



ception, all of these will be paralleled within a year for some distance by electrics. Even now most of them are feeling severe competition. How the problem will work out cannot be anticipated.

### Crossing the Sierras

The announcement sent out from San Francisco that the Southern Pacific had laid aside the tunnel scheme and had substituted therefor a plan to build an electric line across the Sierras, comes strictly within the category of events that would be "interesting if true." The discussion of this subject on the Coast is not confined to electrical engineers, but is participated in by steam railway men and investors. The proposed plan, according to report, contemplates the laying of a third rail between Sacramento and Truckee, and the establishment of an electric plant which will utilize the water-power of the Truckee River. This would certainly be a very remarkable enterprise, involving a number of points which are practically new in heavy electric railroading, and the solution of these problems would call for a good deal of investigation and experimental work. Some idea of the magnitude of the undertaking may be gained from the fact that there will be a constant climb for the distance between Sacramento and Truckee—119 miles. Sacramento is 30 ft. above the sea, Truckee is at an elevation of 5819 ft., and Summit, a point 14 miles from Truckee, 7018 ft. above sea level, is the highest point on the San Francisco-Ogden division. These figures show that the average raise in elevation between Sacramento and Summit is  $66\frac{1}{2}$  ft. to the mile, while in some places it is about 100 ft. to the mile, or 2 per cent grade.

There has been no authoritative statement issued on the subject, but the fact that the utilization of electricity for this work is seriously contemplated by the management is evidence of the confidence that has been inspired by the heavy electric railroading already constructed and in operation on the Pacific Coast, as well as faith in the possibility of operating big traction enterprises electrically.

### The Snow Problem

The recent continued cold weather and succession of snow-storms which have prevailed throughout the Northern States during the last two weeks, have put the snow handling facilities of the street railway companies to a crucial test. One hears so much about the passing of the good old-fashioned winter, that when it suddenly appears in its full rigor the effect is somewhat startling to say the least. But be it written to the credit of the street railways all over the afflicted district, that with few exceptions their tracks were kept open and the cars were kept running with some approximation to the appointed schedules. Here and there the snow came out victorious, but the showing made was vastly better than would have seemed possible a few years ago. The actual amount of snowfall was exceptionally great, and it tended to drift badly, which makes the record of the roads in fighting it all the more creditable. The means used in the struggle are not materially different now from what they have been in the past, but they were applied with exceptional vigor and effect. It is worth noting, too, that, as referred to briefly in a recent issue, the electric roads, upon the whole, came out of the fight much better than the steam suburban roads; which, in many places, were badly tied up. Even where they kept running it was with a total disregard of schedule and of the hopes of the passengers. All in all the schedule of a steam road is pretty easily demoralized, particularly around its

termini where especial trouble is encountered in the yards. Half a dozen years ago we should have had a dismal tale of the trials of the electric roads under circumstances similar to those recently prevalent, but the managers have now learned the lesson of snow fighting pretty thoroughly, while the steam roads are as badly off as ever. And the reasons for the difference are not far to seek.

Eternal vigilance is the price of success in battling with a snow-storm. The snow machines must be ready to run out at short notice, and the men to do the fighting must be at hand when trouble is feared. Fortunately, the weather man generally gives at least a broad hint of coming trouble, so that everything can be made ready. Here is the first point where the electric road scores against its rival. Electric roads generally, even in these days, cover less territory than steam roads, and the equipment can readily be gotten at instead of being stacked up at points remote at least from some parts of the system. One plow jumped into service at the first sign of trouble is worth half a dozen dragged out of remote hiding places a few hours later. But far more important even than the readiness of the main equipment is the fact that on an electric railway system, with its relatively frequent service, cars are from the very first pushing through and helping to clear the way. Most of the track scrapers attached to individual cars are none too effective, but even a very poor scraper does an immense amount of good if it is applied every few minutes. The more frequent the service the less danger of its being interrupted, and we are more than half inclined to believe that the success with which the snow difficulty is generally met to-day, on city roads at least, as compared with former experience, is largely due to the greater frequency of the cars. For this reason individual scrapers on cars during the winter season are particularly useful. They cannot do much against a drift, but if the cars run frequently they can effectively prevent drifts from getting the advantage until the regular snow machines can get settled down to work. Once a blockade is well under way it becomes very difficult to break, since the snow machines may be blocked in behind it, and a plow at the end of a stalled procession of cars is of very little use. But ordinary systems, where cars pass over the track at the rate of a dozen an hour or so, can generally avoid the blockade entirely if work is begun as soon as the snow begins to threaten mischief.

The most troublesome case is found in dealing with the smaller interurban lines, on which cars run on a very open schedule, and whose tracks pass through the open country, where drifts have a first-rate chance to pile up in the intervals between cars. And, as we mentioned a couple of weeks since, it can, under these circumstances, make plenty of trouble, even though the car may keep moving after a fashion. And it is a rather difficult thing to determine what is the best defense in case of a half-hour schedule. Individual track cleaners are good as far as they go, but an interval of half an hour will often let drifts get beyond this remedy. A light nose-plow, attachable to each car at short notice, would get the better of the storm in ordinary case, and would, at least, keep the track clear after the heavier plows had opened a way. But in this sort of interurban case nothing short of powerful plows, used early and often, can cause immunity from blockades. A snow-storm in open country is no joke; we have seen drifts piled up on the line of an electric road 8 ft. or 10 ft. deep. The big rotary plows probably do better *in extremis* than any others, as has been amply proved on many a railroad, and here, as in other

respects, the interurban lines can hardly do better than to follow the example. But these special machines are heavy and costly, and, hence, less used than their merit deserves. We would like to see what could be accomplished merely by attachable nose or shear plows, used with vigor, not only on the regular cars but on as many extras as proper crews could be obtained for. Apparatus that would prove a failure on the basis of a half-hour schedule might do the work well if all the extra cars were pressed into service, and such a scheme might prove considerably cheaper on some lines than an equivalent number of large snow machines. We would like to hear of the various apparatus and expedients brought into service against the recent storms. Every manager of an interurban line was put to his best efforts, and the experience acquired most certainly would prove valuable to all the afflicted in the next storm. We hope our friends will step up and assist in an experience meeting on the snow-drift question, to the end that out of many counsels may come wisdom. For we are not out of winter yet and more storms may be brewing.

### The Problem of Stoking

We are glad to present in the current issue a most interesting discussion of mechanical vs. hand stoking, from no less distinguished an engineer than W. C. Kerr. If our brief editorial comment of Oct. 24 on the "Question Box" served no other useful purpose, we congratulate ourselves on its having brought out so welcome a contribution. Mr. Kerr very properly pleads for the consideration of the whole question, on a broad basis, without attaching undue importance to particular instances of this, that or the other virtue or failing of the stoker, human or mechanical. As he very truly says, the obtainable data on steam generation in general are of a very erratic and unsatisfactory character, and one should be extremely cautious in jumping at conclusions. The discussion of the "Question Box," as we noted at the time, shows this fact very clearly in itself. But our correspondent errs in supposing that the information on which our editorial comment was based, was in any way circumscribed by the data of that discussion. On the contrary, it was based on the accumulation of data from many sources, extending over pretty nearly the whole history of the question, and we find ourselves, upon the whole, nearly at one with Mr. Kerr upon the issues involved. On one matter, however, we must take earnest exception to our correspondent's statement of the case. He remarks that the fact that an expertly hand-fired flat grate can equal stoker firing is about as irrelevant a consideration as could be deduced. We do not entirely agree with Mr. Kerr in this conclusion, so far as the general public is concerned, since the claim is often made by engineers of less broad knowledge and experience than Mr. Kerr that mechanical stoking can and does produce better evaporative results than hand firing.

In the long run such misstatements can only injure the cause of scientific and economical firing, and we are glad to put on record Mr. Kerr's unequivocal endorsement of our position as to the facts. Assuming this, it is certainly pertinent to inquire into the conditions that may in any given case determine the best and most economical procedure as to firing. On the one hand, mechanical stoking certainly should have the credit of whatever gain in average efficiency it may in fact have, and on the other it should not be given the advantage of charging against hand firing carelessness and stupidity in arranging the general coal supply. We do not agree that any commercial process should be judged solely by its performance under the best

conditions, but rather it should be judged by what it does under average good conditions. It is the general, not the exceptional, which should be taken into account in a broad view of the case. And unless we greatly err, one of the most cogent reasons for the use of mechanical stokers lies in the fact that the human stoker's average performance is far below his best. His best is admittedly extremely good, quite up to the work of the machine. And similarly it is unquestionable that the average work of mechanical stokers at large is below their best performance. There are good stokers and bad stokers, both human and mechanical, and in neither case should the faults of individuals be charged up to the general state of the art as such. The vital question touches the comparative results attainable by the two methods, assuming in each case good design and good management in the plant. This is a question of fact, and its answer, probably, depends on a rather wide variety of conditions. As Mr. Kerr most pertinently points out, the size of the plant is an important factor in the situation, for the bigger the plant the harder it generally is to maintain a high average result with hand stoking, so that the managers of large plants find higher grade and better sustained results from mechanical stoking. This raises one of the very issues that was uppermost in the "Question Box"—the effect of size of plant on the desirability of mechanical stoking.

As we pointed out at the time, in a plant of 1000 hp or 1500 hp, which can be handled by a single fireman, automatic stoking is at a disadvantage on account of the cost, maintenance and attention required, and in larger plants these items must be balanced against the saving in wages of firemen. Of course, a lazy or drunken fireman would make a bad job even in a small plant, but so, too, would a bad mechanical stoker and a lazy or drunken attendant.

As regards the up-keep of mechanical stokers, Mr. Kerr rightfully calls attention to the general ignorance as to the repairs necessary on ordinary grates, and holds that for equal fuel burned the best stokers show "about the same" repairs as for flat grates. The very paucity of the data on both classes forbids certainty as to the facts, but on "form," as our sporting friends would say, the ordinary grate should have a considerable advantage in total maintenance, to say nothing of interest charges. The essence of the whole matter is reached by Mr. Kerr's statement, that based on rated horse-power of boilers repairs on the mechanical stoker are the higher. This amounts to saying that the mechanically-fired boilers, for one reason or another, are generally pushed harder or use lower grade fuel, or both. Obviously, the more fuel has to be burned to produce a horse-power at the engine the greater will be the relative advantage of labor-saving devices in handling that fuel, and it has been our consistent contention that the strong hold of mechanical stokers lies in their ability to compass this particular end of handling low-grade coal cheaply. If a given set of boilers is used with such fuel it may require burning double the fuel per horse-power that would be required with the best coal, and would have to employ twice as many firemen. Therefore, in any discussion as to the size of plant for which mechanical stoking pays, the essential point is really the amount of coal to be consumed rather than the rating of the boilers. We are firm believers in mechanical stoking in cases where it can improve the economic result, and we regret the heterogeneous character of the data on performance as keenly as does Mr. Kerr. But we hope that this discussion may tend to bring out a more complete array of the facts obtained in practice, upon which ultimately the judgment of engineers must be based.

**INDIANAPOLIS AND NORTHWESTERN TRACTION SYSTEM**

The Indianapolis & Northwestern Traction Company has recently completed an important line northwest from Indianapolis through Lebanon and Frankfort to Lafayette, with a branch from Lebanon to Crawfordsville. In mileage this road, when completed, will be the second largest of any of those now operating out of Indianapolis. The system, when finished, as shown on the map, Fig. 1, will have about 90 miles of track, including sidings, the main line mileage being about 88. The road, at present writing, is completed and in operation from Indianapolis to Lebanon, and almost ready to operate from Lebanon to Lafayette. The grading has been done between Lebanon and Crawfordsville, and this branch will probably be in operation soon. The Indianapolis & Northwestern Traction Company has issued \$2,000,000 in stock and \$3,000,000 in bonds, making the bond issue equal to \$33,333 per mile of track. The population of the towns and villages passed through, according to the census of 1900, is as follows:

New Augusta .....	215
Zionsville .....	765
Whitestown .....	700
Lebanon .....	4,465
Frankfort .....	7,100
Mulberry .....	529
Dayton .....	500
Lafayette .....	18,116
Crawfordsville .....	6,649

Total, exclusive of Indianapolis.....39,939

The rural population is large, as is shown by the fact that the postoffice has established free delivery over much of the territory covered by this route. A typical view of the country traversed is presented in Fig. 2. Most of the country is level and has been thickly settled for many years, while the roads are

into town. This is a feature that has not been introduced commonly on other interurban roads, and serves to show that there is enough of this class of business, so that neighboring farmers feel justified in maintaining these stables.

**TRACK AND ROADBED**

The track is laid with 70-lb. standard T-rails on 6-in. x

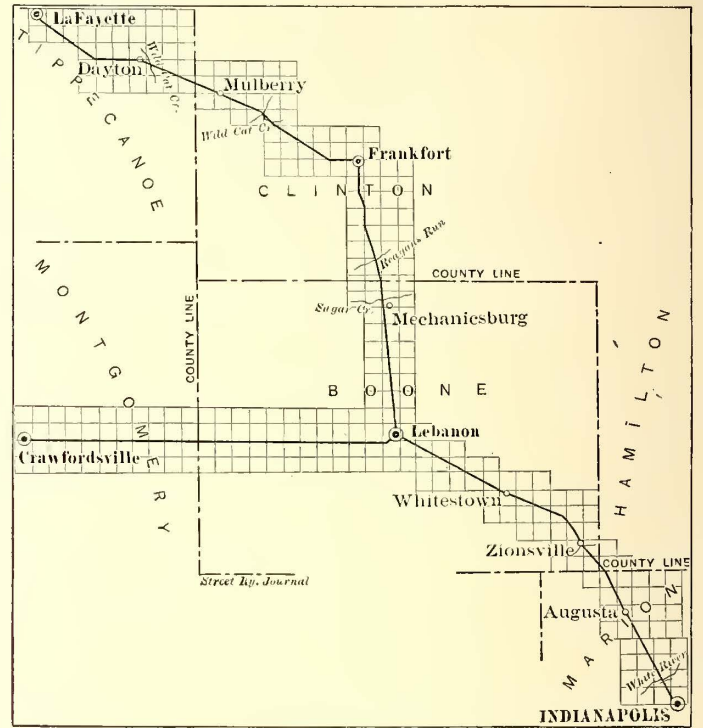


FIG. 1.—MAP OF INTERURBAN SYSTEM

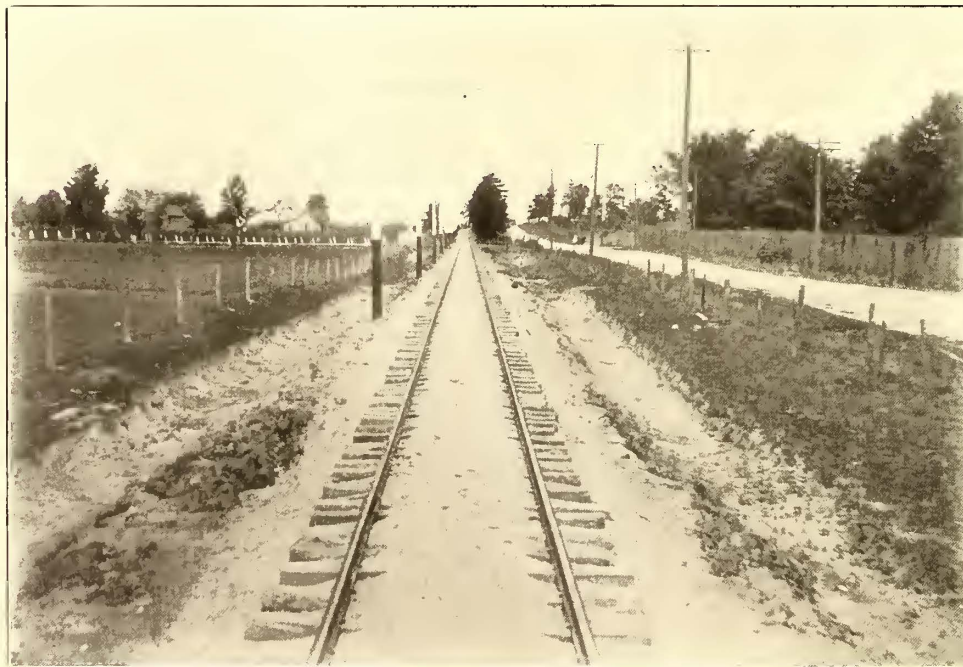


FIG. 2.—TYPICAL VIEW OF COUNTRY TRAVERSED

of the famous Indiana gravel, and this has been available for a liberal amount of ballast on the company's roadbed.

Although this interurban road is new, the part it is beginning to play in rural life is well shown by the fact that in several places farmers living near the line have provided shelter for teams and vehicles, so that those desiring to take the electric cars can drive in from a distance and leave their horses to be fed, sheltered and cared for while they take the electric road

8-in. x 8-ft. ties, spaced 2 ft. between centers. Oak ties were used on part of the road and cedar ties on the balance. The specifications call for 9 ins. of ballast under the ties, but in many places this is exceeded because of the raising of the track to a surface by putting in more ballasting. The ballast slopes directly away from the ends of the ties, and is crowned in the middle to give drainage, which can be seen in Figs. 2 and 3. Cuts and fills have a slope of 1 to 1, which is unusually steep, but is considered safe in soil which is encountered in this part of Indiana. Although the country is so level that there are few places requiring heavy grading, there is 1 mile just north of Indianapolis which calls for a large investment. This includes the crossing of the White River on a bridge of spans, seen in Fig. 4, the crossing of the White River bottoms on a long fill, and a deep cut directly through the bluff north of the river. Fig. 5 is a view looking toward this cut, and Fig. 6 a view taken from the top of the bluff, showing the cut, the fill and the pole line for a mile across the White River Valley. The cut is a maximum of 35 ft. deep, and the fill, just before entering it, about 20 ft. high. All of the right of way is owned by the company except in the villages passed through, where franchises were secured for the use of streets between Indianapolis and Lebanon. The right of way parallels a well-settled highway for some distance out of Indianapolis, but is several hundred feet back from the highway. This is an ideal arrange-

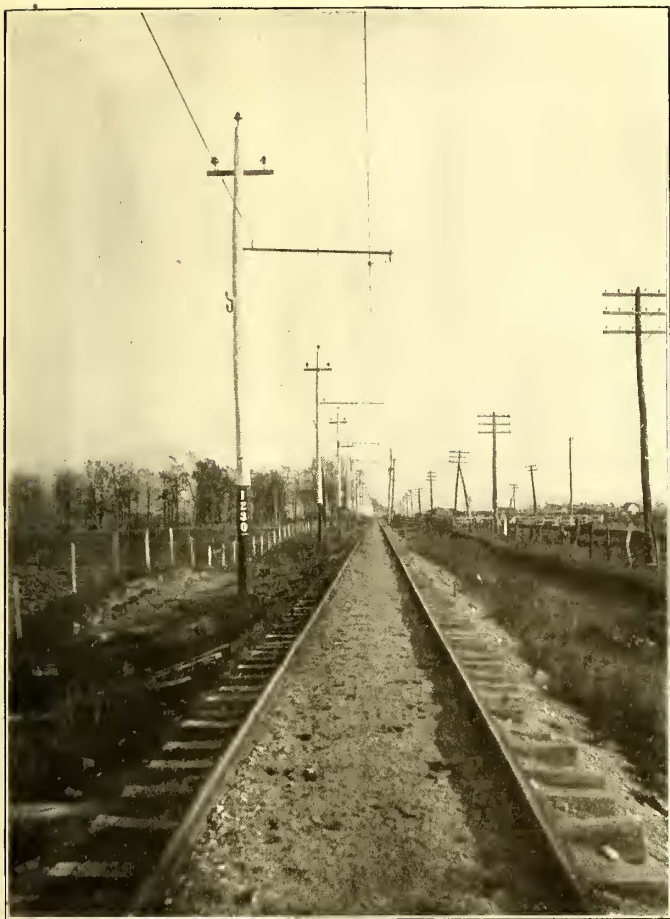


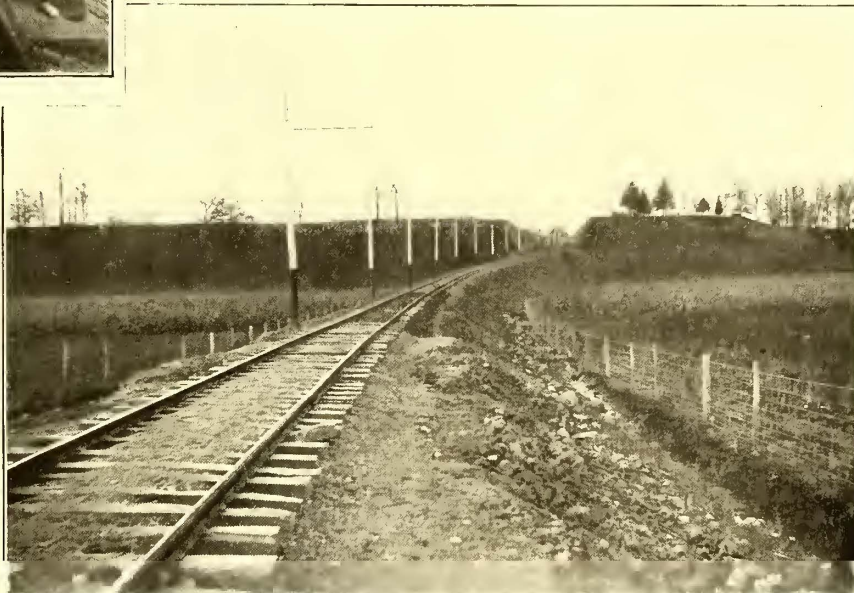
FIG. 3.—OVERHEAD LINE AND ROADBED CONSTRUCTION

ment in some respects and also has its drawbacks, especially from the standpoint of the right of way agent. By paralleling the highway at this distance the railway, of course, gets the benefit of the traffic from the population which is along the highway. However, farmers are likely to raise more than ordinary objections to a right of way which separates them from these farms, and many farms are likely to be separated from the owners' house by the railroad right of way. Another portion of the line between Indianapolis and Lebanon parallels the

Big Four Railroad. A right of way of this kind is easy to obtain, and the location from an engineering standpoint is likely to be good. It does not reach the rural population as well as a right of way adjacent to a highway. One remarkable feature in railway location is to be found between Lebanon and Crawfordsville. Here the right of way follows a section line, making an 18-mile tangent directly on the section line, a peculiar set of conditions which probably is not duplicated anywhere in the United States. It goes without saying that it is a very level country which makes such location possible. All of the private right of way is 50 ft. wide. Turnouts, 500 ft. long, are provided for at intervals sufficient to provide for a half-hour schedule being maintained in each direction.

OVERHEAD LINE

The overhead construction shown in Figs. 3, 7 and 8 is one of the finest features of the road. It is doubtful if a better looking pole line is to be found anywhere. Poles were carefully selected as to straightness and uniformity of size. They are 12 ins. at the butt, 6 ins. at the top, and 36 ft. long where the high-voltage transmission line is to be carried. Where there is no transmission line they are 32 ft. long. They are set 6 ft. in the ground, 5 ft. from the gage line of the nearest track rail. Being painted black and white, as seen in engravings, and set to accurate alignment 100 ft. apart, they present a very fine appearance. Some of these poles are Northern cedar; the balance Southern juniper. The high-tension wires are of No. 4 phosphor bronze, spaced on a 36-in. triangle, using top pin and cross-arm conduction. The insulators are the 8-in. Locke



in number, are carried on glass insulators mounted on an iron bracket opposite the trolley bracket. The diagram showing the power transmission and distribution scheme of the road is given in Fig. 9. The main power station is at Lebanon, with substations at points about 16 miles apart.

POWER PLANT AND SUB-STATIONS

The power plant at Lebanon, Figs. 10, 11, 12 and 13, is a large fire-flash brick structure of the flat-roof type. The engine

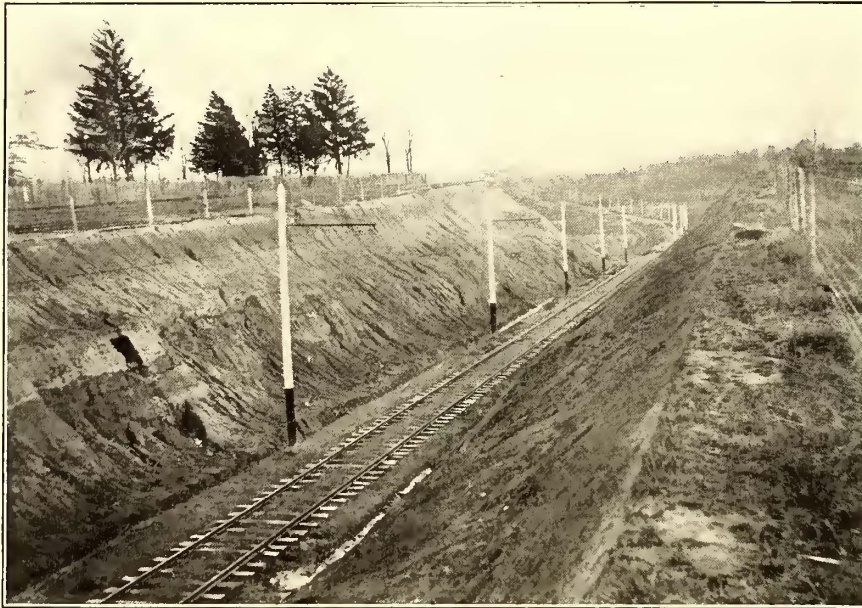


FIG. 6.—VIEW FROM TOP OF BIG CUT ACROSS WHITE RIVER VALLEY

room is 60 ft. x 130 ft., and the boiler room has the same dimensions. There is a steel stack 155 ft. tall, 9 ft. at the base, and with a 6-ft. 6-in. opening at the top. The bottom section is 7-16 in., middle section  $\frac{3}{8}$  in., and top section  $\frac{1}{4}$  in. The engine room has two Hamilton-Corliss cross-compound condensing engines, 24 ins. and 48 ins. by 48-in. stroke. Each drives a General Electric 800-kw, 25-cycle, three-phase generator, running 107 r. p. m., having a 16-ft. fly-wheel weighing 90,000 lbs. These generators (Fig. 11) give 370 volts to 400 volts at their terminals, and this voltage is suitable to supply directly the alternating-current end of the rotary converters in the power station, which are used to feed the trolley line near the station.

The engine room is on a level with the boiler room, and its auxiliary room, or basement, contains three Wheeler surface condensers, designed to condense 22,000 lbs. steam per hour at 27-in. vacuum. The boiler feed-water is taken from a hot-well to the heater, and then pumped into the boiler at a temperature of 210 degs.

The Wheeler surface condensers for the two engines have air pumps 12 ins. x 22 ins., and circulating pumps 18 ins. x 22 ins. Water for condensation is supplied by a pond 3000 ft. away from the power house. The pond is above the level of the power house, and discharges by gravity into a cold well at the power house. Water is forced back to the pond by the circulating pumps of the condenser. A Cochrane hot-water heater takes the exhaust from the auxiliary steam apparatus. Besides the two main engines there is an Ide engine driving a 55-kw, 125-volt exciter. There is room in the power house for another 800-kw unit, which will probably be installed soon.

The engine room is served by a traveling crane of 40,000 lbs. capacity, made by the Case Manufacturing Company, of Columbus, Ohio. This crane and its tackle are worked by hand power. In installing the crane the tackle supplied with it was used to hoist it to its place. Two poles were used to support one of the roof girders, as seen in Fig. 14. The tackle was attached to timbers laid on the girders and hooked to the center

of the crane. Fig. 14 shows the crane during the process of hoisting. It goes without saying that the hoisting was done much more quickly than if the tedious process of building up false work under the crane and jacking up had been followed.

In the boiler room (Fig. 13) are six Stirling water-tube boilers of 500 hp, built for a working pressure of 175 lbs. They are set in batteries of two, with a 27-in. fire-brick wall between them. Each boiler has 411 3-in. tubes, giving 5180 sq. ft. of heating surface, three 42-in. steam drums, and one 48-in. mud drum, 17 ft. long, 11-16 in. open hearth steel, 60,000 T. S. The gases from the boilers are carried in a 6-in. x 8-in. flue below the boiler room floor line, running at right angles to the boilers to the stack outside of the building, thus doing away with breeching above boilers. The steam header is of 12-in. extra heavy bends, connecting with each boiler and using 500-lb. Crane valves and fittings throughout. These boilers are fed with three Barr outside-packed-plunger feed pumps, 7½ ins. and 4½ ins. x 6 ins. Roney mechanical stokers are used under the boilers. Coal is shoveled directly from the railroad siding back of the boiler room in front of the boilers, and is then rehandled by the firemen, who shovel it into the hoppers of the stokers.

For supplying direct-current at 550 volts to the road near the station two 300-kw rotary converters (Fig. 12) have been placed in the main power station. These converters take current directly from the main generator leads at 370 volts. Massive oil switches are employed

in the alternating-current leads of the converters.

For each generating unit there are three 300-kw step-up transformer in the main power house, raising the voltage from

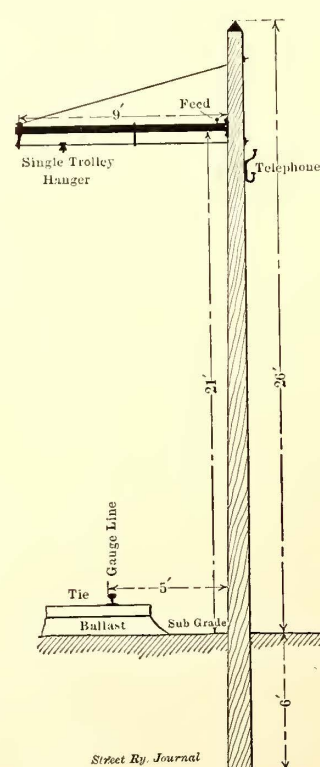


FIG. 7.—OVERHEAD CONSTRUCTION FOR LOW TENSION WIRES

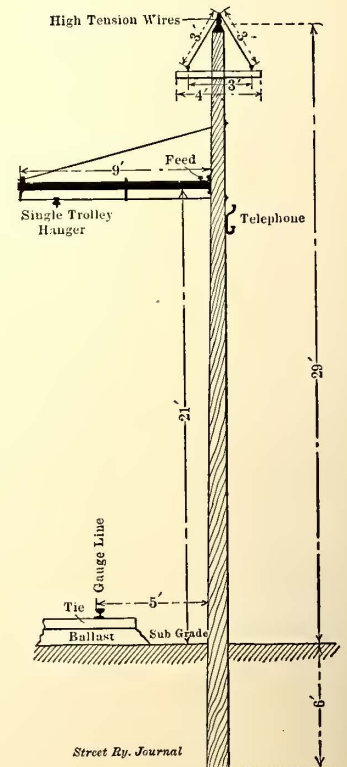


FIG. 8.—OVERHEAD CONSTRUCTION FOR HIGH TENSION WIRES

300 to 26,000. These transformers, with their oil switches and their relative location in the power house, are shown in Fig. 11. The transformers are cooled with air blast from the fan driven

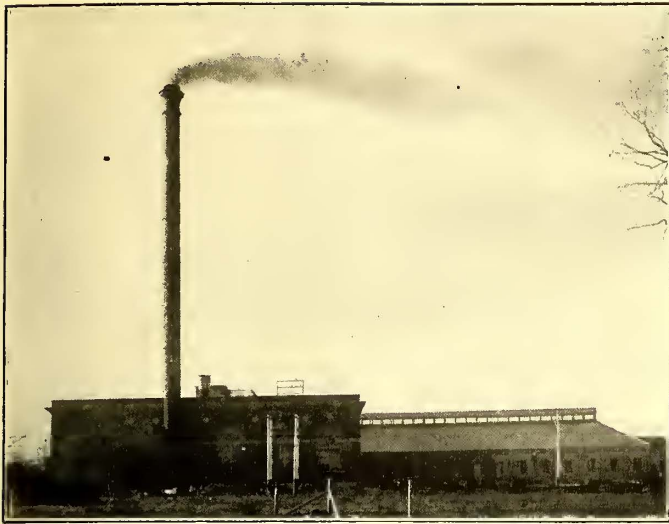


FIG. 10.—POWER STATION AND CAR HOUSE AT LEBANON

by an induction motor, seen in the foreground in Fig. 11. The high-tension oil switches are General Electric type-H, motor operated. Besides the engine-driven exciter before spoken of there is a 50-kw exciter driven by an induction motor. This is ordinarily used to excite the fields of the large alternators.

The switchboard in main station contains sixteen panels, each 16 ins. wide by 8 ft. high, arranged as follows: One engine-driven exciter panel, one motor exhaust panel, one generator exciter panel, three generator panels, three outgoing line panels, two rotary panels, two direct-current rotary panels, three direct-current feeder panels. There is also an auxiliary board, called a disconnecting panel, with each set of transformers, which allows two

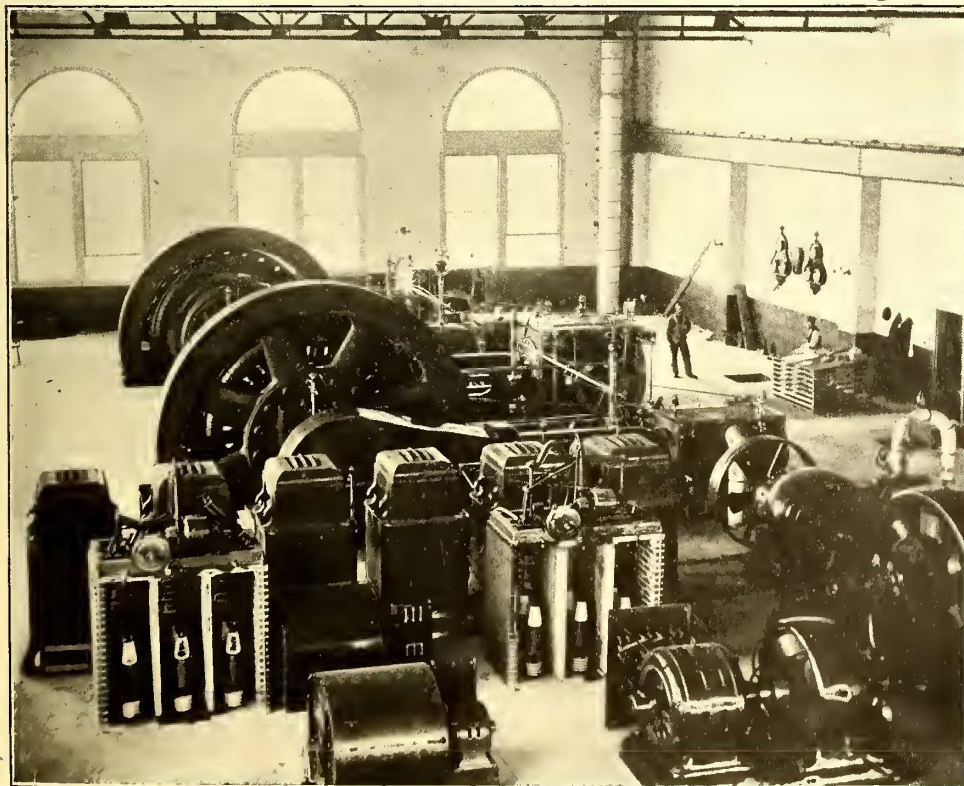


FIG. 11.—ENGINE ROOM

rotaries to be operated from either generator, thus freeing the switchboard of all large and cumbersome switches.

Each sub-station has two 300-kw rotary converters and a bank of three static transformers of 225 kw each, the latter being provided with two secondaries, so that the two rotaries can be run from one set of transformers. A view in the sub-station between Lebanon and Frankfort is shown in Fig. 15. One peculiarity of this sub-station is the omission of alternating-current rotary converter switchboard panels. This practice, while not entirely new, has only recently been introduced in sub-station work. The high-tension oil switch controlling the high-tension circuit to the bank of transformers is operated by a lever in front of the bank of transformers. The only switch in the 360-volt alternating-current circuit of the rotary converter is the switch which is mounted on the reactance coil, which serves as a starting switch when the rotary converter is being started with alternating current. This is the usual three-pole double-throw switch, which, when closed in one direction, connects the rotary converter with the trans-

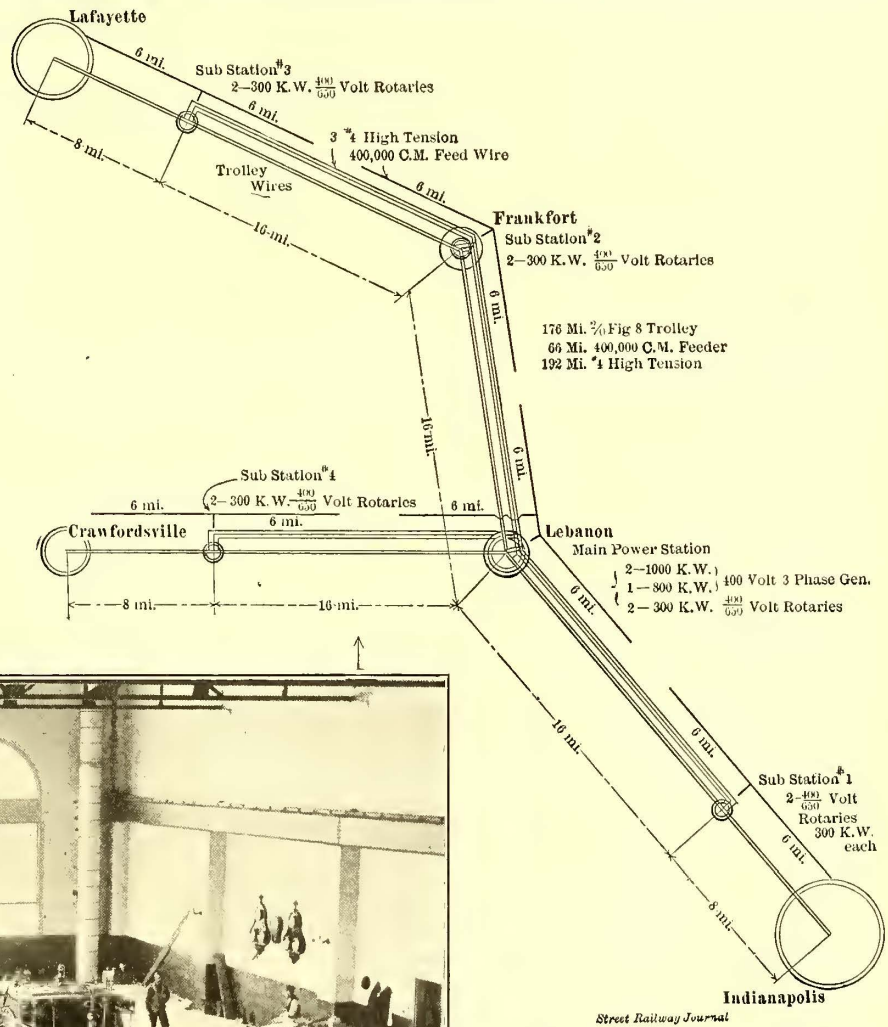


FIG. 9.—DIAGRAM OF POWER TRANSMISSION SYSTEM

formers through the reactance coil, and when closed in the other direction connects the converter directly to the transformer secondaries, the upper portion being 160 volts alternating current, the lower position running positive or 370 volts. This arrangement allows the four panel switchboard to be a direct-current board. Two of the switchboard panels, seen in Fig. 15, are feeder panels, one feeding north and the other south from the sub-station. The other two panels

are for the direct-current end of the two rotary converters. The General Electric lightning arresters for the high-tension lines are seen at the left, Fig. 15. A Lincoln synchronizer is on the bracket of the switchboard for use in throwing the rotary converters in parallel. On the incoming high-tension line is a high-

gage compartment. The smoking compartment in the front end of the car occupies the space opposite four windows. The seats are Hale & Kilburn reversible, with high backs, upholstered in green plush. The finish is mahogany with a small design inlaid in the panels between windows. These cars were built by the Jewett Car Company. They are heated by a Peter Smith hot-water heater, located in the motorman's compartment. The trucks are the Peckham M. C. B. type. The motor equipment consists of four General Electric 73 motors with type-M control. The gear ratio is such as to give about 42 m. p. h. maximum speed on a level. Steel-tired wheels are used exclusively. Twenty passenger cars and two express cars have been ordered.

#### CAR SERVICE

The cars now leave Indianapolis every hour, making all local stops. With the completion of the line to Lafayette and after the proper settling of the roadbed has taken place, it is proposed to run limited cars from Lafayette to Indianapolis in  $2\frac{1}{2}$  hours. The distance is  $68\frac{1}{2}$  miles, including the city mileage at each end. It is proposed to operate local cars, making this run in 3 hours. When the Crawfordsville branch is in operation it is expected to have a car leave Indianapolis every half-hour, the cars leaving on the even hours going to Lafayette and 30 minutes later to Crawfordsville. This, of course, will give a

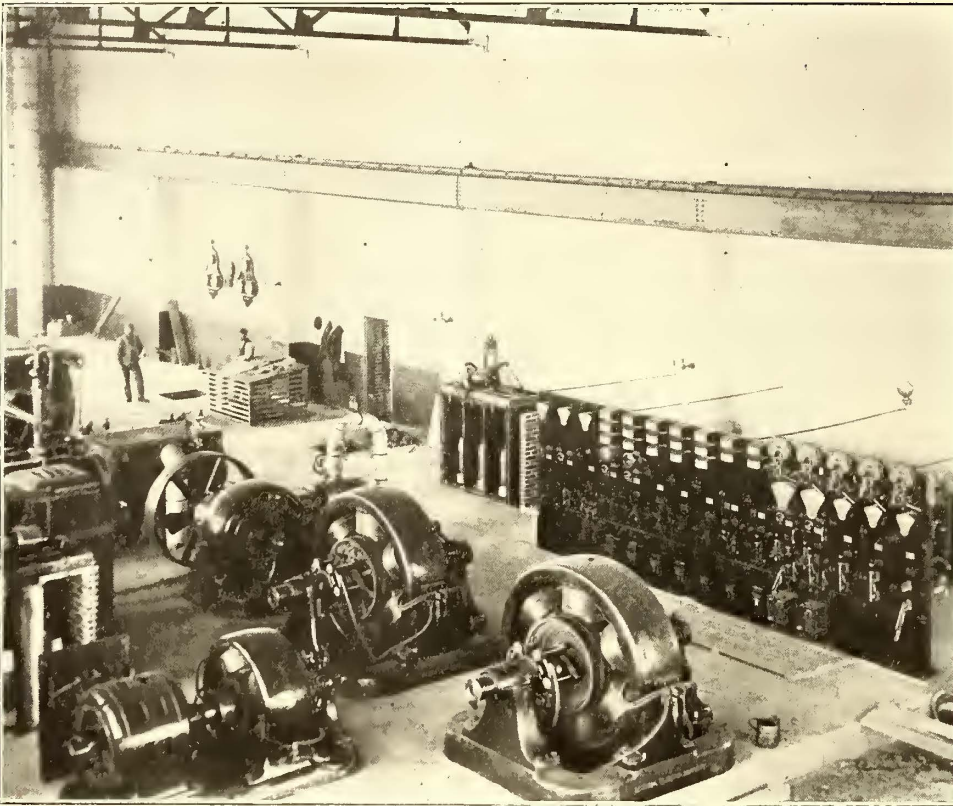


FIG. 12.—SWITCHBOARD AND CONVERTERS IN ENGINE ROOM

tension ammeter, power factor indicator and voltmeter. These are located on one of the pillars near the transformers, Fig. 15. At this sub-station oil switches and high-tension indicating

30-minute service between Lebanon and Indianapolis. The operation of cars is controlled by a dispatcher at Lebanon, who transmits his orders by telephone over the two wires provided



FIG. 13.—BOILER ROOM

instruments are also placed in the high-tension line as it continues on to the next sub-station.

#### ROLLING STOCK

The regular passenger cars, Fig. 16, are somewhat longer than the average interurban car, being 60 ft. over all, with bodies 50 ft. long. The width is 8 ft. 8 ins. These cars seat sixty persons. Although equipped with controllers at each end they are intended to run ordinarily with the motorman's cab and baggage compartment at the front. As can be seen from Fig. 16 there is not platform space at the front end. What is usually the motorman's cab is enlarged to make a small bag-

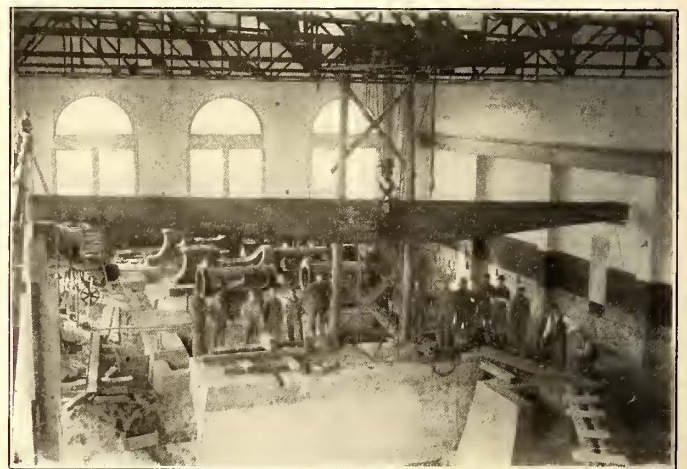


FIG. 14.—HOISTING TRAVELING CRANE WITH ITS OWN TACKLE

for that purpose. Telephones are located in boxes at meeting points along the line. Telephone instruments were supplied by the Carl Electric Company. The conductor receives the dispatcher's orders, writes a duplicate order on a blank provided for the purpose, and after receiving the order must give the duplicate to the motorman and read it to him, to be sure that it is understood. Train crews report to the dispatcher only at terminals except in case the opposing car is not in sight when a crew arrives at a meeting point.

An elaborate system of tickets has been put in use. General Manager C. C. Reynolds is a former steam railroad man, and



has adopted many of the steam railroad forms of tickets, believing that special mileage and commutation tickets tend to produce more riding than a regular uniform cash fare. This is on the theory that a person having purchased a mileage or commutation ticket will think less about the expense of a trip than a person who must pay cash fare every time he rides. The regular one-way fare is slightly under 2 cents a mile. Round-trip tickets are sold at about 1½ cents per mile. Mileage books good for 1000 miles cost 1¼ cents per mile. School tickets, having forty-four rides, good only on school days, are sold at one-half the regular one-way cash fare. These are not limited to a given month, as is usual. One-way tickets between important points are small cards similar to those common in steam railroad practice. Round-trip tickets are cards with the going ticket in one color and the return ticket in another. These card tickets are kept in stock by ticket agents for use between the principal points. Ticket agents also have a supply of miscellaneous way tickets which can be filled in with ink to any way station for which tickets are not printed. National safety paper is used for these tickets. Trunks are checked for 25 cents each. Checks are printed in three parts, one to be attached to the trunk, the other to be given as a check to the customer, and the third retained by the company. Milk tickets, which include the return of the empty can, are made up in similar form. The stub of this ticket is attached to the can, to show to

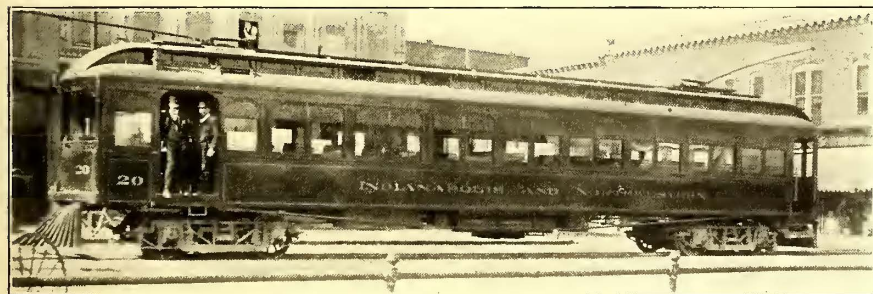


FIG. 16.—STANDARD INTERURBAN CAR

which station it is to be returned. The other two parts are good for the going and return trip of the milk can.

The officers of the Indianapolis & Northwestern Traction Company are: George Townsend, president; Phillip L. Saltonstall, vice-president; Winthrop Smith, secretary; Chauncey Eldridge, treasurer; C. C. Reynolds, general manager, the latter having direct charge of the operation of the road. Townsend, Reed & Company, of Indianapolis, built the road under contract for Tucker, Anthony & Company. The engineering work was done under the direct supervision of Messrs. Townsend and Reed, assisted by Robert P. Woods, civil engineer. William M. Moran, mechanical and electrical engineer, had personal supervision of all foundation work and the erection of boilers, engines, generators and electrical apparatus. F. W. West acted as steam engineer, and Henry Senecal as superintendent of track construction. During the past year Thomas Pettigrew has been on the ground as engineer, representing Tucker, Anthony & Company.

INTERURBAN DEVELOPMENT IN INDIANA IN 1903

The mileage of interurban lines radiating from Indianapolis increased during the year just closed from 273 miles to 525 miles, and the number of roads increased from seven to ten. This does not include the Crawfordsville branch of the Indian-

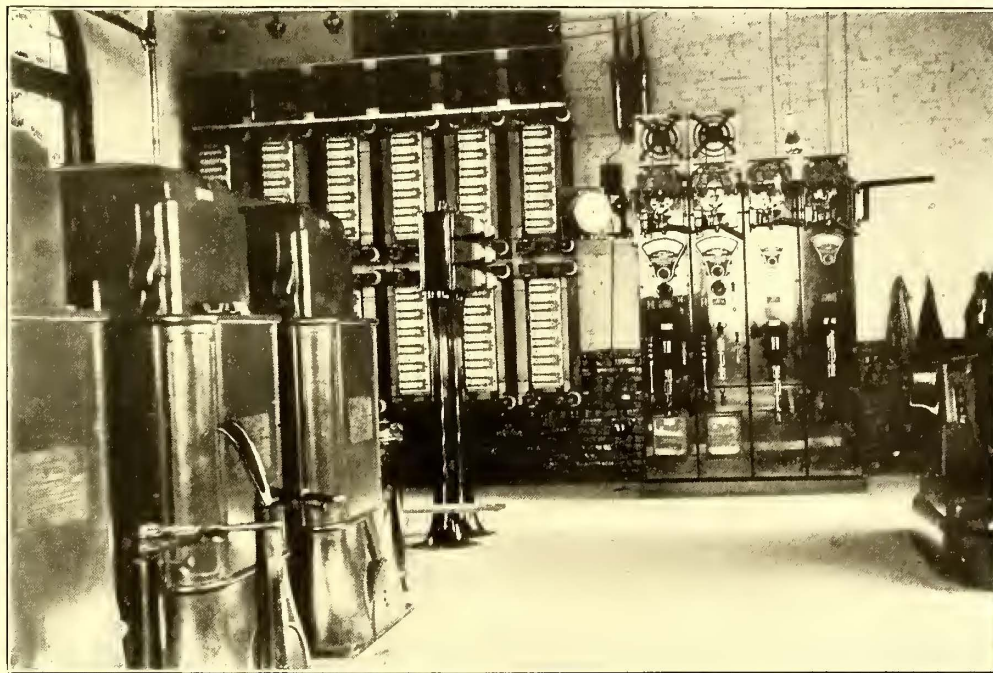


FIG. 15.—SUB-STATION EQUIPMENT

apolis Northwestern, the Indianapolis-Cincinnati line and the Consolidated line, all of which expect to complete their lines and begin operation early in the spring. These will add nearly 100 miles to the 525 now in operation. At this time there are 153 interurban passenger cars in and 153 passenger cars out of Indianapolis every day, making a total of 306 cars daily. In addition there are twenty freight cars in and out daily. A conservative estimate of the number of people brought into and taken out of the city during the year 1903 is placed at 2,250,000.

The gross earnings of all the companies operating into Indianapolis during the year are estimated at \$1,850,000. This is the total business over their 525 miles of track. The officials place the operating expense at 45 per cent of the gross receipts. The total outstanding capitalization of these roads and those now building is \$54,005,000. It is estimated that the interurbans entering Indianapolis did a freight business of \$155,000 during the year.

Thirty miles of interurban road were built in Northern Indiana and 40 miles in Southeastern Indiana connecting Evansville and Princeton. A number of extensions were built by the Indiana Union Traction Company, which are included in the estimate given.

A notable event of the year was the awakening of the interurban spirit all through Southern Indiana. With the improvement of the Ohio and the White River water powers a number of companies have been organized to build interurban lines and promote systems. Lines are now being extended into the coal fields, and as a basis of operation a number of traction men have purchased large tracts of coal land, with a view of mining and transporting coal. The effect of the interurban operation of the lines was noticeable in all lines of business conducted in the towns and cities connected. It is claimed that the interurban roads now operating, together with their

connections, have added to Indianapolis a shopping population of 1,000,000 people.

A notable feature of 1903 was the connection of the Indiana and Ohio lines through Richmond. Arrangements are now being made for a through service from Indianapolis to Columbus and Zanesville, Ohio, a distance of 250 miles. This service is only held in check by an obstructive bridge at Richmond, which will be removed in a short time. The introduction of buffet cars and the Holland palace sleeping cars was not only a feature of the history of Indiana interurbans, but it marked an epoch in the history of transportation facilities calculated to bring the interurbans into closer competition with steam roads for long distance as well as local travel. The outlook for the year 1904 is very bright.

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### REPORT OF TECHNICAL COMMISSION ON THE PARIS UNDERGROUND ACCIDENT

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The Technical Commission, appointed by the prefect of police in Paris to investigate the accident last August on the Metropolitan Underground Railway, and to suggest reforms in the service and equipment on the line, have completed their investigation and have made a number of recommendations. The committee was composed of Messrs. Mascart, a member of the Institute, president; Hospitalier, secretary; Picou, Blondel and Emile Gautier. They were assisted by Messrs. Walckenaer and Victor Gauthier, engineers of the police department. The recommendations made were as follows:

(1) Good mechanical protection of the car wiring in metal conduits, connected electrically with the framework of the car.

(2) Improvements in the construction and arrangement of the wiring to the controllers.

(3) Employment of all necessary means to limit the heating of the motors and ensure their being cool when put into service.

(4) Installation of apparatus permitting the motorman to raise the third-rail shoe without leaving his compartment.

(5) Employment of fireproof material as far as possible and slow-burning material in all other places.

(6) Sub-division of the third rail into a number of sections so that the number of trains on each section is considerably reduced.

(7) Supply of each section by direct feeders from the sources of supply, as well as automatic means for cutting off the current in case of short circuit.

(8) Installation of special apparatus at a number of different points along the track by which the power station or sub-station can be notified to cut current off the third rail, without recourse to the telephone, in case passengers have to leave the cars and walk through the tunnel to the nearest exit.

(9) All light circuits in the tunnel to be kept entirely separate from power circuits. The light circuits should also be especially protected and supplied by feeders outside the tunnel.

The Metropolitan management has already undertaken the introduction of most of these recommendations.

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### REPORT OF THE INTERNATIONAL RAILWAY EMPLOYEES' ASSOCIATION

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The treasurer's report of the International Railway Employees' Association, which is an organization of the employees of the International Traction Company, of Buffalo, has recently been rendered. The Association shows a membership of 1320, an increase of 200 over last year. The total receipts for the thirteen months ending Oct. 31, 1903, were \$9,873. On Oct. 31, 1903, there was a profit and loss surplus of \$1,664.

### MECHANICAL STOKERS VS. HAND FIRING

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New York, Jan. 8, 1904.

EDITORS STREET RAILWAY JOURNAL:

Sirs.—The editorial on stokers in your issue of Oct. 24 suggests several considerations in stoker practice which relate to the standpoint from which the subject is viewed. Discussions and the interchange of facts and data are beneficial in proportion to their breadth, accuracy and the point of view from which they are approached.

Your editorial summarizes in a practical way the comparatively limited substance with which it deals, but the main difficulty in reaching conclusions from the discussion, as contained in the report of the Pennsylvania Street Railway Association and the summary of your editorial, is the same as would be found in riding to San Francisco on a ticket purchased from New York to Philadelphia.

As it is nearly impossible to compress sufficient data for wise conclusions into a brief discussion, certain advantage can be gained from partial information by clear definition of the art, and the true relation which the apparatus under discussion bears to it.

The whole art of combustion for steam making is full of anomalies, influenced as it is by many conditions and more limitations. Results, therefore, scatter through about 100 per cent, and usually fall short of the possibilities. This, therefore, admits of 10, 20, 30 and even 50 per cent savings, which may be variously attributed to causes, conditions or apparatus.

A little data obtained from a few plants, therefore, gives the material necessary for almost unlimited discussion and wide variance of opinion. The most important fact omitted from records is the information as to how well the plant is operated. This is difficult to determine and state, but it can often be exemplified by proceeding to operate 10, 15 or 20 per cent better than heretofore with little or no change in conditions. This is not infrequent where mechanical stokers are in operation with mediocre results and the right man takes charge of the boiler room, promptly showing a substantial increase of efficiency and a large reduction in labor. The eternal vigilance which is the price of economy is then allowed to wane until another period of reformed operation is instituted.

In the midst of such conduction various tests are made with conditions of operation more or less perfectly recorded. The difference between these results form fertile sources of discussion and opinion. Any one, therefore, approaching this subject should get firmly in mind that this is a widely variable art, rather more at the mercy of conditions than many other forms of mechanical service, and judgment should be suspended so long as information is comparatively meager. It is fair to credit any special device with its best performance, and exert all reasonable influences to produce conditions in which such performance can be perpetuated. This will enable any art to advance.

The status of mechanical stokers is quite different from that of engines, generators, motors, etc., in their respective arts. An engine fed with steam and oil, a generator supplied with power, or a motor furnished with electric current will perform certain characteristic functions comparatively unaided. Such machines contain within themselves the intrinsic ability to render certain results in capacity and efficiency with comparatively little outside assistance.

Stokers, however, belong to a class of apparatus which does not contain intrinsically such ability. They are rather in the nature of aids to intelligent manipulation, and the human element, therefore, enters largely into their performance. Such apparatus may, therefore, be considered in one sense as a convenience or as a device or instrument, the intelligent manipulation of which will yield results. The labor they save

is the ordinary manual labor of the many, not the skilled oversight of the few.

It is well known by those best informed that with suitable draft and manipulation a nearly perfect combustion of coal can be obtained, and through suitable heating surface a large proportion of its thermal capacity can be transferred to water or steam for useful service. The laws of combustion are in no wise connected with hand-firing, flat grates, mechanical stokers, or other manipulative functions, and, therefore, the fact that an expertly hand-fired flat grate can equal stoker firing is about as irrelevant a consideration as could be deduced. It would be strange if this were not true.

The problem is that knowing such combustion can be produced, and should be produced quite continuously, what constitutes the most practical method of obtaining it?

The conditions and limitations vary considerably with the size and engineering excellence of the plant and the available labor. It is not impossible to operate satisfactorily a small plant with a few good firemen who do their work carefully and intelligently with a keen eye to their employer's interest. The 50,000-hp plant must, on the other hand, depend on a different class of labor, ever changing, and which has no personal interest in the employer's welfare. Here it becomes a practical necessity so to equip as to insure the best obtainable results under rather severe limitations. There are all kinds and sizes of plants between these extremes. Under such widely varying conditions it will be obvious that a mere statistical comparison of tests is of no importance, and the judgment of men skilled in operating properties becomes of vastly greater weight. Thus it has come that the managers of fairly large plants have found that they get higher grade and better sustained results from mechanical stoking than hand firing.

It should be remembered that the practical point for consideration is not so much a mechanical stoker, considered as a machine, as the adoption of a mechanical stoking system with all it entails, beginning with the facility which a stoker offers for receiving coal by gravity from storage, operating with closed doors, offering means for slicing, and finally removing refuse by mechanical means—representing a practical means for fuel and labor saving proportioned to the quality of the management.

If, therefore, a broad view is taken of the opportunities offered by mechanical stoking systems, the results of good management are carefully studied, and the results of bad management deservedly condemned, it will be found that mechanical stoking has been productive of more good than any other one thing introduced of late years in steam generation.

The use of poorly designed apparatus, and more often to the placing of stokers with insufficient engineering knowledge and consideration of the conditions under which they are to operate, have led to certain failures which should be charged to their true causes and not to the general stoker art.

In the early days of mechanical stoking the construction was too light, grate areas too small, arches too large, combustion chambers cramped, ash pits shallow, boiler settings poor, and altogether the limitations were multiplied resulting unfavorably; nevertheless, scarcely more unfavorable than followed the flat grate practice of the same dates. The new thing, however, always is charged with all of the evils in sight, while an older one with long-suffered attendant evils is tolerated.

The attention given to the proper installation of mechanical stokers has brought much good engineering thought to bear upon boiler settings, flues, drafts and the general structures which tend to benefit the end for which the device offers opportunity. The whole art is by no means perfect but has vastly improved. Flat grate practice remains much the same as ever—always competent to produce a nearly perfect combustion under conditions which it practically never gets, or if it does then only on so limited a scale as to be insignificant.

Some engineers persuade themselves that, knowing the possibility of good combustion with flat grates under certain conditions, they will produce these results without the assistance of various devices. Others avail themselves of such devices as in their best judgment will aid economy. The result often is that the former course leads to results falling short of intentions, supplemented with explanations which do not improve the facts. The latter course approaches fairly close to intended results, yielding a satisfactory service with still some room for improvement, and, above all, maintaining such results with a degree of constancy which the former method rarely or never obtains.

Too much importance is often attached to certain details which vary through a wide range, and which are not clearly identified; for instance, the amount of repairs or maintenance. It is rare that suitable accounts are kept of furnace repairs. Some records show abnormal repair charges, scarcely explainable until an investigation finds that repair parts sufficient to last a year or two have been ordered, put in stock and charged up to the plant within a short time.

Again, certain plants seem to have a peculiar faculty of using up a considerable number of parts of which other plants use none. This is prima facie evidence of bad management or specific defect, either of which can be remedied.

Again, excellently operated plants on which repairs are comparatively low show a variation of 100 per cent in actual amount of repairs per annum.

It is nearly impossible to get satisfactory records of repair of flat grates and their settings made on exactly the same basis in one plant as the basis employed in another where stokers are used, but out of a very large number of such records during the last fifteen years I am convinced that the repairs on the best handled stoker plants are about the same as on flat grates when measured in terms of coal burned. Any other measure is obviously fictitious.

As a rule, stoker repairs show a higher rate when measured in rated horse-power of boilers, and that is merely because they do more work, it being rare to find any stoker plant that is not running at a much higher rate than hand-fired plants—a condition favorable to additional wear and tear. This, of course, is permissible for the same reason that certain classes of rolling stock are entitled to wear out more wheels than others. They make more miles per year at higher speeds and earn more money.

The question of repairs, therefore, is one that cannot be justly considered alone, and inasmuch as the consideration of such items involves a more or less complicated situation than is usually presented by some simple statement, the real facts become clouded, misinterpreted, and form the subject of more or less fruitless discussion.

Again, some one objects to the hot stoker fires, mentions tube and arch burning, and quotes half-baked statistics on the quality of slow fires. Space does not permit discussion of these subjects. Suffice it to state that ample experience proves that hot, but not too hard-driven fires, are essential to economy, capacity and smokelessness. A coal fire cannot be built on a boiler grate that will burn clean tubes containing water. Proper arches will stand any coal fire that can be built on cast-iron grates. Many other such matters can be dismissed from discussion as remnants of early ignorance.

Any one undertaking to make an investigation of the practice of combustion under boilers has, considering the error of many quoted results and the incompleteness of others, a very nearly impossible task, and thus it is that whoever wishes to arrive at fair conclusions along this line needs to first determine, in his mind, the attitude from which he will view it. A proper attitude will benefit the consideration of any one, whether he be much or little skilled in the art.

Engineering judgment is, after all, the only medium through which correct decisions will be reached in an art in which available data scatters over so wide a field as that of the practical application of various appliances to aid the combustion of coal.

In conclusion, I therefore suggest that those who are interested in the subject of boiler furnace combustion, would find it well to think over the whole subject, broadly, in the light of all the surrounding conditions and limitations; take their eye off any specific device; line up their judgment on the total performance of all things required in the various types of plants than minutely studying tests covering wide ranges of results, conditions and unknown management. By this process and observation of the best installations of the respective kinds I think they will get a clearer idea of what will yield their plants most benefit, and they will be aided by the point of view thus gained when required to hold discussion based upon limited data.

WALTER C. KERR.

**ANNUAL REPORT OF THE NEW YORK STATE BOARD OF RAILROAD COMMISSIONERS**

The annual report of the Board of Railroad Commissioners of New York State for the year ending June 30, 1903, was submitted to the Legislature Jan. 11. Certain of the statistics contained in the report, as well as a tabulated list of the gross and net earnings of the different companies, were published in the last issue of this paper. Other statistics, published in the report, are summarized below.

The percentages of sub-divisions of operating expenses to gross earnings and to total operating expenses for all the companies are shown in Table I.

TABLE No. I.—PERCENTAGES OF SUBDIVISIONS OF OPERATING EXPENSES

FOR YEAR ENDING JUNE 30	TO GROSS EARNINGS		TO TOTAL OPERATING EXPENSES	
	1902	1903	1902	1903
Maintenance of way and structures...	4.19	3.99	7.09	6.92
Maintenance of equipment.....	6.78	5.94	11.51	10.29
Operation of power plant.....	8.04	9.42	13.67	16.33
Operation of cars.....	27.52	28.13	46.72	48.74
General expenses .....	12.38	10.22	21.01	17.72
	58.91	57.70	100	100

Table No. II shows statistics of receipts and expenditures per passenger and cost of operation per car mile of some of the principal companies for the year ending June 30, 1903:

PHYSICAL CONDITION OF PROPERTIES

The electrical expert of the board reports generally on the physical condition of street surface railroads as follows:

"The improvement in construction and reconstruction of electric railroads in the State, mentioned in last year's report of the board, has been continued during the past year. The extensions of existing roads and the construction of new ones have been made with not less than 60-lb. T-rail or 9-in. girder rails. In cases of suburban and interurban roads, rails generally have been laid on first-class ties with track properly

**FREIGHT TRAFFIC TO BE CONTINUED ON THE MAUMEE VALLEY.**

THE MAUMEE VALLEY RAILWAYS AND LIGHT COMPANY  
Toledo, Ohio, Jan. 18, 1904.

EDITORS STREET RAILWAY JOURNAL:

The statement in your last issue that this road is to confine itself to the passenger business in the future is incorrect. We are still doing freight business and expect to continue doing so. Please make the necessary correction.

L. E. BEILSTEIN, General Manager.

There is no truth in the daily press reports that the Delaware & Hudson Railroad is to equip its line between Wilkesbarre and Carbondale with the third-rail system to compete with the Westinghouse Company's new third-rail system between Wilkesbarre and Scranton. A prominent official of the Delaware & Hudson Railroad Company said to a representative of the STREET RAILWAY JOURNAL that there was absolutely nothing in the story.

TABLE NO. II. STATISTICS OF RECEIPTS AND EXPENDITURES PER PASSENGER AND COST OF OPERATION PER CAR MILE OF SOME OF THE PRINCIPAL COMPANIES FOR THE YEAR ENDING JUNE 30, 1903.

NAME OF ROAD	Number of Passengers Carried, Including Transfers	Total Car Mileage	* BASED UPON GROSS EARNINGS FROM OPERATION AND OPERATING EXPENSES		* BASED UPON RECEIPTS FROM ALL SOURCES AND TOTAL EXPENDITURES, INCLUDING FIXED CHARGES		PER CAR MILE		
			Average Earnings per Passenger	Average Cost of Operation per Passenger	Average Receipts per Passenger	Average Expenses per Passenger	* Gross Earnings	* Operating Expenses	* Total Expenses Including Fixed Charges
<i>Operated Wholly or in Part by Mechanical Traction</i>									
Albany and Hudson.....	1,211,306	696,659	13.89	8.96	17.20	18.89	24.75	15.96	33.66
Auburn and Syracuse †.....	1,825,644	423,767	1.45	2.86	4.47	4.45	19.19	12.18	19.16
Brooklyn Heights ‡.....	300,892,437	49,389,361	4.07	2.44	4.18	3.93	24.84	14.89	23.98
Binghamton.....	5,643,496	1,165,780	3.96	2.24	4.01	3.45	19.16	10.86	16.70
Coney Island and Brooklyn.....	38,684,152	6,296,662	4.13	2.61	4.15	3.39	25.40	16.02	20.32
Crosstown Street (Buffalo).....	14,601,800	2,449,880	3.42	1.88	3.44	3.11	20.38	11.23	22.59
Geneva, Waterloo, Seneca Falls and Cayuga Lake.....	1,544,744	434,450	4.70	2.63	4.73	3.97	16.71	9.36	14.11
Forty-second St., Manhattanville and St. N. Ave. (N. Y. City)§	19,869,643	2,862,866	4.01	2.39	4.19	4.52	27.82	16.62	31.37
Hudson Valley.....	3,599,464	1,613,467	8.77	9.39	9.70	14.53	19.57	20.97	32.42
International (Buffalo).....	77,709,791	14,577,871	4.07	2.25	4.15	3.22	21.71	11.99	17.18
Interurban (New York City) ¶.....	422,909,442	45,303,499	3.54	1.67	3.61	3.69	33.05	15.60	34.36
Jamestown.....	4,326,992	724,633	3.18	2.12	3.22	2.90	19.01	12.67	17.30
Kingston Consolidated.....	2,425,509	491,489	4.61	2.66	4.62	4.26	22.80	13.13	21.01
New York and Long Island.....	717,609	231,645	4.78	4.91	4.83	4.96	14.80	15.22	15.36
New York and Queens County.....	14,672,125	3,207,323	4.17	2.47	4.22	3.78	19.09	11.55	17.31
Rochester.....	33,663,165	5,829,584	3.84	2.06	3.93	3.23	22.15	11.88	18.63
Schenectady.....	7,942,147	2,264,898	6.62	4.49	8.17	6.00	23.20	15.75	21.04
Syracuse and Suburban.....	1,493,876	404,962	4.98	2.95	5.02	4.72	18.39	10.90	17.43
Syracuse Rapid Transit.....	18,944,315	3,770,292	3.95	2.23	3.91	3.45	19.85	11.19	17.32
Third Avenue (New York).....	50,835,205	6,520,284	4.33	2.33	5.83	5.74	33.73	17.85	44.74
United Traction (Albany and Troy).....	31,693,596	8,080,144	5.07	3.40	5.21	4.34	19.88	13.32	17.03
Utica and Mohawk Valley.....	13,337,569	3,012,009	4.64	2.76	4.66	3.89	20.55	12.23	17.13
Union (New York).....	45,149,750	6,849,201	2.51	1.82	2.52	2.47	16.57	11.98	16.28
<i>Operated Wholly or in Part by Animal Power</i>									
Central Crosstown (New York City).....	18,517,929	1,612,326	2.62	1.67	2.65	2.28	30.09	19.17	26.23
Dry Dock, East Broadway and Battery (New York).....	14,123,925	2,082,924	3.97	3.08	4.01	4.06	26.93	20.91	27.57

\* Includes earnings and expenses of freight, express, mail and all other business. † For nine months ending June 30, 1903. ‡ Includes all lines operated by Brooklyn Heights not making separate reports. § Includes portion operated by horses. ¶ Includes all lines operated by Interurban not making separate reports, and also includes lines operated by horses.

ballasted and ditched. The increased weight of cars and the speed at which they are at present operated has been, in most cases, kept pace with by railroad managers in improved track construction, and more attention has been given to maintenance. In this connection there has been a decided improvement in the matter of structures. A number of wooden bridges have been replaced by steel ones and concrete abutments have been adopted by nearly all roads for replacing trestle, mason work and mud-sill abutments. Concrete is also being extensively used in the construction of culverts and other openings for waterways. A number of the companies have placed crossing-signs at crossings of highways, the views of which were obscured. With the present methods of operation on interurban and suburban roads, this is a matter of importance and safety of operation would be increased if all of the obscure crossings were equipped in this manner. Considerable attention has been given to the subject of runaway cars on heavy grades, and several of the roads have equipped tracks with devices for preventing serious accidents from this cause. These consist, in some instances, of derail switches; in others of obstructions placed at the foot of grades, for preventing cars from running onto other railroad tracks or into dangerous places. In a number of cases grades are sanded by men employed for that purpose, during times of slippery rail.

"The improvement in the construction of cars, both in appearance and comfort, has been continued during the past year, and, at present, some of the roads are being equipped with cars which, in both these conditions, compare favorably with first-class steam road equipment. An improvement in reference to the strength of cars should be made. In a number of cases collisions result in loss of life and serious injury to passengers for the reason that the present car construction is such that the sill of the one car rides over the sill of the other (in cases of collision) and cuts the woodwork above the flooring, and, in most cases, extends a considerable distance into the body of the second car. Uniform height of the buffer from the rail for different classes of cars should be adopted, and stronger construction above sills is required. A number of roads have added to their power brake equipment. This is an important element in preventing accidents, and all cars operated in the State at a speed to exceed 15 m. p. h. should be so equipped."

#### OTHER RECOMMENDATIONS

The recommendations in regard to high-voltage transmission lines and train despatching were published last week.

The board renews to railroad managers its general recommendations made in its annual reports for several years, as to the operation of street surface railroads, especially in the following particulars:

First.—Every street car which crosses a steam railroad at grade shall be equipped with a red flag for use during the day and a red lantern for use at night. When approaching such crossings the car shall come to a full stop at least thirty feet from the crossing, and shall not proceed until the conductor has gone upon the steam railroad, carrying the flag or lantern, and after ascertaining that the way is clear, given the proper signal for the car to proceed. The Board also recommends that at all grade crossings by overhead-trolley railroads of steam railroads, a V-shaped trough of metal be constructed over the trolley wire or wires to insure the motor retaining the current while the crossing is being made.

Second.—That where two or more street car lines cross, or where they merge, an agreement shall be made as to which line shall have the right of way. The car that has not the right of way shall come to a full stop before crossing the tracks of the other line, or entering on the joint track, and the car which has the right of way shall slow down before crossing the tracks of the other line, or entering on the joint track.

Third.—That cars passing in opposite directions shall not meet on street crossings.

Fourth.—That the speed of cars be reduced to the minimum on all curves where the view is obstructed.

Fifth.—That passengers be prohibited from riding on the running boards or side steps of open cars.

Sixth.—That passengers be not permitted to stand on the front platforms of open cars, and that only as many passengers be permitted on such platforms as can be conveniently seated. In the case of open cars that have no seats on the front platforms, passengers shall not be permitted to ride on the platform, and the side gates shall at all times be kept closed. Under no circumstances should passengers be permitted to ride on the front platforms of closed cars.

It may be said that the first of these recommendations, as to flagging across steam railroads, has been generally adopted. It may also be said that at very many of such crossings the V-shaped trough referred to has been adopted. It may also be said that the second recommendation has been generally adopted. While the third recommendation has not been so generally adopted, it has been in some instances.

### ANNUAL REPORT OF THE MASSACHUSETTS BOARD OF RAILROAD COMMISSIONERS

The thirty-fifth annual report of the Board of Railroad Commissioners of Massachusetts for 1903 was made public last week.

The mileage owned, exclusive of that in the subway, is 2159 miles of main track, 364 miles of second main track, and 148 miles of siding. This is an increase of 155 miles over last year.

The Commissioners call attention to the inadequacy of the existing laws giving street railway companies right to construct track on private land. A street railway, in the Massachusetts laws, is defined as a railway "usually constructed in, under or above the public ways and places," and the statutes permit such companies to take private land in order "to avoid dangerous grades or curves existing in the highway," or for "other similar purposes incident to" operation in public ways. Except in cases thus provided for, the building of street railways on private land is expressly prohibited. The board states that in several cases which have arisen recently it has ruled that where no heavy grades, sharp curves or other physical condition make the highway unfit for use by a railway, and where the only purpose in departing from it for long distances is to obtain a more direct route and an opportunity for higher speed, it cannot properly approve construction on private lands. Such use of private lands is not fairly "incident to the use of the highway," or within the purposes of the statute; and the board, therefore, has no authority to approve it, no matter how meritorious the undertaking.

The board believes, however, that where the building of an interurban railway is justified by the public demands for such convenience, the law should encourage and not discourage the enterprise; and there seems to be no good reason why companies should not be given greater freedom of choice as to construction upon highways or private lands. It may be very desirable that an interurban road should be constructed for long distances between communities apart from the highway. A more direct route is secured, there is less interference with other uses of the highway, and a higher rate of speed is possible—three very good reasons why, under suitable conditions, such construction may be permitted in the public interests. The essential purpose of the street railway is still preserved, as it resumes its place upon the highway to take up its distinctive and all-important work of carrying people from door to door and from street to street. This authority to build at the option of the company either upon the highway or upon private land has been granted under special acts in several instances, and the board recommends there should be general legislation granting this in all cases where it is decided by the proper tribunal that the public interests are better served in this way.

The report then discusses fenders, and states that it is of far greater importance to adopt safeguards which will prevent cars from running into people than to make a choice between different devices for tripping or picking them up without injury.

The Commissioners are not yet satisfied that any fender has been devised which is entitled to use above and beyond all others, nor do they consider the fenders now used so eminently satisfactory that there is no need of experiment with new types. They say that it is the duty of every street railway management to offer a reasonable opportunity for testing the value of different new devices in connection with the equipment of new cars.

#### CAPITAL STOCK AND DIVIDENDS

The aggregate capital stock of the 100 operating companies, Sept. 30, 1903, was \$68,404,479.50—a net increase of \$8,368,152 over the preceding year. The total amount of dividends declared the last year was \$3,586,248—an increase of \$447,537 over the preceding year. Forty-four out of the 100 companies at the beginning of the year paid dividends ranging from 1 per cent to 10 per cent, and sixty-five companies declared or paid no dividends. One company paid 10 per cent, seven paid 8 per cent, one paid 8 per cent on preferred and 7 per cent on common, one paid 7.22 per cent, one paid 7.20 per cent, sixteen paid 6 per cent, eight paid 5 per cent, one paid 4.5 per cent, two paid 3.75 per cent, two paid 3 per cent, two paid 2 per cent, one paid 1.25 per cent, and one paid 1 per cent. The average percentage of dividends on total capital stock for the year was 5.24.

#### INCOME AND EXPENDITURES

The total income of the companies from all sources was \$27,027,651; the total expenditures (including dividends) were \$27,010,982, leaving a net balance of \$16,669. The items of expenditure were as follows:

#### TOTAL EXPENDITURES, 1902 AND 1903

EXPENDITURES	1902	1903	Increase
Expenses of operation . . . .	\$15,912,852	\$17,519,367	\$1,606,515
Interest on debt and loans . .	2,161,160	2,350,391	189,231
Taxes . . . . .	1,611,851	1,725,312	113,461
Rentals of leased railways . . .	1,403,225	1,394,283	8,942*
Other charges on income . . . .	440,222	435,382	4,840*
Dividends paid . . . . .	3,138,711	3,586,248	447,537
Total expenditures . . . . .	\$24,668,021	\$27,010,982	\$2,342,962
Surplus for the year . . . . .	250,140	16,668	233,472*

\* Decrease

The gross earnings and expenses of operation the last year are classified and compared with those of the previous year, in the following table:

#### GROSS EARNINGS AND EXPENSES OF OPERATION, 1902 AND 1903

EARNINGS AND EXPENSES	1902	1903	Increase
Revenue from passengers . . .	\$22,989,002	\$24,921,452	\$1,932,450
“ from mails and merchandise . . . . .	65,698	82,837	17,139
Revenue from tolls, advertising, etc. . . . .	431,774	536,522	104,748
Gross earnings from operation . . . . .	\$23,486,474	\$25,540,811	\$2,054,337
Operating expenses . . . . .	15,912,852	17,519,367	1,606,515
Net earnings from operation	\$7,573,622	\$8,021,444	\$447,822

The ratio of operating expenses to earnings was 68.59 per cent, as compared with 67.75 per cent last year.

#### CAPITAL INVESTMENT AND COSTS

The total capital investment (capital stock and net debt) of the street railway companies of the State advanced the last year from \$113,071,113 to \$122,666,365—an increase of \$9,595,252. The average cost per mile of main track (including the cost but not the length of side track), as it stood on the books of the companies Sept. 30, 1903, was \$26,014.49 for construction, \$9,994.30 for equipment, and \$12,546.29 for lands, buildings

(including power plants) and other permanent property—making a total average cost of \$48,555.08 per mile of main track.

#### VOLUME OF TRAFFIC

The total number of passengers carried during the last year on the railways of the 100 companies making returns to the board was 504,662,243; the car-mile run was 107,506,812.

The following table gives for each of the last ten years the average gross earnings, operating expenses, and net earnings from operation, (1) per total mile of main track owned, (2) per car mile run and (3) per passenger carried, thus showing more in detail the changes from year to year in the earnings, cost and net results of operation:

YEARS	AVERAGE PER MILE OF TRACK OWNED			AVERAGE PER CAR MILE			AVERAGE PER PASSENGER		
	Gross Earnings	Expenses of Operation	Net Earnings	Gross Earnings	Expenses of Operation	Net Earnings	Gross Earnings	Expenses of Operation	Net Earnings
1894..	\$11,972	\$8,321	\$3,651	Cents 30.23	Cents 21.05	Cents 9.23	Cents 5.04	Cents 3.50	Cents 1.54
1895..	12,127	8,359	3,768	30.20	20.82	9.38	5.07	3.50	1.57
1896..	11,627	8,274	3,353	27.69	19.70	7.99	5.08	3.61	1.47
1897..	11,187	7,713	3,474	25.68	17.71	7.97	5.12	3.53	1.59
1898..	10,998	7,589	3,409	24.80	17.11	7.69	5.11	3.52	1.59
1899..	10,459	7,132	3,327	24.74	16.87	7.87	5.09	3.47	1.62
1900..	10,152	6,878	3,274	24.46	16.10	8.36	5.06	3.33	1.73
1901..	9,398	6,690	3,308	23.40	15.66	7.74	5.02	3.56	1.66
1902..	9,609	6,510	3,099	23.42	15.87	7.55	5.05	3.42	1.63
1903..	10,121	6,944	3,180	23.76	16.30	7.46	5.06	3.47	1.59

#### ACCIDENTS

The whole number of persons injured in connection with street railway operation, as reported by the companies\* for the year ending Sept. 30, 1903, was 3974, of whom eighty-four received fatal injuries, and 3890 injuries not fatal. The number of passengers injured was 2568, of whom sixteen were injured fatally. The injuries to employees were 161 in all, nine of which were fatal. The number of injuries to travelers and others on the street was 1245, of which fifty-nine were fatal.

#### THE WETZIKON-MEILEN INTERURBAN RAILWAY

In the description of the Swiss interurban electric railway, which has recently been completed between Wetzikon and Meilen, and which was published in the STREET RAILWAY JOURNAL for Dec. 26, the statement should have been made that the rotary sub-station is equipped with apparatus from the works of Brown, Boveri & Company, of Baden, who were also the contractors for the power station at Beznau, from which power to operate the line is obtained. The car equipment and overhead line, as stated in the article, were furnished by the Oerlikon Machine Works.

#### SNOW REMOVAL ON THE BOSTON & WORCESTER.

The Boston & Worcester Street Railway Company, operating between Boston and Worcester, Mass., made an excellent showing in the severe snow-storm that visited the East on Jan. 3. Steam railroads connecting with Worcester were seriously crippled, and service on the lines between Worcester and Boston was very unsatisfactory. But the electric railways survived in great shape. Its line was kept open all the time, its schedule was maintained very well, and many regular patrons of the steam roads between the cities journeyed on the electrics.

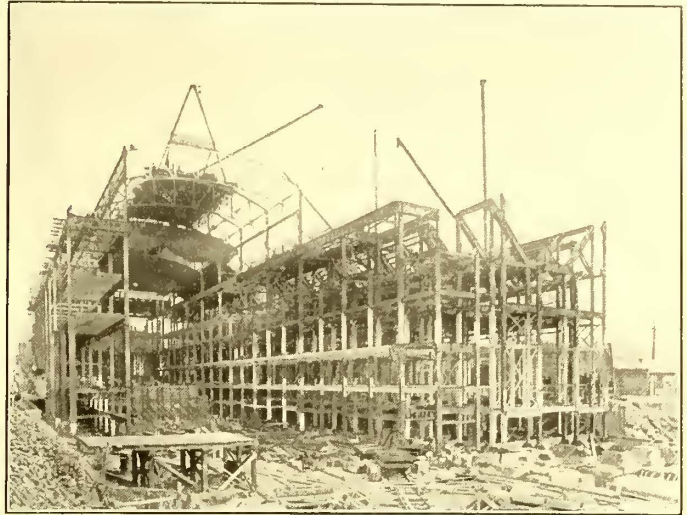
Through service, without change of cars, between Richmond, Ind., and Indianapolis was inaugurated on Jan. 4. The cars run every 3 hours, and the fare is \$1.30. The run is made in 2½ hours, distance 50 miles.

**POWER STATION OF THE INTERBOROUGH RAPID TRANSIT COMPANY OF NEW YORK**

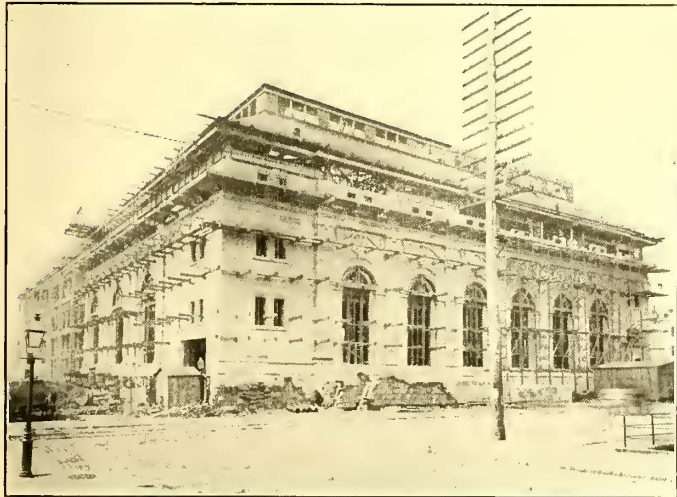
One of the features of the fifty-first annual meeting of the American Society of Civil Engineers, at New York, was the visit, on Jan. 20, to the main power house of the Interborough Rapid Transit Company, now under construction. This structure occupies the block between Eleventh and Twelfth Avenues and Fifty-Eighth and Fifty-Ninth Streets, and is now pretty well advanced. In order to facilitate the inspection of the new plant the Interborough officials furnished a brief description of the structure and equipment to visiting members of the society, containing the following data, with a plan and cross-section of the engine and boiler room, which are reproduced herewith:

The substructure of this power house consists of Portland cement concrete, in the following proportions: One part cement, two parts sand and five parts broken stone. This proportion is used for all column bases, engine beds and wall footings, and all these foundations have been taken down to bedrock, all concrete work being brought to elevation + 1.5 ft. above mean high water (city datum). The rock elevations vary from + 12 to -33 ft., thus showing a very irregular bottom. There are 397 columns and 12 engine beds, the bases of each being enlarged to meet the deflection in the rock. To carry the column loads, there is a granite cap-stone on the surface of

steel will approximate 12,000 tons, and in this respect it is one of the heaviest structures on record. Some of the columns sustain 750 tons. A feature of the design is the bracing required to withstand the strains caused by the chimneys and by the excessive loads carried high in the structure. Each chim-



VIEW TAKEN JULY 15, 1903, SHOWING IRON STRUCTURE



EXTERIOR OF POWER STATION ON OCT. 2, 1903

each concrete pier, and these are of various sizes. On these cap-stones are set cast-iron bases, into which the steel columns are set. All engine-bed footings are of concrete from bedrock to elevation + 1.5 ft. At this elevation the forms are put up, and the anchor bolts, washers and nuts (for engines or generators) are set. Corrugated steel bars, placed horizontally and vertically, are also built into these monoliths. Each bed, above elevation, + 1.5 ft., contains 1,350 cu. yds. of concrete. All wall footings are of similar construction, and are taken from the rock to elevation + 1.5. The walls are of hard red brick to elevation + 17.75, and from this point to the top of the water table granite facing is used.

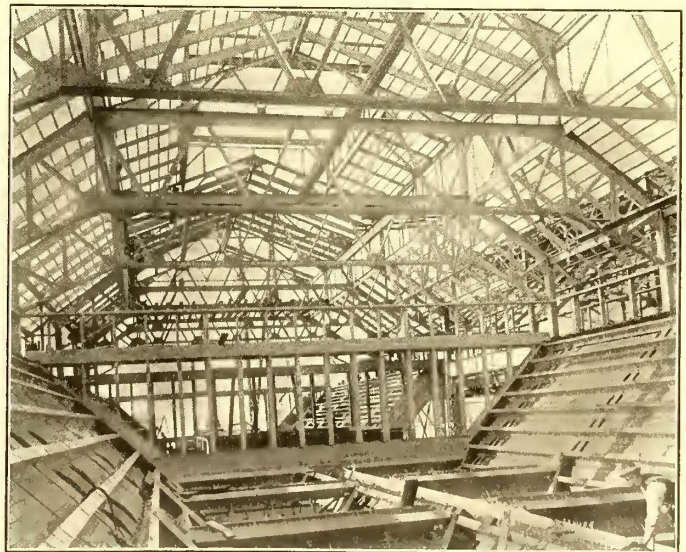
The intake and return-water conduits for condensing purposes are of concrete, reinforced on the river end by corrugated steel bars. This is also true of the coal-conveyor tunnel. The bottom of the intake conduit rests on piling, driven to bedrock, extending out to the city dock line and cut off at elevation -19.5 ft.

All foundations for feed pumps, air pumps and circulating pumps are of concrete. The basement floor also will be of similar construction.

The steel in the building is independent of the exterior walls, which are self-supporting, so that the integrity of the structure would remain if the walls were removed. The weight of the

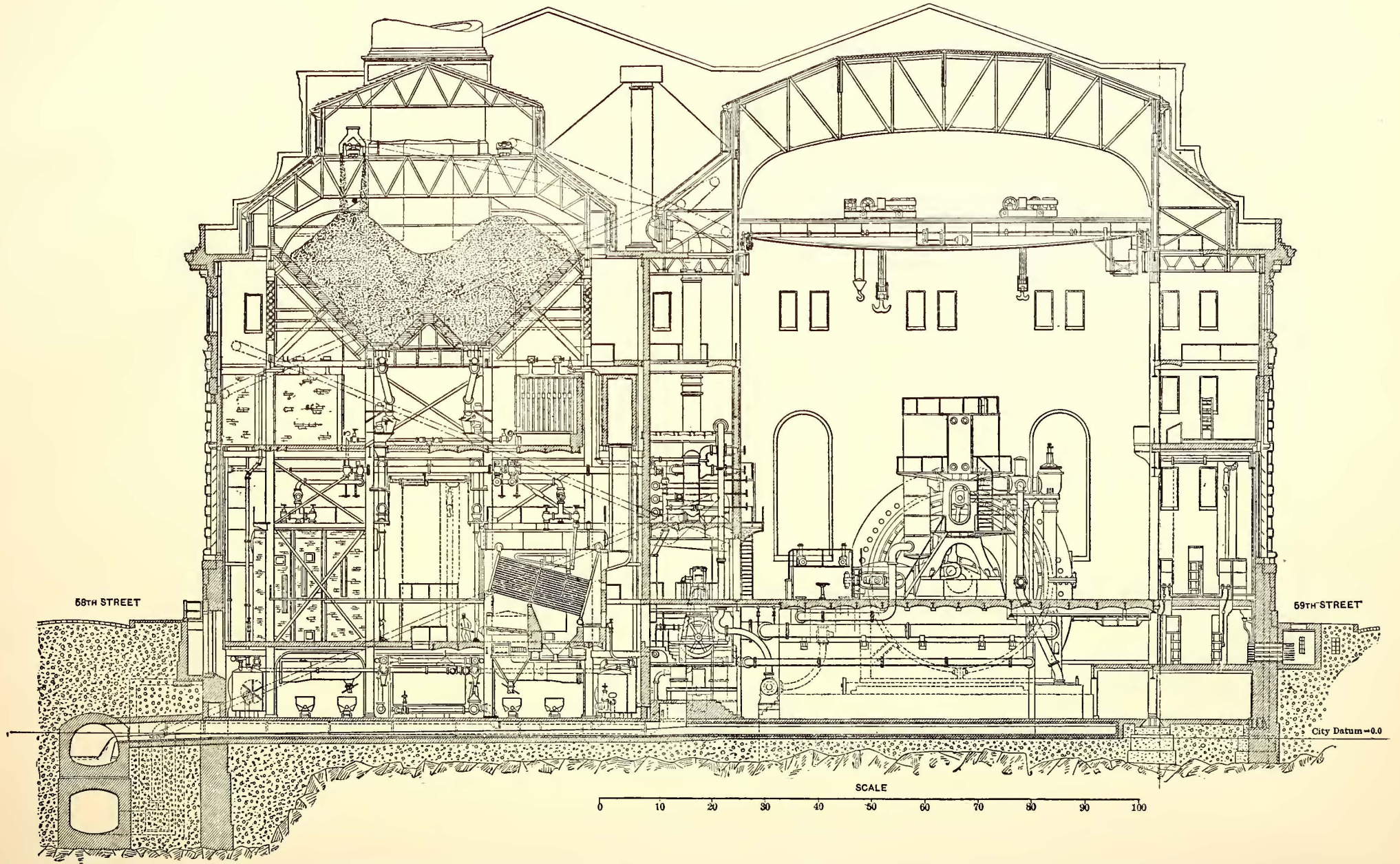
ney is supported on six columns which carry a platform of plate girders 8 ft. deep, over which is placed a grillage of 20-in. beams, placed at 2-ft. centers and filled solidly with concrete. The base of the masonry, resting on the grillage, is reinforced by a steel frame 3 ft. deep, with steel rods running in both directions through the base of the brickwork.

The base of the exterior walls is finished with cut granite up to the water table, above which the facework is of light buff pressed brick, enriched with terra-cotta. The general treatment of the design may be termed Italian Renaissance, and is rather ornate. The structure will be one of the most attractive in New York City. All window sash and framework is of cast iron, glazed with ribbed glass, and all exposed trimwork on the roof is of copper. The flat portion of the roof is of concrete (expanded-metal construction), and the sloping sides of the roof are of terra-cotta covered with green enameled tile of a



CONSTRUCTION OF COAL BUNKER

Spanish roll pattern. The chimneys are faced with brick of the same quality as used in the facework of the structure. The interior of the operating room is faced with brick of a light buff color, and the trim of all doors, sash, etc., is covered with kalamain iron or sheet copper. This trim is reduced to a minimum, so that the building is fireproof in the strictest sense.



CROSS SECTION OF THE NEW POWER STATION OF THE INTERBOROUGH RAPID TRANSIT COMPANY AT FIFTY-NINTH STREET AND NORTH RIVER, NEW YORK



EQUIPMENT

The power house is 200 ft. wide on Eleventh Avenue, and extends westward 694 ft. Its height, from the basement floor to the highest point of the roof, is 125 ft. The structure is divided into two main sections: A boiler house on the south, or Fifty-Eighth Street side, and an operating house on the north, or Fifty-Ninth Street side, each extending the full depth of the building.

On the Eleventh Avenue end is extended a track connected with the main line of the New York Central Railroad, and this is used in bringing machinery and materials into the building. Coal, however, is conveyed into the building with a belt conveyor. This conveyor extends to a pier in the North River, at the foot of West Fifty-Eighth Street, 700 ft. in length. From the pier the coal is conveyed underground to a point at the southwest end of the building, where it is raised by an elevating belt system to the coal bunkers constructed in the roof. The bunkers have a capacity of 25,000 tons. From the bunkers the coal is conducted to the points of requirement at the boilers.

A new feature is the use of a distributing coal conveying system under the bunkers, by which coal of a high grade stored in any one bunker can be distributed to all boilers without handling, thus permitting the use of two or more grades of coal

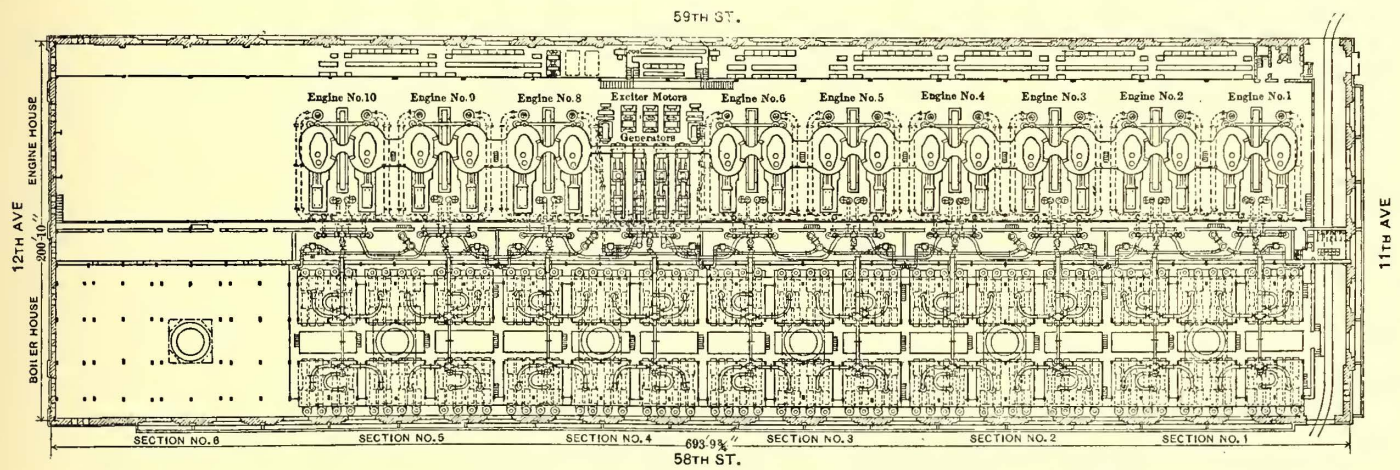
with brick, arranged so that the gases can pass to the chimney directly, or first through economizers.

The immediate installation includes five radial brick chimneys 162 ft. high from the base, and 15 ft. in diameter at the top, which is 236 ft. above the street level.

Each chimney weighs about 1200 tons, and its base is carried on girders and columns, the division between the steel substructure and the masonry superstructure being 74 ft. above the basement. This construction permits the use of the space under the chimneys for boilers. Each chimney is connected to twelve boilers, arranged symmetrically with respect to its center.

On the north side of the operating room there is an area for the electrical work, and on the south side an area for the steam auxiliary machinery. Extending through the operating room is a row of nine 8000-hp to 10,000-hp engines, direct connected to 5000-kw alternators, the row being broken at the center of the structure by an installation of four 2000-hp turbo-generators for lighting purposes.

The total capacity of the nine engines, together with the turbo-generating plant, will be 80,000 hp when operating at their best efficiency, but it will be possible to operate this plant at 100,000 hp. To this should be added 30,000 hp proposed for a future generator equipment in the 108-ft. extension at the



PLAN OF NEW POWER STATION OF INTERBOROUGH RAPID TRANSIT COMPANY

when needed at different times of the day. The ashes from the ash hoppers are removed from the building to the front by a system of trackage with storage-battery haulage.

The condensing water is taken through the river wall at the pier, and passes through a masonry conduit to the several suction wells adjacent to the structure. From the wells it is piped to the circulating pumps, and thence back to a second masonry conduit, from which it is delivered at a point about 200 ft. outside the river wall. The intake conduit is oval in cross-section, 10 ft. wide and 8 ft. 6 ins. high, the bottom of the opening being at 19.5 ft. below mean high water.

For the immediate installation under construction, the boiler plant will consist of sixty safety water-tube boilers, each having 6,000 sq. ft. of effective heating surface, placed in two rows, with a firing space between. The grates are 12½ ft. wide and 8 ft. deep.

The boilers are set higher from the floor than in older practice, and a continuous operating platform extends in front of each row of boilers, thus separating the boiler tenders from the firemen. The level of the operating platform is continuous with the floor of the operating room.

The boiler backstays form a part of the structural steel of the building, and a steel floor, with railings, is constructed over the tops of the boilers, thus preventing radiation of heat and avoiding accidents to the men.

The gases from the boilers pass upward through round steel smoke uptakes, lined with brick, to steel smoke flues, also lined

western end, now in process of construction. Thus the total generating capacity of the completed plant can safely be placed at 130,000 hp.

The engines are of the twin-compound type, having horizontal high-pressure cylinders and vertical low-pressure cylinders; the high-pressure cylinders being provided with mushroom or poppet valves for superheated steam. Each low-pressure cylinder is placed in direct relation with the condensing chamber of a barometric tube-condenser.

Six boilers are provided for each engine, and the entire plant is designed on a unit or sectional basis, the design of each section being identical with that of the others; that is, each section will consist of one chimney, twelve boilers and two engines, in connection with the respective auxiliary equipment for each engine, consisting of one boiler feed-pump, one feed-water heater and one condensing outfit.

Each section can be disconnected from the general system by power-operated valves, thus permitting each section to be thrown out or operated independently. Power-operated valves are also supplied for each boiler and engine.

The steam main for each engine connects with six boilers by bent pipes, then passes straight to a center, back of the engine; thence it divides and connects to the twin-engine cylinders. At the point of division a manifold system of curved equalizing pipes connects all the several mains when desired.

All the pipe fittings are heavier than the so-called extra heavy fittings, all pipe being designed for the strains incident to

200 lbs. pressure, with steam superheated to 500 degs. F., as all boilers ultimately will be provided with superheaters.

All the main features of the piping system are located within the area for the steam auxiliary machinery, and are enclosed above. All manipulations required in operating the piping system can be conducted from an exterior gallery running along the south side of the operating room.

The atmospheric exhaust system is unusually ample, as one 48-in. exhaust pipe is provided for each section of two engines, so that the entire plant can be run on atmospheric exhaust.

A new feature is the location of the auxiliary pump equipment for each engine. This is placed back of the engine, and is controlled from the point where the engine throttles are located.

All the electrical apparatus on the north side of the operating room is designed on the unit basis, and is controlled from a main operating pulpit in the center of the building, from which radiate all the wires, or "nerves," controlling the entire electrical equipment.

The nine 5000-kw alternators generate energy at 11,000 volts, the alternators being of the three-phase, revolving-field type, for 25 cycles.

An exciter plant of three motor-driven and two engine-driven exciters will be provided.

### PROPHETIC CHRONOLOGY OF SAN FRANCISCO

In its "Twenty Million Edition" of Jan. 1, so-called because it prophesies a population of 20,000,000 people in California in the year 2004, the "San Francisco Chronicle" gives a prophetic chronology of things that are likely to happen within the next century. The following happenings predicted are in the line of electric railway improvements:

December 1, 1905.—In this year there was not a wire left above the surface of the ground upon any of the streets in the business section of San Francisco.

1908.—Completion of electric car system from San Francisco to San Jose and from Oakland to San Jose.

1910.—Running of electric freight cars over the street railroads of San Francisco.

1912.—Completion of subway under Market Street, extending from sidewalk to sidewalk. Construction feature was overhead steel beams to carry the surface traffic. The subway itself had tracks for rapid transit, and was so arranged that electric wires, gas and water pipes and other conveniences were accessible at all times for inspection and repair.

1915.—The Santa Barbara-Guadalupe local electric line was completed, making it possible to go from Eureka to San Diego by a continuous chain of electric roads.

Now it is proposed to branch into the business of local package delivery in these towns, the object being to aid merchants in the delivery of their goods to customers at a nominal cost. At present the company has regular delivery routes in the larger cities. By increasing the number and scope of these routes it could make frequent deliveries of goods for down-town merchants, thus increasing the income without materially increasing the mileage or hours of delivery wagons.

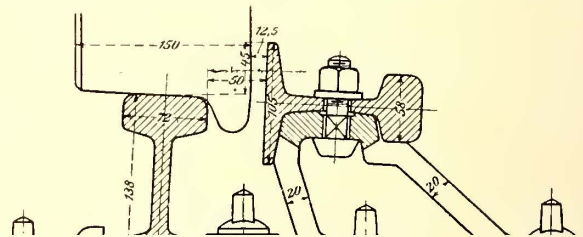
The plan will first be tried in Cleveland, and it is probable that a warehouse will be erected near the present interurban express station. In connection with the warehouse would be the stables for the delivery wagons and horses. The company also aims either to extend its service to other interurban roads in the Central West, or else perfect traffic arrangements for shipping express or freight to distant points. At the present time goods are shipped from Cleveland to points in Michigan, but such packages have to be reshipped at Toledo, as all the Toledo interurbans, with the exception of the Lake Shore Electric, whose business is now handled by the Electric Package Company, class the package business as freight and charge freight rates.

In a short time freight business will be instituted on the new line from Toledo to Detroit, and it will then be possible to ship goods from the Cleveland district to all points reached by the Michigan interurbans. This is done now to a certain extent when the Cleveland-Detroit boat lines are running, but uniform traffic arrangements, such as are proposed, will tend greatly to develop the business. The same is true of the possibilities of business east from Cleveland, as there now are unbroken connections from Cleveland to Westfield, N. Y., and the line reaching Buffalo will be opened this year.

### TRACK AND GUARD RAILS AT ZOSSEN

The accompanying illustration, which is reproduced from the "Electrotechnische Zeitschrift," represents a cross-section of the guard and one running rail used on the Marienfelde-Zossen high-speed electric railway. A view of the complete roadbed was given in the STREET RAILWAY JOURNAL of Nov. 28, 1903.

The guard rail illustrated is used throughout the entire line.



**SINGLE-PHASE CAR EQUIPMENT AT EAST PITTSBURG**

The accompanying engravings illustrate the truck and car now in operation on the Interworks Railway of the Westinghouse Electric & Manufacturing Company, at East Pittsburg, Pa., and equipped with the company's new single-phase series-wound motors. Starts are made easily and without jar, acceleration is rapid and smooth (a rate of 1¼ m. p. h. per second and over may be easily obtained), and a high rate of speed may be secured.

The electrical equipment of the car consists of four single-phase series wound motors of the commutator type, mounted two to a truck, and the following auxiliary apparatus:

- Two master controllers.
- One main-auto transformer.
- One lighting transformer.
- One balancing transformer.
- One induction regulator.
- One main switch.
- One reversing switch.
- One motor cut-out switch.
- One circuit breaker.
- Two resistance grids.
- Three junction boxes.
- Four 7-point connectors.
- One 7-point connection jumper.
- One storage battery, 14 cells.
- One motor-driven air compressor.
- Complete air-brake equipment.

The motors are of the iron-clad type, with circular frames, and in general appearance resemble the ordinary direct-current motors. The mechanical details follow existing standard practice. They are mounted on the axle with a modified "nose"

The four motors are connected in pairs, each pair consisting of two fields in series and two armatures in series, as shown diagrammatically herewith. A balancing transformer is connected across the two pairs of armatures, and the point of con-



SINGLE-PHASE MOTOR CAR—EAST PITTSBURG

nection of the armatures of each pair is joined to the middle point of the transformer winding. This arrangement serves to equalize the voltage on the armatures.

A master controller on each platform controls all the oper-

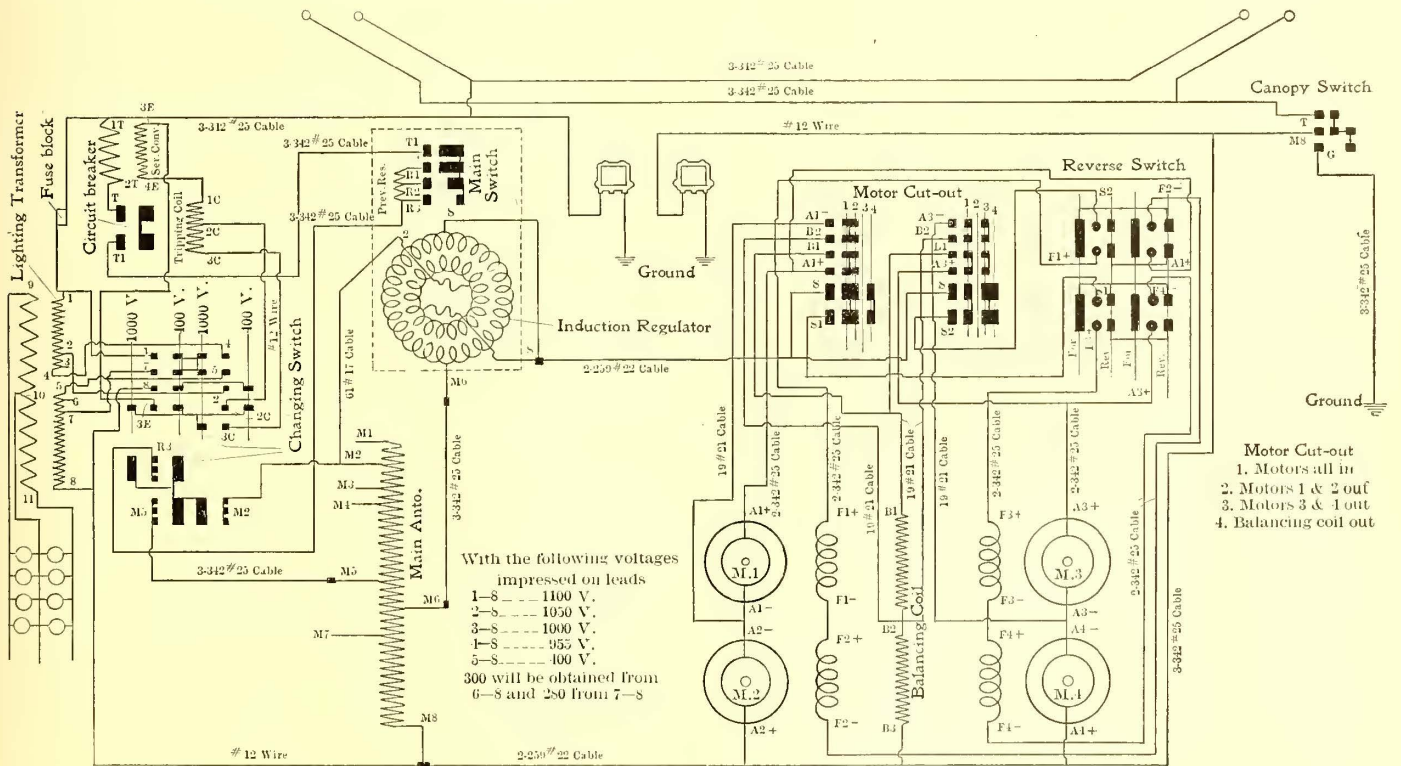
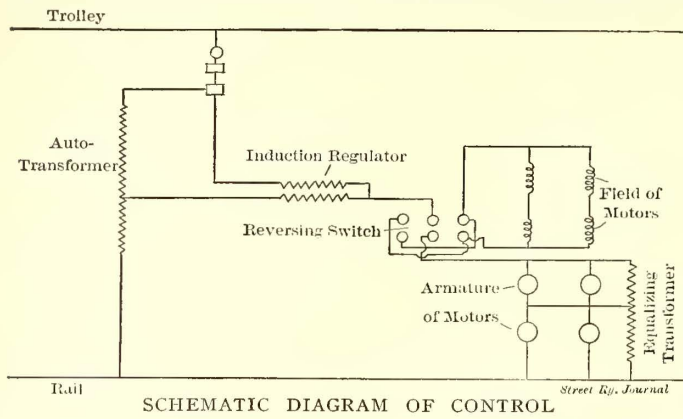


DIAGRAM OF CONTROLLER AND MOTOR CONNECTIONS, SINGLE PHASE CAR EQUIPMENT

suspension, and single-reduction gears, encased and run in oil, connect the armature shafts and axles. The supports for the armature bearings are cast solid with the motor end brackets, and the upper caps of the axle bearings are cast solid with the motor frames. All bearings are habbit lined, and possess large wearing surfaces. The axle bearings are divided. The motors are wound for a potential of 225 volts, and have a nominal rating of 125 hp each.

ating switches, and may be used to operate either a single car, or a train made up of a number of cars, similarly equipped. Its working parts consist of a metal drum made in one casting, with contact points spaced to give the proper combinations, with stationary contact fingers supported on the controller frame. As only a low-potential current from the storage battery is handled, there is practically no burning or other trouble with contacts, but the fingers are removable and easily replaced.

The main auto-transformer and lighting and balancing transformers are of the shell type, with laminated cores outside the



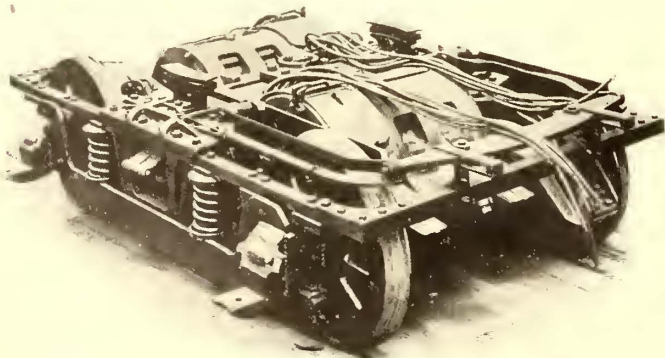
coils. Their construction follows the lines of standard Westinghouse practice.

The induction regulator is of the usual type, and consists of two coils, shown diagrammatically on page 141, one fixed the other movable about its axis, and voltage variation is obtained by change of the relative angular position of these coils. The regulator is wound for a secondary potential of approximately 100 volts. This may be either added to or subtracted from the secondary voltage of the auto-transformer, giving at the motor terminals a range of approximately from 200 volts to 400 volts. The regulator is operated by a pneumatic mechanism controlled by magnet valves. These magnet valves are actuated by low potential currents from the storage battery, and governed by the master controller.

All switches are of the drum type. The main and reversing switches are operated pneumatically, and controlled by magnet valves similar to those used with the induction regulator. The motor cut-out switch is operated by hand.

The air compressor is of a type standard for air-brake equipment, and is driven by an alternating-current series wound motor, similar in design and construction to those mounted on the trucks. From this compressor air is supplied both for the brakes and the operation of all pneumatic switches, including those of the induction regulator.

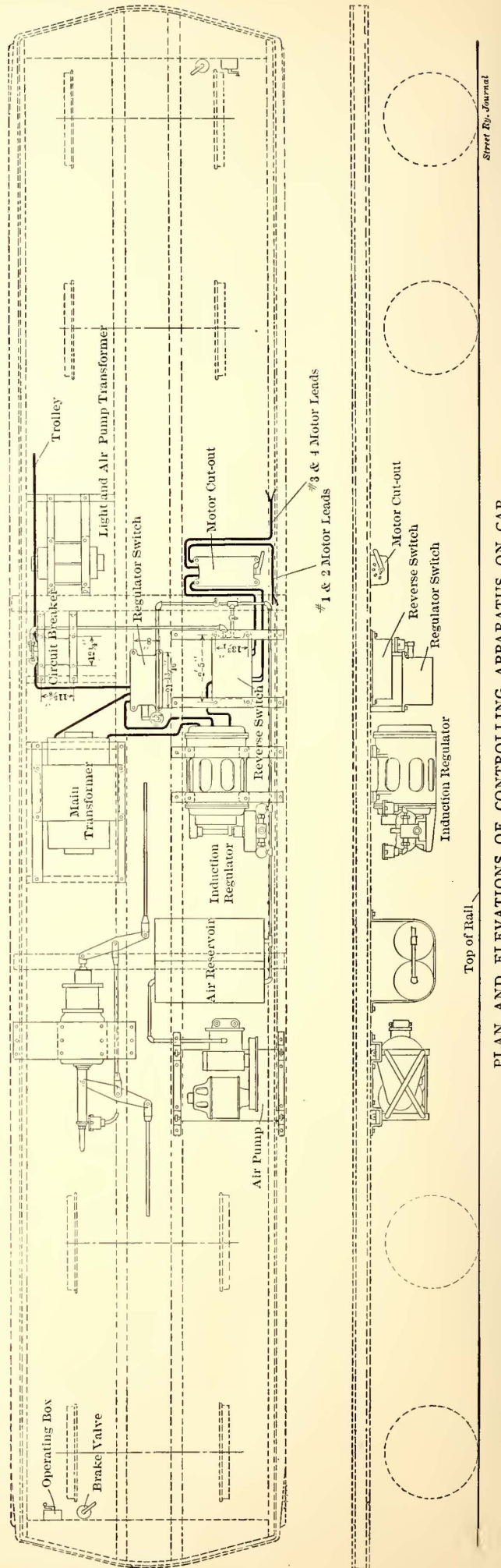
From the preceding description it will be seen that the alter-



MOTOR TRUCK

nating-current system is well adapted for multiple-train control. As the controlling mechanism is operated by current from a storage battery, it is only necessary to carry a low-voltage circuit from car to car. This is conveniently accomplished by the use of seven-point connector plugs and sockets.

By the simple device of bringing out a few loops from the secondary of the main transformer it also is practical to oper-



Street Ry. Journal

PLAN AND ELEVATIONS OF CONTROLLING APPARATUS ON CAR

Top of Rail

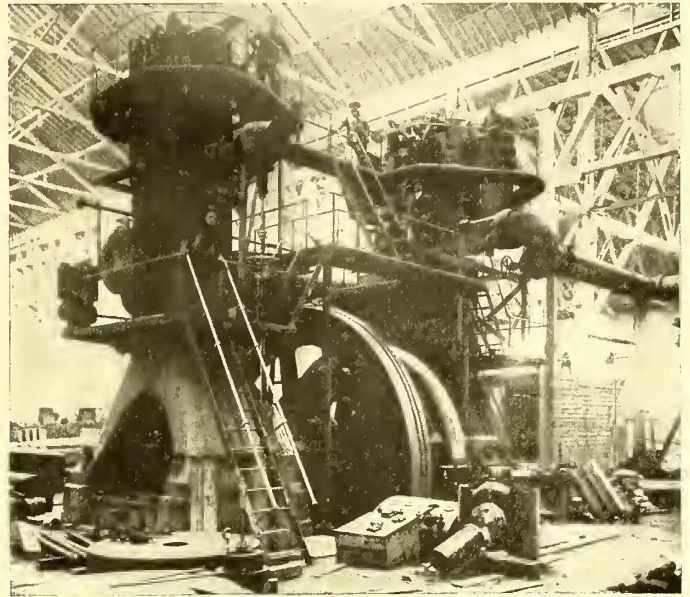
ate the same car from different trolley potentials without change in equipment. For example, an interurban line may use a trolley potential of 1000 volts or over through its country sections, and 500 volts, or even lower, within city limits. With either voltage on the trolley the same voltage will be always possible at the motor terminals. A similar arrangement will permit a high motor voltage and high speed through scarcely settled districts, and a low motor potential and reduced speed, economically obtained, in crowded city streets.

Alternating-current railway motors are now manufactured by the Westinghouse Company in several sizes. Detailed descriptions of the mechanical construction of the No. 91 motor, which is the one now in use on the car at East Pittsburg, will be published in an early issue.

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**THE SERVICE POWER PLANT AT THE ST. LOUIS EXPOSITION**

In the accompanying engravings several views are given of the Palace of Machinery at the Louisiana Purchase Exposition at St. Louis, showing the present condition of the work. As is generally known, street railway apparatus at the St. Louis Exposition will form part of three main exhibits, being divided between the Transportation Building, Palace of Electricity and Palace of Machinery. The first mentioned will contain those exhibits pertaining to maintenance of way and rolling stock; in other words, the mechanical side of the system outside of the power station equipment. In the Electricity Building the student of the electric railway problem will find those appliances which relate to the electrical side of his subject. That is, in this building the electric railway will be treated from the generators through the transmission system, the transforming device, the sub-station and the storage battery, through the motors to the car axle. In the Machinery Building, or the Palace of Machinery, as it is called in the official documents, with the adjoining Steam and Fuels Building, will be grouped

under the control of the Department of Works than exhibit apparatus could be. Such a plant is needed for the service of the Exposition, and it is essential that it should be completed and in operation before the Exposition opened without any of the uncertainties attending the completion of exhibits. It was finally decided to award the contract for such a plant, with a capacity of 8000 kw, to the Westinghouse Electric & Manu-



ONE OF THE 2000-KW UNITS IN THE SERVICE POWER PLANT

facturing Company. This contract covers the entire power plant equipment with the exception of the buildings and stacks. The engines and generators will be placed in Machinery Hall in a space set aside for the service plant. The boilers will be located in the Steam and Fuels Building, 100 ft. distant, which



PALACE OF MACHINERY, ST. LOUIS EXPOSITION

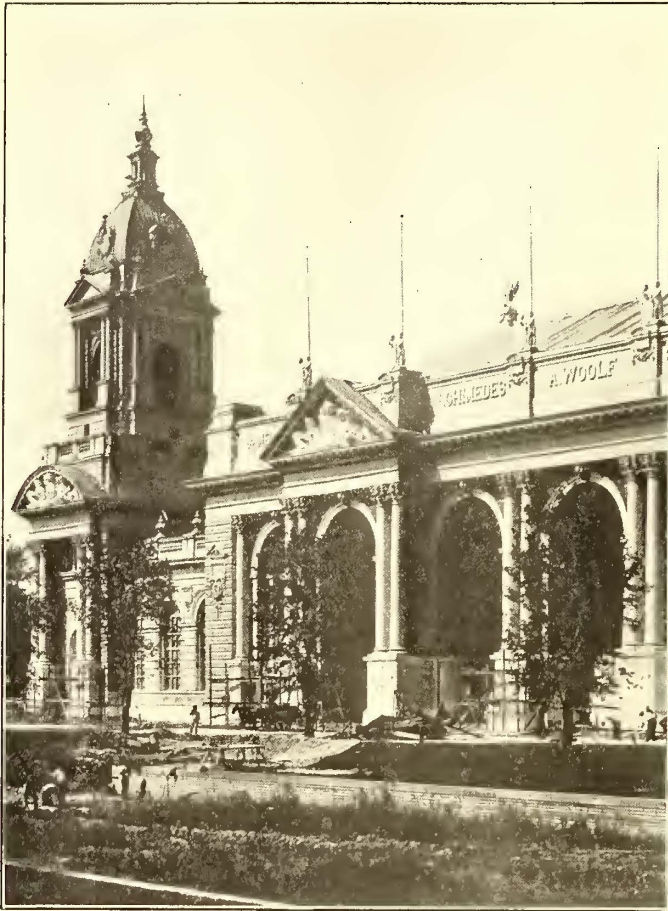
the power apparatus, such as the boilers, condensers, steam fittings, engines, steam turbines, etc.

Although a large amount of power for the use of the Louisiana Purchase Exposition will be derived from exhibition in the Machinery Building, with boilers located in the Steam and Fuels Building near by, it was decided by the authorities that it would be best to erect under contract a service power plant for the use of the Exposition which would be more directly

is the building in which all boilers and gas producing apparatus will be placed.

Although this is a service plant in name, it will, of course, be an interesting exhibit. While there will be nothing radically new in its essential elements, it will represent good modern power house engineering practice. The reasons urged for the award of this contract to the Westinghouse Electric and Manufacturing Company were that, on account of the many allied

Westinghouse interests, it would be possible for this company to handle a large part of the contract without going outside of the Westinghouse companies, and chances for coherent design and prompt completion were better than if the contract were



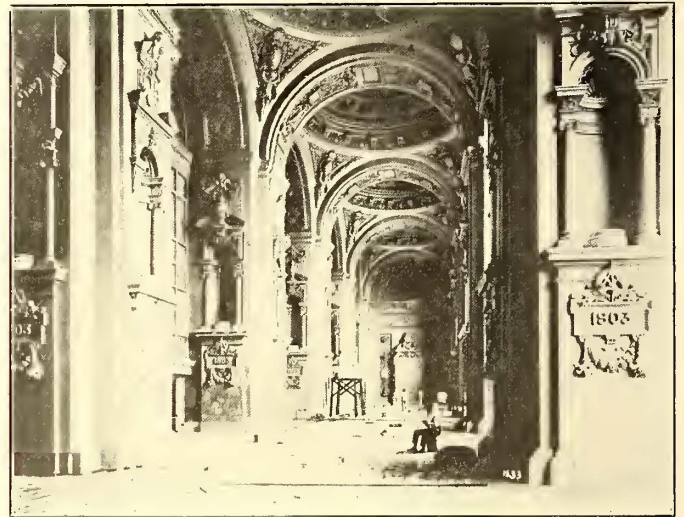
SOUTHEAST ENTRANCE, PALACE OF MACHINERY

awarded to several companies. Thus, the steam engines will be furnished by the Westinghouse Machine Company, and the engineering and construction of the plant will be done under the supervision of Westinghouse, Church, Kerr & Company. The plant will contain four units of 2000 kw each. These will be 25-cycle, three-phase, 6600-volt generators, direct connected to Westinghouse-Corliss engines. The generators will weigh, without the bed, 132,000 lbs., and with the bed, 190,000 lbs. The efficiency guarantee is 96 per cent at full load, 95 per cent at three-quarters load, and 93 per cent at one-half load. They will operate at continuous full load, with not over 35 degs. C. rise in temperature. The engines will be Westinghouse vertical, cross-compound, condensing Corliss, running 83 r. p. m. They are rated at 2800 hp, and have a maximum overload capacity of 5200 hp, the latter capacity being reached at three-quarters cut-off in the low-pressure cylinder. The cylinder diameters are 38 ins. and 76 ins., with 54-in. stroke. The shaft will be hollow forged steel, 31 ins. in diameter. In addition to the fields of the generators the engines will have a fly-wheel of 175,000 lbs. weight. The total weight of the engine is 750,000 lbs. It is guaranteed to operate on 13½ lbs. of steam per indicated horse-power-hour. Water for condensation will be supplied from a cooling tower having fans driven by electric motors to furnish air circulation.

The boilers in the Steam and Fuels Building which will supply this plant are sixteen in number, of 500 hp each, of the Babcock & Wilcox water-tube type. Smoke flues will be placed under the floor and led to stacks built by the Exposition. In addition to the natural draft fans will be installed to produce artificial draft when needed, in accordance with Westinghouse practice. Roney mechanical stokers will be used under these

boilers. That part of the Machinery Building devoted to the service power plant is spanned by a 40-ton traveling crane. Besides the main units, there will be three 80-kw exciter units, any one of which is sufficient for the entire power plant. These units will be direct connected to vertical cross-compound, condensing Westinghouse engines, running 300 r. p. m. The weight of a unit complete is 38,000 lbs.

The switchboard will consist of three exciter panels, four generator panels, two main load panels, two incoming feeder panels and twenty-four outgoing feeder panels. The incoming feeder panels are for the current which is to be purchased by the Exposition from the Union Electric Light & Power Company. The two load panels will pass the entire load; one panel being used for each of the two sets of bus-bars. Solenoid-operated oil switches are to be used for the high-tension alternating current, and these will be controlled in the usual manner by low-tension circuit, with switch handles on the various panels. On each generator panel will be three switches, one controlling an oil switch connecting the generator with one set of bus-bars, the other connecting it with the other set of bus-



MAIN ENTRANCE, NORTH SIDE, PALACE OF MACHINERY

bars, the third being in the generator loads in series with the two just mentioned. The switches will be equipped with time limit release for automatically opening the circuit. Each generator panel will have one power factor indicator and three type-F ammeters. Each feeder panel will have three oil switches, two of which are in multiple for connecting to either set of bus-bars, and the third in series with the other two, or the reverse of the generator switching arrangement. Each feeder panel will have also three type-F ammeters and one integrating wattmeter.

Although not a part of this service plant, another interesting contract which this company is filling for the operation of the Exposition is for the 2000-hp induction motors to be direct connected to Worthington centrifugal pumps, to supply the cascades with 90,000 gals. of water per minute. This will be a remarkable installation, not only on account of the size of the induction motors, but on account of the size of the pumps and the high head to which water must be raised, which is approximately 150 ft.

#### MIRRORS TO ANNOUNCE APPROACHING CARS

Saloonkeepers in Harlem, a suburb of Chicago, have been installing large mirrors, so placed that their patrons can get a reflected view of the street, so as to see the approach of a car. This gives the thirsty race-track followers a chance to spend their money while they wait in the saloon, without running risk of missing a car.

**THE ZONE PLAN FOR CLEVELAND**

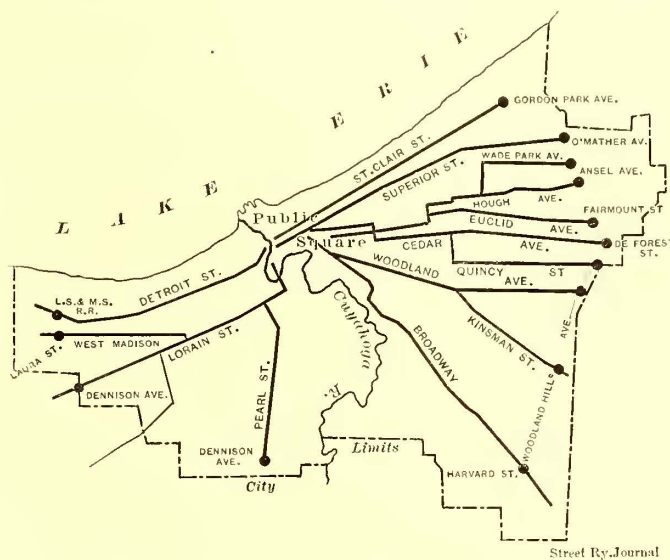
There is every probability that the zone plan of fare will be tested by the Cleveland Electric Railway Company. The efforts of Mayor Tom L. Johnson, of Cleveland, to secure 3-cent fare for the suffering public of that city have, in a measure, proven successful, and the Cleveland Electric Railway Company has agreed to turn over its system for a thorough trying out of the much discussed low fare under the zone plan. The company does not commit itself to adopt the plan should it prove unsatisfactory, but upon the acceptance of the plan, or at least some form of the plan, will depend the granting of a twenty-year franchise to the company by the present Council. A number of concessions will be made to the company which will militate in its favor, and if the calculations made by Mayor Johnson prove correct, the plan may not prove such a bad proposition for the company. Time alone can demonstrate these points.

As outlined in the last issue of STREET RAILWAY JOURNAL the Cleveland Council, on Jan. 11, passed three ordinances of vital importance to the future of the Cleveland Electric Railway. Two of them granted rights to the so-called 3-cent fare company over a number of routes now held by the old company; the time of the expiration of the grants held by the old company being a question that is in dispute by reason of conflicting ordinances. The third ordinance mentioned established a zone within which the old company was required to establish a 3-cent fare.

These ordinances, of course, forced the company to some action, and at a meeting of directors on Jan. 12, it was agreed that a compromise on some form of a zone plan should be effected. President Horace Andrews, of the company, was instructed to carry on negotiations with the city government. The zone proposed by the McKenna ordinance is shown in the accompanying map, the 3-cent limits being indicated by black dots. As will be seen the zone has an irregular boundary, touching in some points the city limits, while in others it is three-quarters of a mile from the limits. President Andrews proposed that the zone limits be made a 3-mile circle from the Public Square, but Mayor Johnson refused to accede to this change, although he conceded several other points of importance to the company. After a week of conferences a compromise was effected on Jan. 18. It is probable that the McKenna ordinance will be repealed, and that a new ordinance granting the Cleveland Electric Railway Company a twenty-year blanket franchise extension will be passed. The terms of the franchise will be practically the same as those of the McKenna ordinance, so far as rates of fare and zone are concerned, and the company will be given three months in which to test the practicability of the plan from a financial standpoint, while the public will be given an opportunity to withdraw from the agreement if it sees fit. In a word, the agreement amounts to an option so far as the company is concerned, and if it decides to withdraw from the option it stands where it does at the present time, and Mayor Johnson will be free to start new legislation to carry out his hobby of 3-cent fare if he sees fit. However, he it said to Mayor Johnson's credit, he seems to be taking a fair view of the situation, and has repeatedly stated in interviews that if the Cleveland Electric Railway Company demonstrates after a fair trial that the public cannot be given good service with a fair profit under the 3-cent fare zone plan, he will feel convinced that the 3-cent fare proposition is impractical, and will admit the error of his ways.

The proposition that is up to the company is briefly as follows: All passengers within the zone limits will pay 3 cents for a continuous ride to the center of the city—or, in case the line which they happen to take extends through the city—to the zone limit on the other side of the city, the longest possible ride for 3 cents being about 9 miles. This is under the present ar-

angement of lines. Since the consolidation the company has coupled up several lines, although not authorized to do so by ordinance, and it is quite possible that it will divide some of these through lines, making them radiate from the center of the city, and in this way the possibilities for 3-cent fare rides will be reduced on these lines. Passengers going beyond the zone limits will be required to pay 5 cents, a 2-cent fare being collected at the zone limits. Passengers boarding a car beyond the zone limits will be required to pay a straight 5-cent fare, and if they desire a transfer will pay 2 cents additional, making 7 cents. A person riding from a point beyond one zone limit to a point beyond another zone limit by means of a transfer will probably be required to pay 9 cents, but this is a point



THREE-CENT FARE LIMITS IN CLEVELAND

which is still under discussion. Mayor Johnson desires to make 7 cents the extreme limit of fare from one point to any other point. Free transfers will be given from any line to cars going to the Union Passenger station.

The chief point conceded to the company is the remittance of all special taxes. This includes the car license of \$10 per car, amounting to about \$10,000 per year; paving, repaving, bridge maintenance and grade crossing taxes. This last item is a very important one, as the city has started on a campaign for the elimination of all grade crossings, a change that will cost many millions, and the railway company was slated for one-fourth the cost of all crossings on streets used by its tracks, some thirty or more. The maintenance of paving has also been a heavy expense, as the company has been forced to pay for repaving its portion, whether the work was necessitated by the company itself or by the city. It will readily be seen that the elimination of these items will considerably reduce the operating expenses. The Cleveland Electric Railway will acquire all the property and franchises of the Forest City Railway Company, including the 2 miles of track laid on Dennison Avenue, and franchises over several other routes, which could be added to the Cleveland Electric system to good advantage. There would also be the advantage that there would be little or no danger of further competition. It is understood that the price to be paid for the Forest City property is a very reasonable one, which indicates what has been generally believed since the first—that Mayor Johnson was the whole thing in the 3-cent fare company.

Some interesting figures have been compiled regarding the probable earnings of the company under the new scheme. Some one has figured that the average sum received from each passenger will be 3.36 cents. This result was arrived at in the following manner:

Basis of average, 100 passengers.

Eighty-five passengers at 3 cents .....	\$2.55
Twelve passengers at 5 cents .....	.60
Three passengers at 7 cents .....	.21
Total .....	\$3.36
Average 3.36 cents for each passenger.	

Mayor Johnson, however, arrives at this conclusion in a different manner. He says that in all computations of this nature, based, for instance, on the number of passengers carried free on transfers, a transferred passenger is considered as entirely distinct from the paying passengers. Viewed in this light the twelve 5-cent passengers and three 7-cent passengers would have to be counted twice, as they represent the transferring passenger. On the second count, each of these fifteen would be counted as paying a 2-cent fare. The table would then be as follows:

Eighty-five passengers at 3 cents .....	\$2.55
Twelve passengers at 3 cents .....	.36
Three passengers at 5 cents .....	.15
Fifteen passengers at 2 cents .....	.30
Total .....	\$3.36
Average 2.9 cents for each passenger.	

This is figured on a basis that each of the 5-cent and 7-cent passengers are transferring passengers, as is necessarily true of the 7-cent class. Of the 5-cent class a small portion will not be transferring passengers, but passengers from outside the 3-cent zone. This raises the average somewhat above the 2.9 cents, and according to the computations by the Mayor the average fare will be 3.07 cents.

Mayor Johnson claims that the Detroit rate at present is 4.01 cents and that the present rate in Cleveland is 4.32 cents. This last figure is probably not correct, because it is a well-known fact that the system of six tickets for a quarter and universal transfers, inaugurated by the company last June, has been a most complete failure, so much so that it has been generally understood that the company proposed to go back to the old plan of eleven tickets for 50 cents and limited transfers. It was thought when the new system was inaugurated that the lower fare would increase traffic, one of Tom Johnson's pet arguments, but the results do not bear out this statement. The number of transfers issued since the universal system went into effect has been 70 per cent greater than those issued before the system went into effect; in other words, 25 per cent of the passengers formerly asked for transfers, while at present 38 per cent to 40 per cent use them. This condition has been improved somewhat by the rule requiring passengers to ask for transfers when they pay their fare, but the condition is still a terrible drain upon the company's receipts. At the time of the

ment on existing franchises, and the possibility of the opening of rival lines have been extremely harrowing to the company, and have had a tendency to force the value of its securities down to a point considerably lower than would prevail were conditions otherwise. In the face of these attacks the company has made constant renewals of equipment, and has maintained its service at a very good standard, in addition to voluntarily reducing its fare and giving almost unlimited transfer privileges. In view of these facts it is quite natural that the company should be dissatisfied with its position and willing to grasp this opportunity of securing franchise extensions and a settlement of many annoying conditions. Whether the change will be a jump "from the frying-pan into the fire" is a question.

There is one phase to the present situation to which Mayor Johnson does not seem to have given due consideration. That is, public opinion. While there are undoubtedly many of the working class that will be benefited by and will be in favor of 3-cent fare inside the zone, it is undoubtedly the opinion of the majority of well informed and thoughtful persons that the advantages to be derived from the zone plan will not compensate for the disadvantages of handling pennies, the disputes arising from the confusion of several varieties of fares, and the increased cost for those who desire to ride from one portion of the city to another and make transfers.

The other day an old colored man stopped President Andrews on the street and said:

"Mistah Andrews, I hopes you ain't goin' give that 3-cent fare they're tellin' about in the papahs?"

"Why not?" said Mr. Andrews, "you live inside the zone, don't you? If we make a 3-cent fare you will only have to pay 6 cents a day to go to and from work."

"Dat's all right, boss," was the reply, "but I'se got seben chillen, and ebery Sunday I takes 'em out to de pawk to hear de band concert, an' if you goes an' makes me pay 7 cents apiece for each of 'em each way, I reckon dey will have to stay at home."

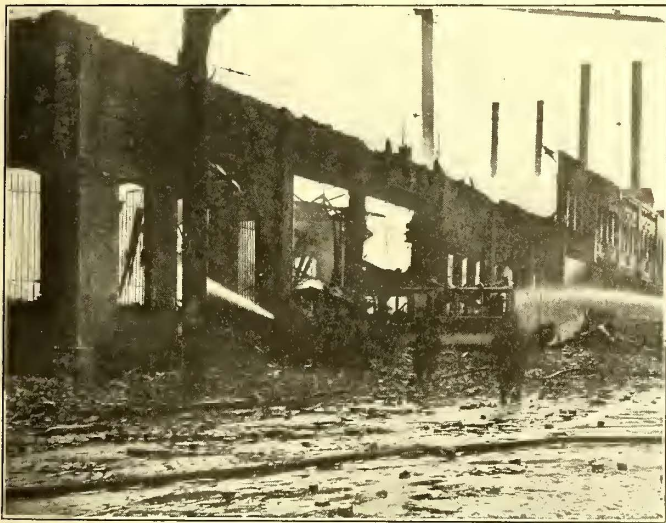
The public has been doing a lot of figuring during the past week, and they reach about the same conclusions as the old colored man. The writer has put the question to several hundred people during the past few days, and he has yet to find one who can find much merit in the proposed change. It would result in the crowding of the city inside the zone district to the detriment of the property outside. The thousands of poor people who have built homes in the outlying districts, in order to secure ample yards and fresh air for themselves and children, will be forced to pay a premium for the luxury.

Already the suburban towns are up in arms at what they claim is an unjust attack by the city government. Several of the surrounding towns that have granted franchises to the city



## CAR HOUSE DESTROYED BY FIRE IN BROOKLYN

The car house of the Coney Island & Brooklyn Railway Company, at De Kalb, Myrtle and Central Avenues and Stockholm Street, Brooklyn, was completely destroyed by fire Friday morning, Jan. 15. The building which was destroyed was one of the largest used for that purpose in the city, and adjoined one of the power houses of the company. It was 8:30 a. m. when the fire was discovered in an old car on the De Kalb Avenue side of the building. This car was used for storage purposes, and it is not known definitely how the fire originated. The employees made an effort to quench the flames before turning in an alarm, but the fire made headway very rapidly, and soon the entire interior of the structure was in flames. In the meantime alarms had been turned in to the fire department, but the water pressure was low, and while the firemen were prompt in getting streams on the building the water only reached as far as the second story. It soon became evident that the building was doomed, and the firemen immediately turned their attention to saving the power house and nearby dwelling houses. The power house was separated from the car house by a thick brick wall, and it was this that prevented the flames from breaking through. The rapidity with which the fire spread is shown by the fact that in half an hour after it was discovered the roof of the building fell in. This hampered the work of the firemen, as they had to abandon the lines proposed. In order better to combat the flames the firemen ascended to the structure of the elevated railway on Myrtle



RUINS OF DE KALB AVENUE CAR HOUSE

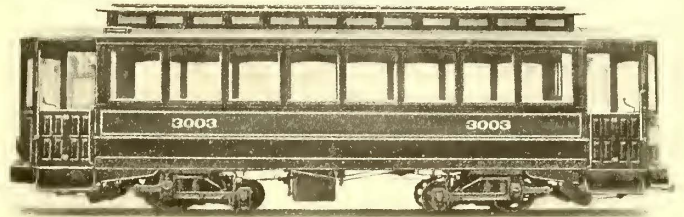
Avenue, and directed streams on the flames from that point.

Fortunately, there were but a few cars in the car house at the time of the fire, for it was during the rush hours, and none of the open cars were stored there permanently. An effort was made to save the few cars that were in the car house at the time of the fire. The accompanying cut shows how the fire overtook the rescuers as they were running the cars out of the car house, and compelled them to abandon the work.

The building was erected in the old horse car days, and at one time the company had its general offices there. A few years ago, however, it was decided to remove the general offices, and an office building was erected at Franklin and De Kalb Avenues. The plan of the company was soon to abandon the old car house, and in order to do so construction was begun several months ago upon a car house at Covert and De Kalb Avenues. This later structure is built strictly in accord with the specifications of the fire underwriters, and it is expected that it will be ready for occupancy in about three months. Patrons of the line were not inconvenienced any by the fire. The loss on the building and material stored therein is estimated at about \$200,000.

## VESTIBULED CARS FOR INTERNATIONAL TRACTION COMPANY

The accompanying illustration shows one of a lot of fifty cars recently shipped to the International Traction Company, of Buffalo, N. Y., by the G. C. Kuhlman Car Company. This car is built according to the Buffalo standard with monitor deck, concave and convex panels, dropped platforms and vestibules open on both sides, equipped with the Buffalo wooden folding gates. The car is furnished with longitudinal spring seats of



VESTIBULED CAR FOR BUFFALO

rattan. The length of car body is 26 ft., length over vestibules, 35 ft. 5 ins.; length over all, 36 ft. 5 ins., and width over all 8 ft. The interior finish of these cars is in cherry, rubbed to a satin finish and ornamented with highly polished bronze trimmings. The head linings are of plain maple, three-ply veneer dull finished and neatly decorated.

## CAR VENTILATION

Several electric roads and steam roads have recently been testing a device for providing fresh air in cars without draft, and at the same time expelling the vitiated air from them. In tests made on the Brooklyn Heights Railroad by the Department of Health, Dr. Walker said that after the cars had been filled with smoke, the ventilators were opened by his orders, and the smoke was entirely replaced with fresh air in 2 minutes and 30 seconds without draft. The Camden & Suburban Electric Railway has been experimenting with the device, and after four months' trial Vice-President and General Manager W. E. Harrington says that "the results obtained have been exceedingly satisfactory and far beyond our expectations. There seems to be an entire absence of drafts, such as is the case usually with ventilating devices in the roof of cars.

The ventilators comprise two airways in the deck sash, and an outside extension of two wings between them. The airways are fitted with louvres that deflect the intake of air toward the roof of the car. The wings intercept the air, eliminating dust, smoke, cinders and moisture. The action of the air in the forward airway produces a partial vacuum behind the wings, providing a strong suction, which draws out the foul air through the rear airway. If the direction of the car changes the action of the ventilator reverses. The airways are fitted with shutters which regulate the intake of air, and can be easily adjusted when there are decided changes in weather conditions. The action of the device does not depend on any moving part, however, and this, it is claimed, makes it much more reliable in operation.

In steam and interurban cars where smoking compartments are a feature of the service, the air can be entirely changed and without draft in 1 minute. This was demonstrated in tests made on the New York Central and the Central Railroad of New Jersey. So satisfactory have been the tests on the latter road that it has formally adopted this system of ventilation, making it standard for its entire service. In a letter of endorsement to the Automatic Car Ventilator Company, which manufactures this device, the Jersey Central official says: "We have definitely determined to adopt this device for our passenger equipment and for future equipment which we may expect to purchase."

**AUTOMATIC CAR SWITCH**

The accompanying illustrations are taken from photographs of a new automatic car switch, invented by W. K. Smith, of Denver, Col., and handled by the American Automatic Switch Company, of Pueblo, Col. This switch has been in practical operation for some time on the lines of the Pueblo & Suburban Traction & Lighting Company, where it has been giving ex-



FIG. 1.—COMPLETE TRACK DEVICE

cellent satisfaction in spite of snow and ice and the mud, dirt and gravel so abundant in Pueblo on account of the unpaved condition of its streets.

Practical railway men will readily understand the principle involved in this switch, namely, that when a car runs toward the butt end of a switch the flange of the car wheel in running through the switch forces the point over. Fig. 1 shows the complete track device, made with a water-tight box enclos-

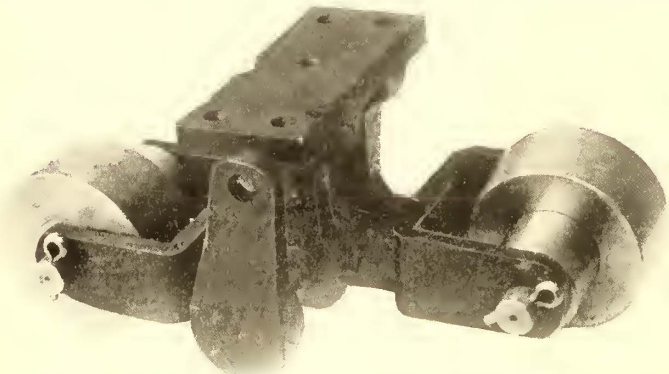


FIG. 2.—OPERATING ARRANGEMENT BENEATH CAR

ing the rod connected to the switch point. The base plate and box are made in one casting. The only place where freezing is possible is between the two planed surfaces on the bottom of the sliding plate and the top of the base plate. The effect of freezing at this point would be the formation of a thin frost coating, which could be easily broken loose by the small operating wheels used in connection with this device.

The rod connection carries two springs between rigid lugs.



FIG. 3.—OPERATING WHEEL THROWING SWITCH

These springs are stiff enough to throw the switch point without compressing the springs. The flanges on the operating wheels are 2½ ins. wide, and will throw a switch point of that or less width of throw. If the 2½-in. wheels are run through a 1½-in. switch point, the point is thrown 1½ ins., and the spring compresses 1 in. The same spring prevents breakage if the point happens to be clogged.

Fig. 2 shows the operating device—two small wheels with flanges on the opposite ends, hung in a frame under the front

of the truck. By throwing either one or the other of these wheels down on the center rail, as shown in Fig. 3, the car is sent to the right or left, as the case may be. When in an in-operative position these wheels hang about 4 ins. above the ground. In attaching to a standard Brill truck the frame is bolted to the angle-bar forming the front of the truck, and even where the motor is carried by the front axle of the car



FIG. 4.—SHOWING METHOD FOR ATTACHING TO CAR TRUCK.

the wheels have sufficient room to tip without striking the motor casing, and they hang directly behind the snow-plow.

Fig. 4 shows the method used in attaching the device to a Brill truck. The hanger, brace and sheave pulley, behind, are attached to the bolts already in use on the trucks, and it is only



FIG. 5.—DRUM, PINION AND FOOT LEVER

necessary to take off a few nuts and put them back again. The long lever behind and the drum and pinion in front, give a powerful leverage. By placing his toe upon the foot lever, which extends above the car floor, the motorman can easily counteract the effect of the spring, throw the wheels into an operative position and hold them there. It requires very little force to hold them down, as the pressure required to shift the ribs on the track device is not a downward one, but is exerted by the side of the wheels pressing against the center rail and the ribs.

A coil spring is carried between the jaws of the hanger, with its lower end resting and bearing on the tipping frame carrying the wheels. This spring throws the wheels back into an in-operative position after they are used.

The drum, pinion and foot lever (Fig. 5) are fastened by their hanger with two bolts through the sill, under the car vestibule, bringing the foot lever just to the right of the motorman's foot. The top of the lever is formed into two treadles, extending to the right and left. If the car is to take the right-hand switch the motorman presses the right lever, or if to the left the left lever.

**NEW CARS FOR CHICAGO UNION TRACTION COMPANY**

The Chicago Union Traction Company has received five new double-truck Brill semi-convertible cars, which will be put in service on North Side lines.

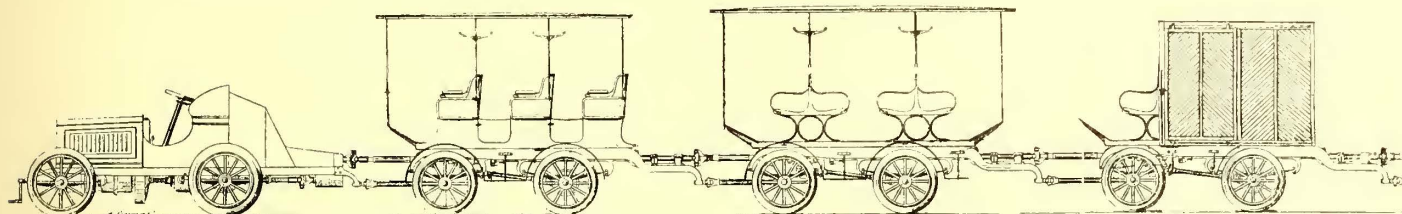
The 100 semi-convertible cars ordered from the St. Louis Car Company are also well along. They are the first of that type to be ordered by the Union Traction Company.

**AUTOMOBILE TRAIN IN PARIS**

A great deal of attention has been attracted in Paris to a system of automobile trains, invented by the well-known Colonel Renard, who was the first pioneer of modern aeronautic experiments in France. An experimental train of this kind was tried for the first time in Paris on Dec. 24. The invention was designed to overcome the necessity of having a very heavy traction engine, heretofore found requisite in automobile train operation. These trains have been tried on the splendid highways of France, but have been found so destructive to the roadways that their use has been forbidden by the authorities.

Colonel Renard's invention consists in composing the trains of motor cars having their own driving-wheels, but not their own power. This is done by placing a powerful motor in the leading car, and transmitting its power by means of flexible

The length of the cars over end panels is 28 ft., and over crown pieces 38 ft.; from panels over crown pieces, 5 ft.; width over sills, 7 ft. 10½ ins., and over posts at belt, 8 ft. 2 ins.; sweep of posts, 1¾ ins.; from rail over roof, 12 ft.; from center to center of side posts, 2 ft. 8 ins. The corner posts are 3¾ ins. thick, and the side posts, 3¼ ins. Long-leaf yellow pine side sills are 4 ins. x 7¾ ins., having sill plates on the inside, 12 ins. x ¾ ins. The end sills are 5¼ ins. x 6⅞ ins. The interiors of the cars are finished in ash with decorated birch ceilings. The seats are 36 ins. long and have walk-over backs. One of the features of this type of car is its extra interior width, obtained by not having wall window pockets. Thus, with a width over all of 8 ft. 2 ins. and 36-in. seats, the aisles are 22 ins. wide. The platform timbers are reinforced with angle-iron and capped with angle-iron bumpers. The platform steps are 15⅞ ins. from the rail to the tread of the



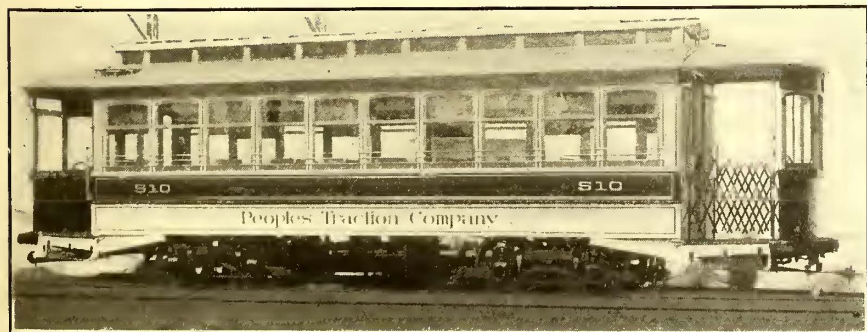
GASOLINE AUTOMOBILE TRAIN IN PARIS

couplings the entire length of the train, to one axle of each car, generally the rear axle, as is usual in automobile work.

To make the rear cars track properly, an important feature in street operation, each car is equipped with a lengthened end frame, which is coupled to a corresponding shaft connected to the front axle, and by properly proportioning these extensions the desired result is secured.

**SEMI-CONVERTIBLE CARS FOR PEOPLE'S TRACTION COMPANY, NEW JERSEY**

The J. G. Brill Company has lately furnished three of its semi-convertible cars to the Inter-State Construction Company, of Philadelphia, for use on a new section of its extensive system, nearly completed, between Burlington and Mt. Holly, N. J. Burlington is an important manufacturing city on the Delaware River, about 25 miles northeast of Philadelphia, and Mt. Holly is directly to the south of Burlington. Both cities are on



SEMI-CONVERTIBLE CAR FOR PEOPLE'S TRACTION COMPANY

divisions of the Pennsylvania Railroad, and the line will be of great convenience to travelers wishing to go to and from cities on one division or the other without the necessity of going to Philadelphia. The cars are similar in general dimensions and in some particulars to a lot of cars built last year for the Burlington County Traction Company, which is under the same management; the differences being that these cars had smoking compartments and the Philadelphia Rapid Transit Company's style of windows, that is, composed of single sash and removable. The windows of the new cars are raised into roof pockets when not in use.

step, 13 ins. from the step tread to the platform, and 9 ins. from the platform to the car floor. Among other of the builder's specialties are folding gates, portable vestibules, radial draw-bars, Dedenda gongs and Dumpit sand-boxes. Three-bar window guards extend from corner post to corner post for protection to the passengers' arms, as the window sills on this type of car are extra low. The trucks are the Brill No. 27-G, having 4-ft. wheel base, 33-in. wheels and 4-in. axles. They are equipped with 35-hp motors.

**FINANCIERS TAKE TRIP THROUGH NEW YORK SUBWAY**

On Jan. 19 a party of well-known financiers took a hand-car trip through the New York subway. The cars were started from the City Hall station some time after 2 o'clock, under about 150 ft. headway. The first car, in charge of August Belmont, contained Jacob H. Schiff, J. W. Alexander, Robert Bacon, A. J. Cassatt, Frederic Cromwell and James H. Hyde.

The second car, in charge of John B. McDonald, carried Valentine P. Snyder, president of the Bank of Commerce; George J. Gould, James Henry Smith, Cornelius Vanderbilt, John D. Rockefeller, Jr., and Alfred Skitt.

On the third car, in charge of Perry Belmont, were Robert H. McCurdy, Charles M. Jacobs, Andrew Freedman, Clarence H. Mackay, James Speyer, William Barclay Parsons, the subway engineer, and George Wickersham.

The fourth-car passengers were George W. Young, DeLancey Nicoll, Elliott Gregory, John F. O'Rourke, Samuel Rea and F. S. Curtis.

The subway was a pleasant relief from the zero weather above ground, the air seeming several degrees warmer. The way was well lighted with gas and electricity, and those who had been on the previous trip called attention to the progress that had been made since Mayor McClellan's trip on New Year's Day.

The Brooklyn Rapid Transit Company has closed a contract with the Peckham Manufacturing Company for 400 maximum traction center-bearing trucks of special design.

## FINANCIAL INTELLIGENCE

WALL STREET, Jan. 20, 1904.

### The Money Market

Last Saturday's bank statement was noteworthy for two things—it showed one of the largest gains in cash holdings ever recorded for a single week, and with another extremely heavy loan expansion it brought the loan item up to within \$16,000,000 of the highest level in the history of the Clearing-House. The reasons for the increase in cash are well enough understood; the usual return flow of currency from the interior, which reaches its maximum in the early part of January is now in progress, and besides this the treasury is a considerable debtor on its regular transactions with the New York banks, while gold engaged some time ago, both in Europe and the Orient, has been arriving. These several movements have now added no less than \$28,000,000 to the local cash supply during the last fortnight. It is far more important, however, in calculations for the future to consider the rise in the loan account. Within the last three weeks the tremendous sum of \$55,000,000 has been added to the outstanding credits of our city institutions, and the serious question is raised whether the money market is not in danger of repeating the experience of previous years when similar enormous borrowings so severely mortgaged the market's resources. There is no doubt that the main cause for the recent loan expansion lies in the requirements of railway and industrial corporations, which for various purposes require new capital at this time. These funds are raised, of course, by issues of new securities. But the money being usually needed for immediate use, while the sale of the securities requires at the very least a considerable period, it is the practice to borrow the sums required in the meantime. It appears from this that the question whether the increase in loans is to be a temporary increase or not is wholly a question of the willingness of the investing public to absorb the new issues offered for sale. Under similar circumstances, both in 1902 and 1903, outside investors resolutely held aloof, and as a natural consequence, the most critical phase of last year's situation developed—the inability of the market under the necessity of curtailing its credits to realize on these corporate borrowings. There is much reason to believe that the investment position has improved sufficiently this season to prevent the recurrence of such a crisis. Nevertheless, the uncertainty suggested by the present loan movement, raises the most important problem ahead of the market. With the rapid accumulation of bank reserves, rates for money have continued to decline, call loans being easily obtained now on the stock exchange at 2 per cent, and time loans at 4 per cent, even for the longer periods.

### The Stock Market

The progress of the negotiations between Russia and Japan has continued during the week to occupy the first place in financial attention. Neither at home or abroad, however, have the markets been as much affected by the crisis as they were during the previous fortnight. Europe has ceased to sell our securities, and while prices have not advanced materially, outside of a few selected

by the recent enlargement of bank loans, and the doubt by no means relieved by the late improvement in the iron trade, as to whether the tendency is still toward a further contraction in general business. Against all this, however, the extremely easy money rates, the excellent railroad earnings, the comparatively low level of stock prices, and the better investment demand as reflected in the more active dealings in the bond market, are influences powerful enough to insure against much of a decline if they do not directly point to a further advance.

In the general revival of market activity during the last few days, the local traction stocks have taken a prominent part. In all instances the operations in this group have been obviously speculative, and plainly due to the manipulation of pools, which for some time past have been active. Speculative sentiment is bullish on the traction stocks first, because of their increasing earnings, and, second, and more particularly, because of the mystery which surrounds the gossip regarding the possibility of some sort of a deal between the properties. The rumor, which has several times done service, to the effect that Brooklyn Rapid Transit is to be taken over on a guaranteed dividend by the Interborough Company, has been brought forward again during the week. This is the basis for the buying of Brooklyn Rapid Transit stock. The rise in Manhattan seems to be mainly the work of professional speculators more or less identified with the inside interests in the company.

### Philadelphia

Higher prices have been recorded in most of the active Philadelphia specialties during the week. The two most active issues have been Philadelphia Electric and Union Traction. The former sold up from  $6\frac{1}{8}$  to  $6\ 9-16$ , but fell back to  $6\frac{3}{8}$ ; the latter rose to 47, which is the highest figure in some time. To-day the call for the assessment on Philadelphia Rapid Transit falls due. The stock has been dealt in at  $8\frac{3}{4}$  up to 9, and at  $13\frac{1}{2}$  for the shares with the full \$15 paid in. In Philadelphia Company issues no further efforts have been made to renew operations for the rise. An unpleasant report has circulated that the company is "squeezing" its earnings for stock market effect and while this has a strong suggestion of a speculator's canard, it nevertheless has served to check the advance in the shares. The common fell from  $40\frac{3}{4}$  to  $39\frac{3}{4}$ , and then rallied to 41; the preferred has changed hands at 45. Other transactions for the week comprise Chicago Union Traction common at  $6\frac{7}{8}$ , Railways General at 2, American Railways from 44 down to  $43\frac{3}{4}$ . City Passenger "ex" dividend at  $196\frac{1}{4}$ , Consolidated of New Jersey at 64, and Fairmount Park Transportation, which rose on purchases of a few hundred shares from 19 to  $20\frac{1}{2}$ .

### Chicago

The reduction of the dividend on North Chicago stock has been followed by a further decline in the price to a new low record of 75. Offerings, even at this figure, have failed to attract buyers. Union Traction shares were depressed by this dividend cut, the common selling down to 5, and the preferred to  $29\frac{1}{2}$ . But later both stocks rallied, the common to  $5\frac{3}{4}$ , and the preferred to  $32\frac{3}{4}$ . A favorable decision is now expected in the ninety-nine-year franchise case, which will come up for hearing either in the latter

active. Elevated sold between 140 and 140½, West End common sold between 90½ and 90, and the preferred at 109. In Baltimore the United Railways stocks and bonds are unchanged on the week. The common stock has sold at 8¼, the income bonds at 56¼ to 56, and the general 4s from 91½ to 91, with quite heavy trading at the lower figure. Other sales include Atlanta Consolidated 5s at 103 to 103½, Baltimore Traction 5s at 113, Baltimore Traction convertible 5s at 101¼, City and Suburban (Baltimore) 5s at 112¼, Norfolk Street Railway 5s at 105½, Knoxville Traction 5s at 101, Lake Roland Street Railway 5s at 119, Pittsburgh Traction 5s at 110¾ and Anacostia & Potomac 5s from 92½ to 93. The feature of the New York curb dealings has been the extremely rapid rise in Interborough Rapid Transit, which, starting at 93 reached 106½ yesterday. Reports of a general "traction deal," in which the company is to take the central part, are the explanation for this advance. About 3500 shares of the stock have been dealt in in the course of the movement. Other traction sales on the local curb comprise Brooklyn Rapid Transit 4s from 77½ to 76½, one hundred shares of New Orleans common at 95¾, St. Louis Transit (500 shares) from 11¾ to 12½, United Railways of St. Louis preferred (200 shares) at 52, Washington Traction common at 127¾ to 13½, the preferred from 47 to 47½, and the 4 per cent bonds from 75¼ to 85¾. North American stock has had a further sharp advance on the Stock Exchange, which is ascribed mainly to the benefits which the company will enjoy from its contract to light the St. Louis Exposition grounds and buildings.

Traction bonds were active in Cincinnati last week. Cincinnati, Dayton & Toledo 5s sold to the extent of \$17,000 worth at 81 and 81½. Northern Ohio Traction consolidated 5s brought par and then sagged to 96½ on sales aggregating \$10,000. Cincinnati Newport & Covington second 5s brought 106½. The preferred stock of this company ranged from 82 to 83½, while the common brought 30. A few sales were made in Cincinnati Street Railway with a range of from 133 to 134½, the latter a high mark for several months. Detroit United brought 68½ and then sagged to 66.

At Columbus the Columbus Railway & Light was quite active, with a range of from 34¾ to 35. The Columbus Railway common was in good demand at 85¼, while the preferred brought 104. Rochester Street Railway common was active, and several hundred shares sold at a range of from 75½ to 80¾, the latter the close.

At Cleveland the indications that the Cleveland Electric might secure a twenty-year franchise under the terms proposed by Mayor Johnson, caused a sharp advance in that stock. Sales totaled 873 shares, all in small lots, opening at 68¾, advancing to 77¾ and then declining to 74½ on news that the terms of the proposed franchise extension might not prove so favorable as had been anticipated. Miami & Erie Canal was quite active and advanced from 6 to 11½, the high figure, however, was under the buyer's privilege for ninety days on the delivery. Northern Ohio Traction advanced to 14½, and very little is being offered at anywhere near this figure. Northern Texas Traction sold at 32. A lot of Northern Ohio Traction & Light 4s sold at 56, and are in strong demand at this figure. Cincinnati, Dayton & Toledo 5s sold at 78½, several points lower

	Closing Bid	
	Jan. 12	Jan. 19
Metropolitan Street .....	120½	122½
Metropolitan Securities .....	87	90
New Orleans Railways (common).....	95¾	95¾
New Orleans Railways (preferred).....	29	29½
New Orleans Railways 4½s.....	79	78
North American .....	85	87½
Northern Ohio Traction & Light.....	13¾	14
Philadelphia Company (common).....	40	40¾
Philadelphia Rapid Transit .....	8½	8¾
Philadelphia Traction .....	97½	97½
St. Louis Transit (common).....	a13¾	10½
South Side Elevated (Chicago).....	91	92
Third Avenue .....	122	121
Twin City, Minneapolis (common).....	89	91
Union Traction (Philadelphia) .....	46	46¾
United Railways, St. Louis (preferred) .....	55	52½
West End (common) .....	89½	90
West End (preferred) .....	108½	108

a Asked.

**Iron and Steel**

It is now admitted on all sides that a decided improvement has occurred during the past six weeks in the general iron situation. This improvement consists, on the one hand, of a very heavy decrease in the output of pig iron, which has brought down the monthly furnace capacity from a maximum of 1,550,000 tons last summer, to an estimated total of only 800,000 tons for January. Reserve stocks have ceased to increase, indicating that at length the desired equilibrium has been restored between production and consumption. On the other hand a much better demand has recently been noticed in many of the finished products, the results of which are seen in a slight advance in the wire trade, and a better inquiry for structural material and steel plate. Although the crucial question as to whether prices are low enough to permanently hold consumers, is still uncertain, the market is plainly moving to the advantage of the producing interests. Quotations are as follows: Bessemer pig iron \$13.75 to \$14, Bessemer steel \$23, steel rails \$28.

**Metals**

Quotations for the leading metals are as follows: Copper 13 cents, tin 29¼ cents, lead 4½ cents, and spelter 4 15-16 cents.

**BUSINESS IMPROVEMENT IN GERMANY**

Frank H. Mason, Consul-General at Berlin, writes in a recent report that the German manufacturing industries are enjoying a gradual recovery from the hard times experienced during the last three years. He attributes part of this returning prosperity to the fact that several of the leading electrical manufacturing companies have secured some important contracts for lighting and power plants, street-railway installations, etc., in foreign countries, notably Mexico and South America. At a recent meeting of representatives from all the electrical manufacturing companies, it was found that they were, almost without exception, running on full time and with orders booked that will keep them occupied for several months to come. Many of these orders

**NEW PENNSYLVANIA INTERURBAN LINE**

The Hazleton, Weatherly & Mauch Chunk Railway Company, recently incorporated, and which has been financed by R. E. Loper & Company, of Philadelphia, contemplates the construction of a most important interurban electric railway in Pennsylvania. The line will have its northern terminus at Broad and Wyoming Streets, Hazleton, where it will connect with the Wilkesbarre & Hazleton Railway Company's high-speed electric road, with its frequent train service, which brings Wilkesbarre and Scranton, and, in fact, the whole Wyoming and Lackawanna Valleys in close touch with Hazleton. Also at this terminus connection will be made with the Lehigh Traction Company's system. From Hazleton the line will operate over private rights of way, and nearly parallel with the Lehigh and Susquehanna turnpike, crossing the Delaware, Southern & Susquehanna Railroad under grade, passing within easy reach of Coleraine to the main street of Beaver Meadow, at the easterly end of which, crossing the Beaver Meadow branch of the Lehigh Valley Railroad, with an over grade crossing, continuing down the Beaver Creek Valley to and along Main and Hudsonale Streets in the borough of Weatherly, to the southerly line of said borough; thence by private right of way and maximum grades of 3 per cent to Hudsonale, where the Quakake, Little Quakake and Dark Hollow Creeks, and the Mahanoy branch of the Lehigh Valley Railroad are crossed overhead, with a single embankment, and an arch bridge with a steel span over the railroad, continuing to the summit of Broad Mountain, with a 3 per cent grade; the road will then descend to Nesquehoning with a 3½ and 4 per cent grade to a crossing of the Nesquehoning Creek, Nesquehoning branch of the Central Railroad of New Jersey, and the breaker tracks of the Lehigh Coal & Navigation Company, with three steel spans, entering Main Street, Nesquehoning, to a connection with the Mauch Chunk, Lansford & Tamaqua Electric Railway. This road extends from Mauch Chunk to Lansford, passing through Nesquehoning, Lansford, Summit Hill and Coaldale. At Tamaqua it has a connection with the Pottsville & Tamaqua Electric Railway, and at Mauch Chunk with the Carbon County Electric Railway, with lines to East Mauch Chunk and Lehighton.

The new line will thus connect the Carbon County Electric Railway, and the Mauch Chunk, Lansford & Tamaqua Railway with a contiguous population of 35,000, with the Lehigh Traction Company system, with its contiguous population of 50,000 people. The new line will have a contiguous population from and including Hazleton, Beaver Meadow, Weatherly and Nesquehoning, of 33,000 people.

The road will be 19½ miles in length, and there will be no heavy grades. The work will be done according to the best method of railroad construction, the heaviest and best materials being used, and there will be few or no grade crossings. The electrical equipment will be of the very best. There will be eight cars, capable of maintaining a speed of 25 m. p. h. on the maximum grades. The road will offer a thirty-minute service, requiring six motor cars. The time of the trip will be 1:15.

The completion of this road will form a connecting link of a complete system of electric street railways between Carbondale and Philadelphia, with the exception of about 6 miles between Lehighton and Slatington, which will be built during this year.

**STATEMENT OF MILWAUKEE COMPANY FOR TAX PURPOSES**

President John I. Beggs, of the Milwaukee Electric Railway & Light Company, has filed with the Controller of Milwaukee a statement of the taxes to be paid on gross receipts by the Milwaukee Electric Railway & Light Company and the Milwaukee Light, Heat & Traction Company. The two companies will pay a total of \$129,064 taxes, of which the former company will pay \$120,657, and the latter \$8,407. The Milwaukee Electric Railway & Light Company, under the State law, pays 4 per cent on its gross receipts, and the Milwaukee Light, Heat & Traction Company 2 per cent. The following table shows a comparison of the taxes of the two corporations since 1898, the figures showing that the taxes of the company have more than doubled in six years:

	T. M. E. R. L. Co.	M. L. H. T. Co.	Total
1898.....	\$62,460.01	\$1,509.08	\$63,969.09
1899.....	79,087.73	4,650.00	83,737.73
1900.....	87,654.40	5,836.38	93,490.78
1901.....	95,540.99	6,426.71	101,967.70
1902.....	108,259.89	7,023.53	115,283.47
1903.....	120,657.03	8,407.05	129,064.08

The following is a statement, as required by law, of the gross cash receipts derived from the operation of the railways and elec-

tric lighting plants of the Milwaukee Electric Railway & Light Company for the twelve months immediately preceding Dec. 1, 1903, viz:

Gross cash receipts railway system.....	\$2,546,102.80	Tax at 4 %	\$101,844.11
Gross cash receipts, lighting system.....	470,323.02	Tax at 4 %	18,812.92
Total .....	\$3,016,425.82	Tax at 4 %	\$120,657.03

Apportioned as follows:

	—Railway—		
	Actual Mileage	Tax Mileage	Taxes
Milwaukee, city .....	115.48	346.44	\$87,188.74
South Milwaukee .....	2.74	8.22	2,067.44
Whitefish Bay .....	3.40	10.20	2,566.47
East Milwaukee .....	2.94	8.82	2,220.20
Cudahy .....	3.55	10.65	2,678.50
West Allis .....	3.36	10.08	2,535.92
Lake, town .....	7.15	7.15	1,802.64
Wauwatosa, town .....	2.72	2.72	682.36
Greenfield, town .....	.39	.39	101.84
Milwaukee, town .....	.00	.00	0.00
Total .....	141.73	404.67	\$101,844.11

	—Lighting—		Total
	Receipts	Taxes	Taxes
Milwaukee, city .....	\$469,714.02	\$18,788.56	\$105,977.30
South Milwaukee .....	.....	.....	2,067.44
Whitefish Bay .....	2.00	.08	2,566.55
East Milwaukee .....	.....	.....	2,220.20
Cudahy .....	.....	.....	2,678.50
West Allis .....	.....	.....	2,535.92
Lake, town .....	65.00	2.60	1,805.24
Wauwatosa, town .....	.....	.....	682.36
Greenfield, town .....	.....	.....	101.84
Milwaukee, town .....	542.00	21.68	21.68
Total .....	\$470,323.02	\$18,812.92	\$120,657.03

The following is a statement, as required by law, of the gross cash receipts derived from the operation of the railways and electric lighting plants of the Milwaukee Light, Heat & Traction Company for the twelve months immediately preceding Dec. 1, 1903, viz:

Gross cash receipts, railway system.....	\$350,347.82	Tax at 2%	\$7,006.96
Gross cash receipts, lighting system.....	70,004.44	Tax at 2%	1,400.09
Total .....	\$430,352.26	Tax at 2%	\$8,407.05

Apportioned as follows:

	—Railway—		
	Actual Mileage	Tax Mileage	Taxes
Racine, city .....	15.33	45.99	\$1,849.84
Caledonia, town .....	7.10	7.10	285.88
Mt. Pleasant, town .....	3.89	3.89	156.26
Somers, town .....	5.25	5.25	210.91
New Berlin, town .....	9.59	9.59	386.03
Waukesha, town .....	2.45	2.45	98.80
Waukesha, city .....	3.76	11.28	404.05
Pewaukee, town .....	5.68	5.68	228.43
Delafield, town .....	1.61	1.61	64.46
Milwaukee, city .....	1.27	3.81	153.45
Oak Creek, town .....	3.85	3.85	154.85
South Milwaukee, city .....	2.70	8.10	325.82
Greenfield, town .....	11.58	11.58	465.96
Wauwatosa, town .....	9.88	9.88	397.30
Wauwatosa, city .....	4.06	12.18	489.79
Milwaukee, town .....	.29	.29	11.91
North Milwaukee, village .....	2.21	6.63	266.97
West Allis .....	8.34	25.02	1,006.20
Total .....	98.84	174.18	\$7,006.95

	—Lighting—		Total
	Receipts	Taxes	Taxes
Racine, city .....	\$54,710.92	\$1,094.22	\$2,944.06
Caledonia, town .....	.....	.....	285.88
Mt. Pleasant, town .....	1,049.97	21.00	177.26
Somers, town .....	.....	.....	210.91
New Berlin .....	.....	.....	386.08
Waukesha, town .....	775.66	15.51	114.31
Waukesha, city .....	1,161.06	23.22	477.27
Pewaukee, town .....	.....	.....	228.43
Delafield, town .....	.....	.....	64.46
Milwaukee, city .....	.....	.....	153.45
Oak Creek, town .....	.....	.....	154.85
South Milwaukee, city .....	5,471.91	109.44	435.26
Greenfield, town .....	.....	.....	465.96
Wauwatosa, town .....	20.44	.41	397.71
Wauwatosa, city .....	6,790.48	135.81	625.60
Wilwaukee, town .....	.....	.....	11.91
North Milwaukee, village .....	24.00	.48	267.45
West Allis, village .....	.....	.....	1,006.20
Total .....	\$70,004.44	\$1,400.09	\$8,407.05

**REORGANIZATION OF CAR BUILDING COMPANY**

The Niles Car Manufacturing Company, of Niles, Ohio, has reorganized with ample additional capital and is now in the market for business. It has recently added a new blacksmith and machine shop, and as all old orders have been completed and shipped, the company is in excellent position to make prompt deliveries. A. W. Schall has been retained as superintendent, and as it was under his supervision that practically all cars so far turned out by this company were built, it can be taken for granted that all future cars will be of the same high-grade as those now in service on the Aurora, Elgin & Chicago Railway; Western Ohio Railway; Rockford, Beloit & Janesville Railroad; Stark Electric Railway; Trenton & New Brunswick Railway; Louisville & Eastern Railroad, etc.

The company recently showed what it could do in the way of quick shipments, by delivering twenty-five double-truck city cars to the Cleveland Electric Railway within twenty-eight days from date of order.

James B. Ludlow has been appointed general sales agent, having resigned his position as secretary of the Ludlow Supply Company of Cleveland, Ohio.

**COL. BRYAN TRAVELS ON THE EVANSVILLE-PRINCETON ELECTRIC LINE**

Col. William Jennings Bryan, enroute from Indianapolis to Evansville, made the trip from the city of Princeton to Evansville on the new Evansville-Princeton traction road, which has been in operation just a month. It was on January 14 that Col. Bryan made his visit to Evansville, and as there was a demand among the people that they be given the opportunity to see and hear the distinguished Nebraskan, General Manager Sonntag tendered the use of special cars to the Evansville committee, who went to Princeton to meet Col. Bryan. The result was that the distance of 28 miles from Princeton to the Ohio River city was made at easy stages, stops being made wherever and whenever desired, orders having been issued that the "Bryan special" should have right of way.

At the completion of the journey Col. Bryan complimented the manager for the manner in which he had been treated, saying the road was one of the smoothest he had ever traversed, and that the equipment was of the very best. He said that his ride through such a picturesque country, and being given the opportunity to meet so many people under such favorable conditions, was most gratifying to him.

**GOVERNOR OF OHIO DISCUSSED ELECTRIC RAILWAYS IN HIS INAUGURAL ADDRESS**

In his inaugural address, Myron T. Herrick, the new Governor of Ohio, touched on the subject of electric railways as follows: "The rapid growth of interurban railroads, street railroads and other quasi-public corporations, and the apparent demand for their enlargement in the next few years, render it desirable that they shall be regulated and governed by wise legislation, that will encourage the investment of capital to the extent that it is necessary to meet the demands and requirements of the public; that will insure it protection when invested; that such corporations shall be so regulated that the public shall secure the most efficient service at reasonable cost."

Governor Herrick is interested in several electric railways in Ohio, and the above views are indicative as to how he will stand in the event of the passage by the State Legislature of a bill providing for the placing of electric railway franchise matters in the hands of a special commission. It seems probable that such a measure will be introduced in the present Legislature.

**INDIANAPOLIS INTERURBANS DECLARED COMMON CARRIERS**

Henry Warum, City Attorney, has rendered an opinion at the instance of the Indianapolis Board of Public Works, to the effect that interurban cars are common carriers and must carry freight; that the interurbans entering Indianapolis must, under their franchises, build freight depots in a reasonable time; and that they must haul freight for a reasonable compensation. If there is any doubt as to the reasonableness of the time in which to provide freight houses or of the charge for freight haulage, it must be determined by a court of law.

**REMARKABLE EARNINGS OF THE CHICAGO & MILWAUKEE RAILROAD COMPANY**

Earnings of the Chicago & Milwaukee Electric Railroad Company for the year show gross of \$292,246 and net \$193,619. The per cent of increase over 1902 was 50.9, though in September, 1903, the Libertyville branch was opened. Comparative figures follow:

	Gross earnings	Oper. exp.	Net earnings	%†
1900.....	\$140,684.55	\$59,515.44	\$81,169.11	42.3
1901.....	171,171.99	74,015.09	97,156.90	43.2
1902.....	190,110.31	79,364.12	110,746.19	41.7
1903				
January .....	\$12,035.19	\$6,570.52	\$5,464.67	45.5
February .....	10,644.73	5,817.41	4,827.32	54.6
March .....	13,355.12	6,317.37	7,037.75	47.3
April .....	15,160.56	6,242.20	8,918.36	41.1
May .....	20,042.31	7,156.61	12,885.70	35.7
June .....	22,482.59	7,742.66	14,739.93	34.4
July .....	29,529.43	8,522.87	21,006.56	28.1
August .....	30,465.17	8,745.91	21,719.26	28.7
*September ...	40,920.70	9,820.14	31,100.56	21.5
October .....	43,307.42	10,746.31	32,561.11	24.8
November ....	30,218.57	10,626.66	19,591.91	31.1
December ....	24,084.97	10,318.41	13,766.56	42.8
Total .....	\$292,246.76	\$98,627.07	\$193,619.69	33.7

\*Libertyville branch opened Sept. 1, 1903.

†Per cent of special expenses to gross receipts.

**STILWELL-BIERCE & SMITH-VAILE COMPANY'S AFFAIRS**

The bankruptcy proceedings instituted against the Stilwell-Bierce & Smith-Vaile Company, of Dayton, Ohio, one of the largest builders of water turbines, pumps, etc., in this country, will not interfere with the operation of the plant, whose capacity is now taxed to the utmost. The petitioners are Frank J. McCormick, of the Dayton (Ohio) Supply Company, who has claims for \$4,379.53, with interest; John W. Johnson, of Dayton, who files a bill of \$1,963.82, with interest, and Alexander Gebhart & Company, also of Dayton, who put in an account for \$10,994, with part interest. The petition has been lodged in the District Court of the United States, South Division of Ohio, West Division.

Receivers have been appointed in the persons of H. E. Talbot, president of the Stilwell-Bierce & Smith-Vaile Company, and William B. Earnshaw, an attorney of Dayton. The company is incorporated under the laws of the State of New Jersey, with a capital of \$1,100,000, practically all of which has been issued. The assets of the company are put at \$2,000,000, while the liabilities foot up a total of \$1,250,000. The contracts in hand are understood to represent at least \$500,000.

It is confidently expected that matters will be adjusted satisfactorily within the next month or so. The company is taking orders right along, and is figuring on some substantial contracts, especially for export to South America and England, in which countries it has been doing quite an extensive business for some years past.

**IMPORTANT TRANSFER DECISION IN NEW YORK**

A decision which, unless reversed on appeal may result shortly in the issuance of transfers by the Interurban Street Railway Company, at every point in New York where its lines meet or intersect, has been rendered in the Appellate Term of the Supreme Court.

The opinion reverses the ruling of Justice Tierney of the Municipal Court, in the case of Richard Topham, who brought suit to recover the \$50 penalty prescribed by statute for the failure of a railroad corporation to grant a transfer when requested.

Justice Tierney, after hearing Topham's story of his ride on the Broadway line, and the refusal of the conductor to give him a transfer at Twenty-Third Street, held that Sec. 104 of the Railroad Law, which provides the \$50 penalty, did not apply to the defendant and ruled in the company's favor. The Appellate Term in reversing his decision, grants Topham a new trial, with costs.

Justice Freedman says that the judgment of the lower court was erroneously placed on the ground that the provisions of Sec. 104 did not apply to the corporation. Inasmuch, however, as the question involved is of great public importance, the railway company is given leave to appeal its case to the Appellate Division.

## A MODERN ENGINE PLANT

The Hooven-Owen-Rentschler Company, of Hamilton, Ohio, designer and builder of the well-known Hamilton-Corliss engine, has lately completed the reconstruction of its entire plant. All departments of the works have been thoroughly remodeled, equipped with modern tools of special designs, and located so that all material may be quickly handled at minimum expense. These extensive improvements have more than doubled the manufacturing capacity of the plant, and the company is now better equipped than ever for turning out first-class steam engines.

The works enjoy splendid transportation facilities, a siding along the westerly wall of the main shop connecting with the Cincinnati, Hamilton & Dayton Railway, and another on the eastern side running into the main line of the Pittsburg, Cincinnati, Chicago & St. Louis Railway. A loop connecting these lines runs through the southerly end of the main shop. The standard gage tracks are arranged to deliver all raw material directly into the foundry, blacksmith and machine shop yards. Inside the works the handling of engine parts and other material is greatly facilitated by a complete system of industrial railways and cranes, the capacities of the latter ranging from 10 to 50 tons.

The tool room is located in the center of the shop. The northeast corner of the main building is used for the general offices of the company, the upper floors of this section being devoted to the drafting departments. The superintendent's office is situated in the machine shop and is elevated about 5 ft. above the floor level, thus commanding an excellent view of the entire shop. Intercommunication between all departments is afforded by an elaborate interior telephone system.

The power station and main shop are connected by a 5-ft. diameter tunnel, which contains the steam heating mains, electric conduits and other piping systems.

## NEW COMMISSIONER OF BRIDGES IN NEW YORK INSPECTS STRUCTURES

Last week Commissioner of Bridges Best, of New York, accompanied by the deputy commissioner, the chief engineer and the engineer of the Brooklyn Bridge, made a partial inspection of the Brooklyn and Williamsburg bridges, in the course of which he looked into the matter of relief from the present overcrowded conditions in both the terminals of the former structure. Commissioner Best would not say what he proposes to do to relieve congestion on the old bridge, but said he thought the terminals could be improved. The inadequate elevated train service on the bridge is what seemed to strike the bridge commissioner most forcibly in the course of the inspection, and he said that he intends to give the matter very careful consideration. As regards the Williamsburg Bridge the Bridge Commissioner says he sees no reason why trains, both elevated and surface, should not be running on the structure within six months. In view of the difficulties existing at the Manhattan terminal, Commissioner Best's statement that there will be cars running on the new bridge in six months is interesting. It is said that the Manhattan terminal of the new bridge will not be ready for use inside of a year and a half, and at present there are absolutely no switching facilities which would permit of the operation of either cars or trains, except from terminal to terminal. Mr. Best would not say what scheme it is proposed to adopt that will provide transportation arrangements on the new bridge inside of six months.

## ANNUAL BALL OF THE INTERNATIONAL RAILWAY EMPLOYEES' ASSOCIATION

The third annual ball of the International Railway Employees' Association, of Buffalo, N. Y., was held on Jan. 5, and proved a very enjoyable and successful affair. It is estimated that fully 5000 people were present. The association is a beneficiary organization and the proceeds of its annual balls have always substantially increased its funds.

W. Caryl Ely, president of the International Railway Company, was at the ball and danced as well as the youngest man present. All the other officials of the company were also on hand to see the employees and their friends have a good time. Among them were T. E. Mitten, first vice-president and general manager; Frank Clement, second vice-president; R. F. Rankine, treasurer, and W. J. Sullivan, secretary.

## REMARKABLE RECORD OF RAILWAY MOTOR SERVICE

James Anderson, manager of the Sandwich, Windsor & Amherstbury Railway, Windsor, Ontario, has recently reported the remarkable service performed by Westinghouse 12-A railway motors on his lines. The first motor of this type has been in continuous operation since 1895, a period of eight years, during which time it has covered a distance of approximately 450,000 miles. Not a coil has been renewed on either armature or field, nor has any repair been made other than the replacement of brushes, re-lining of bearing boxes and the turning off of commutator. The commutator has been worn from an original diameter of 8 $\frac{3}{8}$  inches to 8 inches. As a wearing depth of  $\frac{3}{4}$  inch is provided in the manufacture, it would appear that under similar conditions this commutator still has a prospective life of eight years, making a total life without renewal of sixteen years, and a corresponding travel of approximately 900,000 miles.

Three additional 12-A motors of the same size and construction were installed in 1896. During seven and one-half years service each has operated over 400,000 miles. Commutator diameters of two of these motors have been reduced to 8-1/16 inches, while that of the third now measures 8-3/16 inches. Except bearings and brushes, all parts are still intact, and the motors are doing regular duty. In 1901 two additional motors of similar type were put in service. Each now has 135,000 miles to its credit. Commutators have been turned to 8-3/16 inches and 8-5/16 inches diameter respectively. The last 12-A motor was added in 1902, and has operated over 58,000 miles. The commutator now measures 8- $\frac{1}{4}$  inches in diameter.

With the exception of rebabbiting bearings, renewing brushes and turning off the commutators, and the replacement of one broken hand-hole cover, not a cent has been expended on the repair of any of these motors. Not a coil has been replaced on armature or field, nor has a soldering iron been even once brought in service. All parts are apparently in as good condition as when new, and each motor is taking its regular part in the work of the system.

These motors are operated in single equipment, and under 18-ft. closed cars during the winter, and ten-bench open cars during the summer season. The road is practically level and without sharp curves, so that conditions are favorable.

## PROPOSED RAILWAY COMMISSION FOR NEW YORK CITY

Comptroller Grout, of New York city, has taken a stand in opposition to the plan of some of the men interested in the Merchants' Association, and in the City Club as well, to have the Legislature pass a bill for the creation of a Municipal Railway Commission to have full charge of all street surface and elevated railroads in New York. The Comptroller declares that instead of vesting these power in a new commission, the powers should be given to the present Board of Estimate and Apportionment.

"The Board of Estimate is daily becoming more and more the board of directors of this city," said the Comptroller. "This is a good thing. The proposition that has been advanced by Merchants' Association and City Club men to have a new committee of three would complicate matters, and I hope that they will either alter their bill before it is presented to the Legislature, or else that the Legislature will amend the measure before passing it."

## BROOKLYN RAPID TRANSIT TO HANDLE PACKAGE FREIGHT

The Brooklyn Rapid Transit Company has entered into a contract with the Bush Terminal Company to handle package freight.

The Bush Terminal Company has erected a number of fine piers and warehouses along the water front in South Brooklyn, extending from about Thirty-Ninth Street to Fifty-Second Street. It now handles business for the following lines: Baltimore & Ohio, Jersey Central, Erie, Lehigh Valley, New York Central, Ontario & Western, West Shore, and the Old Dominion Steamship Company. These connections will make a large volume of package business available for collection and distribution by the Brooklyn Rapid Transit lines.

The question of the transit company's right to transact such a business seems to be decided by the fact that a practically similar traffic has been carried on in the removal of ashes at night and the operation of the American Express Company's cars on the trolley roads. The freight business will be handled for the most part at night.



**ANNUAL REPORT OF THE LOUISVILLE RAILWAY RELIEF ASSOCIATION**

The annual report of the Louisville Railway Relief Association, composed of employees of the Louisville Railway, for the year ending Dec. 31, 1903, has just been issued. The condition of the association has improved wonderfully during the past year. The association has added a considerable amount to the reserve fund, establishing the stability of the association. The good work done during the past year was accomplished by the careful and painstaking work of the entire board of managers. The membership has increased very considerably. The dues collected from members during the year amounted to \$2,986. Interest, etc., made the total receipts for the year \$3,089.36. Sick benefits amounting to \$1,705.50 were paid to one hundred and sixteen members. Death benefits paid were \$300, and the general expenses for the year \$380.45, making the total disbursements \$2,385.95, a net gain for the year of \$703.41. This sum, added to the amount on hand at the beginning of the year, \$4,395.04, gives a balance Jan. 1, 1904, of \$5,098.45. The report contains a resolution adopted at a special meeting of the association, thanking the company for assisting in the success of the annual entertainment of the association, which last year took the form of a Christmas Tree for the children of the members. The company furnished transportation for the families of the employees, and also the services of many employees in the preparation of the entertainment.

**NEW YORK SUBWAY STRIKE AVERTED**

A general strike on the New York Subway was scheduled for Jan. 14, owing to the employment of non-union men at the power house and at other points along the line. Fifty union tile layers at the Eighteenth Street and Fourth Avenue Station went out on Jan. 13, because the Manhattan Glass Tile Company employed four non-union men. The president of the tile company refused to discharge these men, explaining that they were experts in laying the special tiling used, and that they had no union in their specialty.

Complications were increased by the fact that several of the out-of-town contractors have employed non-union labor, and the unionists demanded that either New York men be employed at union wages, or the men employed be paid New York union wages.

To avert the threatened tie-up a meeting of all the representatives of the trades interested in the completion of the Manhattan subway, and of the contractors vitally concerned, was held on Jan. 15 in the office of John B. McDonald, the general contractor for the subway. The conference lasted two hours, at the expiration of which time it was announced that all existing differences between the trades employed in the subway and John B. McDonald and the sub-contractors had been amicably settled. The result was arrived at after many mutual concessions.

**THE ADJUSTMENT OF THE WORCESTER & SOUTHBRIDGE FAILURE**

A settlement of the claims against the Worcester & Southbridge Street Railway Company, of Worcester, Mass., whose financial difficulties resulted in the appointment of receivers last summer, is made probable by the report of a committee of the creditors recommending the acceptance of an offer to pay 50 cents on the dollar in cash on all unsecured claims, without discrimination as to whether or not they are endorsed. Payment of the claims is to be made on or before Feb. 15, with interest up to Jan. 1. All claims must be in the hands of the Worcester Safe Deposit & Trust Company for collection Jan. 19.

The committee of the creditors was appointed at a meeting at Boston Dec. 18 to make an investigation to determine whether the offer of a settlement on a basis of 50 per cent, made by the receivers, was the best that could be made. The committee reported that as much is being contributed by the endorsers of the notes as could be obtained from them in bankruptcy proceedings, and that the credit of the road will be used to raise funds equal to the amount that could be realized from a forced sale.

Many of the creditors of the Worcester & Southbridge Street Railway Company have filed with the Worcester Safe Deposit & Trust Company acceptances of the cash offer of 50 cents on the dollar made by the receivers of the road. Jan. 19 was the last date for filing acceptances.

**AN AUTOMOBILE'S VALUE IN AN EMERGENCY**

John J. Stanley, general manager of the Cleveland Electric Railway Company, is the owner of a handsome touring car built by the Winton Motor Carriage Company, of Cleveland. Mr. Stanley frequently uses his automobile in going over the system, but found it of exceptional value on the occasion of the Holmden Avenue car house fire, mentioned in the STREET RAILWAY JOURNAL of Nov. 21. On the morning of Nov. 16 Mr. Stanley, who lives some miles from the Cleveland business section, was awakened by a telephone message that the Holmden Avenue car house was on fire. Instead of having to delay until a horse and buggy could be hitched up, Mr. Stanley ordered out his automobile and quickly reached the fire. As it was 4 a. m., and in an hour it would be time for the morning cars to start on their runs, Mr. Stanley saw that unless strenuous measures were speedily taken, a large portion of the system would be tied up. It would have done no good to telephone to other car houses to have cars sent, because there were no men on hand at that time to run them. Mr. Stanley, therefore, gathered eight employees who were at the fire, and taking them in his automobile, sent them post haste to other car houses, with instructions to return with double headers. In a short time a number of cars were on their way to the tied-up district, and there was but little interference with the schedules on the entire system.

**ST. LOUIS COMPANIES IGNORE NEW CAR LICENSE LAW**

The St. Louis Transit Company and the St. Louis & Suburban Railroad Company are disregarding the new street car license law which became operative Jan. 1, and which provides a tax of 1 mill for each passenger carried. The city register notified the companies in advance that the new law would go into effect Jan. 1, and ordered the company to make daily reports of passengers carried on each car, beginning Jan. 1. The intention of the companies evidently is to carry the case to the courts.

Under the old law there was a tax of \$25 on each car operated. Under this law the city received a revenue from the street car companies of about \$22,500 a year, while under the new law it was hoped to get about \$160,000 a year. The latest quarterly reports of the two companies show that the Transit Company carried 37,583,198 passengers, and the Suburban 4,407,822. On this basis the quarterly tax would amount to nearly \$168,000 a year. The extra traffic of the World's Fair period, it was estimated, would bring this sum well above \$200,000.

The register has twice notified the companies in regard to the provisions of the law, and has informed the companies that he will take the necessary steps to compel compliance. The register and the comptroller have held a conference on the matter.

**PROPOSED STATE COMMISSION FOR OHIO PUBLIC SERVICE CORPORATIONS**

Developments of Senator Hanna's alleged plan for a State commission to grant franchises to street railway companies show that the project is to include public service corporations of all sorts, such as gas, electric light, telephone companies, etc. As now planned, the law will provide for a commission of five, to be appointed by the Governor, to look into questions of fares, etc. Other phases of the quasi-corporation business will also come before this commission and it will have power to grant original franchises and extensions. The work is being entrusted to Squire, Sanders & Dempsey and John W. Warrington, who were Governor Nash's code advisers.

The constitutionality of the proposed law is already being attacked by Columbus attorneys. One of them said that such a law would not stand the test of the courts. He pointed to recent decisions in street franchise cases of several kinds. The rights of owners of property abutting on lines of proposed street railways have been well guarded by the courts. In a Butler County case, the Supreme Court, within the last year, held that the owner of abutting property could even sell his consent for a railway franchise in the street.

It is this right that the bill proposes to take, not only from the property owners, but from their representatives in city councils as well. It seems to run squarely against the constitutional provision that one may not be divested of his property rights, even for the public use, without fair compensation.

**PROPOSED REPEAL OF NEW YORK'S "NEAR SIDE" ORDINANCE**

As stated in the STREET RAILWAY JOURNAL of Jan. 9, the New York Board of Aldermen passed on Dec. 14, 1903, an ordinance entitled "Rules of the Road," the most important part of which is that requiring surface cars to stop only on the near side of the street when discharging or taking on passengers.

Although the ordinance went into effect on Jan. 1 in Brooklyn Borough, little opposition was shown until it became effective on Jan. 17 in Manhattan Borough. Chief among the objections has been that it compels passengers to get on and off cars about 40 ft. from street crossings and wade through snow or mud to the sidewalks.

An ordinance was introduced recently at a meeting of the Board of Aldermen, calling on the street railway companies to clean the streets 40 ft. back from the crosswalks. It was discovered afterward that it could not be made effective, and that the only remedy would be to ask the Street Cleaning Commissioner to do this work. Commissioner Woodbury, however, said that to clear a space in each block where rear ends of the cars stopped under the new ordinance made it necessary to take men from other work and crippled his force. Then the Aldermen who had advocated the stopping of cars on the near side of the street decided to repeal the measure.

On Jan. 19, Alderman Doull introduced a resolution calling for the repeal of the "near side" section of the "Rules of the Road." The resolution was referred to the railroad committee, and it will probably be two weeks before any change can be effected. Sentiment appears to be divided with regard to this matter, as many people believe that the new rule has not been given a fair trial. In any event, the Aldermen could not have chosen a worse time for dabbling in traction matters. It is needless to say that although the railway companies had nothing to do with making the ordinance they are receiving the usual abuse from the public.

**STREET RAILWAY CARS FOR SNOW REMOVAL**

Commissioner Woodbury, of the Department of Street Cleaning of New York, has outlined plans which he has been going over to effect an improvement in the methods of removing snow from the city streets. These plans include the use of modern railroad machinery to sweep up the snow, load it into cars on every street and avenue where there are surface railways, and then have the loaded cars run to the dumping points by the street railway companies. The Commissioner says he has the support of the officials of the companies to carry out the plan.

President Fish, of the Illinois Central Railroad, is one of the railroad builders who first called Commissioner Woodbury's attention to the plan, which is now in operation on the Illinois Central and many other roads, especially further West. Working along the lines laid down, Commissioner Woodbury declares that with the last storm he could have cleaned Broadway to Fifty-ninth Street in four hours, and before the city was ready for business on the following day could have cleaned Forty-second, Thirty-Fourth, Twenty-Third and Fourteenth Streets, which are the principal streets of New York City. The Commissioner declares the plan will not diminish the number of men employed, will cost no more than the present system, and ought to cost considerably less. It comprises a plan by which the snow will be collected and loaded into a train of thirty or more trolley cars.

**NEW OFFICERS OF THE PECKHAM MANUFACTURING COMPANY**

At a recent meeting of the board of directors of the Peckham Manufacturing Company, E. Burton Hart, Jr., Bird S. Coler and Henry G. Lewis were elected to the board, in place of J. J. Riley, Virgil B. Van Wagonen and W. H. Wilkinson, resigned. The board now consists of the following: E. Peckham, president; Hon. Bird S. Coler, ex-comptroller of the city of New York and member of the New York Stock Exchange; E. Burton Hart, Jr., president of the Portsmouth, Kittery & York Street Railway Company, director of the Consolidated National Bank, etc.; J. R. Beetem, vice-president and general manager, formerly general manager of the Union Traction Company, of Philadelphia, and vice-president of the New York & Queens County Railway Company; Henry G. Lewis, treasurer, assistant cashier of the Consolidated National Bank, etc.; Hon. C. H. Duell, ex-commissioner of patents, U. S. A., and member of the firm of Duell, Megrath & Warfield; Geo. H. Bowers, secretary and assistant treasurer.

**INCREASE IN WAGES AT SEATTLE**

Several months ago, when loyal employees of the Seattle Electric Company refused to join a strike, the company assured them that they would be rewarded by an increase in wages soon, and accordingly a new wage scale was recently posted. It became operative on Jan. 1. Both the old and new wage scales for motormen and conductors, which are shown in the following table, indicate the high prices which prevail on the Pacific Coast generally, and especially in such a rapidly growing place as Seattle:

Time of service—	Rate per hour in cents	
	old scale	new scale
Six months .....	22	22
Next twelve months.....	23	next 6 months 23
Eighteen months to five years.....	24	1 to 4 years... 24
Five years .....	25	4 to 6 years... 25
Ten years .....	26	6 to 10 years.. 26
Ten to twelve years .....		27
Twelve to fifteen years .....		28
Fifteen to eighteen years .....		29
Eighteen years and thereafter .....		30

**CHICAGO TRACTION DEVELOPMENTS**

Minority stockholders of the North and West Chicago Street Railroad Companies are attempting to break the amended lease to the Chicago Union Traction Company adopted last August, and in the United States Court of Appeals have questioned the power of Judge Grosscup to pass upon the validity of such lease. A movement has been started to secure the removal of R. R. Govin and James H. Eckels as receivers of North and West Chicago Companies. It is claimed that they could not consistently be receivers of both the Union Traction Company and the underlying lines.

**CHICAGO STRIKE RIOTER CONVICTED**

The first of the list of Chicago strike rioters, indicted in December, to be convicted is John Kelly, who has been found guilty of violence during the Chicago City Railway strike. The evidence showed that Kelly was in a crowd of strike sympathizers at Nineteenth and Clark Streets and was caught stoning a car.

**POLICE STOP CAR SERVICE IN LA CROSSE, WIS.**

The police of La Crosse, Wis., stopped all street cars on Jan. 12, and arrested the motormen operating them. An ordinance was passed several weeks ago providing that all street cars in the city must have conductors. The company has not complied with the terms of the ordinance, and the case will probably be carried to the Supreme Court.

**PROPOSED HIGH-SPEED EXPERIMENTS NEAR SCHENECTADY**

It is reported that the General Electric Company and the New York Central & Hudson River Railroad Company are arranging for a series of high-speed tests by electric power over a stretch of track, 9 miles in length, belonging to the New York Central & Hudson River Railroad between Schenectady and Amsterdam, and which is not now used for regular passenger traffic. The roadbed is said to be well-suited for these high-speed experiments and a rate of 125 m. p. h. is reported to be that which will be aimed at by the officials in charge.

**AN EDISON MEDAL TO BE FOUNDED FOR ELECTRICAL STUDENTS**

The friends and associates of Thomas A. Edison have taken steps to found an Edison medal, which will be entrusted to the American Institute of Electrical Engineers for annual award to graduating students in electrical engineering. It is proposed to present the medal fund for this purpose at the Institute's annual dinner on Feb. 11, to be held at the Waldorf-Astoria, at which Mr. Edison will be a guest of honor.

NEW PUBLICATIONS

Electric Traction. By John Hall Rider; 453 pages; illustrated. Price, 10s. 6d. Published by Whittaker & Co., London.

Mr. Rider is chief electrical engineer of the London County Council Tramways, and his treatise on the subject of electric railway construction and operation is an interesting review of the subject, chiefly from an English standpoint. The book forms one of the Specialists' Series, and is consequently not written exclusively for engineers; nevertheless, it contains a great deal of interesting and valuable reading for the operating engineer and manager, as might be expected from a gentleman of the standing and with the experience of the author. Mr. Rider's opinion of surface contact systems is especially interesting, and is shown by the following two sentences, taken from different parts of the chapters which he devotes to a discussion of this subject: "While surface contact systems are almost perfect in theory, they are most difficult to design and work satisfactorily in practice. \* \* \* No engineer, who values his peace of mind, would willingly put down a system which means the use of, probably, 1000 switches per mile of roadway, the failure of any one of which may have fatal results." We do not agree with the writer that the "passenger-capacity mile" or the passenger mile is the best unit in comparing "running costs," although some of the arguments in its favor are perfectly correct. The "car mile" in combination with the "car hour" will be found, we believe, more satisfactory on the whole than the "passenger mile," in spite of differences in the size and weight of cars.

Traité Pratique de Traction Électrique. By L. Barbillion and G. J. Griffisch. Vol. II.; 778 pages; illus., paper. Price for complete work, 40 fr. Published by E. Bernard & Co., Paris.

The first volume of this elaborate treatise was reviewed in these columns three or four months ago. The second volume contains chapters VI. to X., devoted, respectively, to rolling stock, general characteristics of city and interurban railways, heavy electric traction, special types of roads, and legal. The book is the most extensive and complete of any which has been published since the notable volume by Blondel and DuBois, and the second volume shows the same attention to practical details to which reference was made in the review of the first volume. The book devotes considerable attention to American practice, and a great deal of discrimination has been used in eliminating antiquated examples and cuts, and employing in their places illustrations of late installations. In the chapter devoted to heavy electric railroading, an extended description is given of all the latest elevated, underground and heavy traction roads.

Das Eisenbahn und Verkehrswesen auf der Industrie und Gewerbeausstellung zu Düsseldorf, 1902. By M. Buhle; 44 pages, 220 illustrations, paper. Price, 6 Marks. Published by Julius Springer, Berlin.

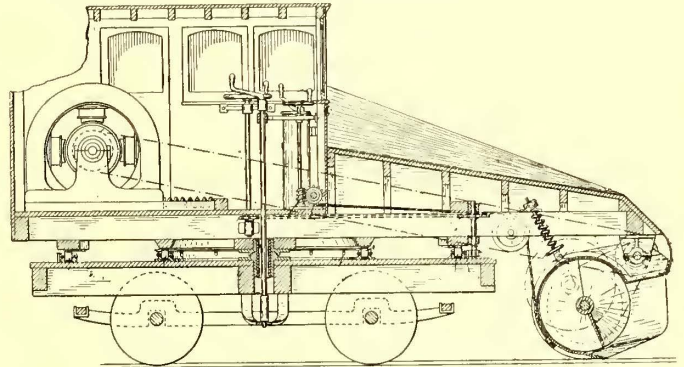
This is an extended illustrated review of the exhibits of steam and electric railway track construction and rolling stock at the recent Düsseldorf Exhibition. Views are given in the first part of the pamphlet of the different types of wheels and brake-shoes exhibited, among both of which we notice several American appliances. Following this comes the section on track construction and rail bonds, after which views are given of the different types

749,172. Reversible Rotary Snow-Plow; Otis Cutting, Seattle, Wash. App. filed Aug. 4, 1903. Details of construction.

749,261. Switch; Troy Cope, New Waterford, Ohio. App. filed Aug. 20, 1903. Details.

749,401. Electric Railway; Leon W. Pullen, Philadelphia, Pa. App. filed April 18, 1903. A system wherein circuit controllers in the roadbed are actuated by magnets carried by the car to energize contact studs fixed at intervals along the way.

749,509. Trolley; Willis D. Williams, Kirkland, Arizona Ter. App. filed Aug. 19, 1903. Star wheels mounted on both sides of the harp to maintain the wheel in contact with the wire and adapted to turn upon their bearings when they contact with the hangers of the trolley wire.



NO. 749,172.—REVERSIBLE ROTARY SNOW PLOW

749,579. Convertible Car; Michael Power, Toronto, Canada. App. filed Aug. 17, 1903. The seats are arranged in sections longitudinally of the car when used as a "closed" car, and are adapted to be swung across the car when it is used as an "open" car. Other features.

749,597. Electric Railway Switch; Johann G. Weniger, New York, N. Y. App. filed June 9, 1903. Details.

749,601. Trolley Harp Device; Frederick H. Allen, Dunkirk, N. Y. App. filed Nov. 2, 1903. A construction whereby the wheel may be quickly removed and replaced.

749,609. Thomas M. Galbreath, Memphis, Tenn. App. file Sept. 29, 1903. A novel construction of rail adapted to be laid in pavement.

749,626. Switch Mechanism; John W. Osborne, Exeter, Ill. App. filed March 17, 1903. Details.

PERSONAL MENTION

MR. HORACE F. PARSHALL AND MR. R. W. BLACKWELL, of London, are making a short visit in this country.

MR. J. N. ELEY, formerly the chief electrician of the Georgia Railway & Electric Company, of Atlanta, has taken a similar position with the Mobile Light & Railway Company.

MR. CHARLES GOODWILL has been appointed superintendent of transportation of the Saginaw Street Railway, of Saginaw Mich. to succeed Mr. Thomas B. Redmond who resigned

time Mr. Gallatin has wished to retire from the work of administration, but he has continued in active duty to carry into effect certain of his projects which he desired to perfect under his own hand. Mr. Gallatin's successor has not yet been determined.

MR. HENRY G. FOREMAN has resigned as president of the board of directors of the Chicago Union Traction Company, giving as a reason his many other public duties in Chicago including the fact that he is president of the county board, which is now in a controversy involving Union Traction tax matters.

MR. W. J. TUBBS, former secretary of the Railway Department, Y. M. C. A., Texarkana, Tex.-Ark., has entered upon his new work as secretary of the Street Railway Department, Y. M. C. A., of Richmond, Va. Quite a handsome clubhouse is being fitted up and the association is expected to formally open in a few weeks under the most auspicious circumstances.

MR. HARRY DESTEESE, of the Stuart-Howland Company, has been transferred to the headquarters of the company at 261-287 Devonshire Street, Boston, and promoted to the position of assistant manager of the railway department. He will, however, continue catering to his many customers in the same territory as when in charge of the New York city branch.

MR. GEORGE BACON, electrician of the Cleveland Electric Railway Company, of Cleveland, Ohio, has resigned to accept a position with the Willard Storage Battery Company. The vacancy has been filled by the appointment of Mr. Frank Wisner, who formerly was electrician for the Cleveland City Railway Company. Mr. Wisner has charge of all electrical equipment in power houses and battery stations.

MR. W. J. JOHNSTON, formerly proprietor of the "Electrical World," of New York, has sold to Mr. H. M. Swetland his stock interest in the Johnston Publishing Company, the corporation which owns the "Engineering and Mining Journal," and has severed his connection with that publication. Mr. Johnston will now devote his entire time and energies to the development of the "Pacific Coast Miner," which he has owned personally for the past year, but to which heretofore he has only been able to give "absent treatment."

MR. CHARLES H. MEYER, a young man who for years has been identified with the development of the street railway enterprises in York, Pa., and vicinity, died at his home in York a few days ago, as the result of an illness of several weeks. The deceased was educated in the public schools of York and at Princeton. Until two years ago he was the treasurer of the York Street Railway Company. When the York Street Railway system was extended to reach suburban and rural villages, Mr. Meyer was placed in charge of the construction of two of the most important lines the York & Dover Electric Railway and the York & Dallastown Electric Railway. He performed these duties most successfully. At the time of his death Mr. Meyer was treasurer of the York County Agricultural Society, a director in the York National Bank and the York Gas Company, and was identified with other public enterprises. He is survived by two children and two sisters, Mrs. Grier Hersh, wife of the vice-president of the York County Traction Company, and Miss Helen Meyer.

MR. W. G. ROSS, the newly appointed managing director of the Montreal Street Railway and the Montreal Park & Island Railway Cos., was born in Montreal, Aug. 6, 1863. For more than twenty years he has been an accountant and auditor, having been associated with his father in that capacity as early as 1880. Between 1880 and 1890 he was successively secretary, treasurer and assistant manager of the Windsor Hotel Company. In 1892 he became associated with Mr. James Ross, who was active in developing Canadian street railways, and organized the financial department of these companies. Mr. W. G. Ross has been successively controller and secretary-treasurer of the Montreal Street Railway Company. He also occupies the position of second vice-president of the Montreal Light, Heat & Power Company, is treasurer of the Mexican Light & Power Company, and is a director in various other companies. He was one of the organizers of the Street Railway Accountants' Association of America.



W. G. ROSS

GENERAL ASA S. BUSHNELL, of Springfield, Ohio, former Governor of Ohio, died at Columbus, Ohio, three days after being stricken with paralysis while attending the inauguration of Governor Herrick. For many years General Bushnell was at the head of large manufacturing interests at Springfield. Two years ago he sold out these interests, and it was announced that he would invest a considerable portion of his immense fortune in the building up of an electric railway system centering at Springfield. He acquired control of the Springfield & Xenia Traction Company, and organized and became president of the Springfield, Troy & Piqua Traction Company, whose line is now nearing completion. General Bushnell was much interested in the work of giving his home city better transportation facilities, and had several other lines in view. He served with great distinction in the civil war, was a thirty-second degree Mason, and greatly beloved as a public spirited and benevolent gentleman, whose chief interest seemed to be the building up of his home city.

MR. JOHN B. ALLAN, recently appointed general manager of the Allis-Chalmers Company, is an example of what steady, efficient service in the employ of one company, together with ability, can accomplish. Mr. Allan's career is notable, not for the great number and variety of positions which he has filled, but for the opposite, and for the fact that it is practically identical with the growth of one of the great engine building concerns of the country. Mr. Allan was born at Davenport, Iowa, in 1860, in which place he spent his boyhood and received his common and high school education, together with some practical education in a general machine shop. At the age of seventeen he went to



J. B. ALLAN

Worcester Polytechnic Institute, from which he graduated as a mechanical engineer in 1880, and in May of the following year he entered the employ of Edward P. Allis & Company as a draftsman, and also working on engine indicating and testing. During the four years of his service in the Milwaukee shops promotions were frequent. In 1885 the company decided to open a Chicago office, and Mr. Allan was placed in charge. The business of the company in Chicago had previously been taken care of by agents who had other interests, which had resulted in their financial embarrassment. As a consequence, the Chicago business was in a demoralized condition, and it fell to Mr. Allan to put matters again on a satisfactory basis. Mr. Allan relates how, in his capacity as engineer as well as salesman, he spent many evenings and holidays in the engine rooms of Chicago plants, making necessary repairs on neglected engines in order that the company's reputation might not suffer and that sales could be made on the strength of satisfactory performance of engines already running. The territory of the Chicago sales office was gradually increased, less and less being handled direct from the Milwaukee office, until in time it included all the territory between Duluth and New Orleans, Eastern Ohio and the Rocky Mountains. As manager of the most important office of the largest Corliss engine builder in the country, Mr. Allan, naturally, for many years had much to do with the steam engineering of many of the largest power plants erected in the Middle West. When the Allis-Chalmers Company was formed Mr. Allan was placed in general charge of the engine sales department, with headquarters still at Chicago, a position similar to that which he had before the consolidation, but with enlarged power. This position he held until the recent action of the board of directors, which made him a vice-president and the general manager of the company, in charge of all departments, including selling and manufacturing. This appointment was very popular with those in the service of the Allis-Chalmers Company, because Mr. Allan is personally acquainted both with the men and the needs of the company, and so has the confidence and co-operation of the heads of all departments, as no one who had not been long identified with the business could have. Mr. Allan, although connected with the selling department for a number of years past, is fully as much engineer as salesman, as is eminently fitting in one who has had charge of the placing of the Allis product. Nearly every man has his hobby outside of business, and Mr. Allan's is the collection of fine paintings. Paintings of his home collection are to be seen frequently in the loan exhibits in the Art Institute at Chicago, and at least one will be seen at the St. Louis Exposition as the best work in America of a noted French painter.