nine members, five of whom are officials of the tramway company and four are employees. The benefits to the men are greater than could be derived from any insurance company, as a maximum premium of \$12 a year entitles the members beneficiary to \$1,000 in case of death, while a sick benefit of \$6 a week is also provided for. The company agrees to pay 25 per cent of the amount of contributions by the members, and pays all current expenses and makes up any deficiencies that may arise in the fund. Out of 700 employees of those eligible 500 have become members of the aid association, this number including practically all of the trainmen.

The pension department is entirely separate from the aid association, and is purely voluntary on the part of the company, its control being vested in three officers of the company.

NEW CAR SHOPS

Plans are under way for the enlargement of the company's Broadway shops and car house. The work will include the ex-

ension of some of the present buildings and the erection of a new fourteen-track car house, 256 ft. long and 175 ft. wide, with a car-storage capacity of seventy-six cars. The buildings will be connected with a straight track on Alaska Street by twelve curves, laid with 35-ft. and 50-ft. radii. The proposed plan for the shops and car houses is shown in Fig. 27. A view of the special work, embracing the first five curves, is illustrated by Fig. 28. This view also shows the special pole-raising wagon in use on the new overhead work. Fig. 29 is a view in the construction shop, and shows how a piece of special work is laid out and formed.

NEW ROAD OPENED IN WESTERN PENNSYLVANIA

The Pittsburg & Charleroi line of the Pittsburg Railways Company has just been placed in regular operation. It is 27½ miles long from West Liberty, and extends out in a direct line through Castle Shannon and Finleyville to Monongahela, Charleroi and other towns along the Monongahela River. The present route is from Liberty Street and Eleventh Street, to Smithfield Street, to Carson Street, to Brownsville Avenue, to Washington Avenue, Pittsburg, along the old Mt. Lebanon Road to Castle Shannon, to Bethel Road, Library, Finleyville, Mingo Falls, Riverview, Black Diamond, Lock No. 4, Charleroi and to Allenport, which is 35 miles from the Pittsburg Union Station.

On the long stretches through the country the cars run on a single track, but grading has been done on another track which will be put down when business warrants. Already the indications are that the traffic will be very large. The tracks, except on the streets of the towns through which the line passes, run on private right of way, and there are but few grade crossings. Eighty-pound rails have been used, and the road has been thoroughly ballasted. The cars are of the regu-

lar double-truck interurban type, equipped with four 56-hp motors. The maximum grade is 6 per cent. Between Castle Shannon and Allenport are twenty-five steel and stone bridges, one of which is 165 ft. high.

The operation of the line at present is divided into three parts. One is from Union Station to Castle Shannon, another from Castle Shannon to Riverview, and the third from Riverview to Allenport.

Power is generated at Rankin and transmitted at 15,000 volts to sub-stations at Riverview, Library and Charleroi. At these sub-stations the voltage is reduced to 550, at which potential it is fed to the line. Each sub-station is equipped with a battery and two rotary converters, in addition to the step-down transformers. A steel car house is now being erected at Charleroi. It will be 220 ft. x 80 ft.

NOT A "JIM CROW" LINE

The North Jacksonville Electric Railway, recently placed in operation at Jacksonville, Fla., stands unique among street railways in the United States. Most of the owners of the road are well-known colored citizens, and the cars are managed by colored motormen and conductors. The story of the opening of the road says that no sooner had the first car arrived at the end of the road than it was packed with colored people.

ECONOMIC CONSIDERATIONS DETERMINING THE MAGNITUDE AND DETAILS OF A PROPOSED ROAD*

Among the most important and trying economic questions relating to the design, construction and operation of high-speed electric railways reaching well out of the congested centers of population, which the designing and managing engineers are called upon to decide, are those relating to the character of construction and equipment to be adopted, and the character and kind of service to be given.

These considerations may be stated as follows:

1. Number of tracks to be installed.
2. Speed, headway and size of the train units.
3. Weight of rails and characteristics as affecting costs of ties, ballast, block system and other details of permanent way.
4. Character of rolling stock and power stations and transmission system, together with the location and number and character of the passenger stations.

All of the foregoing are functions of the estimated gross earnings of the proposed installation. The earnings must be taken as the starting point. At the present time the plans of some proposed systems appear to indicate a tendency, in some instances, to do too much. There appears to be in some cases a lack of appreciation of the proper relations which should maintain between fixed charges and the estimated gross receipts. In some cases which I have investigated the fixed charges upon installations, as proposed, equal 40 per cent to 50 per cent of the estimated gross receipts, a margin far too close for safety. For the cases of a number of the higher class steam roads in operation the fixed charges are found to vary between 20 per cent and 30 per cent of their actual receipts. On account of the demonstrated ability of electric systems to develop business more rapidly than their steam predecessors the above ratio of the steam lines may at times be exceeded in such cases where the estimated earnings have been conservatively made by experienced engineers. It is always best, however, to keep on the safe side and let the earnings, after the proposed system is operating, do something toward augmenting the installation. If this latter course be followed it is safe to say that the officers and stockholders of the company will not have nearly as many sleepless nights as they otherwise may have should they too ambitiously "reach out and lead." In addition, there will probably be less doing in the receivership and absorbing and reorganization business.

Generally speaking, the idea should be to install no more tracks than can be kept busy safely and satisfactorily, taking care of the business in sight and which apparently will accrue from the first few years of development on account of the increased or improved facilities proposed to be given.

In applying the foregoing statement the question of speed must never be lost sight of. Relatively high speed, being the *raison d'être* for these roads, must be maintained. Again, in attempting to get as much out of a pair of tracks (single-track roads being out of the question) as possible, it must not be lost sight of that while the capacity of a given installation with a given schedule speed can be increased by gradually adding train units up to a certain point, a limit will be reached, after which, on account of the headway requirements, any increase in the number of units will necessitate a reduction of the schedule speed, and if carried far enough the carrying capacity will be actually reduced. Any material reduction of schedule speed will probably also cause a loss of traffic. If a schedule speed of 30 m. p. h. has been determined upon as that which will be required for a given territory, the idea should be to ascertain the maximum capacity of say two tracks for the proposed road when operating at that schedule speed. If it be ascertained that

the two tracks will not be sufficient, at the determined schedule, to carry the maximum estimated business, then a third track, to be used for express trains going one way during the morning and the other way in the evening, should be estimated upon. It will generally be found that wherever a third track is warranted the conditions will generally admit of the small additional outlay required for a fourth track. The additional costs are those required for the relatively slight additional graduation (earth and rock work) and the additional rails, ties and ballast, and the labor of installation. In cases of supplying the suburbs of cities as New York, Boston, Paris, London, Berlin, Chicago and San Francisco, and similar cities, it will generally be a question of determining whether two tracks or four tracks should be installed, and the safe and conservative solution will always be arrived at by considering the comparative ratio of the different fixed charges which two, three or four tracks will impose to the probable gross receipts, estimating the gross receipts for the conditions which will exist when the road commences operation. In some instances, where a rapid growth and development is apparent, as about New York city and London, such future development must be allowed for in the original design. As an illustration of such comparisons I shall assume a set of conditions about as they will be found to arise as follows:

Suppose the estimated gross receipts of a proposed road are \$900,000 per annum. Suppose, furthermore, that a two-track road could be installed to do this business for \$5,000,000, and that a four-track road would cost \$6,000,000. The fixed charges for the two-track road, at 5 per cent, will be \$250,000 per year, while on the same basis those for the four-track road will be \$300,000. The annual operating expenses, taxes and insurance would be about \$500,000 for the conditions assumed for the two-track road, leaving for the two-track road \$400,000 for fixed charges, etc. Deducting the \$250,000 fixed charges of the two-track road would leave \$150,000 annually to be applied to unforeseen contingencies, betterments and the sinking fund account.

If we assume that we will run approximately the same number of train units between the termini daily for the four-track road at the start, the operating costs will be about the same. In order to justify such an assumption it would, of course, be necessary to reduce slightly the schedule of the two-track road, which can at times be done.

For the case of the four-track road we will then have left, after deducting, say, \$525,000 for the annual cost of operation, taxes and insurance, the sum of \$375,000 for fixed charges, etc. If we now deduct the fixed charges of \$300,000 we have left \$75,000 for unforeseen contingencies, bad times, betterments and sinking fund, a margin which is somewhat too small for the solid comfort of the bondholders and the stockholders, especially that of the stockholders. In fact, an enterprise starting upon its career upon the last basis might well be called a "receiver's delight," a "reorganizer's joy," or a "stockholder's obsequies" installation. A four-track installation for the case we have assumed would only be justified where a great immediate development along the line of the road was apparent. Even then the engineer should prepare statements of both conditions, as above outlined, and submit them to the bankers or underwriters so that they will have full knowledge of the relative conditions and contingencies.

The development of large cities and the consequent apparent exceeding of the capacity limits of some existing rapid transit or urban rapid transit systems has offered opportunity for much lay, semi-professional, and even so-called engineering criticism of the shortsightedness of the originators of such transportation systems in not installing more tracks at the time of the original construction. If such critics will investigate they will ascertain that, generally speaking, such roads have been hard pressed for many years to make ends meet, and that they are

* From advance proofs of "Electric Railway Economics," by W. C. Gotshall, published by the McGraw Publishing Company. Copyrighted, 1903, by the McGraw Publishing Company, New York.

only now reaping their hard-earned fruits. A little thought will also show that had such systems at the outset provided installations adequate to do the business they are now receiving, they would certainly, in years past, have suffered financial difficulties to state it mildly. As a general rule promoters and financiers are fairly healthy, and in cases where they are not entirely so there are other and milder means than that of placing large amounts of money in relatively certain jeopardy, by reaching out and leading, of recruiting their exhausted energies. So much for the permanent way.

It is apparent that the matter of schedule speeds, as related to costs of operation, is not generally understood.

The schedule speed may be a large factor in determining the commercial success or failure of an enterprise. As an illustration, by referring to the table below, we see that the watt-

DISTANCE BETWEEN STOPS		Watt Hours per Ton-mile for Schedule Speeds of					
		40 Miles per Hr.	35 Miles per Hr.	30 Miles per Hr.	25 Miles per Hr.	20 Miles per Hr.	15 Miles per Hr.
Miles	Feet						
3	15,840	110	80	78	65	53	49
2½	13,200	121	90	83	74	54	40
2	10,560	142	99	86	80	60	41
1½	7,920	---	123	95	85	68	43
1	5,280	---	---	128	90	74	50
½	2,640	---	---	---	145	119	56
¼	1,320	---	---	---	---	---	120
Train friction in pounds per ton.		35	30	27.5	25	20	15

The braking effort or retardation is taken at 150 lbs. per ton. The stops are taken at 15 seconds each, except in the case of the 15 mile per hour schedule, where 10 seconds is taken.

The foregoing figures are for cases of approximately level and approximately straight roads.

For a schedule of 40 miles per hour the speed attained will be between 60 miles and 65 miles per hour. A schedule of 25 miles will require speeds of from 40 miles to 50 miles per hour, etc.

The rate of acceleration for the long runs varies from 75 lbs. to 110 lbs. per ton, going as high as 210 lbs. per ton for short runs.

The foregoing applies to single car units. If units of more than one car be used, the friction in pounds per ton will decrease and with it will also decrease the energy consumption in watt hours per ton mile.

Some of the places have been left blank on account of the impracticability, with existing apparatus, of making some of the high schedules with the short distances between stops assumed in the table.

The figures are for the energy required at the motors.

hours per ton-mile, allowing a stop every 2 miles, required for a 40-m. p. h. schedule, are 142, while for a 35-m. p. h. schedule there are required about 99 watt-hours per ton-mile. If we assume, as an average, a road 30 miles long, over which are made 100 round trips per day, with cars weighing 45 tons each, and assuming a loss of 25 per cent between the motors and the main power station switchboard, and taking the cost of energy at \$.006 per kilowatt-hour we have

$$\frac{100 \times 30 \times 2 \times 45 \times 0.006 \times 365 \times 142}{0.75 \times 1000} = \$111,952.80$$

as the cost of operating the 40-m. p. h. schedule with single car units and

$$\frac{100 \times 30 \times 2 \times 45 \times 0.006 \times 365 \times 99}{0.75 \times 1000} = \$78,051.60$$

at the cost of operating the 35-m. p. h. schedule with single units.

The difference between these costs is \$33,901.20, which, at 5 per cent is the interest on \$678,024. For a road 30 miles in length the time between termini for the 35-mile schedule would be 51.4 minutes, while the time for the 40-mile schedule would be 45 minutes; a difference per trip of 6.4 minutes.

The very best materials and construction only should be em-

ployed for the permanent way and the rolling stock, as it is only by so doing that the maximum safety can be assured to the traveling public, which must always predominate in considering costs of construction. Accidents are always costly, as are also conditions of uncertain operation and delays. The public will not patronize a road upon which accidents are frequent or whereon uncertainty of operation or delay is at all marked. Inferior permanent way and rolling stock is, therefore, equivalent to burning the candle at both ends on account of the natural reduction of receipts, for the reasons stated above, and the additional increase of operating and maintenance costs, which always maintain on poorly engineered and poorly installed railways.

Regarding the determination of the details of the passenger stations, it is needless to say that the location of the stations may have a material influence upon the business which the road will do, depending upon whether the stations are located so as to render them easy of access or otherwise. The matters of the general design, size, finish and specific details of the station will have to be determined separately for each case.

In designing stations, however, the object should be to provide stations whereon the annual aggregate salaries of ticket sellers and attendants will be a minimum. If ticket offices be placed along each side of the roadway at each station this will not be the case. The stations between the tracks on some elevated systems, known as "island stations," are examples of minimum operation and maintenance cost idea. About half the annual attendance is required for such stations as compared with those on each side of the tracks. The objection sometimes urged against the "island station" system is that people who are so disposed can ride back and forth any number of times after paying a single fare.

In connection with the development of the engineering details of a road with which the writer has been connected, the tracks of which will be upon a private right of way throughout, and furthermore, upon earth or rock cuts or fills, he devised and recommended the following station plan:

Wherever the roadway is on an embankment and above the grade of the streets, the station is to be constructed by providing under the roadway and approximately at right angles to the tracks, a passageway or tunnel extending entirely across and under the railroad roadway and 50 ft. or more, as may be required, in width. The width of this passageway would, of course, be along the length of the tracks. In the center of this passageway is to be one ticket office, provided with proper approaches, from each side of the roadway; and inside of and beyond the ticket office are to be waiting rooms, etc., and the stairs ascending to the island platforms between the tracks. This underground passageway is to be of the concrete-steel construction. Where the tracks are in a cut, at station locations, and consequently beneath the surface of the streets, the design provided for a concrete-steel structure over and entirely across the tracks, wherein is located one ticket office, as before, with waiting rooms, etc., inside the ticket office, and stairs descending to the island platforms. Stations of this kind are worth about \$8,000 each.

It is evident that the same plan can readily be used for a two-track road.

Where a high-speed electric railway crosses a public highway or other railroad, either above or below the grade of the other road, the design of such a crossing, especially where it is below, and consists of a subway of greater or less length, may exercise considerable effect upon the subsequent cost of operation of the system, as it may determine the limiting length of the cars where trains are used. In the first place, a high-speed electric road should be designed throughout as to permit of the operation of any of the cars now used by steam railroads. There is, however, another reason of essentially an economic kind. As an illustration, suppose that upon a given road it has

been found that on account of the dimensions of part of the subways it will not be possible to use a car more than 40 ft. in length, and that train units of three such cars will be required. It is apparent that train units consisting of two 60-ft. cars would carry the same number of people as the three 40-ft. cars, and, allowing one conductor or guard per car, at an operating cost of one man per train unit less. It is easy to see that if train units be operated for any considerable part of the day, the length of the cars becomes a most important consideration and economic factor of the subsequent costs of operation. Mistakes of the kind have occurred and are now practically the cause of considerable additional fixed costs of operation, which could have been avoided had such apparently small details been given that thorough and competent consideration at the outset which their economic importance demands.

The marvelous activity for some years past in the various branches of electric railroading and kindred engineering and financial enterprises has required the frequent retention of engineers and experts for the purposes of making investigations, reports and recommendations. Some of these reports are remarkable for what they do not contain. When a banker, financier or investor employs an engineer to make a report it appears to me that, while he may be interested to know existing conditions, and the statistics showing results from roads approximately similar to the proposed enterprise he may have in hand, he is essentially trying to find out "what to do." That is, shall he reorganize an existing company, and if so, how much money will be required to do it, and for what, and what will be the commercial and economic result of such reorganization and outlay, and what will be the best plan of reorganization? Or, if it be a new enterprise, the question simply is: Shall he "go in" and is it "a good safe thing?" and if so, why?

Engineers or experts in making reports often appear to forget or ignore the fact that the essential value of their reports lie in the conclusions, and a brief statement of the bases for these conclusions. The body of a report may contain as much statistical detail and general data as may be required to pad out the document to make its outward appearance justify the fee, but the client, upon receiving the document, will generally search the index for that part of the report giving the conclusions, and the bases therefor. Often the search is in vain.

Among some reports which have recently been submitted to me for analysis was one consisting of ninety-seven pages of legal cap size paper, and literally bristling with statistics, etc., but which did not contain one positive conclusion or recommendation. The expressions "it would appear" and "it seems," which have so long and so faithfully served the members of the legal profession, have no business in the vocabulary of men representing themselves as railway engineers or experts.

TOURING CARS IN CLEVELAND

The Cleveland Electric Railway Company is evidently finding the plan of operating touring cars a success, for five trips are now run daily. A fare of 25 cents is charged for each trip, which lasts two hours. The routes followed are different for four of the five trips, and four extra trips are made on Sunday. The excursions have been well advertised this summer, and have been patronized by residents as well as strangers in the city. The season was advertised to close Sept. 25, but the popularity of the car has been so great that its trips will be continued indefinitely.

The story comes from Dayton (Ohio) that a 60-lb. pig, which had become entangled in the fender of a Dayton & Xenia car while out in the country, was carried into the city unnoticed. The accuracy of this story cannot be vouched for.

CURTIS STEAM TURBINE*

BY AUSTIN R. DODGE.

The Curtis turbine, in addition to nozzles delivering steam at high velocity to a single wheel, has also stationary vanes which redirect the steam discharged at considerable velocity from the first wheel, due to the relatively low bucket speed, into the second wheel. The velocity of the jet leaving the nozzle is about 2000 ft. per second, about half the velocity of the De Laval under the same conditions of exhaust pressure, while the peripheral speed of the vanes in the Curtis is proportionally much less, about 400 ft. per second, instead of 1200 ft. per second. By this process of fractional abstraction the speed of



CURTIS TURBINE IN NEWPORT STATION OF THE NEWPORT & FALL RIVER STREET RAILROAD COMPANY

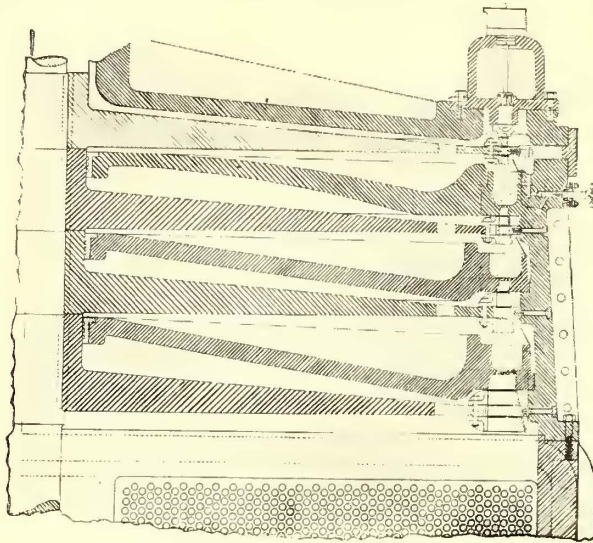
revolving vanes need not be excessive to secure maximum economy; in other words, to bring the direction of the jet discharged from the last set of vanes parallel to the shaft, as shown in the velocity diagram. With this high steam velocity only a minimum of revolving vanes are necessary, and they rotate in steam which has a lower density, due to the considerable drop in pressure from one stage to the next. There is a large clearance between outer wall of revolving vanes and the shell, reducing friction due to water of condensation. End thrust is eliminated, as there is abundant opportunity for the pressure to equalize on each side of the revolving discs, and the entrance and discharge angles of the vanes are the same.

In the larger sizes of the Curtis type the shaft is vertical and floats on oil under sufficient pressure to balance the weight of the revolving element, which rises a few thousandths of an inch until the clearance is sufficient to permit the discharge of the oil delivered at the center of the supporting block. That there is no end thrust in this turbine is shown by the fact that the oil pressure necessary to float the revolving element does not change under any condition of load. This vertical arrangement affords great compactness and greater uniformity of expansion due to heat.

The clearance between stationary and moving parts has proven thoroughly commercial, as shown in several months' operation of vertical 500-kw units. In cases in which the oil pressure has failed in the vertical type of this unit during the use of a temporary belt-driven oil pump, there has been no damage to the revolving or stationary vanes. Any contact which may occur is due to the lifting of the revolving element owing to formation of ridges on the step bearing surface. The weight of the revolving element, therefore, tends to neutralize any tendency to injury. As the vanes are less in width than the metal from which they are cut, nothing more serious hap-

* Abstract of paper read before the New England Cotton Manufacturers' Association.

pens than a polishing of the solid part of the wheels. Even the step bearing blocks can be faced off and used again. When using the standard direct-driven oil pump a failure of oil supply to the step bearing is highly improbable.



ASSEMBLY OF 5000-KW FOUR-STAGE TURBINE

The 500-kw type has two sets of nozzles, each delivering steam to a set of three revolving discs, carrying the vanes, which are machined from the solid disc. Governing is effected by operating a series of valves which control the admission of steam to the nozzles on the first stage. This insures a constant velocity in the first stage nozzles, while the pressure in the first stage diminishes with the steam flow until at no load it is nearly equal to the vacuum in the second stage, a desirable condition, as it reduces the density of the steam in which the first stage wheels rotate, and renders unnecessary adjustment of the valve controlling the second stage nozzles.

As to the first cost of a Curtis turbine installation, the machine requires only 7 per cent of the floor space taken by a horizontal cross-compound engine of the same capacity, and the cost of foundations is about the same proportion favors the turbine. The weight is from 15 per cent to 25 per cent that of the engine. There is no wear with a moderate amount of superheat resulting from the action of the steam jet on the vanes, even at a velocity of 2500 ft. per second, as shown by long continued tests.

One of the great advantages of a turbine is due to the entire absence of internal lubrication. Consequently, the condensed steam can be returned to the boilers, saving the cost of oil and feed water, often 10 per cent the cost of fuel. As no boiler scale is formed while using the same feed water continuously, tube cleaning is unnecessary and the boilers are maintained at the highest efficiency without withdrawal from service.

It is estimated that the saving in attendance charges will average 25 per cent on the entire station pay roll. A turbine having but one moving part requires no adjustment, unlike a reciprocating engine with a large number of moving parts, which must be carefully inspected at frequent intervals by a skilled engineer. The economy, therefore, remains constant, which is not true of a reciprocating engine.

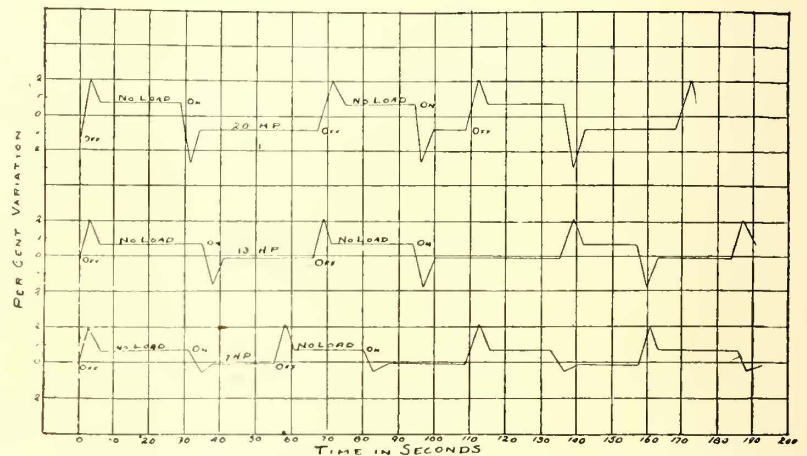
A turbine has a large amount of stored energy in its revolving parts, and is, therefore, well adapted for work requiring close regulation. The variation in speed of the larger units is within 2 per cent, when the load is varied from no load to full load. Fly-wheels are

not required on any type, as the driving force is always transmitted without angular variation; a desirable condition when generators are operated in parallel.

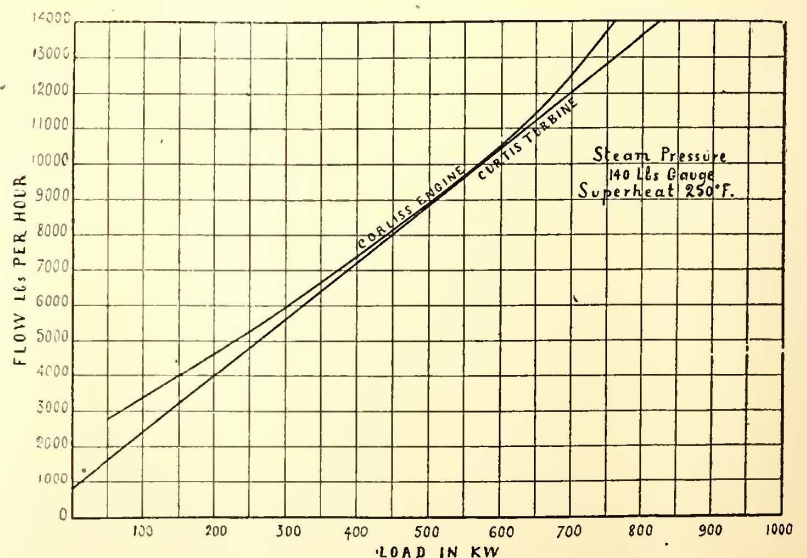
The absence of internal lubrication permits a high degree of superheat. In the Newport plant the superheat of the turbine has been raised to 250 degs. F. without increasing the temperature of any part of the revolving wheels or surrounding casing, except the admission valves. The conditions in an engine operating at this high temperature would not be as favorable. Actual experience in commercial operation has shown that water carried over from the boilers in large quantities does no injury to any part of the turbine, a serious condition when engines are in use.

The first vertical turbine engine to be installed in this country was at Newport, R. I., and is illustrated herewith. The station is arranged for four turbines, two of which have been put in service. Comparison with a Corliss cross-compound condensing engine of similar capacity under the same conditions of pressure and superheat was made, assuming the engine to have the same full-load economy. Few engines of this capacity, even when new, can show as high efficiency at full load. The curves clearly indicate the saving afforded in steam by installing a turbine when operating at light loads and overloads.

The motors required to operate the circulating and air pumps for the condenser are driven from the turbine generator, and this power, about 20 kw, is included in the output of the machine. Analysis of the velocities obtained indicate that this result from the first vertical unit will be materially reduced. Lighting, railway and arc load are all carried on the same unit



CURVES SHOWING REGULATION OF 20-HP CURTIS TURBINE 3000 R.P.M., WITH SUDDEN CHANGES OF LOAD



CURVES OF STEAM FLOW AND OUTPUT, 500-KW UNITS, ASSUMING SAME EFFICIENCY AT FULL LOAD

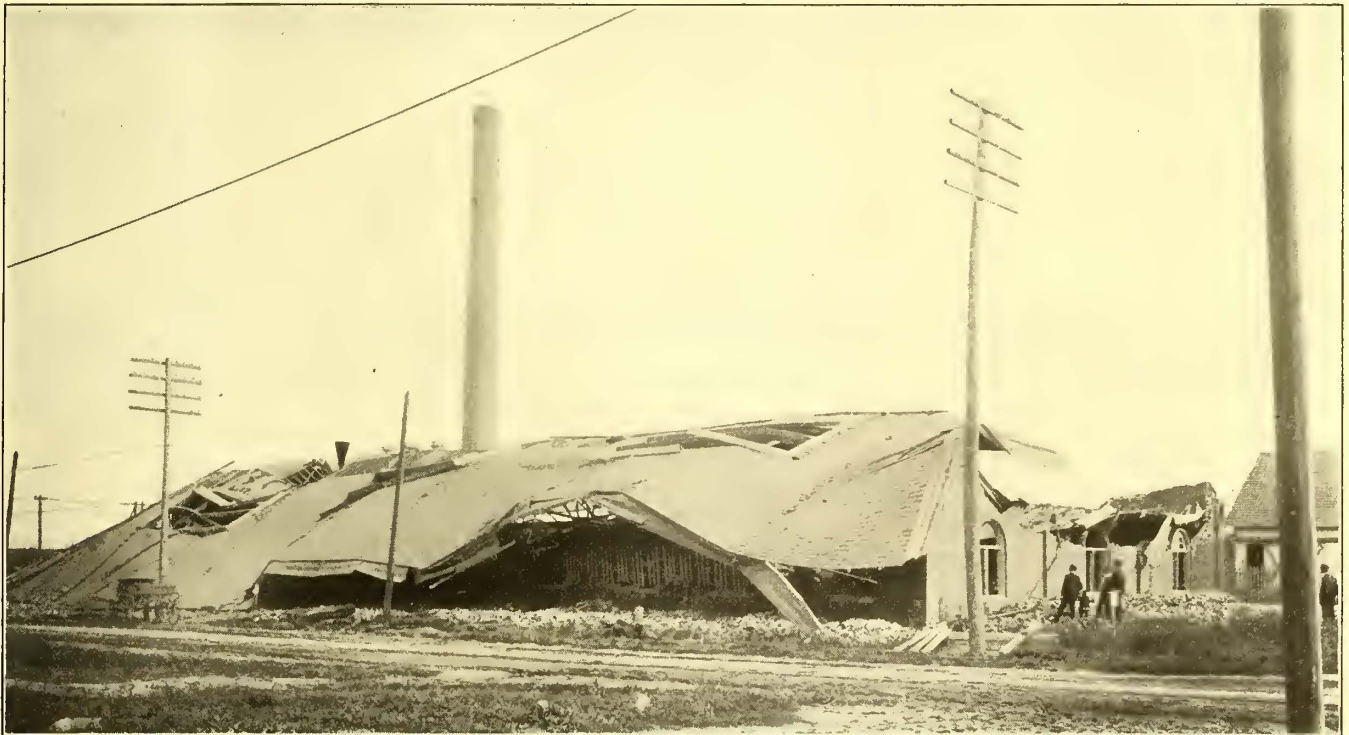
without difficulty. Minor troubles have developed, but no more than with every radically new device, and these have in turn been corrected as rapidly as possible under commercial operation.

Similar plants have been installed at Scranton, Pa., Dover, N. H., and within the last year orders have increased to such an extent that 200,000 hp of Curtis turbines are under contract. A 600-kw horizontal unit has been in continuous service at Schenectady for two years, operating for two periods of about four weeks each without a single shut-down.

A 1500-kw Curtis unit is in successful operation at Port Huron, Mich., carrying a mixed load of motor power, railway and lighting. This turbine has the standard clearance of .03 in. to .05 in. between stationary and moving parts, and can be started cold and brought up to full speed in half an hour. It is easily brought into synchronism with other three-phase generators driven by cross-compound engines. One 800-hp Russell and one 500-hp Ball, both tandem-compound engines, also one

DESTRUCTIVE HURRICANE IN SOUTHERN NEW JERSEY

On Sept. 16 one of the most severe wind storms ever experienced in Southern New Jersey completely demolished the new car house and power house of the Atlantic City & Suburban Railway Company at Pleasantville, N. J. The lines from Atlantic City to Pleasantville were completed but a few days before the storm, and, unfortunately, only one of the seven new Brill cars (semi-convertible and Narragansett) was running. The other cars were standing in the car house when the wind blew in the walls, and lifted the heavy slate roof and the supporting girders and dropped the mass upon the cars. A remarkable feature of the wreck was that not a car was injured below the roof, not even to the springing of a side post. Several other cars were to be shipped from the Brill works a few days previously; luckily they were delayed, and thus escaped. Other fortunate circumstances were that the Custodis chimney stack remained standing, the machinery in the power



CAR HOUSE AT PLEASANTVILLE, N. J., WRECKED BY WIND STORM

500-hp Westinghouse cross-compound engine, all condensing, have heretofore carried the load, about 750 kw, requiring two 500-hp and one 250-hp Sterling boilers. With the turbine alone carrying the same load, one of the 500-hp boilers is cut out.

A 5000-kw Curtis turbine has recently been installed at the Commonwealth station, Chicago, where provision has been made for fourteen similar units. This machine, the first of its size, has been operated continuously for several periods of eight hours each on a water rheostat load of 5000 kw, and will shortly be put in commercial service. On account of water leaks around the condenser tubes no reliable economy tests have yet been made.

The Pennsylvania Railroad Company will make an effort to capture some of the local business between Indianapolis and Richmond. Since the opening of the interurban line the local business has decreased to such an extent that the local passenger trains have hardly made expenses. The first step in the fight proposed against the interurban line was taken when the railroad offered a rate of 45 cents from Cambridge City and return for the James Whitcomb Riley entertainment held a short time ago. The interurban fare is 50 cents.

house was not seriously damaged, and, above all, no lives were lost.

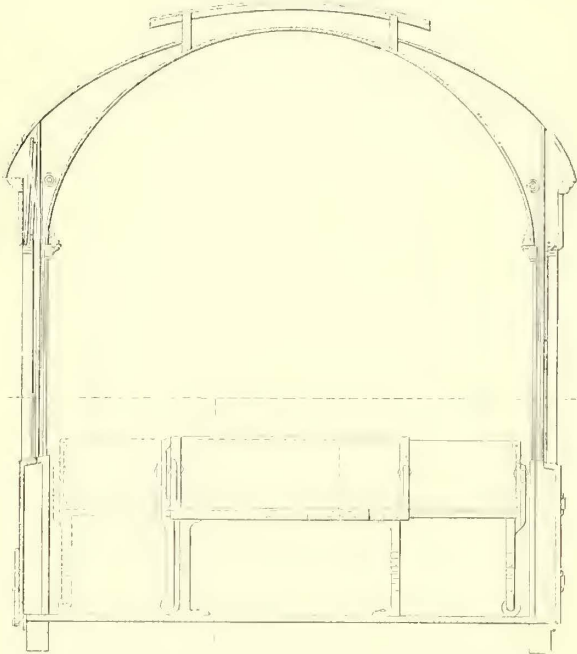
The work of removing the wreckage has been rapidly pushed forward, and within a few days cars were running on the lines. The damaged cars have been sent back to the builders for the roof repairs, there being no convenient place on the lines to carry on such work. It is planned to have the new buildings of more substantial construction.

ANOTHER TRANSFER DODGE

A clever dodge to defraud the company by manipulating transfers has been discovered by the Cincinnati Traction Company. On the back of one of the transfers recently turned in there was pasted a small piece of paper which was almost a perfect match in color of the transfer itself. On close examination it was discovered that there was something wrong with the ticket. A critical examination was made, and it was seen that the transfer had been punched for two different dates. At the back of one punch the slip of paper was pasted, while it was seen that the punch cuts from the second punch had been cleverly pasted in the hole where the paper was pasted so as to add to the deception.

NEW CONVERTIBLE CAR

The accompanying cut represents a vertical cross-section of a novel convertible car which has recently been designed by Henry W. Covert, of Waterford, N. Y. This type embodies horizontally swinging doors for closing the lower portions of the openings between the vertical side posts, vertically sliding panels for the upper portions, and a seating arrangement which permits the seating capacity to be varied as occasion requires.



VERTICAL CROSS SECTION OF CONVERTIBLE CAR

By the use of the swinging doors the handling of the movable parts is facilitated, and the overweighting of the upper part of the car avoided. In the illustration herewith the side doors on both sides are shown closed, and two panels lowered on one side and raised to the pocket on the other.

The floor and roof are connected by side posts, which form the usual openings for the entrance and exit of passengers. From the lintel downwardly about half-way to the floor these side openings extend from post to post, and are adapted to be closed by glazed panels, which are movable along grooves in the posts. In the present type each side opening is equipped with two panels, which can be moved upwardly along the slideway grooves and deflected into a storage pocket subjacent to the car roof.

Below the space closed by the sliding panels the car body is provided with side wall sections built around the respective posts, with side openings of equal width between them. Each side opening can be closed by the door hinged along the vertical edge of the corresponding wall section. This door is not only adapted to swing horizontally across the neighboring opening to close the same, but also outwardly against the side wall section, to which it is hinged, when desired to leave the opening unobstructed for passengers. All side doors are provided with a locking device, which permits all the doors on one side to be locked or unlocked simultaneously. Each door is also furnished with an auxiliary arrangement for separate operation.

The whole arrangement is very flexible, permitting the use of any known forms of locking, laterally-movable doors and vertically-movable panels.

In the bottom of the storage pocket is provided a separate

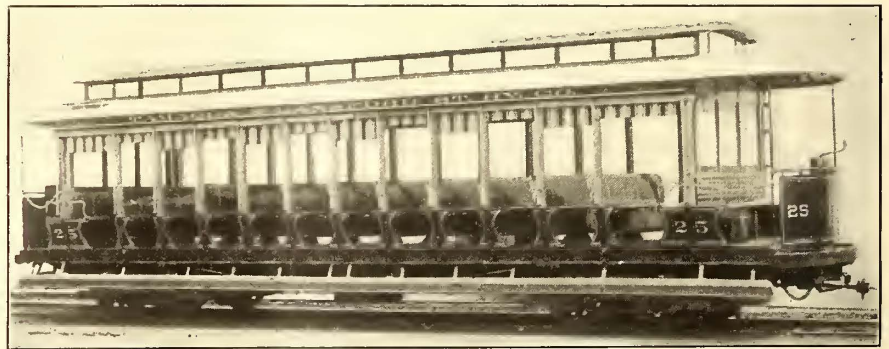
recess or socket adapted to receive the lower end of the panel last entering the pocket, said panel being the lower one used to close the side opening. The sockets do not extend to the full width of the pocket, but are formed to leave along the end wall of the pocket an outwardly and downwardly inclined surface for receiving and supporting the lower edge of the upper panel. The corner portions of the lower panel are cut away to adapt them to enter the socket whereby the lower panel, when deflected into the pocket and seated in the sockets, is not only prevented from being displaced by car vibration but also serves to prevent the displacement of the other panel.

The car is provided with a sliding door at each end. The doorways are arranged diagonally opposite, each adjacent to the side wall of the car, whereby passengers may quickly enter or leave the car when the side openings are closed. A novel reversible seating construction permits the formation of an unobstructed aisle along either side of the car in line with one of the end openings. This construction comprises a row of stationary seats, each of less width than the interior of the car, arranged along the longitudinal middle of the car, and in telescopic relation with each of said stationary seats a pair of extension seats at the opposite ends. The arrangement is such that when the extension seats are forced in on one side to make an aisle the opposite extension seats are automatically forced out. When necessary, however, both end seats can be extended to increase seating capacity. Stationary seats may also be provided in the corners not used for doorways. Another form of seating construction makes it possible to obstruct lower portions of one or more side openings whenever it is considered undesirable to have passengers use the side entrances.

The car is also fitted with roller curtains for temporarily closing side openings, ventilating arrangements and other auxiliary devices used in car building.

NARRAGANSETT CARS FOR TAMAQUA & LANSFORD STREET RAILWAY COMPANY

The Tamaqua & Lansford Street Railway Company has recently purchased from the J. G. Brill Company three fifteen-bench "Narragansett" cars as an addition to its equipment of the five Brill combination passenger and smoking cars which were described in the STREET RAILWAY JOURNAL of March 7. The popular amusement park, situated midway between



FIFTEEN-BENCH NARRAGANSETT CAR FOR TAMAQUA & LANSFORD STREET RAILWAY COMPANY

Tamaqua and Lansford, is owned by the company, and it has been found necessary to have open cars, which will facilitate handling the large crowds attracted to the park. The scenery along the lines is mountainous and picturesque, and the large number of passengers carried make the trip for the pleasure of the ride.

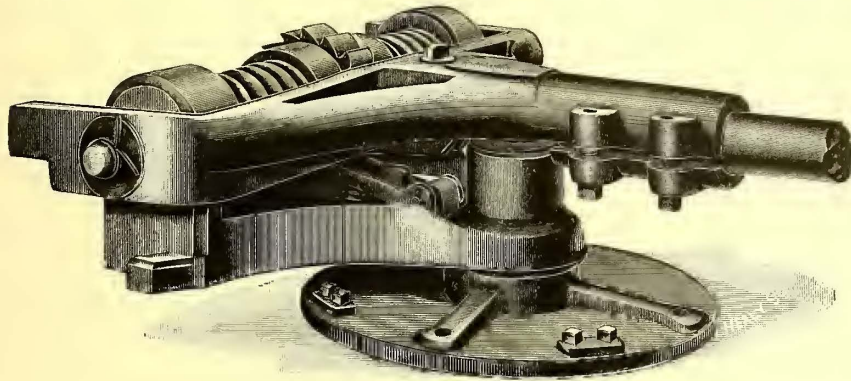
The particular feature of the cars consists of Z-bar sills with an upper step in the sill, thereby providing a double step without increasing the over-all width of the car and that

of a standard single-step double-truck car. Metal brackets, firmly bolted to the sills, form sockets for the posts and bases for the round corner seat end panels. This arrangement affords a firm seating for the posts, and strengthens the entire superstructure. The advantage of the double step is that the running board, or lower step, is brought to within 16 ins. of the rail head. From the running board to the sill step is 13 ins., and from the sill step to the car floor $7\frac{1}{2}$ ins.

The length of the car over the crown pieces is 40 ft. $4\frac{3}{8}$ ins.; from center of corner posts over crown pieces, 4 ft.; width over sills, 7 ft. $9\frac{1}{2}$ ins.; sweep of posts, 5 ins.; from center to center of posts, 2 ft. 6 ins.; thickness of corner posts, $3\frac{3}{8}$ ins., and of side posts, $2\frac{3}{4}$ ins. Interiors are finished in cherry and ash, with ceilings of decorated birch. Sand-boxes, alarm gongs, angle-iron bumpers, draw-bars and brake handles are among the patented specialties with which the cars are equipped. The cars are mounted on 27-G trucks with 4-ft. wheel base, $3\frac{3}{4}$ -in. diameter of wheels and 4-in. diameter axles. Each truck is equipped with two 35-hp motors. The weight of a car and trucks with motors is 36,850 lbs.

BALL-BEARING TROLLEY BASE

The W. R. Garton Company, of Chicago, has recently taken the Western sales agency for the Parker ball-bearing trolley



BALL-BEARING TROLLEY STAND

base. This base is said to have some very meritorious features which are radically different from anything else of the kind ever placed on the market before, and numerous tests have been made to prove the claims of the inventor. The accompanying illustration sets forth the construction, which is very simple but strong. Being ball bearing this base readily adapts itself to the lateral qualities of the line and the wide range of the tension springs permits constant contact between the wheel and the wire. This is not possible with a trolley base which is not sensitive to rapid and fluctuating changes. The springs from which the tension is gained work in the reverse direction to the ordinary coil spring, so that the limit of the utility of the spring is not gaged by its binding on its spindle. The adjustment of tension is very simple and quickly attained. The trolley base is stated to be from $1\frac{1}{2}$ ins. to 2 ins. lower than any other now on the market. This permits of going under very low viaducts, etc., with ease, giving better contact with the wire because better tension is maintained. The springs under these conditions are longer lived than under other methods of producing spring pressure.

VISIT OF THE ROYAL COMMISSION ON LONDON TRAFFIC

The members of the Royal Commission on London Traffic, who are visiting this country, reached New York Sept. 26, on the Arabic, and spent the following week in New York studying the subject of its transportation facilities. The principal object of the Commission in visiting this country is to study the practical working conditions of traffic commissions in this

country, and to report on this subject at the coming session of Parliament. At present there is no one body in London corresponding with the Rapid Transit Boards of Boston and New York city, and all proposals for electric railway franchises are considered individually by Parliament. It has been proposed that if such a board should be constituted, dealing exclusively with the routes of proposed rapid transit and surface lines in London, a more harmonious development of the entire city transportation system could be secured than with the present mode of procedure. This is a subject on which the present Commission will render a report.

The board has been taking testimony in London on this subject for five or six months previous to the visit to this country, and consisted of Sir David Miller Barbour, K. C. S. I., K. C. M. G. (chairman); the Right Hon. Earl Cawdor, the Right Hon. Viscount Cobham, the Right Hon. Lord Ribblesdale, the Right Hon. Sir Joseph Cockfield Dimsdale, Bart., K. C. V. O., M. P.; Sir John Poynder Bickson-Poynder, Bart., D. S. O., M. P.; Sir Robert Threshie Reid, G. C. M. G., K. C., M. P.; Sir John Wolfe Wolfe-Barry, K. C. B., F. R. S.; Sir Francis John Stephens Hopwood, K. C. B., C. M. G.; Sir George Christopher Trout Bartley, K. C. B., M. P.; Charles Stewart Murdoch, Esq., C. B.; Felix Schuster, Esq.; George Stegmann Gibb, Esq.; Lynden Macassey, Esq., secretary.

Only seven members of the Commission, including the secretary, are visiting this country. While in New York their sessions were held at the Waldorf-Astoria, and H. H. Vreeland, William Barclay Parsons and B. J. Arnold were among those whose testimony was presented. The Commission has been in Boston during the present week and will probably visit Philadelphia and possibly Chicago before the return to England on Oct. 16.

ELATERITE ROOFING

A roofing material is being put on the market by the Western Elaterite Roofing Company, of Denver, Col., which is made of elaterite, a mineral rubber composition rich in hydro-carbon, which does not dry, harden or crack, and is said to be virtually indestructible. The roofing is made with a foundation of two layers of cloth, a canvas center and cloth top, and it has a mica surface and paper back. The grade used for flat and steep roofs weighs 65 lbs. per square, and is put up in rolls sufficient for covering 100 sq. ft. of surface. The manufacturer asserts that the roofing is proof against water, steam, acid, rust and wind; is a perfect non-conductor of heat, cold and electricity, and is not injured by expansion or contraction. It is a protection against fire, resisting cinders, etc., and is a finished product, needing no painting or sanding. No coal tar or pitch is used in its composition.

The material is especially adapted for the roofing of business blocks, factories, smelters, mine buildings, power stations, warehouses, chemical works, and is used by railroad companies for car sheds, round houses and car shops. For seven years elaterite has been used extensively throughout the Western States, and is said to have withstood many severe tests. The power station of the Denver Tramway Power Company is roofed with it, and it has been used satisfactorily on railroad and street cars. The Denver City Tramway Company has also adopted this material for roofing all its shops, power houses, etc., and two of the large Colorado steam railroads use it on their passenger cars and cabooses. A lighter grade is made for use in place of iron, on the sides of buildings, such as mills and warehouses, and it is thus extensively used at Cripple Creek, Col., Deadwood, N. D., and in other important mining camps of the West.

NEW YORK STATE STREET RAILWAY CONVENTION

The twenty-first annual convention of the Street Railway Association of the State of New York was held at Syracuse, on Tuesday and Wednesday, Oct. 6 and 7. The conventions of this Association are always well attended and characterized by the excellent papers presented and the large amount of business done. If possible, however, this record was surpassed by the Syracuse Convention. The sessions were held in the Common Council Chamber, in the City Hall, which had been loaned to the Association for the purpose, as a mark of the high esteem in which Mr. Connette, the general manager of the Syracuse Rapid Transit Railway Company, is held in Syracuse. The headquarters of the Association were at the Yates Hotel. A full account of the Syracuse Convention will be published next week, but a brief summary is given below.

Following the meeting of the executive committee the first session of the convention proper was opened at the Common Council Chamber, in the City Hall, at 10:30 o'clock Tuesday morning, with about fifty delegates in attendance. The visitors were welcomed by Mayor Kline, and President Rogers then read his annual report, which will be found on another page of this issue. The report of the executive committee and that of the treasurer were submitted, both of which showed the Association to be in a very favorable condition. Communications were received from the Syracuse Museum of Fine Arts, inviting the delegates to visit that institution, and from the Central New York Telephone Company, giving the delegates the privileges of long-distance service during the convention. Votes of thanks were passed for these courtesies.

The convention then proceeded to the consideration of the papers, the first to be presented being on "The Use and Abuse of Transfers," by John E. Duffy, superintendent of the Syracuse Rapid Transit Railway Company. The next paper was by Dr. John J. Moorehead, of the Interurban Street Railway Company, of New York, entitled "Methods of Discovering Fraudulent Claims for Injury," and another paper along similar lines on "Physical Examination in Accident Cases," by W. A. Dibbs, of New York. The last paper to be read at the morning session was by C. E. Parsons, of Glens Falls, on "Hydraulics in Connection with Street Railway Operation."

The afternoon session was opened by the presentation of a paper on "Track Construction and Maintenance," by T. Wilson, of the International Railway Company, of Buffalo. This paper was followed by one on "Power Transmission for Interurban Lines," by J. B. Storer, of Syracuse. After the discussion on this paper, F. J. Pearsall, secretary of the Railroad Branch of the Young Men's Christian Association, delivered an address on the work of the Association among street railway companies. Mr. Pearsall referred to the work in Rochester and Binghamton. In the discussion on this subject, Mr. Nicholl, of Rochester, and Mr. Clark, of Binghamton, addressed the convention, describing the Young Men's Christian Association work in their own cities.

The closing session of the Association was held Wednesday morning. The first paper read was on "Despatcher's Duties and Electric Signals," by Orlando W. Hart, of Fall River. This was followed by a paper on "Crossings of Steam and Electric Railways," by Charles R. Barnes, expert of the State Railroad Commission. The discussion on the following topics was then introduced by the gentlemen named below: "Standard Equipment for Interurban Service," by C. Loomis Allen, of Utica; "Car Despatching," by E. R. Wilcoxson, of Rochester; "Interurban Ticketing," by J. E. Stephenson, of Buffalo; "Traffic Arrangements with Other Interurban Lines," T. J. Nicholl, of Rochester. A paper to form part of the discussion, "Development of Freight and Express Service," and prepared by E. F. Seixas, of St. Catharines, Ont., was presented in the absence of Mr. Seixas.

The report of the nominating committee was then in order, and contained as president of the Association the name of G. Tracy Rogers, who has been president of the Association for the past nine years. Mr. Rogers, however, stated in a graceful speech that it would be impossible for him to accept the nomination owing to the press of private business. Mr. Ely, of Buffalo, then, in behalf of the Association, paid a very high tribute to Mr. Rogers' valuable services to the organization during the period which he has been connected with it. He stated that the thanks of the Association were due Mr. Rogers, and suggested that engrossed resolutions, testifying to the high esteem of the Association for Mr. Rogers for the services which he has rendered to it, be presented to him. He also suggested a similar set of resolutions for Mr. Robinson, who also retired from the office of secretary and treasurer of the Association, after occupying that position for a long term of years. Officers for the ensuing year were then elected as follows:

President, E. G. Connette, of Syracuse.

First vice-president, A. B. Colvin, of Glens Falls.

Second vice-president, J. L. Heins, of Brooklyn.

Secretary and treasurer, W. W. Cole, of Elmira.

Executive committee, C. L. Allen, of Utica; B. B. Nostrand, Jr., of Peekskill; W. H. Pouch, of Newburgh, and J. H. Pardee, of Canandaigua.

The social entertainment of the Association and its guests was provided by the hosts of the Association, the railway companies in Syracuse, and were most heartily enjoyed. On Tuesday, a committee of ladies met the visiting ladies at the parlors of the Yates Hotel, and took them to Onondaga Valley, where a very attractive luncheon was served. They were then driven in tally-ho coaches through the Indian reservation and to Green Lake Park. The party consisted of about thirty ladies with two or three gentlemen, and returned to the hotel about 5:30 in the evening. On Wednesday morning the ladies were entertained by a trolley ride to Edwards Falls, over the line of the Syracuse & Suburban Railway, and on Wednesday afternoon joined the delegates and other attendants at the convention in a trip over the Auburn & Syracuse Electric Railway to Skaneateles, where they embarked on the steamboat for a trip on Skaneateles Lake. A luncheon was served about 6 o'clock at Long Branch, on the line of the Syracuse, Lakeside & Baldwinsville Railway, after which there was music and dancing until the guests were obliged to leave to take the trains home.

The hosts at Syracuse, who were the Syracuse Rapid Transit Railway Company, the Syracuse, Lakeside & Baldwinsville Railway Company, the Syracuse & Suburban Railway Company and the Auburn & Syracuse Electric Railway Company, spared no pains or expense to entertain all of the visitors during their two days' visit in Syracuse, and succeeded in making the visit to the city one of the most enjoyable in the annals of the Association.

The banquet of the Association was held on the evening of Wednesday, Oct. 7, at the Yates. The large dining room of this hotel and the individual tables were very attractively decorated, and the dinner was an excellent one and was well served. The toastmaster was Charles L. Stone, of Syracuse, and the toasts were as follows: "Introductory," President G. Tracy Rogers; "The City of Syracuse," Hon. Jay B. Kline, Mayor of the city; "The State of New York," Hon. Frank Hiscock, of Syracuse, formerly United States Senator from New York; "Electric Railways and Their Future," Herbert H. Vreeland; "Useful Workers," Hon. Peter B. McLennan, of the New York State Supreme Court; "My Paradoxical Relations; Legislation vs. Street Railways," Hon. John T. Smith, of the committee on railroads; "New York State Commerce," W. Caryl Ely; "The Ladies," J. M. Wakeman; "The Supplyman," E. J. Lawless.

SOME OF THE PAPERS AT THE SYRACUSE CONVENTION

PRESIDENT'S ADDRESS

BY G. TRACY ROGERS

Nine years have passed since we met in annual convention in this, the "Central City," of the Empire State. The wonderful changes which we see in the street railway construction, equipment and service, and the cordial relations which I understand exist between the public, the city officials and the street railroad in this beautiful and thrifty city, fostered and solidified within that time, illustrate the results achieved by courage, capital, diplomacy and good management.

The year past has been one of general thrift and prosperity. This is most fortunate, as otherwise the smaller and interurban roads would have suffered equally with the other factors of summer life whose prosperity has been injured by the unseasonable summer weather. The results for both have been most disastrous and are to be deplored. I wish to congratulate the roads of the State upon their handsome gain in gross receipts, made under the existing circumstances. The electric roads of the State continue to improve the conditions of life, and are a power for public benefit. They continue to work changes in the sociological, moral and financial growth, a factor in producing the present prosperous condition of our people.

I believe that the most liberal and fair-minded man realizes what we are doing, and to a degree understands the difficulties and appreciates the many obstacles which have to be overcome in our construction, operation and in every department of our work, also in our relations with the public. Wherever the rails of an electric railroad go, there follows increased population and prosperity; therefore, the people who build and operate these roads are entitled to a fair return upon their investments, and an adequate recompense for their services.

Any movement tending to hamper or obstruct the completion and extension of electric railroad transportation facilities is a serious menace to the general public good, the merchant, and especially the owner of real estate in outlying districts.

The enterprise of railroad extension must have the hearty co-operation and good will of the people along the route, as the short-sighted policy of placing obstacles in the way of street railway development, or of imposing serious restrictions and impracticable regulations for operation, will result in the abandonment of many projects from the completion of which the entire community would reap valuable and substantial benefits.

The most poorly constructed electric railroad, operated in the most shiftless way, would not willingly be dispensed with by the community which it serves, even inefficiently.

The electric railroad, if not seriously hampered, and with a fair amount of encouragement, is bound to progress, as it will give the best system of urban and interurban transportation that the world has ever known; therefore, its progress must not be retarded. Its growth should be carefully fostered, regulated and guided, but it should not be limited and circumscribed with useless restrictions and conditions.

The State of New York has been far behind many of the sister States in the construction of interurban electric railroads, and until a comparatively recent date, inactivity in this particular has prevailed, but the present extensive, thorough, and I might say perfect character of the interurban construction now under way, particularly in the central portion of our State, will soon place us foremost in the matter of electric interurban transportation facilities. The builders of the numerous roads recently constructed and now in process of construction although tardy, will be able to take advantage of the experience and mistakes of others, thereby working out a material benefit which will redound to the traveling public, as well as those investing in the properties.

Considerable attention is being paid to the light freight and local express business on interurban roads. I think this a desirable step, not only for profit, but because of the material assistance in developing the territory through which smaller roads operate. The interurban proposition to-day in all of its departments is worthy of our most careful thought and consideration. Its problems are still new, and contain many questions which must be worked out by careful thought and experience.

The evolution of equipment, track construction and the power station; the development of power transmission; the introduction of the rotary converter; the third rail and the multiple-unit system of control, have given great impetus to the interurban road.

What the steam turbine has in store for us remains to be seen, but from present indications, I judge that there is still another

surprise for us through its introduction. No doubt the 500-volt system will remain standard for some years to come, especially for city systems, but we hope that in the near future the inventor will solve the questions before us and introduce more economical power for use upon our interurban roads. It may be that the next step in this great development of power will be the perfection of the present experimental use of the alternating-current motor upon the cars.

I am informed that the inventor will have the alternating-current motor in actual use within the year. I am also informed that this motor is constructed to operate with a direct current as well as an alternating current. This will be of great advantage to provincial cities operating both urban and interurban lines.

It is to be hoped that the American Railway Mechanical and Electrical Association will work out for us a system of standardization. There is nothing more important or deserving of more thoughtful attention at this time than this question. While we are working to this end on our individual properties, a general standardization plan should be perfected, which would greatly cheapen maintenance and improve the practical operation, as well as assist in transporting our patrons with a greater degree of safety and economy.

I have each year called your attention to the fact that we are carrying the United States mail at a rate which does not pay actual expenses. It is to be hoped that the committee appointed by the American Street Railway Association will succeed in obtaining an increase in the rate.

It is often suggested by the public press that the street railroads are making a vast amount of money out of the streets, to the exclusion of the citizens who are being deprived of their rights, but these self same men are never ready to come forward with their money to invest in this character of valuable franchises. Someone must furnish the intelligence and the capital to improve the streets, which were primarily intended for transportation purposes. While the majority of the franchises of our State are perpetual, this title does not prevent an arbitrary and rigorous supervision of all details of construction and operation by the State Railroad Commission or the local authorities.

I believe it to be of great benefit to any property to be in close touch with local officials, and if the securities are placed locally the integrity of the enterprise is assured; thereby it will be much easier to obtain the local legislation absolutely necessary, insuring a more sympathetic co-operation of the public which we serve.

I am pleased to note that the once much mooted question of municipal ownership of street railroads is one which has been finally settled adversely in the minds of the American people. They full well appreciate what municipal ownership of street railroads would mean under our system of politics. The American citizen has learned that it is safest to keep the transportation facilities of our cities out of local political control.

In the Greater City of New York the street railways have progressed rapidly in the construction of the improvements indicated in my last address, but no new construction propositions of interest and importance have been advanced. The city is resting meantime awaiting the completion of the underground subway, and to determine its effect both upon the growth of the city at large and the present transportation facilities. It is to be regretted that the delays of the last year, caused by strikes and inability to procure machinery, will prevent the completion of this great improvement as early as anticipated.

The lease of the elevated lines to the subway operating company is another step in the line of consolidation of railroad interests which has been so noticeable during the last five years.

A subject which is of the greatest interest to cities, affecting especially at present those of the first class, and which will undoubtedly affect the other cities of the State, is the status of the law under which the public, upon paying a fare of 5 cents, demands a transfer as well as a retransfer upon the lines of a system. The extent to which the net earnings are diminished by this obligation will at once be recognized as serious and militating against the best interests of street railways. Its effect is shown by the reduction of the average fare on roads in Manhattan Island to 3.46 cents, and on roads in the boroughs of Bronx and Westchester to 2.64 cents, and the evidence that 30 per cent of all payers of fare request a transfer ticket. While the issuance of transfer tickets, in my opinion, is of great value to the companies and undoubtedly increases their income, the law under which transfers were first given has been so construed as to make it optional with a passenger as to what point and upon what lines

he would ride, thus depriving the company of the exercise of the discretion which is vested in its board of directors to operate their road for the best interests of the public.

This condition, overburdening as it does some lines and preventing the distribution of traffic upon others, which reach substantially the same point of destination, rapidly wearing out the equipment, militates, in my opinion, strongly against the best interests of street railway companies and of the public itself.

While I am not prepared at this moment to recommend in what particulars a change should be made in the present methods, I am of the opinion that this paramount question of importance should receive our full and complete consideration.

The transportation facilities of the various railroads of the city of New York, as well as those of the other large cities of the State, were taxed beyond their capacity during the holiday season of last year. As an outgrowth of this condition of affairs, and in pursuance of the clamor of public and press, hearings were held by the State Railroad Commission, at which numerous reform societies and individuals appeared and were heard, offering suggestions for relief and proposing ordinances or laws for facilitating transportation, some of which suggestions were partially feasible, others utterly impossible and impracticable. Later the congestion receded and the transportation situation resumed its normal condition, but not until the reform societies and individuals above referred to had studied the situation and discovered the many insurmountable embarrassments and obstacles which the managers of the various transportation companies daily encountered. There is no question as to the probable honest intent and purpose of the societies and individuals who seek to revolutionize transportation methods, but it is generally attempted with no knowledge of the true conditions of the situation as it exists, and uniformly without any experience, consequently unreasonable demands are made and impracticable suggestions for relief offered.

Legislation pertaining to street railroads, owing to the evolution and rapid growth and development of the business, occupies a prominent place in State legislative matters, therefore it has become necessary to modify and amend somewhat the existing street railway laws enacted during the days of horse car operation to properly meet the present-day requirements of financing, construction, operation and maintenance of the great network of street railroads throughout the State of New York, also to afford proper protection to investors and adequate facilities for prospective development. Unfortunately there has been an apparent disposition on the part of the public and press in certain quarters to attack vigorously all legislative bills pertaining in any way to street railways or their operation; oftentimes without even inquiring into the merits, necessity or intent of the proposed law. This condition of affairs has developed until now the introduction of a street railroad measure in either branch of the State Legislature is the signal for an unwarranted attack, arising, I think, from a misunderstanding or misinterpretation of the true text of the proposed measure, rather than from a desire to do the street railway interests of the State an irreparable injustice. Street railroads are entitled to the same consideration at the hands of the Legislature as accorded to an individual, firm, or any other corporation, particularly in view of the fact that they are a prominent factor in the building up and broadening out of the territory through which they operate, and when they ask for legislation, special or general, their motives or honesty should not be impugned or questioned, at least until the proposed legislation is thoroughly investigated and understood.

The street surface railroad laws of the State of New York are at present in a somewhat chaotic and decidedly ambiguous condition, owing to the general character of a number of the most important sections which affect both steam and street railroads in a manner that it is almost impossible to draw the line of distinction. This is due to the fact that at the time the laws were enacted the steam railroad interests of the State were paramount, those of the street surface railroads being entirely subordinate and not seriously affected by the laws, as they were governed largely and almost entirely by local municipal acts. It would be much more advantageous to all parties concerned and prevent misunderstandings, misinterpretation and endless litigation if the street railroad laws were properly codified and made applicable to street railroads in plain, certain and decisive terms.

The street railway interests of the State of New York are large and rapidly growing. Millions upon millions of dollars are already invested in transportation enterprises by the public; millions more are required to complete the necessary growth and development, particularly the much-needed interurban construction, which is comparatively in its infancy in New York State. In order to interest capital in street railway enterprises, adequate, just and equitable protection is necessary, and must be afforded by shaping laws, both local and State, to that end.

We, in asking for legislation, either local or State, make no mistake in frankly and clearly setting forth the necessity and reasons for the required legislation, as well as what we hope to accomplish thereby.

It is often the case that men elected to make our local and State laws have conceived the idea that it is their duty to oppose any request that we may make. Those very men, after careful observation and upon becoming more fully acquainted with the true situation, appreciate the difficulties that we experience and the struggles we are necessarily making to meet the requirements of the exacting public, and to build up the territory through which we operate.

We also make no mistakes in taking State or city officials and the public into our confidence, as we must have their co-operation. The evolution of the street railway from the tramway to the electric railway has been so rapid and startling that the public has become so suspicious and apprehensive that its rights will be imposed upon that it is difficult to obtain necessary legislation to meet the changes.

The injustice of being denied the privilege of carrying negligence actions to the Court of Appeals is an unwarranted discrimination without reason or justice. Legislation modifying the present law in this respect should be secured if possible. Last year I called your attention to the injustice of the present law whereby a negligence action can be brought any time within three years from the date of accident without giving notice. An effort was made again last winter (without success) to have the law amended, giving the individual and the corporation the same consideration that is now given municipalities, whereby notice is required of an accident. The Association should again make a determined effort to have this law placed on the statute books, thereby to a degree stemming the tide of unjust speculative litigation with which we are almost daily confronted.

I also call your attention to the condemnation law affecting our rights to condemn easements of abutting property owners in the streets of cities. I feel that this is an important question which merits your thoughtful consideration.

For a number of years we have been confronted in the Legislature with a proposed mortgage tax bill taxing our corporation mortgage. I consider it imperative to remind you of the disaster which would befall us in event the proposed law should be enacted. The street railroads are bearing, in the way of taxation, all the burdens that should be imposed upon them.

The percentage of net income paid in taxes by the street railways of the State as shown by the last annual report of the State Board of Railroad Commissioners for the year ending June 30, 1902, was 35 per cent—when the Ford franchise tax bill was passed it was 28 per cent. This percentage does not include the amount of the Ford franchise tax which was assessed for 1902, but not paid by the large companies for that year, they claiming the law to be unconstitutional, but the Court of Appeals has since declared it constitutional, and the amount assessed against these companies for that year must be paid and added to the above percentage, which will very materially increase the above rate.

Of the ninety-nine operating roads of this State for that year but eleven paid dividends, three of these being in New York city. Of the remaining eight dividend-paying roads three showed a deficit after so doing.

The percentage of gross earnings paid for taxes during the year 1902 for the maintenance of State, local and municipal government was 5 2-10 per cent. It would seem from the above figures that we are now paying our share of the tax. Should a law be passed taxing our mortgages it would seriously affect the sale of our securities, which would result in retarding the future development of street railroads throughout our State, which development, if uninterrupted, would materially increase the assessed valuation of real estate to an extent which would largely offset the expected revenue to be derived by the enactment of a law taxing our mortgages.

I do not believe that the State of New York can afford to enact any law that will in any way thwart or retard the prospective great development of street railroads, particularly the interurban service.

It is time to enter an emphatic protest against the policy of imposing every year some new burden of taxation upon public service corporations for the purpose of reducing and ultimately abolishing the annual State tax levy. If the Legislature is able to make reckless appropriations from a State treasury swollen by the tributes annually extorted from public service and other corporations, and still the members of the Legislature can go back to their constituents with a reduced State tax levy, the people may be deceived for a time, but the policy is essentially vicious, and must inevitably lead to ruinous results. Extravagance and corruption will be encouraged, and the sense of official responsi-

bility for the expenditure of the people's money will be destroyed. Ultimately the people will learn that excessive taxation distributes itself and that every citizen must bear his share of the burden of public extravagance. If street railroad service is to be extended and improved the people who travel and whose property is transported must ultimately pay for the extension and improvements. Rates of fare and freight must increase burdens of taxation or else the public accommodations must be correspondingly reduced. Street railroad corporations are limited to their 5-cent fares, and they cannot maintain, improve and extend their railroads if their resources for such purposes are to be exhausted by increased taxation.

Even if all the State taxes should be paid by the corporations, the various municipalities would receive no direct benefit therefrom, and would inevitably seek to imitate the example of the State by demanding that corporations should also bear a larger proportion of the heavier burden of local taxation. The next step would be legislation requiring additional payment by public-service corporations into treasuries, based on percentages of gross receipts or other similar devices, which would prevent all further extensions, betterments or improvements either of roadbed or equipment so earnestly desired by the public and demanded by the press, and in most instances would mean receiverships and the loss of savings invested by the public in street railroad securities. Such legislation would not interfere with State expenditures, and would present a very seductive appearance to legislators, who would still be able to keep up the false pretense of reducing the taxes of their constituents while encouraging a more elaborate municipal expenditure.

I have called your attention to the unjust discrimination in the State franchise tax law, whereby we are taxed 1 per cent of our gross earnings and other public-serving corporations pay but one-half of 1 per cent. An effort should be made to correct this injustice.

The committee on rules of this Association is to be congratulated upon its splendid work. No greater indorsement can be had than the action of the American Street Railway Association in adopting the code prepared by our committee without change. I understand that the committee is to report on the rules governing interurban service at this meeting.

The discussion at the recent meeting of the American Street Railway Association upon Mr. Vreeland's paper, "Right of Way," brought out some most excellent ideas, which I believe we should attempt to put into actual practice in this State. I think we should follow President Ely's example and request our respective school superintendents to set aside a few moments each week in instructing the children of our schools as to the rules of the highway. If that plan could be adopted we would later on have people upon our streets familiar with the common rules and laws governing the use of the highway by pedestrians and drivers of vehicles. If people could be taught to cross the street at crossings it would save a vast amount of time, also prevent confusion and accidents.

I understand that the accidents on the roads of this State are on the decrease. I believe this result is largely due to the fact that people are becoming used to the electric car and familiar with the dangers, together with the greater experience of and the increased care taken by our motormen. An effort should be put forth, I believe, to have ordinances enacted giving proper regulations to the passage over public ways and streets and regulating the operation of trucks and other heavy vehicles as far as possible and practicable. Every facility should be afforded by the local authorities to regulate the use of the street and assist in promoting rapid transit. The question as to whether a car should stop on the near or far side of the street is being agitated to some extent. I believe that stopping cars on the near side in cities where the streets are paved would effect a great saving in time and accidents.

The pleasant relations existing between the employers and employees of the roads of this State is a matter of congratulation. This situation is largely due to the application and practice of the sentiments expressed at these meetings and the encouraging and assisting of the mutual benefit associations and in maintaining the club and reading rooms connected with our roads. It is our duty to make the life and lot of our employees as comfortable as possible; we should go out of our way to do this, also showing true personal interest in their future welfare, and if possible assist them to better their position in life, thereby creating a sympathetic and harmonious co-operation as well as loyalty to the service, and faithfulness in the performance of their duties.

Proper discipline promotes manliness and candor. Just and considerate discipline cannot help but command the respect of employees. Courtesy and civility on the part of the employees to the public will make the road popular and will tend to eliminate the annoying occurrences which often arise between them and the ex-

acting public, and thereby reflecting credit upon the management.

The success of the management of a road is largely in having loyal, enthusiastic and efficient co-workers in all departments, and it is the duty of the management to encourage breadth of thought and personal interest in all employees, thus broadening the ideas and interest of the co-worker and teaching him to think. The more closely we can have employees identified with the development and prosperity of the roads, the more efficient and ambitious they will be to rise from the ranks. To every such employee a helping hand should be extended.

The plan so successfully worked out by the steam railroads, through their R. R. Y. M. C. A. is a plan well worthy of our consideration. A suggestion has been made that the steam and electric railroads work together in this laudable departure.

The large attendance of supply men at these meetings is most gratifying, as they always add interest to the occasion. The annual meeting with the men with whom we deal, and the pleasant interchange of social relations must necessarily prove of benefit to the interests we both represent.

I feel that the Association is greatly indebted to the supply men and representatives of the press, who have for years attended our State conventions. For a number of years they were an important factor in keeping the Association together. It was largely through their efforts that new members were induced to join. Nine years ago, in this city, when I was honored by being elected your president, there were but twelve street railway men present, outside of the local representation, and at Rochester the year preceding, but eleven. At Rochester there were twenty-seven supply men and representatives of the press in attendance, and at Syracuse thirty-three. The purpose of the meetings at that time seemed to be to spend a few hours in pleasure seeking, the actual business of the Association being of secondary importance.

I cannot refrain from alluding to the great changes which have been brought about in the growth and usefulness of this Association, which are due to the hearty interest taken in its future and usefulness by all its members and officers. I have had occasion to call upon you many times, and have always found you ready to respond promptly and with hearty interest in the work required. I have but to refer to the printed reports of our meetings to show the influence and benefit to the great interests in this State which we represent. I feel that the good this Association can do is but just begun, and when, not long ago, one hour was all that was required to perform the business of the convention, the full day and one-half is now insufficient to perform the work of the Association and discuss the many questions of importance to us, all of which are brought up for consideration.

At one time it was very difficult to obtain papers to be presented, and still more difficult to provoke a frank discussion on them. Now the time allowed is insufficient.

I feel it my duty to call your attention to the splendid work of the executive committee; these men, representing large interests and having great responsibilities, have always been ready to spend their time and money and to travel across the State in the interest of the Association.

In closing, I bespeak an even wider and more important work for the Association in the future, which result can only be attained by a continuance of the same hearty support and co-operation of the individual members accorded the officials and executive committee in the past. The Association has demonstrated that it is an important factor in the development and protection of the business interests which we represent, and its usefulness should be increased and perpetuated.

THE USE AND ABUSE OF TRANSFERS

BY JOHN E. DUFFY, OF SYRACUSE

When asked by the president of this Association to prepare a paper to be read at this convention upon "Transfers, Their Use and Abuse," hesitation was made in giving consent, feeling that this subject, of so much importance, should be dealt with by some one with a wider experience than is to be found in the city of Syracuse; and, in presenting this paper, no claim is made that the conditions enumerated and met with in this city are applicable to any other locality, but, as the general laws governing the right of passengers to ride between any two points in a city in this State, where a line has received a franchise under the laws of 1884, or the railroad laws now existing, a discussion of the general practice cannot help but prove to be useful and beneficial. It is not always possible to give all passengers a continuous ride covering all points of the compass in every city or village, and, therefore, the use of the transfer ticket has come into existence. Whenever it is possible, it should be the duty of the manager in routing the lines to arrange them so that as large a percentage of its pa-

trons should have the benefit of a continuous passage as is possible from the standpoint of economical operation.

There is, perhaps, no part of the successful operation of a street railway that has caused the management more thought and worry than the adoption of a transfer system that would prove satisfactory to its patrons, and not leave loop holes that could be taken advantage of by those who think it no sin or crime to beat a corporation. It may be a disputed fact that the giving of transfers by railway companies to complete a passenger's journey from one point to another point on its system has not proven beneficial. But, in a large majority of cases, the adoption of such a system has been highly beneficial to the receipts of the company adopting it. To such a large extent has the practice been followed that most of the street railways of this State, and generally throughout the United States have, from year to year, extended such privileges very liberally and the management of one of the largest systems in this country has stated that in his opinion there is nothing, since the adoption of electric traction as motive power, that has done more to increase its receipts than the giving of transfers.

Riding on the street cars in cities of moderate size is a habit to be acquired and the more attractive the habit can be made the larger proportions it will assume. Managers are to-day providing parks, pleasure resorts, summer theatres, beautiful cars and everything that will tend to stimulate travel and attract passengers, and the transfer is one of the reasonable privileges that companies intend to give their patrons. They are only trying to provide that the passenger shall not be permitted to ride back toward the starting point of his trip for a single fare.

The transfer, under legal requirements, and from the standpoint of the company presenting it, is not intended to be a "stop-over" ticket, but to be used for a continuous passage from one point to another point on its lines, not reached by the car on which the passenger's journey began. It is only proper that reasonable rules for its use may be made but too often, in trying to enforce such rules, the manager finds that it is more perfect in theory than in practice. Nevertheless, as attraction of passengers to your cars is the first consideration, the impositions practiced on the part of the public are put up with.

The ideal system of transferring would involve a station through which all cars would pass. This system would prevent a large number of the general abuses that are now practiced. As it is impracticable in a large majority of cases the plan of street transferring is the one in general use. It is sometimes a problem to provide for the congestion that this causes at more important points of transfer, and, especially is this true in the large cities at what are known as the rush hours. But as the transportation of passengers is the business of a railway company, it is generally cared for successfully. One of the troublesome questions with which the manager has to deal in this connection is involved in the collection of the fares on the large cars that are constantly being added to the service of all roads. With the collection of cash fares, making change, etc., the transfer ticket should be simplified, so that the conductor can see at a glance what it is. Do not make it so complicated that an examination of it to see that it is good takes up so much time that the conductor will lose in the meantime three or four fares that he might have collected while looking at it. Have all of the spaces that are to be punched and inspected as large as they can be. The daily dated transfer has helped much in this respect, and different colors for different directions are another change to be commended.

The registration or non-registration of transfers is a debatable question, and one on which all managers do not agree.

One of the most general forms of abuse practiced by passengers is the over-staying of the time limit. When this is done intentionally the passenger invariably claims that the transfer has been received within the proper time, and that conductor, who issued it, punched it improperly. Another abuse is that the people living between parallel lines coming toward the center of the city, come in on one line, get a transfer back on the other line, stop over and do their shopping, returning home for a single fare. Another is the abuse by clerks, and others returning from meals, who obtain a transfer to the line on which a brother clerk rides, and he, in turn, coming back, obtains a transfer for use of succeeding clerk. This is practiced in some places.

Another is the obtaining of transfers by passengers who have no use for them, and the giving of them to newsboys or saloons, who, in turn, distribute them to persons who are not entitled to their use.

The liberal giving of transfers has, to a very large extent, aided in increasing the business of the system with which the writer is connected. The lines of this company may be compared to the spokes of a wheel, radiating out from a common center to all points of the compass. A large number of the lines parallel each

other for long distances, or converge together at the outer ends, and, in other cases, start from the same point at outer extremities and come together again at the common center. In some cases it has been necessary to prevent abuse to make closed lines of them as far as the use of the transfer is concerned. In other cases it has been necessary to make the last junction point the transfer point, instead of the first point of intersection, as is commonly the case; but, it is possible for a passenger to go from any one point in the city to a point distant in any other part of the city for a single fare.

The Stedman time limit is used and is lived up to as close as possible, although great care is taken before ejecting a passenger from the car on account of non-payment of fare because the time limit on transfer has expired. This is done on account of the liability of error of the issuing conductor, and this, in one or two instances, was proven on trial of cases brought against the company, to be the case. Here it might be said that there is a wide difference of opinion among passengers as to the time limit on the transfer being of any account. Many claim that the transfer is good any time within the twenty-four hours in which it was issued, and this opinion causes a great number of disputes between passengers and conductors.

On account of the size of our road, conductors punch the date on the transfer, and, we have found that there is a liability of error in this way. Conductors are required to place the transfers collected on each trip in an envelope and deposit such envelope in a box provided for that purpose at the common center, where all cars pass. Collections of the envelopes through the day are made at regular intervals, and are turned in to the auditing department to be checked by clerks, whose duty this is, with the trip card or conductor to show that the number called for by the trip card has been turned in. The transfers are also checked for sequence of time, to show that conductors have issued them properly, according to serial number. All spoiled and unused transfers are turned in at the close of the day's work with their cash to the receiver. Transfers short in envelope, punched wrong date, or no date are charged to the conductor the same as register shortage. To these and all other errors in punching of transfer, the conductor's attention is called.

Transfers are registered on single registers the same as cash fares. On double registers transfers are registered on one side and cash fares and tickets on the other side.

It is shown by our reports that one passenger in five rides upon a transfer. This is a yearly average.

The traffic in transfers by employees is a trouble that we have not experienced to a very great extent, and gross abuse of transfer privileges are generally called to the attention of the officials of the company by the conductors, to be remedied where possible.

In conclusion, it may be said that the transfer is here to stay, and companies while desiring to be as liberal as is consistent with good business policy, must adopt such measures as will prevent them from being imposed upon too generally. This has happened in several cases, notably by systematic robbing practiced by conductors and accomplices in some of the large cities, the forging of tickets, as practiced in another city. The manager must therefore ever keep a watchful eye on this important branch of his business, because, as the volume of business increases, new difficulties will have to be met with by those in charge who must handle the problem according to the local conditions. The public know that they are entitled to certain privileges after they have paid a fare, but are hard to satisfy as to how far those privileges extend. Some believe that the laws are made exclusively to fit their side of the case; that the corporations have no right to restrict those privileges in any way; that they can ask for a transfer at any time throughout their trip, get off at any place they desire, stay as long as they want to, and then board any car that comes along and be carried to their destination. On the part of the railway companies there does not seem to be any concerted effort to find out how far the laws fit their side of the case, but they go on from year to year, satisfied because their business has increased, and hoping that the public will be contented. But experience has shown that, regardless of how much is given, the public will ask for more and rail at the hard-heartedness of public corporations if nothing more is given.

INTERURBAN TICKETING

BY J. E. STEPHENSON, OF BUFFALO

I realize that my subject, "Interurban Ticketing," is one that has been the object of experiment ever since the trolley started its way across our country, and that varying conditions, increasing extensions and later exigencies, which will arise as electric roads become more and more the means of interurban communication,

On double track the dispatcher's duties amount to little more than keeping apart the regulars and the extras, except in case of accident or other interruption to one or both tracks, which would make it necessary to move trains in an opposite direction from that given by schedule. Then the dispatcher's responsibilities are far greater than under any ordinary conditions presented by single-track operation.

Electric railways, except in a few instances, have not the advantage of manned stations along the line, with telegraphic communication with the dispatcher's office, as is the case with the steam roads. They are also at a disadvantage owing to the large number of operating units and the fast schedules maintained on their urban and interurban divisions.

By the use of the modern high-power telephone instruments and lines it is possible, by the use of verbal orders, to derive from a dispatcher's office all the advantages now obtained by the use of the telegraph; but on most railways it would be impracticable to keep in operation the telegraph stations, consequently some system of signals should be installed and maintained enabling the dispatcher to set an order signal at any desired point or telephone station along the line, and to receive an "answer back" or reply from the station so operated, which would be characteristic of itself, recording the same, together with the date, hour and minute of the operation, on an instrument in the office provided for the purpose.

All movements should be simple and automatic in their action and positive in reply, but in no case should the "answer back" be received until after the signal is at "full danger" and locked in that position.

Only one signal should be operated at a time, but so arranged that in case of the setting of two or more signals two or more movements of the office instrument should be made and their replies recorded. By the use of such a system all the advantages of the manned stations could be obtained, together with the additional advantage of its being always on duty.

Any system of signals which will bring about these results is of vital importance when set at special meeting points, either as a safeguard on crews forgetting orders which have been given, or in case of a car or train whose right of track having been overlooked, and is running ahead of a car whose rights have been restricted by orders. And, lastly, the important factor of operation enabling the dispatcher to correct a blunder should one be made should not be forgotten. While this course is seldom necessary its importance is apparent, as an accident is generally the result.

The combination of this system of signalling with the telephone puts every car, train and crew in the direct charge and control of the dispatcher. The operation of the road, or the respective division thereof, will then be reduced to the one man on duty, through whom all operating orders should be sent.

The importance of the dispatcher is second to that of no official of the road. He must be strictly temperate, of quick, sound judgment, a cool, clear head and of unquestioned ability. He must have a thorough knowledge of the road, the running time of cars, the ability of the crews and how much dependence to place in them. In fact, all the minute details of everything connected with the operation of cars and the character of the road must be known to him, but especially the time-tables and schedules.

All persons must recognize his authority, and his alone. All matters concerning time-tables and rights under existing schedules should be his regardless of opinion.

A dispatcher's duties are to keep the road operating as near the running time given in the time-tables as possible, and when cars are "on time" there is little for him to do. As soon as a car becomes "off-time" or late it is necessary for the dispatcher to take control of this car and govern its movements, properly restricting its right of track, and then moving up other cars against it. In this way he can keep the road "on time," making the already late car later if necessary, but holding all other cars to the time-table as nearly as possible. Otherwise his entire schedule becomes upset and the road late. At these times complete control must be had of all "extras," so they may be handled with due regard to the schedule.

He must daily test his instruments and signals and report to the superintendent any defects or interruptions that exist or have existed, and what measures have been taken for repairs. He must report all facts concerning employees disobeying orders or disregarding the rules of his department, and order the removal of such men, pending investigation, should he deem such a course necessary. He must construct all orders, keeping in a book provided for the purpose an exact copy of the same, and in addition he should keep a train sheet, showing all the operations of the day, and then filed away for future reference.

A dispatcher can be held responsible only so far as his orders and authority go, and any accident that may occur generally is traced to carelessness on the part of the dispatcher and the two men at fault.

The weak point in all systems of order despatching is that it provides little or no check on the employee, and when important movements are entrusted to them, either singly or doubly, if they blunder, the error results in disaster without chance of detection. Human agents err, and the dispatcher's system is devised so as to keep a check on the employee. If no mistakes were made by them no system would be necessary. But as it is, a system is needed which will reduce the liability of making blunders, and by demanding of the employee a full knowledge of the system, there is a chance of correcting the error as soon as made. The efficiency of the system is dependent upon the rapidity and surety with which it corrects the mistakes made by the employees.

Time is an important subject to be considered in the operation of railways by the dispatcher system, and one to which little or no attention is often paid. No employee should be allowed to carry a watch that will not run correctly within thirty seconds a week. A certificate of the condition and reliability of their watches should be furnished the dispatcher on regular blanks intended for that purpose, and signed by the jeweler appointed by the company, and who shall be officially known as the inspector of time. Standard railroad time should be adopted, and main regulators or master clocks should only be used for comparison by the men. The steam railroad rule governing the daily registration of any variation should be strictly adhered to and adopted. All cars should be run according to schedule unless superseded by special orders from the dispatcher.

An order from the dispatcher takes precedence always, and upon arrival of the car at the point designated in the order the car falls back on its schedule rights, unless the order be renewed or extended. A special order is never considered to mean more than it expresses, and must not be used as rights not fully and distinctly expressed in them. Crews having special orders against a certain car must be governed strictly by their orders and rights, as against all other cars not specified. All cars running as extras or work cars under special orders are considered "wild," and their rights are only to the extent of their orders.

Whether written or verbal train orders are given or received established forms should always be adhered to when possible, and orders must be so constructed as to admit of but one interpretation, and given in the same words to all employees affected by them.

Having given an outline of the system it will be well to give an example of a movement made by a dispatcher using the telephone and signal system previously described.

Should it become necessary to make a new meeting point for two cars, we will say, for example, at station No. 6, the dispatcher, by the use of the signal system, sets a signal at station No. 4 and No. 6, for it is his purpose to operate only on the side of safety and use the double order system of orders. The replies having been received that both signals are at danger, the dispatcher must, by order, hold all other cars at these points until he hears the call from the crew having the right of track. The motorman, seeing the signals at danger or against them, will stop the car, and the conductor will go to the telephone station and call the dispatcher's office; on receiving a reply, will say: "Smith and Jones, eastbound, station No. 6, signal set." This being the crew holding the rights of track, the dispatcher gives this order: "Smith and Jones, eastbound, will meet Hughes and Wheeler, westbound, at station No. 5." This message is repeated by Jones, and if correct he is given orders to have Smith, the motorman, repeat the message as he heard it; this is done, and if not repeated correctly, Smith is again given the order till he has it correct. He must then listen on the line till he receives the O. K. from the dispatcher. Should he hear the order given to the Hughes and Wheeler crew he must note carefully the message, and should any mistakes be made immediately call attention to the fact.

The message sent to Hughes and Wheeler, at station No. 4, should be in the exact words that it was given to the Smith and Jones crew. The O. K. in any case is given by the dispatcher in this manner: "Smith and Jones O. K.; restore the signal." Both crews now having the O. K. they can proceed to the new passing point. As a precautionary measure the dispatcher may now set the signal at station No. 5, and the first car arriving at the station will call the office, and the dispatcher asks for information regarding the other car. Upon its arrival being given, the time is noted on the train sheet and orders given to restore the signal.

Unless new orders are given at this point the cars now continue on their schedule.

In the transmission of telephonic messages giving orders for

the movement of cars, it is best to use a slow, distinct monotone, with no special stress on any part of the message, but making the whole message of the same importance.

No variation from the original wording of the message can be allowed when repeated by an employce, but it must tally, word for word, with the written order in the order book; then it will come from all repeating it in precisely the same language as given.

It would be useless to discuss the subject of electric block signalling systems, as applied to trolley lines, and used alone as an operating measure, for none of the systems now shown possess the first principals of a safe device. No signal should be used as a running measure wherein any wire or part necessary for the operation of the signal can be disconnected or broken without the signal coming immediately to danger. A signal that does not do this is not worthy of even a moment's consideration.

At best an electric signalling device, dependent for its means of operation on either the car or crew, should not be used as an absolute running signal, but only as a cautionary measure. Experience has proved this, and it matters not if some roads who have used such signals have never had an accident by their use. The time will come when too much dependence will be placed on them and serious results will follow.

It would, no doubt, be very beneficial to the subject in question if the managers of the various railways of the country employing despatchers would, during the coming winter months, send their despatchers to a convention, held for the purpose of discussing the question of safe operation under the train order system, and also for adopting a set of rules and forms for the government of all the companies represented. Such an association should be permanent from year to year, and the members can make such amendments to the rules adopted as they may deem advisable.

HYDRAULICS IN CONNECTION WITH STREET RAILWAY OPERATION

BY C. E. PARSONS, OF GLENS FALLS

Before the possibilities of the electric railway were recognized, nearly all of the accessible water-powers of the country had been developed for use in various arts and industries. So when the demands for cheap transportation increased it became necessary to find immediate means for supplying energy, and steam seemed to be the only available source. Railways were projected, built, and operated in a few months' time, and, although the cost of energy by steam was high, there seemed to be no other means of getting a quick return on the capital invested. To-day the engineer, with his knowledge of what may be done in electrical transmission and conversion, recognizes that water-powers are much the most important factors by which the cost of electrical energy may be reduced.

The new hydro-electric development at Spier Falls on the Hudson River is to play a most important part in the operation of the street railways in the eastern part of the State. Some of the features of this plant, and of the one at Mechanicsville, together with their various transmission systems, give an idea of what may be done in reducing the cost of energy as used for electric traction.

Within the last year a complete system of connecting railways has been put in operation in the Hudson and Mohawk Valleys, and lines now run from Gloversville in the west, to Albany and Hudson in the east and south, and Lake George on the north, while all of the intervening cities have the benefit of the most modern electric railway engineering and construction. Six different railway systems are located within a radius of 45 miles of the Spier Falls plant. The Hudson Valley Railway connects Albany and Warrensburg and the adjoining villages. The Ballston Terminal Railway connects the various manufacturing villages in the vicinity of Ballston. The United Traction Company's lines are located in Albany, Troy and vicinity. The Albany & Hudson Railway's third-rail system covers the territory from Albany south to Hudson. The Schenectady Railway Company operates lines between Schenectady, Albany and Troy, and has nearly completed a line to Ballston and Saratoga. The Fonda, Johnstown & Gloversville Railroad covers 34 miles of territory between Gloversville and Schenectady.

Three of these systems are now using power from Spier Falls and Mechanicsville. The Hudson Valley Railway is connected with the Glens Falls transmission line at Glens Falls. The voltage on this line is 20,000, and part of the current is used in rotaries at this point. The remainder is transmitted over the company's high-tension lines, located on the right of way to the Wilton substation. The 18-mile line from Saratoga to Glens Falls is supplied from the rotaries at this station. The railway company has a

complete system of high-tension lines, and connections may be made with very little additional copper, so that the whole 125 miles of line may be operated from Spier Falls. The United Traction Company of Albany is under contract to take 6000 hp. at its sub-stations in Watervliet and Albany, and a large part of this power is now being supplied. The Schenectady Railway Company is receiving power over three separate transmission lines. Two are from the Mechanicsville plant at 10,000 volts, and one from Spier Falls at 30,000 volts. These lines reach sub-stations at Latham's Corners on the Troy branch, Colonic on the Albany branch, and the Dock Street station in Schenectady. The railway company also has a 10,000-volt transmission system connected to its steam plant.

With the prospect of so much of the energy being used from Spier Falls for railway purposes, it became of the utmost importance that a reliable and constant supply should be assured. The one object which of all others has been kept in view since the very inception of this water-power development was to so build that the supply of power would never fail.

One of the first questions to be decided in a water-power plant is the size of the units, both of wheels and of generators. The Spier Falls plant is laid out with four more generators than can be run in extreme low water. This gives a spare set of generators during the low-water months, and provides for the sale of 30 per cent more power during the eight months of the year when the supply is abundant. Another feature which also applies to most plants is that of the construction of storage reservoirs to regulate the flow during the summer months. It is easier to provide for additional units to be supplied from this storage, while the first part of the plant is under construction, than at some future time, when foundations would have to be put in with the aid of coffer dams. The additional cost of the masonry and rock work for spare units is small, as compared with the expense of a shut-down, if future extensions are found to be desirable.

In regard to the question of the comparative size of water-wheels and generators there seems to be a difference of opinion among designing engineers, and at first consideration it might seem as if there were no necessity for a wheel much larger than the generator. The Spier Falls wheels are built to develop 40 per cent more power than the rated capacity of the generators, and the wisdom of such construction has already been demonstrated in the following manner. It became necessary, in order to fill power contracts, to start the generators before the dam was carried to its full height, and the wheels are now operated under a 64-ft., instead of an 80-ft., head. Because of their large capacity they are able to maintain the speed and develop the full rated power of the generators, although the head is 20 per cent less than that for which the wheels were designed.

The protection of the canal and forebay is a most important feature, and a thorough study of existing plants was made before the present layout was adopted. The canal and intake rack run parallel with the river, and the racks are made continuous, with ample space behind them. This gives a larger rack surface, and the velocity being correspondingly less, there is not so great a tendency for drift wood to choke the water supply. This arrangement allows the larger pieces of wood to be floated down the face of the racks, and over the waste way at the end, instead of lifting them out bodily. A practice which should be avoided where feasible, is that of placing the intake square across the current. If this is done heavy projecting piers must be built to take the ice thrust in times of high water.

The plant at Mechanicsville, unfortunately, has this arrangement, and there was serious trouble with the ice almost every year, until a series of ice breakers was built diagonally across the river. In order to facilitate the making of repairs on the hydraulic equipment, and to enable any part of the system to be laid up without interrupting service, a series of grooves for stop logs was arranged, both for the canal head gates and for the gates in front of the penstocks, and any of the gates may now be repaired or replaced without affecting the others.

The question of the governing of a plant is one to which altogether too little attention is usually given. It is impossible to attain accurate speed regulation with the best governor that can be built, unless due consideration has been given to the principles upon which depends the speed of a water-wheel. The function of a governor is to vary the energy delivered to the wheel as the generator load changes, and this can be satisfactorily done only when the gates and gate rigging are so designed that they will respond quickly to the governing mechanism. The limitation of speed control is that imposed by the inertia of the water, and to obtain good governing the one most essential thing is for the water column to respond promptly to the varying aperture of the gates. It is to the water column, therefore, that attention should be given from the moment the plant is begun, if the accurate

speed control which is now demanded is to be obtained. The shorter the penstock, the sharper the downward pitch, and the less the velocity, the better on the whole will be the regulation.

It must be remembered also that the water column does not end at the gate; and long and contracted draft tubes and shallow tail races may have a serious effect on the governing, even if the work above the wheel is correctly planned. Frequent cause of disaster is the sudden and dangerous rise of pressure in the penstock, due to sudden closing of the gates, and there seem to be but two practical methods of eliminating this danger. Standpipes are effective if properly built, but are expensive and a source of trouble in cold climates. The problem seems to be solved at Spier Falls by the use of Lombard relief valves. They are easily adjusted, open and close quickly and have a discharge area large enough to afford ample protection. As a result of a study of the foregoing principles and of the adoption of the most modern governors, the regulation of the Spier Falls plant is very satisfactory.

The switchboard is another part of the system which needs to be carefully studied if shut-downs are to be reduced to a minimum, and the one at Spier Falls is to be modern in every respect. It will be possible to put any one of the ten machines on any one of the eight outgoing circuits, by means of the small controlling switches on the operating board in the center of the station. Consequently in case of trouble with the generators, there will be no delay in changing. The transmission lines are all to be built in duplicate, and two separate pole lines, running through different sections of the country, will reach the larger centers of power distribution.

There is a great deal of scepticism among railway managers in the East, as to the reliability of water-power as applied to electric traction. This is largely due to the fact that designing engineers have not given the proper study to their hydro-electric developments, and numerous shut-downs and poor regulation have caused the more conservative to withhold their approval. From the results which will be attained in the Spier Falls plant, and in other modern plants of this character, under construction, it seems safe to predict that water-power will be as reliable as steam, with the additional advantage of a saving of 50 per cent in the cost of energy.

NOTES ON SOME OF THE EXHIBITS

The National Car Wheel Company, of Pittsburg, was represented by Charles L. Jackson, of New York.

The interest of the National Electric Company, of Milwaukee, was well taken care of by H. W. Ransom, J. T. Cunningham and Robert Long.

The Sherwin-Williams Company was represented by F. A. Elmquist, of Cleveland.

William B. McVicker, of New York, was present at the convention in the interests of the Dearborn Drug & Chemical Company, of Chicago.

The interest of the Taylor Truck Company, of Troy, N. Y., was well looked after by Frank M. Nicholl.

The Lorain Steel Company was represented by H. C. Evans, of the New York office.

R. W. Conant, of Cambridge, Mass., was on hand at the convention, exhibiting his motor and bond testing instruments.

The Cornell Manufacturing Company, of Syracuse, N. Y., exhibited, for the first time at a convention, its new automatic trolley switch. This switch was shown in the lobby of the Yates, as well as in actual operation in the overhead construction of the Syracuse Rapid Transit Company, on the corner of James Street and Manlius Street. This corner is one of the most difficult and troublesome to the overhead material of the company. The switch has been in operation there for some months, and since its installation no trouble has been experienced in keeping the trolley on the wire. The switch possesses a movable tongue, or rather a double tongue, to carry the trolley wheel from the branch wire to the main wire, the tongue being automatically moved into position by the trolley wheel.

The Pittsburg Reduction Company was represented by Safford R. Colby, manager New York office, and W. R. Darby.

The Lumen Bearing Company, of Buffalo, N. Y., was represented by Edward P. Sharp, manager of the street railway department.

The John A. Roebling's Sons Company was represented by Marston R. Cockey and G. W. Swan, both of New York.

The American Steel & Wire Company was represented by A. G. Greenberg, of Worcester, Mass., and F. A. Keyes, of the New York office.

The presence at Syracuse of E. J. Lawless, of New York, and

Thomas F. Carey, of Boston, was appreciated by the many friends of the John Stephenson Company.

The H. W. Johns-Manville Company, of New York and Milwaukee, had in attendance at the convention J. W. Perry, manager of the electrical department.

The Curtain Supply Company, of Chicago, had as its representative at the convention its general sales agent, A. L. Whipple, of New York.

N. M. Garland, the New York agent of the Ohio Brass Company, attended the convention in the interests of his company.

The New Process Raw Hide Company, of Syracuse, N. Y., was represented by its vice-president, T. G. Meachem.

The Keefer Car Switch Company, of Albany, N. Y., had as its representatives J. W. Keefer and D. H. Keefer. One of the company's switches was installed on the corner of West Genesee and Salina Streets. Many of the delegates to the convention inspected the operation of the switch and made comments in its favor.

The Consolidated Car Heating Company, of Albany, N. Y., was represented by Cornell S. Hawley and S. B. Keys, of the New York office.

The Crouse-Hinds Electric Company, of Syracuse, N. Y., had a very neat exhibit, in the writing room of the Yates, of the various specialties manufactured by this company. The booth was decorated by Norbitt specialties extensively used in the decoration of street railway parks. The new arc headlight recently perfected and placed on the market by this company was exhibited in full operation. The well-known Syracuse changeable headlight, junction boxes and heavy switches were also on exhibition. The company was represented by its president, H. B. Crouse.

The American Automatic Switch Company, of New York, had on exhibition a model automatic switch. The company was represented by H. N. Powers.

The Duff Manufacturing Company, of Pittsburg, had as representative at Syracuse George A. Edgin, who entertained the friends of the company in room 84 of the Yates, where some Barrett jacks were on exhibition.

Heywood Brothers & Wakefield Company, of Wakefield, Mass., was represented by its New York sales agent, Bertram Berry.

The Ohmer Fare Register Company, of Dayton, Ohio, was represented at the convention by C. W. Ketterman, who exhibited the Ohmer Register in room 185 of the Yates.

The O. M. Edwards Company, of Syracuse, N. Y., had a very neat and extensive exhibit in the writing-room of the Yates. All types of this company's patent window fixtures for railroad cars, and its automatic trap-door for vestibules of Pullman cars, were shown. The newly patented window fixture for opening and closing windows in closed street cars, as well as the improved new type of Hartshorn roller for curtains in open or closed cars, were also exhibited. The company was represented by Messrs. O. M. Edwards, J. E. Simons and G. G. Norris.

The Continuous Rail-Joint Company, of Newark, N. J., was represented at the convention by B. M. Barr, of the New York office, and W. A. Chapman, of the Boston office. This company had a very neat exhibit of the well-known continuous rail-joint.

The Van Dorn & Dutton Company, and the Van Dorn-Elliott Electric Company, of Cleveland, Ohio, were represented at the convention by W. A. Dutton, treasurer of the company.

The Brady Brass Company, of New York, was represented at Syracuse by its president, Daniel M. Brady.

The interests of the Columbia Machine Works and Malleable Iron Company, of Brooklyn, N. Y., were ably looked after by Second Vice-President W. R. Kerschner.

The Bemis Car Truck Company, of New York, was represented by Eugene McKernan. A neat model of one of the company's medium heavy trucks was exhibited in the rotunda of the Yates. There are embodied in this truck many excellent features which ought to appeal strongly to managers who are looking for a truck which will stand up under the severe conditions of heavy suburban and interurban service.

The Westinghouse Traction Brake Company was represented at the convention by J. R. Ellicott, C. R. Ellicott and George E. Baker.

The interests of the Westinghouse Electric & Manufacturing Company were looked after by Paul T. Brady, S. B. Storer and J. D. Mickle, of the Syracuse office of the Westinghouse Company.

J. W. High, of New York, took good care of the friends of the Pantasote Company at the convention.

The Rochester Car Wheel Works was represented by E. H. Chapin.

The Peckham Manufacturing Company, of New York, was represented by its second vice-president, E. G. Long. A complete and handsome catalogue of the various types of trucks built by the Peckham Company was distributed among the delegates at Syracuse.

J. H. Stedman, of Rochester, N. Y., attended the convention in the interest of his own business, as well as that of the Ohmer Fare Register Company, of Dayton, Ohio.

The L. Plant Iron Works, of Syracuse, N. Y., had on exhibition several types of brake-shoes, which it is manufacturing for street railway service. L. Plant took care of the interest of the company at the convention.

George M. Haskell, New England agent of the J. G. Brill Company, was present at the convention in the interests of his company.

The General Electric Company had as representatives at the convention, J. J. Mahoney, H. Greer and A. B. Babson, of the New York office; W. Gibson Carey and J. G. Barry of Schenectady; H. H. Crowell, of Syracuse, and J. C. Calisch, of Buffalo.

The Standard Underground Cable Company displayed a very interesting exhibit of its manufactured goods, including bare, weatherproof and rubber-covered wire, and the many styles of aerial, underground and submarine cables, of which the company is one of the largest manufacturers in this country. One of the company's large new plants has been devoted almost exclusively to the manufacture of trolley and weatherproof feed wire for railway use, and is now engaged in turning out some of the largest orders for these materials that have been awarded this year. The company was represented by H. P. Kimball, of the New York sales office.

NEW STREET CAR REGULATIONS FOR BOSTON

The Massachusetts Railroad Commissioners have ordered that Boston's regulations regarding the running of street cars be changed to comply with the following:

1. In approaching any public or private way intersecting that in which the railway is located the speed of the car must be reduced to such a rate as will make it possible to stop it immediately.
2. In rounding curves the speed of the car must be reduced to meet the condition of limited vision of railway and highway.
3. Before taking any heavy descending grade the speed of a car must be so reduced as to test the working of the brakes.
4. Where the railway lies within a highway and is close to a narrow traveled road, the speed of the car must be reduced to meet this condition whenever such road is in rightful use by others.
5. Where the railway occupies a portion of the traveled road the absence of any exclusive right of way on the part of the car makes it necessary that its speed be from time to time so restricted as to permit others to safely exercise their common right to a reasonable use of the road.

LORAIN STEEL COMPANY'S CLAIMS ADMITTED

The controversy between the Town Council of Wolverhampton, England, and the advocates of the Lorain surface contact system has resulted in a substantial victory for the Lorain Steel Company. As reported in the *STREET RAILWAY JOURNAL*, of July 4, the Council had refused to reimburse the company in full, alleging that it had not carried out the promises made as to efficiency and economy. The company naturally declined to admit the unreasonable assertions made by some of the Council members, but expressed its willingness to arbitrate. A sub-committee, appointed to investigate the matter, presented a report which was very favorable to the Lorain Steel Company, and from which it appeared that the corporation had offered the company £15,000 for the tramway. This offer was rejected, as were also several others. The company finally sent a communication to the Council requesting payment in accordance with the contract, the entire amount being about £25,000. The sub-committee recommended the acceptance of this proposition, but was voted down.

At a later meeting Alderman Mander, chairman of the tramways committee, stated that the company was willing to accept £22,000 and install a number of new contact boxes. He also presented some figures in favor of accepting the company's offer, and said that the installation of the new boxes would result in an additional saving of £530 per annum. Although some members opposed these statements, the Council finally acceded to the company's terms by a large majority.

President C. H. Shattuck, of the Parkersburg, Marietta & Interurban Railway Company, of Marietta, Ohio, has issued an appeal through the newspapers requesting parents to exercise care in permitting children to play on the streets traversed by the company's lines. Employees have personally visited many of the homes and requested parents to forbid their children to play on the tracks.

ANNUAL CONVENTION OF THE MASSACHUSETTS STREET RAILWAY ASSOCIATION

At the annual meeting of the Massachusetts Street Railway Association, held at Young's Hotel, Boston, Sept. 9, 1903, the following officers were elected: President, Edward P. Shaw, of Newburyport; first vice-president, Francis H. Dewey, of Worcester; second vice-president, Robert S. Goff, of Fall River; treasurer, Fred H. Smith, of Quincy; secretary, Charles S. Clark, of Boston; executive committee, the president, vice-presidents and H. H. Crapo, of New Bedford; P. F. Sullivan, of Lowell; W. S. Loomis, of Holyoke; W. W. Sargent, of Fitchburg, and R. T. Laffin, of Worcester. The following were elected auditing committee: Charles F. Grosvenor, of Palmer; George W. Cook, of Springfield, and H. C. Page, of Pittsfield.

A REAL TROLLEY GUIDE

Since May 15, 1903, the Electric Print, of Trenton, N. J., has issued regularly as a monthly publication a handbook of electric railway trips in New Jersey, Pennsylvania and Delaware that, for completeness as to the details of the service given, the operating schedules and the rates of fare, is superior to guides that are much more pretentious. No attempt has been made to make it a literary production, and no pictures are given of places of interest in the territory covered. Instead, all this is displaced by information that the tourist needs in order to travel with the maximum of comfort. At the very beginning of the book, and where it is most needed, is a summary of the trips now possible within the territory which the guide covers. Following this is a detailed schedule of the service between New York and Philadelphia. The number of changes, time cars leave, their time of arriving at their destination, the fare, the frequency of the cars and the time the last car leaves are given in a tabular form that can be readily interpreted. Supplementing this is descriptive matter that details the entire route between the cities. Similar details and tables are also given of the routes between Philadelphia and Reading and the Lehigh and Wyoming Valleys. Of the trips of which details are given, but that do not warrant time tables, are many into and between Pennsylvania towns, also into Delaware. Trips in New Jersey that may be taken as side issues to the New York-Philadelphia trip are also given. The guide is closed with tables of places reached by trolley from Philadelphia and from Trenton, with details of the time, fare and distance from these cities. It is a guide that guides, and should be in the possession of all persons having occasion to use the electric railways within the territory it covers.

TEACHERS BECOME MOTORMEN AND CONDUCTORS

The lot of the country school teacher—perhaps it should be said the lot of the school commissioner—seems to be particularly hard just now in the vicinity of Springfield, Ohio, for complaint has been entered by the superintendent of the township schools that low salaries have caused the teachers in these townships to give up teaching, thus making it impossible to open the schools this season. The teachers who deserted the country and their positions are said to have become motormen and conductors of city street cars. Now, as between the village school marm, who falls a victim to Cupid's darts and deserts her profession in the middle of the school year to become the helpmate of some prosperous farmer's son, just returned from college, and the hardy young rustic who deserts his profession for a place on an electric car, the school authorities are certainly in a bad predicament. But the question is how to cope with the situation. Increase the pay of the teacher is at once the cry. But hold! That won't help the situation very much, either. Granting that the authorities could increase the pay, it seems improbable that the desire of the country youth to break away from home associations could be overcome, and that the susceptibility of the young women to the darts of Cupid could be reduced by this means. Some will, perhaps, suggest that a Guizot is needed to address to the community another such touching letter on schools and their influences that the tide of desertion may be effectually stopped. It is not so many years since the famous Frenchman lived, but there has been such a change in political conditions. What do we of the present day care for the service that will find its ultimate reward in heaven? No, that isn't sacrilege. We are simply, as Punch would say, looking out for ourselves. If deserting school teaching for a position on an electric car is going to add materially to our earthly lot, why we are just sordid enough to become motormen. And if poor school teachers become good motormen, the community at large and the street railway companies will be benefited, although it may be hard on the school commissioners at first.

SEVENTH ANNUAL MEETING OF THE METROPOLITAN STREET RAILWAY ASSOCIATION

The seventh annual meeting of the Metropolitan Street Railway Association was held at Carnegie Hall, New York, on Oct. 3, 1903. This association is a mutual benefit organization, composed of employees of the Metropolitan Street Railway Company, and of the Interurban Street Railway Company, and is one of the most successful, as well as the largest organization of its kind in the world. The initiation fee to members is \$1.00, and the dues are 50 cents a month. For this a member of the association receives free medical attendance, medicine at cost, and one-half his wages while sick. He also has a life insurance of \$300, a pension when superannuated, depending, in amount, upon the length of time he has been in the service of the company; use for himself and his family of the library of the association, use of its club rooms, and other privileges. The expense of all of these are not defrayed by the association itself, as certain of them, as, for instance, a bed in St. Vincent's Hospital, have been donated by the president individually, while others, like the pensions, are given by the company. In addition to the receipts from initiation and dues, the association, under a State statute, is the recipient of the amount received for the sale of unclaimed property found on the cars.

The financial statement of the organization distributed at the annual meeting shows among other statistics that the association has paid out, during the year, sick expenses and death claims to the amount of \$26,439, and up to date \$111,280. The association has a fund invested of \$15,000 and cash on hand of \$16,244.

The annual meeting is by no means devoted entirely to a report of the finances of the association. A vaudeville entertainment is given, and the families, as well as the members, are invited to it. Carnegie Hall was crowded on the evening of Oct. 3, and among those present were a number of invited guests, who witnessed an excellent programme, rendered by performers from a number of the city theaters. At the opening of the meeting the president of the association, H. H. Vreeland, made an address, reviewing the work of the association, and as it outlines so well the scope of the association a portion of it is given below.

MR. VREELAND'S ADDRESS

We have met so frequently during the past year that there is little which is new that I can say in connection with the growth and work of the association and my relations with you men, but the meeting this year has a special significance, first, because this is the tenth anniversary of my connection with this property, and, secondly, because ten years ago a little group of thirty or forty men, of whom I was one, laid the foundation for this, the most successful mutual association of its kind in the world. I shall not go over the many detail benefits which I think have accrued to us as an outgrowth of this association, but simply wish to mention one or two salient points in connection with it. The principal things which I had in mind at the time of the organization of the association, were, first, medical attention and financial assistance for sick and disabled members; second, a death benefit fund; third, social and educational opportunities; fourth, establishing a pension fund. From time to time during the past ten years of the association's history, as circumstances and financial conditions warranted, these various benefits have been established. The first three on the part of the association, and the last by the railroad company by whom we are employed.

Referring to the pension system in combination with the association, from the time a man enters the service of the company, until the time of his death, he is properly cared for, the pension system stepping in where the association leaves off when a man becomes incapacitated for active labor. It has also been made a rule that all of the lighter grades of work, such as transfer agents, janitors, watchmen, etc., are reserved for men in the service of the company who, either on account of age or injury, have become incapacitated for the more active service. This is in direct contrast with the system in vogue years ago, when influence had much to do with the placing of men in these positions, employees of many years of service being forced out with no means of support.

As an illustration of the workings of the pension system, an employee with an annual salary of \$900, who receives 40 per cent of that average salary through pensions, would receive \$360 per year. This is the interest, at 4 per cent, on \$9,000, a sum which a man living in a thrifty manner would be unlikely to save during his active service.

During the earlier years of the association, many financial and operating men connected with large systems of street railways, considered an association of this character as useless and sentimental. These same men are now forced to admit that there were many other features in such an association, and they are now attempting to do this very thing which they condemned a few years ago. The

relations with their employees not having been satisfactory, adjustments of questions have been conducted by outside influence, causing friction and ill-feeling between employees and the management, with resulting ills to all concerned. Whatever we have done in the way of settlements of differences has been between ourselves in a friendly way and has resulted satisfactorily to all concerned. The employees of our system stand to-day in the matter of wages, hours of service, relations with officers and heads of departments, in as good, if not better, position than the employees of any other street railway system in the world. All this has been accomplished through the understanding that has been the result of personal contact with the officers and operating heads of departments through the medium of association work.

Since we last met I have traveled far and seen many properties like ours devoted to the public service, and I am proud to tell you that nowhere had I occasion to feel but flattered by the contrast which naturally comes to mind under these circumstances. Nowhere, and I investigated public service corporations under three different forms of government and twenty odd forms of management, was there anything like the conditions under which we exist. You know there is nothing more general than the impression that the other fellow's job is easier and pleasanter than the one we have, but we generally find on investigation the other fellow has troubles of his own which make ours easier to bear. We have done our own work of combining for mutual benefit, and we are not the object of patronage for any one. We own, as an investment, an interest in the property we operate, and we help each other from our own resources, and this is as it should be, for on no other plan can men secure that mutual respect which is the very foundation of confidence.

NEW TRANSFER ARRANGEMENT IN CLEVELAND

The Cleveland Electric Railway Company has promulgated a new rule, which it is hoped will circumvent those who have been taking unfair advantage of the universal transfer put into operation when the local Cleveland companies were consolidated. Heretofore transfers have been issued to passengers approaching transfer points, and they have been given without question, whether the passenger paid fare or presented a transfer. The new rule, which went into effect Oct. 1, compels the passenger to ask for the desired transfer when he pays his fare. There is no hard and fast rule relative to giving a transfer on a transfer, when a passenger desires to go in one continuous direction, but a transfer which will enable a passenger to return in the direction from which he came is refused.

PROCEEDINGS OF THE TWELFTH ANNUAL CONVENTION OF THE PENNSYLVANIA STREET RAILWAY ASSOCIATION

On Sept. 23 the Pennsylvania Street Railway Association began its twelfth annual convention. The sessions were held in the ballroom of the Park Hotel, Williamsport, Pa., and were attended by a large number of street railway and supply men.

The convention was called to order by President Ernest H. Davis, who also introduced Hon. John F. Laedlein, Mayor of Williamsport. Mayor Laedlein welcomed the delegates and briefly reviewed the good points of Williamsport. He was followed by President Davis, who, after responding to the Mayor's welcome, took up the regular work of the convention. He laid particular stress upon the question box idea, and expressed the hope that through the hearty co-operation of the members the question box would prove of valuable assistance to street railway men. In referring to the development of interurban railways President Davis said that their construction in the past had been greatly hindered, owing to unnecessary restrictions in the present State laws, and called upon the members to use their utmost influence to secure more favorable legislation for interurban railways.

The afternoon session was devoted to the reading of and discussion on John F. Ohmer's paper entitled "Fares and Fare Protection," which was published in the *STREET RAILWAY JOURNAL* of Oct. 3. In the evening the delegates enjoyed a smoker at the Park Hotel. The following day over seventy delegates took a pleasant trip, in three special coaches, to Eagles Mere, via the Reading, Williamsport & North Branch Railroad.

The election of officers resulted as follows: President, F. B. Musser, general manager, superintendent and purchasing agent of the Harrisburg Traction Company; secretary, C. H. Smith (re-elected), superintendent and purchasing agent of the Lebanon Valley Street Railway Company; treasurer, William H. Lanus (re-elected), president of the York County Traction Company.

FINANCIAL INTELLIGENCE

WALL STREET, Oct. 7, 1903.

The Money Market

On the whole the money market is currently described as somewhat easier than a fortnight ago. This description applies, however, to the surface tendency rather than to the market's real position. Liquidation on the Stock Exchange has freed a certain amount of capital which was not available two weeks ago; from Sept. 12 to last Saturday there was a total shrinkage of over \$13,000,000 in loans of the Clearing-House banks. In addition to this the government has redeemed some \$4,500,000 of the 5 per cent bonds under the recent offer, and the greater part of this sum having found its way to New York, has kept the Sub-Treasury a debtor, where a little while ago it was a creditor in the local market. Finally the extreme delay in the harvesting of the crops is making itself felt in an exceptionally slow movement of currency to the interior. Shipments were heavier last week than they were the fortnight before, but their volume still fell considerably short of a year ago. As a result of these several causes, local bank reserves have been remarkably well preserved, and time money rates have softened a trifle. But it must be observed that each of these factors mentioned as prominent during the last two weeks, is likely to be only temporary. Selling in the stock market has come to a halt, and no further loan contraction on this account can be expected. The Treasury bond disbursements have admittedly fallen below expectations, and even now are slackening. As for the interior cash movement nobody supposes for a moment that the outgo will not soon reach its customary large proportions. There is little prospect of gold imports this autumn, because, even with increasing exports of cotton and grain, our market will have to repay a number of foreign loans which mature during the next few months. The conclusion is, therefore, that while anything like the crisis of a year ago is extremely improbable, bank reserves from now on are likely to decline very steadily, and money rates to work higher. Call money is a trifle stiffer, at an average of 3 per cent. Sixty-day discounts are quoted at $5\frac{1}{4}$ to $5\frac{1}{2}$ per cent, with $5\frac{1}{2}$ per cent nominally asked for four months' loans.

The Stock Market

The stock market has gone through another feverish period during the last two weeks, with several days of rather severe decline, which was scarcely less disturbing than the dark days of July and August. Nobody now pretends to find an explanation for the liquidation that has occurred in anything else than the necessities of the sellers. There is no doubt that certain wealthy holders have had to let go some of their standard investments in order to protect themselves against obligations incurred in the numerous flotations of new capital during the last few years. They have been compelled to throw over their stocks regardless of price; consequently it is urged that market quotations cannot be considered a fair measure of intrinsic values as ordinarily determined by conditions outside of the stock exchange. This, however, is not the only element of weakness in the situation. The urgent needs of those who have sold the stocks are only half the story. What is of equal importance is the reluctance of the investors of the country to come in and buy. Investment capital is unquestionably timid. It is fearful lest the great decline in security prices during the past year represents something more than a speculative crisis, lest it portends a season of general trade depression which would bring with it decreasing earnings, reduction of dividends, and a consequent lowering of real investment values. This uncertainty, widespread as it has now become, prevents any substantial improvement in the general market. The business situation, as a whole, presents few evidences of a retrograde movement. In the iron trade there has been considerable falling off, and reports from other industries are that business is slackening. But such measures as bank clearings and railroad earnings, which are usually the most accurate guides to the state of trade in general, are holding well above last year's corresponding level, and it is impossible to believe that this favorable comparison could be made if a really serious reaction were in progress. The future is uncertain, to be sure, but the main point is that there is no better ground for pessimistic than for optimistic predictions. The waiting attitude assumed by the stock market is, however, the most sensible one under the circumstances. It is doubtful if the standard stocks can go much lower than they

are now, even if liquidation were to be renewed, but, on the other hand, so long as genuine investment buying is scarce, and the larger interests cautious, there is nothing upon which to base any substantial operations for the rise.

During the general collapse in the market of ten days ago the local traction stocks were as weak as any other group. All of them reached new low prices for the season. Metropolitan was driven down below 100, and Brooklyn Rapid Transit below 30, which means the lowest that they have ever sold since the time previous to the boom of 1898-1902. There is a persistent rumor that most of the selling of the traction shares came from one or two capitalists whose reputation in street railway affairs is international. This version is corroborated from so many different sources that it is impossible to believe that it has no good foundation. Manhattan went off with the others, but has rallied much more readily, and altogether has given a very good account of itself. The investment absorption of this issue is steadier than, perhaps, in any other active stock in the market. Brooklyn Rapid Transit has suffered probably unjustly from some disagreeable reports concerning the financial position of one of the most active speculative interests in the property. There certainly has been very little attempt made to support the stock.

Philadelphia

The market for traction shares in Philadelphia has borne its part in the general speculative liquidation of the period. The leading stocks have, as a rule, reached bottom figures again, and in one or two instances have made new low records for the season. Philadelphia Company common declined from $38\frac{1}{2}$ to 36 a week ago Monday, this being the lowest that the stock has ever sold. It rallied sharply on the succeeding days, getting back to $38\frac{5}{8}$ ex-dividend, then dropped back again to $37\frac{3}{8}$. The preferred held steady at $43\frac{3}{4}$. Union Traction broke from 44 to $40\frac{7}{8}$, recovered to 43, then sold off to $42\frac{3}{4}$. Philadelphia Rapid Transit dropped from $13\frac{3}{4}$ to 11, then rallied to $12\frac{1}{2}$. Philadelphia Traction suffered less than any of the group, with a decline from $94\frac{1}{2}$ to $93\frac{1}{2}$, and a recovery to 94. American Railways sold down from 43 to 42, and up again to $42\frac{1}{4}$. The selling in all these stocks had little reference to individual properties; it reflected merely the exigencies of people who were forced to sell on account of general market conditions. Other traction sales in Philadelphia included Consolidated of New Jersey at 60, Hestonville Passenger preferred at 73, and Fairmount Park Transportation, fifty shares of which sold at 20, a loss of six points from the last previous sale.

Chicago

In most instances the recent fluctuations in the Chicago market have represented a changing about of quotations rather than variations in the relative strength of the buying and selling. To illustrate this it may be observed that South Side Elevated declined last week from 95 to $90\frac{1}{4}$ on transactions of only 80 shares, while the very next transaction was the sale of 20 shares at 95 again. In the same way it took only a few scattering offerings to depress Metropolitan Elevated common from 18 to 17, and only a single purchase to carry it back to 19. Metropolitan preferred dropped 2 points from 55 to 53, establishing a new low record for the season. Traffic on all the elevated lines during September showed moderate gains over the same month of last year. These ranged from an increase of 7 per cent on the South Side, to a little more than $\frac{1}{2}$ per cent on the Lake Street. September was the best month, altogether, for the year, with the exception of June. The reorganization committee of the Lake Street Elevated is supposed to have finally arranged the main outlines of its plan, and to be ready to present them to the public at an early date. The stock has changed hands during the last two weeks between $4\frac{1}{2}$ and 5. It is stated that the whole affairs of the Union Traction Company will now be taken up very shortly by Judge Grosscup and the receivers of the company. The subjects now under discussion are, the reorganization of the company, including the disposition of the North and West Chicago lines, negotiation with the city officials on the franchise proposition, ways and means of raising sufficient money to carry on the work of improvement, and, finally, what permits shall be secured from the city for necessary repairs. Scattering sales have been reported in Union Traction preferred at 32, West Chicago at 52, North Chicago at 95, Northwestern Elevated from 17 down to 16, and back to $16\frac{3}{4}$, and City Railway from 170 to $167\frac{3}{4}$, to 170 again.

Other Traction Securities

All of the Boston traction specialties lost heavily during the severe declines of ten days ago. Massachusetts Electric common made a new low figure at 17½, but when the later recovery set in it rallied very rapidly to 21. The preferred stock was much less excited, both on the decline and on the subsequent advance. It went as low as 77 and as high as 78. Boston Elevated fell from 136½ to 135, but recovered to 137. West End common got down to 88¼, then rallied to 89, the preferred changed hands at 108 to 109. In Baltimore the feature of the recent dealings has been the extreme weakness in United Railways issues. Both the stock and the bonds made new bottom figures for the season. The stock went down from 10 to 8½, but later rallied to 9¾. The general mortgage 4s were driven down from 89¼ to 89½, but have since regained more than this loss; they sold yesterday at 90¾. The income bonds were relatively the weakest of the three. They dropped from 61¾ to 58¾, rallied to 60¼, and fell again to 59¾. The break in all of these has been due entirely to the general market demoralization. Other Baltimore sales include Philadelphia Company's 5s at 108¾, Atlanta Consolidated Street Railway 5s at 101, Norfolk Street Railway 5s at 105½, Newport News & Old Point Comfort 5s at 100, North Baltimore Traction 5s at 116, Virginia Electric Railway debentures at 85, and Anacostia & Potomac 5s at 92. On the New York curb particular interest was aroused by the remarkable fluctuations in Interborough Rapid Transit stock. The decline in these shares from 97 to 81 was associated with the demonstration against the other local traction issues on the floor of the stock exchange. One rather credible report had it that a loan in which Interborough stock formed a part of the security was hastily sold out, and that this was the explanation for the extreme decline. The shares rallied nearly 7 points from their lowest, getting back to 87½, but they soon fell off again to 83. Other curb sales for the two weeks comprise, American Light & Traction preferred at 90, St. Louis Transit from 17½ to 17. Washington Traction 4s at 72¼ and 72, and Brooklyn Rapid Transit 4s from 77½ down to 76 and back again to 77½.

Security Quotations

The following table shows the present bid quotations for the leading traction stocks, and the active bonds, as compared with last week:

	Closing Bid	
	Sept. 22	Oct. 6
American Railways	43	42
Aurora, Elgin & Chicago	a20	a17
Boston Elevated	137	135
Brooklyn Rapid Transit	37¼	33¾
Chicago City	170	170
Chicago Union Traction (common)	4½	4
Chicago Union Traction (preferred)	30	30
Cleveland Electric	a70¾	60
Consolidated Traction of New Jersey	60	59
Consolidated Traction of New Jersey 5s	104½	104¼
Detroit United	65¼	64
Elgin, Aurora & Southern	a42	a42
Lake Shore Electric	—	a7
Lake Street Elevated	5¾	4¼
Manhattan Railway	132½	130½
Massachusetts Electric Cos. (common)	19	20
Massachusetts Electric Cos. (preferred)	78	77½
Metropolitan Elevated, Chicago (common)	18	18
Metropolitan Elevated, Chicago (preferred)	53	53
Metropolitan Street	112	105
New Orleans (common)	10	9¾
New Orleans Railways (preferred)	30	30
North American	75	71
Northern Ohio Traction & Light	15	15½
Philadelphia Rapid Transit	13½	12
Philadelphia Traction	94½	94
St. Louis Transit (common)	17	15¼
South Side Elevated (Chicago)	94	90
Syracuse Rapid Transit	—	—
Syracuse Rapid Transit (preferred)	—	—
Third Avenue	108	105
Toledo Railway & Light	20	17¼
Twin City, Minneapolis (common)	—	86
Union Traction (Philadelphia)	43¾	42¼
United Railways, St. Louis (preferred)	65	62

a Asked. b Last sale. * Ex-dividend. † \$10 paid.

Iron and Steel

Yesterday's cut in the Steel common dividend, and the report of the heavy decrease in the company's earnings in the last three months, afford the most conclusive evidence of the extent and im-

portance of the recent reaction in the iron industry. This falling off in the profits of the leading concern is largely, no doubt, due to the tie-up in the building trades in New York city this last summer, and in so far as this is true the decrease may prove to be only temporary. Yet, making all allowance for this explanation, yesterday's developments must be considered as the first positive check upon the prosperity of business in general, and the steel trade in particular, of which the public has been apprised.

Conditions otherwise in the iron market are substantially the same as they were two weeks ago. The drift continues toward lower prices for pig iron, and, in fact, a fresh reduction of 50 cents a ton was reported in the leading grades only yesterday. It now remains to be seen how successful the attempts to restrict production recently inaugurated will be. That there is at present an over supply, although not a particularly large one, is generally admitted. As for iron and steel manufactures, the labor troubles have been, and still are, the most adverse factor. But another unfavorable influence, the importance of which can scarcely be over-estimated, is the necessity on the part of the railroads to curtail their improvements and extensions, because of their inability to borrow the requisite capital on advantageous terms. Quotations are as follows: Bessemer pig \$16.85 per ton, Bessemer steel \$27, steel rails \$28.

Metals

Quotations for the leading metals are as follows: Copper 13½ cents, tin 26 cents, lead 4½ cents, and spelter 6 cents.

REPORT OF THE RAILWAYS COMPANY GENERAL

The report of the operations of the Railways Company General for the fiscal year ending June 30, as made public at the annual meeting of the company last week, compares with 1902 as follows:

	1903	1902
Income interest on bonds subsidiary companies, etc.	\$75,532	\$24,618
Expenses (salaries, rents and taxes)	7,445	6,748
Net profit	\$68,087	\$17,869

The profit and loss balance as of July 1, 1902, was \$17,869, and as of June 30, 1903, \$85,957.

Balance sheet as of June 30, 1903:

ASSETS	
Cash	\$30,076
Due from subsidiary companies	108,419
Bond of subsidiary companies	593,132
Capital stock of subsidiary companies	256,090
Other securities owned	120,825
Sundry underwritings	183,865
Furniture and fixtures, etc.	4,366
Capital stocks of Railways Company General in hands of W. W. Gibbs and George S. Graham, trustees	34,000
Unpaid stock subscriptions	28,000
Total	\$1,358,677

LIABILITIES

Capital stock	\$1,200,000
Due to banks and bankers on company's notes	\$231,719
Less loans upon collateral	159,000
Profit and loss	85,957
Total	\$1,358,677

During the year it was considered wise to move the offices of the company to the city of New York, where the principal interests of the country are now concentrated. President Dick said:

"With the exception of Michigan Traction, the net results of the subsidiary trolley lines have been unsatisfactory; however, the Railways Company General has been compelled to advance \$72,036 to the Michigan Traction Company for improvements and extensions. Some of these improvements and extensions have been made voluntarily, and others under coercion by the city of Kalamazoo. The outlook for the Michigan Traction Company seems to warrant a considerable increase in net earnings."

Mail boxes have been placed on the street cars in Chattanooga, Tenn., and a street railway mail service inaugurated. A special arrangement is provided in this mail service for special delivery letters, such letters being immediately taken in charge at the transfer station by a messenger boy.

RAILWAY PROFIT SHARING IN BRITISH COLUMBIA

Coincident with the declaration of its regular annual dividend a few weeks ago, the British Columbia Electric Railway Company placed in operation the liberal system of profit-sharing, details of which were announced in the STREET RAILWAY JOURNAL of Aug. 30, 1902. Every man in the employ of the company in Vancouver, New Westminster and Victoria received \$25, that amount being each man's share of one-third of the surplus remaining after payment of the regular 4 per cent dividend to stockholders. The total amount disbursed to the employees was \$7,600, and the officers hope that next year the amount will be even larger.

This profit-sharing scheme was introduced by J. Buntzen, general manager of the company. Upon his recent return from an extended trip to England and his old home in Denmark the employees of the company gave an elaborate dinner in his honor. On that occasion Mr. Buntzen pleasantly surprised his men by announcing the amount of the bonus, which has just been paid.

ANNUAL REPORT OF THE SOUTH SIDE ELEVATED

The report of the South Side Elevated Railway Company, of Chicago, for the year ending June 30, 1903, has just been made public. The report shows that gross earnings increased \$136,796, while the operating expenses increased \$95,915. The increase in net earnings was \$40,881. There was a decrease in fixed charges of \$26,647. The increase in surplus was \$73,066. The balance sheet gives an increase of \$110,000 in bonds outstanding. This, however, is due to the deposit of \$110,000 of the company's bonds with the city government as a guaranty in respect of the Englewood extension ordinance. No additional bonds have been sold during the year. Maintenance charges were the largest in the history of the road, and \$50,000 was charged off for depreciation. Details of the report follow:

EARNINGS AND EXPENSES			
Year ending June 30—	1903	1902	
Whole number passengers.....	30,074,457	27,188,965	
Average daily	82,396	74,490	
Earnings—			
Passenger	\$1,503,723	\$1,359,448	
Advertising, etc.	41,398	48,877	
Gross	\$1,545,121	\$1,408,325	
Expenses—			
Maintenance way	\$64,298	\$59,062	
Maintenance equipment	122,867	102,598	
Conducting transportation	388,730	346,397	
Loop rent and expenses	196,019	179,170	
General	84,213	72,985	
Total	\$856,127	\$760,212	
Net earnings	688,994	648,113	
Other income	9,922	4,384	
Total income	\$698,916	\$652,497	
Charges—			
Bond interest	\$33,750	\$33,750	
Taxes	66,845	94,168	
Depreciation	50,000	50,000	
Miscellaneous	676	
Total	\$151,271	\$177,918	
Balance for stock	547,645	474,579	
Dividends	412,952	412,952	
Surplus	\$134,693	\$61,627	
Per cent expenses to gross (including loop)	56.9	54.0	
The balance sheet, as of June 30, 1903, shows:			
ASSETS			
	1903	1902	
Cost road and equipment	\$11,999,518	\$11,804,908	
Stocks owned	92,400	92,390	
Cost and current account	28,475	66,323	
Materials and supplies	23,357	20,791	
Other assets	170,316	12,034	
	\$12,314,066	\$11,996,246	
LIABILITIES			
Capital stock	\$10,323,800	\$10,323,800	
Funded debt	860,000	750,000	
Various accounts	177,709	104,582	
Profit and loss	952,557	817,864	
	\$12,314,066	\$11,996,246	

GROUND BROKEN FOR THREE-CENT LINES IN CLEVELAND

Ground was broken last week on Denison Avenue, Cleveland, for the first of the long-promised 3-cent fare lines promoted by the People's Street Railway Company. Building materials have been distributed along the route, and the company has about a dozen men at work, in charge of Thomas Powers, formerly in the construction department of the Cleveland City Railway Company. The route over which the company holds a franchise is an isolated one, at the extreme southern end of the city, and in itself could not be made to pay with any rate of fare. Mayor Johnson has secured the passage of another ordinance providing for a 3-cent line on Rhodes Avenue, and extending onto Denison Avenue. This is over a portion of the same route as the one on which the company is now building. It is claimed that this grant was secured so that in case the company was stopped by injunction on one street it could go ahead on the other. Ordinances have also been proposed for three more routes in various parts of the city. Mayor Johnson announces that he is advising the promoters to move cautiously, as he claims to foresee an injunction suit. He suggested that it would not be wise to place material in the streets until the old company has taken some action. Thus far the Cleveland Electric Railway has made no attempt to enjoin the work, and it is generally believed that the Mayor is disappointed at this.

CHICAGO ELEVATED TRAFFIC AND THE INFLUENCE OF UNIVERSAL TRANSFERS

Figures on the traffic of three Chicago elevated railroads for the first nine months of 1903, as compared with the first nine months of 1902, seem to show that the adoption of universal transfers over the lines of the Chicago Union Traction Company has considerably reduced the natural increase of travel on the elevated roads. This is especially noticeable on the Metropolitan Elevated, where the increase of travel has been nothing like that on the South Side Elevated. The same influence has also been felt, but it has been less marked, on the Northwestern Elevated. The Northwestern Elevated does not cover as large a territory as the Metropolitan.

The following are the figures referred to, showing number of passengers carried, by months:

	METROPOLITAN ELEVATED.		Inc.	P. C.
	1903	1902		
January	112,171	98,029	14,742	15.03
February	116,090	100,466	15,624	15.55
March	116,176	105,512	11,204	10.61
April	117,597	109,246	8,351	7.64
May	109,330	105,799	3,531	3.34
June	111,613	101,734	9,870	9.70
July	102,057	97,929	4,128	4.22
August	102,971	100,099	2,872	3.00
September	112,933	104,751	3,242	2.95
SOUTH SIDE ELEVATED				
January	86,637	79,154	7,483	9.45
February	88,516	79,386	9,130	11.50
March	87,989	80,318	7,671	9.56
April	87,553	81,009	6,544	8.08
May	82,884	76,063	6,821	8.97
June	85,262	76,449	8,813	11.53
July	76,236	70,767	5,469	7.73
August	72,646	68,334	4,312	6.30
September	81,887	76,572	5,315	6.94
NORTHWESTERN ELEVATED				
January	68,206	62,010	6,256	10.00
February	69,885	64,760	5,125	7.91
March	70,070	65,362	4,708	7.22
April	71,340	65,430	5,910	9.03
May	66,990	63,199	3,791	6.00
June	66,571	60,813	5,758	9.47
July	59,393	56,110	3,283	5.85
August	60,093	57,942	2,182	3.60
September	68,107	63,950	4,157	6.50

BRAZILIAN TRACTION PROJECT

An electric traction system is to be built between the city of Rio Janeiro and Nitheroy, once the capital city of Brazil. The length of the road will be about 5 miles. It will be a metric gage line. Dr. Carlos Cesar de Oliveira Sampaio and Antoni Julio de Oliveira Sampaio have secured the concession for the construction and operation of the system. Among the provisions of the franchise is the exemption from import duties of the materials, etc., for the construction of the road and for the first three years of its working.

WATERBURY REPUDIATES "LABOR"

Waterbury, Conn., has justly repudiated at the polls the element that terrorized the community in the recent street railway strike, and by so doing will unquestionably regain some of its former prestige. The population of the city is 50,000, and up to the time of the declaration of the strike last winter there had always existed between labor and capital the most cordial relations. When the labor agitator made his appearance harmony disappeared. The boycott was resorted to when it was seen that the strike was a failure, and the prosecution of the public was carried to such an extent that peace and comfort within the confines of the city became unknown. The memorable Sunday riots, the murderous assault on a car in the suburbs, are too well remembered even to need recital here. The nominees for Mayor were men whose theories and environments were as far as possible removed each from the other. The Democratic candidate was a man of high repute, but a radical of the radicals. A strong unionist, and one of the leaders of the Economic League, his following more than the man was feared. The Republican candidate, a prominent officer of the American Brass Company, was a man of the ultra-conservative type. Pitted against each other, therefore, were the extremes of each party. With the terrors of the despotism of unionism fresh in their minds, the voters of the city went to the polls and did their duty. Overwhelmingly they voted for a return to the conditions that obtained previous to the present administration.

CHICAGO TRACTION MATTERS

Now that the Chicago City Council vacation is over some action regarding franchise matters is hoped for soon. Judge Peter S. Grosscup, of the United States Circuit Court, under whose direction the receivers of the Chicago Union Traction Company are acting, was recently made a tempting offer to retire from the bench and argue the merger cases of the Northern Securities Company. Judge Grosscup returned to Chicago last week and in response to the many interested inquiries regarding his future movements gave out an interview to the Chicago press, which is of interest, because of the light it throws on his attitude toward the Chicago franchise question. The judge said:

"About six weeks ago some men who are interested in the merger cases came out from New York, and while here asked me if I would argue those cases in the Supreme Court. I told them that to do so would require my resignation. I have considered the whole matter carefully, and as a result have determined not to resign.

"I have some conscience on the subject of accepting office, and believe that when one takes office it ought not to be laid aside merely to subservise a personal interest. I have a great desire to practice law again, and, as a mere lawyer, would like, of course, to argue the merger cases, for they will be historical—the greatest in consequence and interest since the insular cases. But I have got to a place in the traction situation where I could not lay it down without injury, I fear, to the interests committed to my care.

"Those interests are twofold—the interests of the public, whose servants the traction companies are, and of the investors, whose property the traction interest is. I believe the Mayor and the Common Council wish to bring about an honorable adjustment of these interests. I feel that I can help them as against any unjust or exorbitant demand on the part of the companies, and as against any purpose in any quarter to take property without compensation.

"I sought neither of these responsibilities, but having acquired them in the performance of my duties I do not feel that I can, for mere personal advantage, run away from them. The meanest man is the one who won't stay by his duties when they get him into a tight place.

"Then, there is another reason more general than the last, which has influenced me. It grows out of my relation to what is called the trust problem. Personally, I believe in combinations of capital. I believe that they are here to stay, and, properly controlled, will help rather than hurt the public interests. But the time has come to insist that corporations of every character be honestly organized and honestly managed and controlled, and I think I have done something toward creating a public sentiment in that direction, and back of everything I have done—more than anything else in getting me the public ear—has been the moral weight of my judgment. To lay it aside now would seem like surrendering opportunity to dollars.

"My wish—and as far as I can control affairs, my purpose—is to bring about an immediate solution of the traction problem. If there be no immediate solution, the fault will not be here."

According to Edwin Burritt Smith, special counsel for the city of Chicago, publication of the plan for the City Railway franchise is not possible until about October 10. All the questions have been agreed on practically, except the greatest problem—that of rate of compensation to the city. There are no former figures as a basis and among the data to be considered are operating expenses now and in the future, fixed charges, etc.

"In the main," said Mr. Smith, "we believe Mr. B. J. Arnold's figures are substantially correct. No exact offer of compensation rate has been yet made on either side, and we are approaching the subject slowly."

Discussion of public ownership of the street railways was the feature of the City Council meeting Monday, Oct. 5. A petition from the Municipal Ownership Delegate Convention, said to contain 60,000 names, and favoring an ordinance providing for submission of the Mueller act to popular vote, was referred to the committee on local transportation. The Aldermen were urged not to pass street railroad franchises until the Mueller act had been submitted to a referendum at the next city election.

ANOTHER NEW RECORD ON THE ZOSSEN LINE

A special press cable, dated Berlin, Oct. 6, says that an electric car on the Marienfelde-Zossen experimental line reached a speed of 125 4-5 m. p. h. that day, or a kilometer more than the highest previous record. The machinery and roadbed were unimpaired, so the cable says, and the engineers are determined to try for still higher speeds, and venture the opinion that they will be able to attain the rate of 140 m. p. h. The new record was made by the car used in the previous tests, but the information at hand says that another car of somewhat different equipment as to motors and transformers has been built for additional high-speed tests. The statement is made that while the engineers do not believe a speed of 125 miles is practicable at present on the State railroads, they are prepared to recommend a speed of 93 miles an hour between Berlin and Hamburg.

STRIKE THREATENED IN CHICAGO

A crisis in the relations of the Chicago City Railway Company and its union employees which may result in a strike was reached Monday, Oct. 5, when General Manager McCullough refused the demands of a delegation of employees headed by President William D. Mahon, president of the Amalgamated Association of Street Railway Employees of America. The men demanded an increase of pay for men in the electric train departments, a reduction in hours for the car house and repair men, and the employment of only union men. Decisive action on the matter will be taken by the employees on Saturday evening, Oct. 10, when a special meeting will be held to vote on the question of ordering a strike.

NEW BRIDGE TRAFFIC PLAN TRIED IN NEW YORK

A fifty-four minutes' test, Tuesday, Oct. 6, on the Brooklyn Bridge of what is known as the Poulson plan to relieve the congestion of the trolley car patrons at the Manhattan terminus and minimize the peril of crossing four loops failed to convince officials of the Department of Bridges and of the Brooklyn Rapid Transit Company that it was practicable in "rush hours." Neil Poulson, the author of the plan, who is president of the Hecla Iron Works, said after the test that he was not satisfied with it, because neither the motormen nor the public had been properly drilled to make it successful and that other trials would be had.

Mr. Poulson's scheme of relief was to utilize all available space at the bridge entrance, to have a single loop track at the extreme western end of the surface car terminus, to unload the cars in groups of five on the north track, and to load them on the south track, also in groups of five, and to have no passenger leave or board the cars on the loop. The test was under existing conditions, but the plan contemplates the raising of the single loop so that passengers leaving and taking cars shall pass under the loop from and to the groups of five, and that proper exit and boarding platforms shall be constructed. It was planned that during the trial no vehicles should use the north and south roadways, and that passengers from and to the elevated trains and promenades should not cross the loop, but use the extreme western stairways.

At the point of arrival, where the cars made groups of five as they came up single, were five trolley inspectors, one for each car. At the point of departure were as many inspectors. Mr. Poulson controlled a gong, which, when sounded, started ten cars, five at the arrival point and five at the starting point. The dead cars moved round the loop 10 ft. apart. The first starting car speeded so as to open up a "spacing" headway. The test summarized resulted as follows:

First cars were started on afternoon schedule time, 160 to the hour, for half an hour. Employees worked in good faith, getting 85 cars through, or at the rate of 170 to the hour, without a hitch. Then "extras" were switched on to make up a "rush-hour" condition. In 24 minutes 100 were got through, or at the rate of about 117 in half an hour instead of 140, and the north track was blocked to the entrance on the Brooklyn side. Then the trial was called off, and the usual afternoon schedule resumed.

THE CRAWFORDSVILLE CASE

Judge Baker, of the United States Federal Court, adjudged Attorneys Harding and Johnson, President Townsend and Contractor Wise, of the Indianapolis & Northwestern Traction Company, not guilty of contempt of court in the Crawfordsville, Ind., franchise case, but held that the company had violated a restraining order of the Montgomery Circuit Court in putting down its tracks in the city. The court decreed that the defendants should pay the costs of the suit, and pay to the Consolidated Traction Company \$200 for expenses brought about through the contempt proceedings, also that the Indianapolis & Northwestern take up its tracks in case the suit now pending against it by the Consolidated Company for possession of the streets should go against it. The case will now be tried on its merits. The Council of Crawfordsville first granted a franchise to the Indianapolis & Northwestern Company. This franchise was accepted and a bond filed with the city clerk. Subsequently the Council abrogated this franchise, and granted a franchise exclusively to the Consolidated Company. Which of these franchises is to stand is the question for the court to determine.

PUBLIC SERVICE EMPLOYEES VOTE AGAINST STRIKE

The announcement was made on Friday, Oct. 2, in Newark, that the employees of the Public Service Corporation, controlling the street railway lines in Newark, Jersey City, Paterson, Hoboken and surrounding country, had voted overwhelmingly against a strike on the company's system. Seventy-five per cent of the votes cast in Essex, Passaic, Hudson and Union counties were against the proposed strike, and less than 10 per cent of the entire number of motormen and conductors employed voted for the strike; that is, out of 2500 men on the pay rolls 224 voted for going on strike. The agitation for a strike has been prevalent for some time, and finally ended in the decision just recorded.

STREET RAILWAY PATENTS

UNITED STATES PATENTS ISSUED SEPT. 21, 1903.

[This department is conducted by W. A. Rosenbaum, patent attorney, Room No. 1203-7 Nassau-Beekman Building, New York.]

739,364. Maximum Traction Truck; Charles F. Uebelacker, Kingston, N. Y. App. filed Aug. 25, 1898. Embodies, among other features, a center-bearing swing-bolster and a two-part slide attached to the car body and the truck, and arranged to guide the swing of the truck under the car body, and to bring the pivotal center of the truck in close proximity to the axle of the driving wheels.

739,386. Automatic Sanding Device; Will F. Cady, Harrison Valley, Pa. App. filed June 16, 1903. Means for automatically opening the sand valve when the car is started or stopped.

739,518. Railway Block Signaling System; Herbert B. Taylor, Newark, N. J. App. filed Aug. 2, 1901. Relates to details of a track circuit system.

739,582. Street Car; John A. Brill, Philadelphia, Pa. App. filed April 17, 1903. The side sills in an "open" car comprise two parallel strips of metal which are held in position and separated by means of hangers, which support an intermediate step and the running board.

739,588. Electric Braking; Frank E. Case, Schenectady, N. Y. App. filed July 6, 1900. As the speed of the vehicle decreases, the magnetization of the brake-actuating devices can be reduced without reducing the current generated by the motors under momentum by a corresponding amount.

739,605. Brake-Shoe; Harry Jones, Mahwah, N. J. App. filed Oct. 9, 1902. The brake-shoe is provided with a malleable wire skeleton hook for attaching it to the brake-head.

739,632. Trolley Catcher and Replacer; James V. Ainsworth, Los Angeles, Cal. App. filed Jan. 22, 1903. Details.

739,742. Street Railway Switch; George W. Thompson, Pittsburg, Pa. App. filed Dec. 2, 1902. Comprises, in connection with a pivoted switch tongue, a cable which is connected to the tongue and is extended over pulleys suitably arranged in the roadbed and pivotally connected at one end to a trip located adjacent to one of the rails, and adapted to be actuated by the car wheel.

739,749. Switch-Operating Mechanism; Zachariah L. Trainham and Harry E. Eastman, Richmond, Va. App. filed April 16, 1903. Consists in providing a pivoted disc having a curved slot therein, within which is mounted the end of a link connected to a bell-crank lever, one arm of which projects above the roadbed, and is adapted to be depressed by suitable mechanism on the car.

739,771. Car Truck; Walter S. Adams, Philadelphia, Pa. App. filed June 21, 1902. A car truck having a frame and axle-box pedestals provided with inwardly extending lugs, upwardly-arched semi-elliptic springs, supported by the lugs, links resting upon the semi-elliptic springs and adapted to have longitudinal and transverse swing, and a bolster pivotally supported by the links.

739,772. Car Truck; Walter S. Adams, Philadelphia, Pa. App. filed June 21, 1902. Consists of a frame with pedestals, perforated lugs projecting inwardly from the pedestals, swing-links supported by the perforated lugs and semi-elliptic springs engaging the links.

739,794. Semi-Convertible Car; Warren M. Smith, Borough of Prospect Park, Pa. App. filed May 13, 1903. An improved construction whereby either one or both of the upper and lower sashes of each window of the car may be lowered completely below the window-sill.

739,799. Arm Rest for Semi-Convertible or Other Cars; Samuel M. Curwen, Philadelphia, Pa. App. filed April 17, 1903. In a semi-convertible car in which the window-sills are very low, an arm rest is secured to the panel in such a manner as not to interfere with the sash locks.

739,800. Car Truck; Walter S. Adams, Philadelphia, Pa. App. filed June 21, 1902. Consists of side frames provided with axle-box pedestals, semi-elliptic springs links and spring supports for the links on the pedestals for supporting the semi-elliptic springs, and a bolster rigidly attached to the semi-elliptic springs.

739,801. Car Truck; Walter S. Adams, Philadelphia, Pa. App. filed June 21, 1902. Means connected with the frame for supporting longitudinally thereof a plurality of arched semi-elliptic springs, links pivoted to the arches of the springs, and a bolster pivoted to the lower extremities of the links.

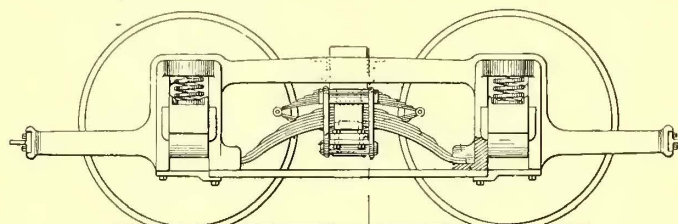
739,802. Car Truck; John A. Brill and Walter S. Adams, Philadelphia, Pa. App. filed June 7, 1901. An equalizing bar supported by the journal boxes, a truck side frame, and springs interposed between the extended ends of the equalizing bar and side frame and resting on said equalizing bar.

739,803. Sand-Box for Railway Cars or the Like; Henry E. Haddock, Philadelphia, Pa. App. filed Jan. 14, 1903. Details of construction.

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739,816. Contact Stud and Fixing for Use with Surface Contact Systems of Electric Traction; Benjamin H. Bedell, London, England. App. filed May 12, 1903. A stud composed of magnetic material having a switch-piece electrically connected therewith, also composed of magnetic material, and suspended at the lower end of the stud, and an electrical conductor supported on a series of insulators which are adapted to revolve on pins.

739,819. Electrical Tramway or Railway Rail; Henry M. Bigwood and Horace Bigwood, Wolverhampton, England. App. filed April 14, 1903. The tread and web of the rail are separate pieces,



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and a bonding plate is inserted between the two parts at the joints of the rail lengths.

739,899. Marginal Protecting Strip for Pavements; Daniel Mullen and Andres A. Mullen, New York, N. Y. App. filed Sept. 24, 1901. A metallic protecting strip arranged adjacent to car rails, and means for anchoring the same.

740,037. Trolley; Jacob M. Olinger, Vienna Crossroads, Ohio. App. filed Aug. 1, 1903. Details.

740,074. Multiple-Control System for Railway Vehicles or Trains; Louis M. Aspinwall, Wilkensburg, Pa. App. filed Feb. 6, 1903. An electro-pneumatic controlling system, the main object being to provide means for insuring automatic step by step operation of each controller.

740,081. Means for Diminishing, Deadening and Preventing Sound; Henry W. Blair, Manchester, N. H. App. filed Sept. 29, 1896. A casing for the motor having a lining of non-sound-conducting material.

740,105. Trolley-Restoring Device; Charles W. Dowling, Newark, Ohio. App. filed Jan. 31, 1903. Details.

740,129. Fender for Cars; John Haskins, Boston, Mass. App.

filed Feb. 21, 1903. Comprises a main and auxiliary platform, the main platform being hinged to the frame and to the auxiliary platform, and the auxiliary platform being movable lengthwise of the frame.

740,134. Lift Guard for Trams; Walter Hirt, Breslau, Germany. App. filed Nov. 7, 1902. A series of loops of cane or similar elastic material arranged across the front of the car.

740,144. Trolley Pole; Phineas F. King, Cleveland, Ohio. App. filed Aug. 23, 1902. A ratchet segment and pawl at the trolley base for locking the pole at the inclined position in case the wheel leaves the wire.

740,205. Trolley Wire Crossing; Oliver Vanorm, Los Angeles, Cal. App. filed June 2, 1903. Two members pivoted together, each having oppositely disposed arms, the arms having channels for the reception of feed wires.

740,272. Trolley-Pole Controller; Charles Harter, South Pasadena, Cal. App. filed July 9, 1903. The trolley pole is controlled by pneumatic cylinders mounted at the base.

740,279. Switch-Operating Mechanism; Oliver D. Hunt, Columbus, Ohio. App. filed Jan. 19, 1903. Details of construction.

740,299. Life-Saving Device for Vehicles; Kenneth Mooring, Rockland, Ohio. App. filed June 2, 1903. A frame attached to the car and inclining downward from the buffer, a receiving platform having its inner end movable and its outer end pivoted between the inclined frame, a catching net having the members of its lower end slotted to receive the movable end of the receiving and tilting platform, and a pair of guard rails connected to the car, and to the front end of the fender.

740,313. Trolley Catcher; Charles B. Robertson, Ottumwa, Ia. App. filed Dec. 13, 1902. Details of a pawl and ratchet and spring drum controller.

740,356. Switch-Tongue Operating Mechanism; Harry A. Earl, Cleveland, Ohio. App. filed Feb. 20, 1903. Details of construction.

740,375. Motorman's Valve for Air Brakes; John Shourek, Pittsburg, Pa. App. filed Dec. 22, 1902. Means for automatically operating the gong-ringing mechanism and the sand-applying mechanism when the brake is applied.

ENGINEERING SOCIETIES

A meeting of the Franklin Institute was held at the hall of the Institute, in Philadelphia, on Thursday evening, Oct. 8. Mr. W. E. Harrington, general manager of the Camden & Suburban Railway Company, of Camden, N. J., will present a paper entitled: "Rail Bonds." Several additional brief communications are expected.

PERSONAL MENTION

MR. JOHN H. PARDEE, who has been manager of the Ontario Light & Traction Company since its organization, several years ago, has been appointed manager of the new Rochester & Eastern Rapid Railway, of Rochester, N. Y.

MR. FRANK O. NOURSE, purchasing agent of the Appleyard syndicate, at Columbus, has resigned, to take effect Nov. 1. It is understood Mr. Nourse has accepted a very good position with a railway supply house in the East.

MR. L. H. WHEELOCK, superintendent of the Amherst & Sunderland Street Railway, of Amherst, Mass., has been appointed superintendent of the Claremont Street Railway, of Claremont, N. H. He will be superintendent of both roads.

MR. GRANT R. BUCHANAN, formerly chief train despatcher of the Lake Shore Electric Railway, of Cleveland, Ohio, has been appointed superintendent of the Cleveland division of that company.

MR. A. G. HEGGEM, who has been for several years general superintendent of the Russell Engine Company, of Massillon, Ohio, has resigned his position, and after Nov. 1 will open an office in Kansas City, Mo., from which to conduct a general engineering business.

MR. JERE C. HUTCHINS, president of the Detroit United Railways Company, of Detroit, Mich., has returned from Europe, and is now in active charge of the property. Mr. Henry A. Everett, who has been in charge of the property during Mr. Hutchins' absence, has returned to his home in Cleveland.

MR. CHARLES E. DRESSER, treasurer of the Waltham Street Railway Company, of Waltham, Mass., died in Boston Tuesday, Sept. 29. His death was unexpected, and was caused by fatty de-

generation of the heart, from which disease he had suffered for some time. He was seriously ill but an hour when death came. Mr. Dresser was born at Lee, Mass., thirty-eight years ago, and was unmarried.

MR. A. J. CASSATT, president of the Pennsylvania Railroad Company, has resigned as third vice-president of the Public Service Corporation of New Jersey, because, it is said, of the pressure of other business. Mr. A. B. Carleton, formerly president of the United Electric Company, has been elected as his successor.

MR. MAXWELL E. NASH, formerly superintendent and claim agent of the Milford & Uxbridge Street Railway, of Milford, Mass., has been appointed assistant superintendent of the Boston & Worcester Street Railway, having charge of the operation of cars on the line between White's corner, Fayville and Hudson. Mr. Nash left Milford last May and went to Porto Rico.

MR. W. H. ZIMMERMAN, who for the past two years has been on the engineering staff of the Arnold Electric Power Station Company, of Chicago, has been appointed general manager of the De Kalb-Sycamore Electric Company. This company now operates 6 miles of road between De Kalb and Sycamore, and central station plants in both towns. Rights of way have been obtained for extensions in the direction of Belvidere, Ill.

MR. E. W. GOSS, retiring general manager of the Milford & Uxbridge Street Railway Company, of Milford, Mass., was presented with a beautiful diamond stud a few evenings ago by the employees of the company, as a token of appreciation. Mr. Goss has decided not to take up the active management of another property until he has had a thorough rest. He will soon start for Florida, where he expects to spend the winter with his family.

MR. W. F. BRYCE, JR., has been designated by the Virginia Passenger & Power Company, of Richmond, Va., to take charge of the transportation department of the Petersburg lines. Chief Engineer of the Railway Department Mr. Calvin Whitely will take charge of the roadway and tracks, and Mechanical and Electrical Engineer Mr. George H. Whitfield will have charge of the wires and mechanical portion of the line. Mr. Harvell will still remain as superintendent, but will be chiefly engaged in looking after the work on the power plant.

MR. GEORGE T. BISHOP has assumed the presidency of the Eastern Ohio Traction Company, of Cleveland, Ohio, succeeding Mr. H. Clark Ford, who resigned recently. It is the intention of the company thoroughly to rebuild the Chagrin Falls division of the road. Mr. Bishop states there is no truth in the published report that he is to succeed Mr. R. L. Andrews as general manager of the company. Mr. Andrews is general manager of the Youngstown & Southern Railway, but he will continue to have charge of the affairs of the Eastern Ohio Company.

MR. J. V. DOZAL, of Mexico City, Mex., former attaché of the Mexican Legation in Washington, sailed for home a few days ago, after visiting Baltimore and Pittsburg. While here Mr. Dozal arranged contracts for rolling stock for the new railway from Zimatlan to Oaxaca, the corporate name of which is the Ferrocarril Urbano y Agrico de Oaxaca. He stated that part of the line is to be equipped with a third-rail system if present plans of the company mature. Engineers are now surveying the property of the Alcasia Development Company located 12 miles south of Cananea, State of Sonora in the Ajo Mountains, where it is purposed to construct a large electric power plant, the machinery for which Mr. Dozal has arranged to be supplied by several firms in the United States.

MR. ALEXANDER CLARK, for the past twenty years one of the leading practicing lawyers at the Chicago bar, and a resident of Evanston, died very suddenly Sunday morning, Sept. 27, at Antioch, Ill., where he had gone in the interest of the Chicago & Milwaukee Electric Railway. Over-exertion in hastening to catch a train is supposed to have brought on heart failure. In his twenty-two years of practice at the bar in Chicago Mr. Clark had come to be recognized as one of the ablest lawyers in his line in the city. For years he had been the legal adviser and representative of several large corporations. He was, at the time of his death, one of the attorneys for the Union Traction Company, the Union Elevated Loop Company, the Chicago & Milwaukee Electric Railroad, and the Waukegan & North Shore Electric Railway. Aside from his business connections, Mr. Clark was prominent as a promoter of public enterprises. It was due to his efforts that the Evanston electric extension to the Union Traction system was accomplished in 1894. The Union Elevated Loop, in the downtown district, also represented the fruit of his services. Mr. Clark is survived by a wife and two children.