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Of this issue of the Street Railway Journal 8000 copies are printed. The total circulation for the year 1905 was 424,350 copies, an average of 8160 copies per week.

Passes on Interurban Roads

At the last meeting of the Ohio Interurban Railway Association the subject of passes to employees and others was discussed. The subject was brought up by reason of the fact that one of the most important syndicates in the Central West, operating systems in both Ohio and Indiana, has adopted the policy of refusing free transportation to all outside the service of the company, and only granting passes to employees while in the actual performance of their duties. Newspaper men and others heretofore privileged will be included in the ruling. It is stated that the independent lines operating in Indiana will also follow suit.

The sentiment among Ohio roads, however, is that companies can afford to be liberal, at least with employees and their dependents, in the matter of free transportation. It is argued that it would frequently be a hardship upon employees to require fares from their dependents, because, in a great many cases, operating headquarters are located at points where it is impossible for them to secure provisions. It is believed that the refusal of passes would lead to "dead-heading" on cars, a practice which is hard to detect, and which has a tendency to lead to dishonesty in other directions. In the matter of free transportation to newspaper men, it is the opinion that such free transportation is a good investment from an advertising standpoint, and that it is rarely abused. There is a general sentiment, however, among all the roads in this district that free transportation to county and village legislators and to other "friends of the road" should be cut down to a minimum. The recent campaign of pass elimination among the steam roads, and the tendency of the steam roads to reduce rates to meet those of the electric roads, afford excellent reasons why the traction lines should follow suit and close up some of the loopholes through which a large amount of revenue has been allowed to escape in the past.

Guarantees on Power Plants

In large modern plants more attention is being paid to the matter of economy than ever before. Electric railway men have gradually learned that a railway load is not necessarily a hopelessly uneconomical one, and that while the load as a whole is subject to a bad peak, that upon the generators in use is in large plants reasonably steady. One is justified, therefore, in demanding a fair degree of economy in station operation. In planning the station, one of course is able to get guarantees of steam economy in his prime movers, of efficiency in his generators and of duty in his steam generating apparatus. But if one co-ordinates all these with the conditions that hedge them about, he is very apt to find that the partial guarantees do not fit well, and that he can form only an indifferent idea of what the final result at the coal pile is likely to be. In these days of mechanical stokers, the question of firing is not so serious a source of uncertainty as it once was, and while a mechanical stoker may not at all times give the very best results attainable, it should at least give quite uniform results, which can confidently be counted upon month in and month out. With the firing apparatus reduced to a determinable state, it should be possible to put the operation of a plant squarely upon the basis of thermal units in the fuel per kw-hour—to reckon directly from the heat energy at one end of the chain of transformation to the electrical energy at the other. On this basis there is no chance for quibbles—either the plant gives the required result or it does not.

Why should one not be able to make with fully responsible

parties a straightforward contract for a new power station calling directly for a specified duty per thermal unit in the fuel provided, or per ton of coal of specified thermal value? Such a contract would give precious little space for dodging the plain issue, and would insure results better than are now attainable, save in rare instances. To begin with, the boilers are generally guaranteed for a duty much greater than is commonly reached. Why not tie the boiler and firing machinery together and demand results, not theories? If superheated steam is to be used, there is always a hole left for successful evasion of boiler duty, and therefore it is well to pass on to the wattmeter, which cannot be dodged. As to the engines and dynamos, their performance is of scientific interest, but the practical man desires to know how much coal he must pay for per kw-hour actually delivered. In many tests of prime movers, too, the power required for the auxiliaries is dextrously dodged, but it may run from 2 per cent of the whole to 15 per cent or more, and there is precious little use in having a prime mover giving the brake-horse-power on 13 lbs. of steam if the actual figure, including auxiliaries, is 15 or 16. In just the same way there is a tendency to dodge the issue of dynamo efficiency. Direct-coupled dynamos are almost always guaranteed without counting loss due to excitation, so that a 95 per cent guarantee really means perhaps 92 per cent to 93 per cent. All these rat holes can be successfully plugged up by going straight back to the coal pile and comparing the inroads made upon it with the results achieved at the switchboard, where it should be seen to that the station wattmeter records the energy used in the station as well as that delivered to the lines. We have no doubt that contractors can be found quite willing thus to guarantee results, and good results. The load for which such a guarantee should be made is, of course, the critical point of the matter. It ought to be a specified particular load, intended to represent the mean load which, with good management, should be attainable. Bring down contracts to definite guarantees of results and the effect will be to improve the efficiency of generating stations all along the line. At present there is plenty of good apparatus available, but it takes a mind reader to figure out from the individual guarantees the probable summation.

Winding Armature Coils in the Shop

Among shop superintendents there seems to be quite a difference of opinion as to whether armature coils should be wound in the shop or purchased already made up from factories which make a business of winding them. We find that some of the larger systems which use a great quantity of coils for one style of machine, purchase all of them, and, again, we know of systems which require but possibly half a dozen sets of coils for one type of motor in a year, that go to the trouble of making their own coils.

In determining upon the advisability of making the coils in the shop, the question of the cost of the coil is sometimes given most prominence. Again, the time required to obtain coils from the factory, as compared with that to wind them in the shop, is a governing factor. Many who have had mysterious armature troubles when factory wound coils were employed, make their own, because they believe the coils will be made more carefully and will have fewer weak spots in the insulation to give future trouble. As often obtained, also, figures on the cost of manufacturing and of buying coils will show up in favor of their being made in the shop. The customary method of calculating the cost by adding the value of the material in the coil to that of the time required to complete a set under

trial is at times misleading. There are usually some wastes of material that are not figured in. Again, it should be remembered that the workmen will not apply themselves so assiduously at other times when they know they are not being watched, and that the time the workman actually spends in making the coils is sometimes a comparatively small percentage of the total time spent in making preparation for the work, adjusting the coil formers, getting material together and similar preliminary work. In addition, the interest on the investment, consisting of the stock of materials kept on hand, the winding machines, oven facilities and the percentage of the shop, devoted to these machines should be reckoned, if nearer results are desired. The increase of cost due to all these factors cannot be determined with any degree of accuracy, but under usual conditions it will add materially to the figures obtained by the shorter but less exact method.

Where a shop is in a locality at a great distance from a factory or a supply house from which coils may be purchased, the fact that in an emergency, if made in the shop, a set of coils can be obtained more quickly and with more certainty than if an order is sent out, is often of such importance as to warrant the home work, even at a slightly increased cost over the purchasing price. It might be argued that there is no necessity for getting out of coils or in a position when they must be had on extremely short notice. Certainty there would not be could the purchasing agent and the storekeeper anticipate the effects of a thunder storm and would place orders accordingly. But this is out of question, and the fact remains that emergencies will arise in which armature coils and other supplies as well are required on very short notice, and it is a strong point in shop management to be able to supply them quickly and with certainty.

As to the ability to make coils better and freer from defects than those purchased, we hardly believe this a factor that should be considered strongly. It might have been of some moment a few years ago, but at the present time there are so many firms supplying armature coils, and competition for the trade has grown so lively among them, that each has exerted itself to the utmost to devise schemes for bettering their product. We do not believe it probable that a master mechanic who can give but a few moments a day to the making of his armature coils will be able to improve much on the methods of those who spend all of their time upon the one question.

A Long-Needed Improvement,

We are glad to be able to record the fact that a contract has at last been let for the complete electrical equipment of the tunnel under the St. Clair River from Sarnia to Port Huron. This tunnel has a long and sinister record of asphyxiations, to which we have been forced to refer in these columns more than once, so that it is gratifying to note that something is at last to be done. From a technical standpoint, the plan for relief is exceptionally interesting as involving the use of single-phase locomotives. The case is not one in which there has been any doubt of the ability of direct-current locomotives to do the work, and the delay in equipping the tunnel electrically is not in the least degree extenuated by the previous lack of alternating-current apparatus. That this apparatus should have been chosen by an experienced engineer in preference to the well-tried direct-current system, and in a case where the distribution is not extensive enough materially to handicap the latter in cost, is a most significant fact. The service, too, is especially severe, since the entire service of the Grand Trunk

Railway, freight and passenger, has to pass through this single-track tunnel with its slopes toward the center of the river, and the power station load will consist essentially of a series of formidable peaks as the successive trains are pulled out of the tunnel on the up grade. The only steady load will be a considerable amount of pumping and lighting.

As we understand the situation, the advantages of a. c. and d. c. traction in this case were very thoroughly considered, the former showing a sufficient economy in distribution to warrant its choice in view of certain collateral advantages. Perhaps the most important of these latter was the smoothness of the a. c. regulation by transformer taps in the work of accelerating heavy freight trains on the up grades. The work in the tunnel and its approaches will in fact consist very largely of rather formidable acceleration, so that the matter of speed control assumes here an unusual and disproportionate importance. A collateral advantage was the ability to use three-phase induction motors for the pumping, the intention being to use three-phase generators in the power station. The use of three-phase traction might have proved desirable save for the overwhelming importance of speed regulation and the relatively high power factor of the series-compensated motors. It is very significant that on the showing of these advantages the a. c. equipment was selected, in spite of the lack of experience with a. c. motors on the scale here demanded. Each locomotive is to have three driving axles, each equipped with a 250-hp a. c. motor, and the draw-bar pull specified is 25,000 lbs. up a 2 per cent grade at a speed of 10 m.p.h. This means a powerful locomotive, especially since two or more such machines can be coupled together and worked on multiple control. Entrusting such important service to these locomotives means abiding faith in a. c. traction on the part of the engineer, and a few more contracts of such sort will shake up the heavy traction business in rather startling fashion. At the present moment the important thing to be found out is the actual performance of the large a. c. motors. All the data yet available, and they are rather meager, have been from the few a. c. roads now in operation which are equipped with motors of only moderate power. No one has yet openly stated the difficulties which have been encountered in this preliminary work, but the mere fact that there has been no well defined line of criticism made evident is fairly good proof of rather satisfactory performance. Hence, while we are disposed to take a somewhat conservative view of the matter, we have no reason *a priori* to distrust the operative success of an equipment like that now chosen for the Sarnia tunnel. Its choice under skilful and unbiased advice, on a difference of cost that can hardly have been of itself decisive, surely indicates favorable results in sight. At all events, a particularly unpleasant and dangerous tunnel will now be made safe.

The Automobile and the Trolley

Every now and then some enterprising promoter seeks to beguile the public ear with a wonderful tale of the enormous profits to be made by substituting automobiles for trolley cars in urban service, and it is to be feared that the resulting stock subscription list does not always represent that mature analysis of the situation which hard-headed business sense dictates. We have many times pointed out the obstacles which lie in the path of rapid transit automobilism on a commercial scale, and would hesitate to refer to the subject at this time were it not for some exceptionally convincing figures which have come to hand. Then, too, the spring season is already hinting its approach in

the automobile trade, with all its possible enthusiasms as the "1906 models" swing into line, and surely a word of caution on the financial problem is not out of place to any of our persuasive but misguided friends among our readers who have figured it all out that by 1910 the trolley car will be a curiosity and the power house a temple of cobwebs.

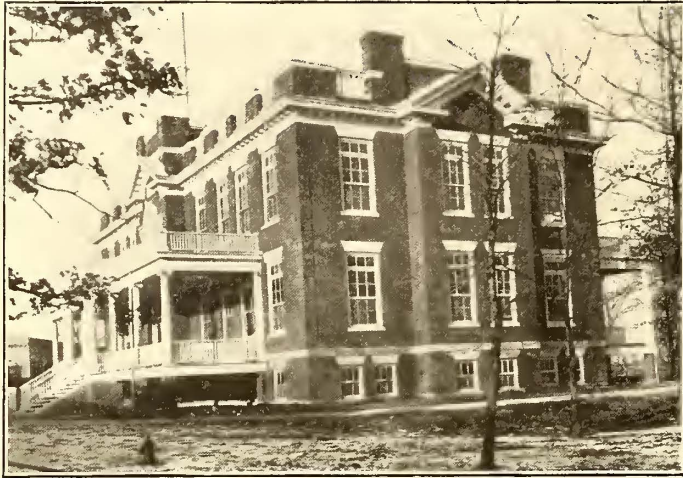
In actual experience it is difficult to persuade an automobile enthusiast that interest and depreciation cannot be dodged, even with the most flexible steering gear in devil-wagondom. Figures of operating cost are available without end in automobile circles, but there is usually a tendency to limit these to the cost of gasoline, oil and waste per car-mile, instead of including the burdensome items of maintenance which both touring car and runabout impose. Many a man buys a machine on the guarantee that it will cost but 1 cent per mile to run it, only to find that this figure covers fuel and supplies alone.

An actual case in which the costs were carefully kept was that of a touring car representing an original investment of \$2,500, a machine built by one of the best known American makers and operated with scrupulous care during 1905. The car held four persons with comfort, and mileage records were tabulated after each run. The total mileage was 2500, and the operating and maintenance expenses were as follows: Oil, gasoline and waste, \$37; tire replacements, \$88; tire repairs, \$19; other repairs, \$71; total, \$215, or 8.6 cents per car-mile. The cost per passenger-mile, assuming five passengers, is 1.7 cents. Comparing this with an ordinary 25-ft. double-truck trolley car, seating thirty-six passengers, and costing for operation and maintenance the extreme figure of 20 cents per car-mile, the passenger-mile operating cost comes to less than .6 cent. In actual street railway practice the operating cost per passenger-mile runs, of course, much higher, for the reason that a very small percentage of the car capacity is utilized on the average throughout the year, but the same sort of reasoning would apply with equal force to any automobile capable of seating as many passengers as the competing trolley. No account of standing passengers is figured in the above, and allowance for them would reduce the passenger-mile cost still further.

Turning to the fixed charges, the trolley car has the best of the game at the outset. The first cost per seated passenger is far below the automobile figure, and would probably remain on the same side of the line even with the largest commercial motor car likely to be handled in city service. Assuming the two to be equal, however, the question of depreciation decides the matter in favor of the trolley. Certainly no experienced engineer would allow less than from eight to ten years' life in figuring the depreciation charges upon a modern urban trolley car. The allowance to be made for the automobile is difficult to estimate, but we believe that the man who buys a machine with the idea that its life will greatly exceed five years in the present state of the art is more enthusiastic than wise. Even if the motor car is not beyond the pale of useful operation at the end of this time, there is little doubt that the improvements of the near future will have a powerful influence in relegating present-day automobiles to the domain of the obsolete. In a nutshell, the steel rail is the secret of economical transportation upon land; without it, operating expenses are certain to leap far upward, and it is a serious question if the hundreds or thousands of motor cars necessary to replace the trolley in any large city can ever handle in an equal time the volume of traffic which can be carried over the definite right of way which the modern railway track provides.

EXTENSIONS AND IMPROVEMENTS ON THE CHICAGO & MILWAUKEE ELECTRIC RAILROAD

The past year has been a period of reconstruction, extension and improvement in all divisions of the Chicago & Milwaukee Electric Railroad. The line has been extended to Kenosha and

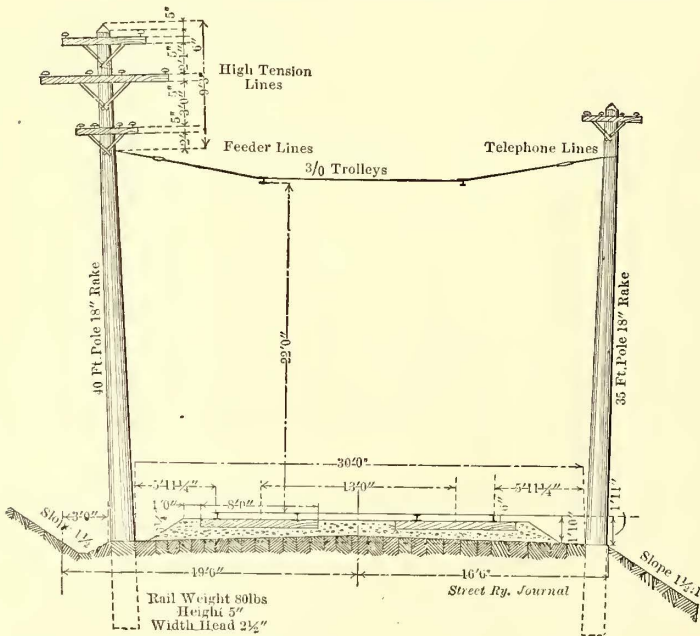


THE NEW OFFICE BUILDING AT HIGHWOOD

to Rockefeller; grades and curves have been removed from the old portion of the road; new rolling stock has been added to the equipment; stations have been built along the line, and a new operating office has been erected at Highwood. Much of this work was begun more than a year ago, but the greater portion of it has been carried out under the direction of A. L. Drum, who assumed the office of general manager of the road early in the spring of 1905.

THE NEW OFFICE BUILDING

All of the operating offices of the road are located in the new



STANDARD CROSS-SECTION OF LINE ON EXTENSIONS

office building, completed a few months ago at Highwood. The building, which occupies a site just south of the car repair shops and present power house, is of brick, and its exterior appearance resembles greatly a Colonial residence. At the present time the tracks run along the rear side of the building, but when they are straightened at this point they will pass along the west side or front.

On the first floor to the right on entering the central hall is

the general manager's office. To the left are those of the superintendent and superintendent of transportation, the dispatchers' room being between these two offices. In the rear of the general manager's office are reading and smoking rooms for trainmen. The reading room, in addition to being supplied with technical magazines, contains several cases of books, which may be drawn out and taken from the building under rules similar to those prevailing in public libraries. The auditor's and cashier's offices are in the northeast corner of the building, the cashier's office containing a window opening into the hallway through which conductors make their returns.

The second floor is occupied largely by the engineering departments; the offices of the electrical and civil engineers occupy the south half of this floor. Adjoining these offices are drafting rooms, well supplied with natural light through skylights. The offices of superintendent of motive power, claim agent and general superintendent of construction occupy the north half of the second floor. Very extensive facilities for blue printing and photographic work are provided on the third floor. The blue print room contains a Eugene Dietzgen vertical blue printing machine, and, in addition, runways are provided through the windows to carry frames for printing by natural light.

A well-equipped gymnasium occupies one-half of the basement floor. Parallel bars, vaulting horses, mats, dumb-bells, Indian clubs, boxing gloves, punching bags, a rowing machine and similar gymnasium apparatus are provided. The north half of the basement contains locker, bath and toilet rooms for trainmen, the bath room containing both shower and tub baths. In addition to the indoor gymnasium, tennis courts, trapeze, horizontal and vaulting bars, and facilities for hammer throwing, and for carrying on other similar sports are provided outside in the vicinity of the building.

Fireproof vaults are constructed on all of the floors. In the vault in the basement, articles found on cars are stored. That on the first floor is adjacent to the cashier's office, and is used largely for the storage of tickets. The vault immediately above is equipped for the storage of tracings, field books and engineering data in general, while the vault on the top floor is for the use of the claim agent. The furniture, which includes



INTERIOR OF GYMNASIUM

Globe-Wernicke filing cabinets for each department, has been obtained to match the interior finish of the building, which is of oak.

TRACK IMPROVEMENTS AND EXTENSIONS.

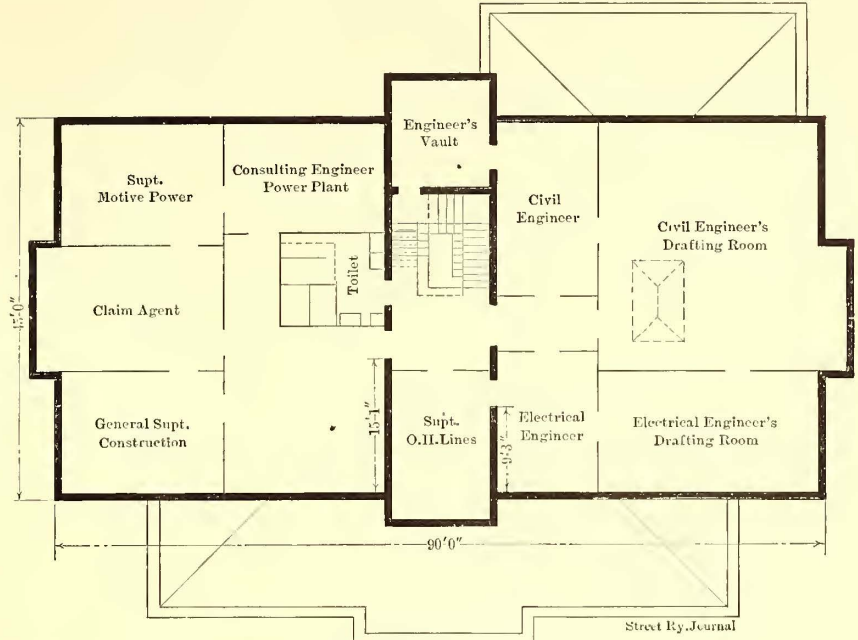
Although the road was originally organized to operate between Chicago and Milwaukee, it has for several years past extended only from Evanston on the south to Waukegan on the north, a distance of about 25 miles. About two years ago

an extension from Lake Bluff on the main line west to Rockefeller was opened up. This extension, which is about 8 miles long, penetrates a region where several small lakes are found. In addition to caring for the summer travel to and from the lake regions, this west branch was constructed partly with the idea of developing at some future time a heavy freight service, as the extension taps the Chicago, Milwaukee & St. Paul and E., J. & E. Railroads at Rondout and the Wisconsin Central Railway at Rockefeller. In order to afford better service when freight traffic is developed, the tracks are laid double to Libertyville.

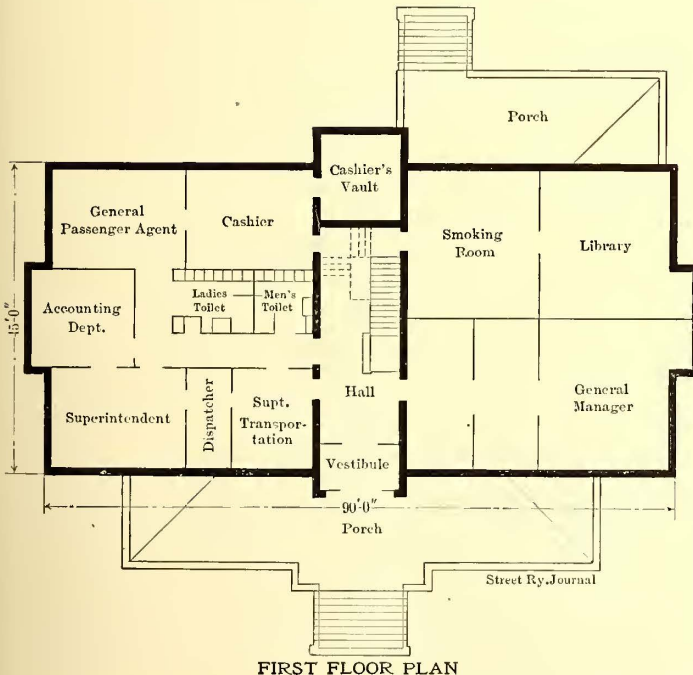
During the past season an extension, which represents the highest type of electric railway track construction, has been constructed from Lake Bluff to Kenosha. The new line was built on the west side of the tracks of the Chicago & Northwestern Railway, and as the old line to Waukegan is on the east side, the system has four tracks between Lake Bluff and Waukegan. The west division will be used largely for freight and passenger express service, while the old tracks will continue to accommodate local passenger service. At the present time one track is laid the entire distance to Kenosha, and the work of completing the second track is being pushed rapidly and will be completed in a few weeks. Between Waukegan and Kenosha right of way has been obtained, all abutments over crossings have been built and other provisions have been made for four tracks.

One of the accompanying drawings shows

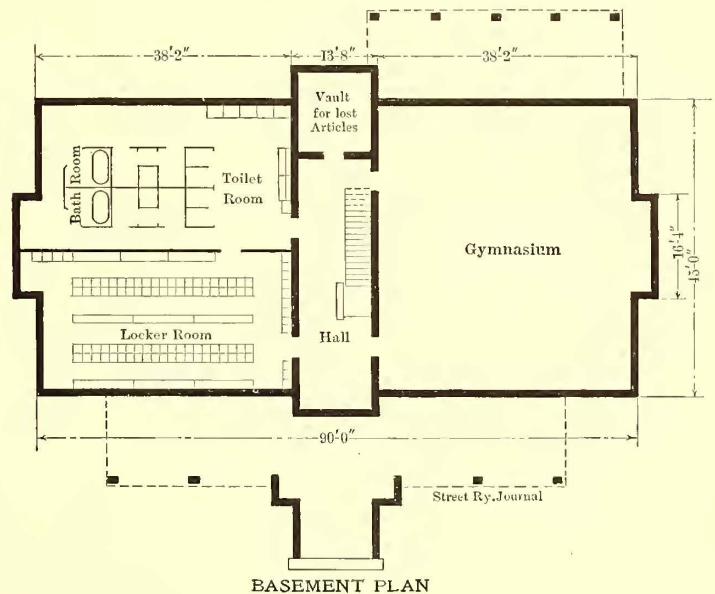
apart. These are of white cedar with 8-in. tops, and are set with a rake of 18 ins. Those on one side of the track are 35 ft. high, and carry above the span wire one cross-arm, on which telephone wires are strung. Poles 40 ft. long on the opposite side carry three cross-arms. The two upper ones support the high-tension circuits, the separate wires of which are placed 36 ins. apart. Some distance below the high-tension cross-arms, the third arm carries direct-current feeders of 500,000-circ.-mil capacity. The trolley



SECOND FLOOR PLAN.



FIRST FLOOR PLAN



BASEMENT PLAN

PLAN OF OFFICE BUILDING AT HIGHWOOD

the track and overhead construction on the new extensions. The track is laid on a bed of gravel, having a depth of 12 ins. at the crown, the earth below the gravel sloping away on either side of the crown to facilitate drainage. The rails are laid in 33-ft. lengths, and continuous rail-joints are used. These cover concealed, soldered bonds of the Flexible Mesh Rail Bond Company type. The peculiar feature of these bonds is a copper mesh over the terminal of the bond, which retains the solder by capillary attraction and reinforces the solder as mesh in wire cloth or steel in concrete.

The tracks are placed with centers 13 ft. apart. Span wire construction is used throughout, the poles being placed 30 ft.

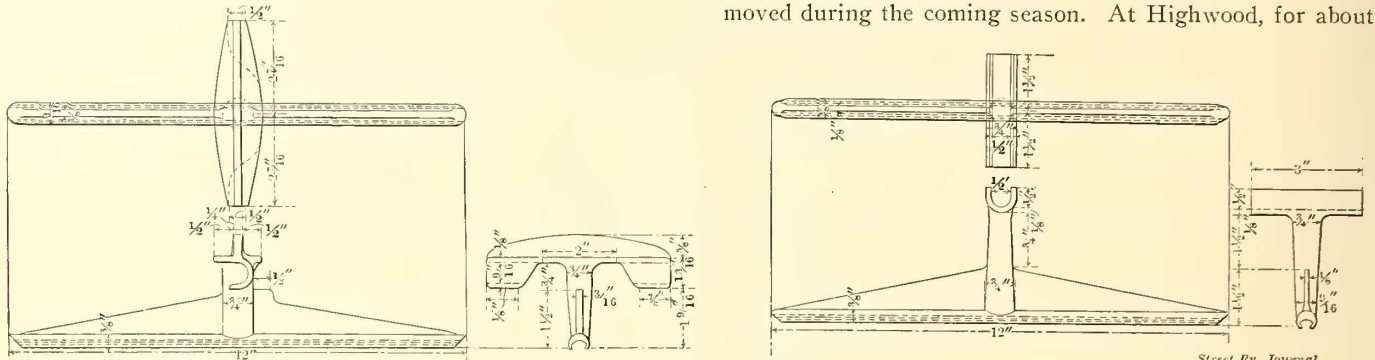
is of No. 000 copper, and is placed 22 ft. above the track.

The drawing on the next page shows the combination trolley ear and hanger employed. This is cast of brass in one piece, and no insulation is placed between the trolley and the span wire. Wood strain insulators, placed in the span wires near each pole, provide proper insulation. The hanger was designed by J. F. Scott, superintendent of overhead lines of the system. It may be noted that by its use both trolley wires of a double-track line serve as feeders for a car on either track, and thereby diminish the line loss. The greatest advantage of this construction, however, is its rigidity. There is practically no danger of the ear breaking loose, and no trouble has been ex-

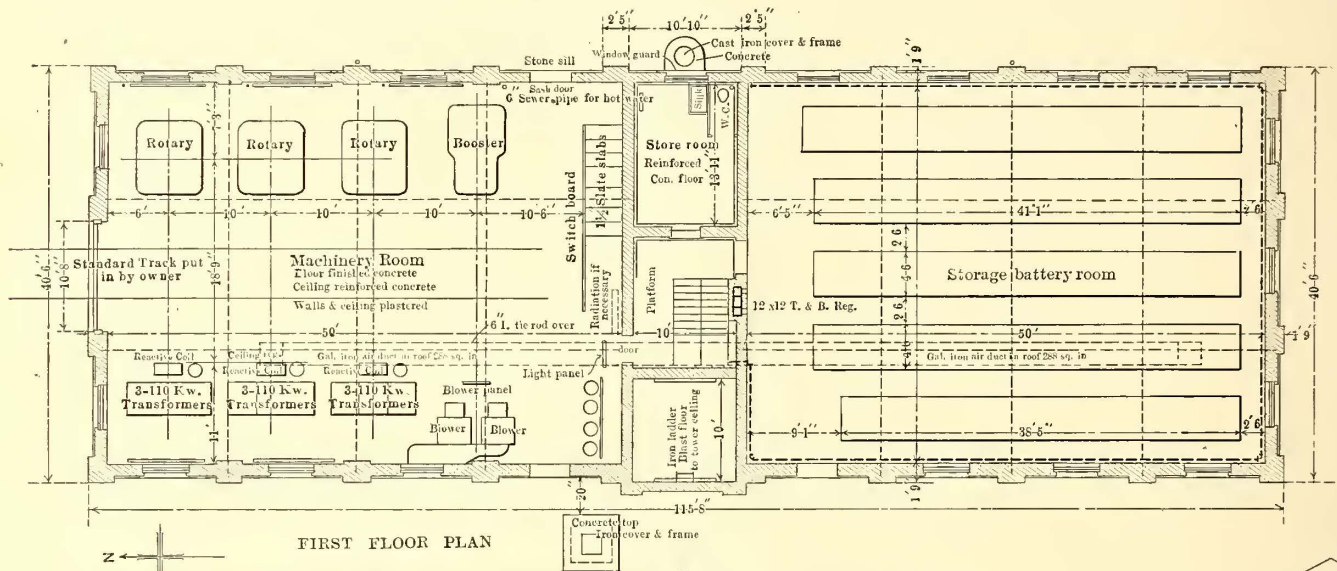
perienced in this direction since the hangers were installed.

This north extension, from Lake Bluff to Kenosha, has been built with all the requirements for high speed. The whole division is practically one tangent. There are only two 1-deg. curves in the entire distance, and there are no grades of any

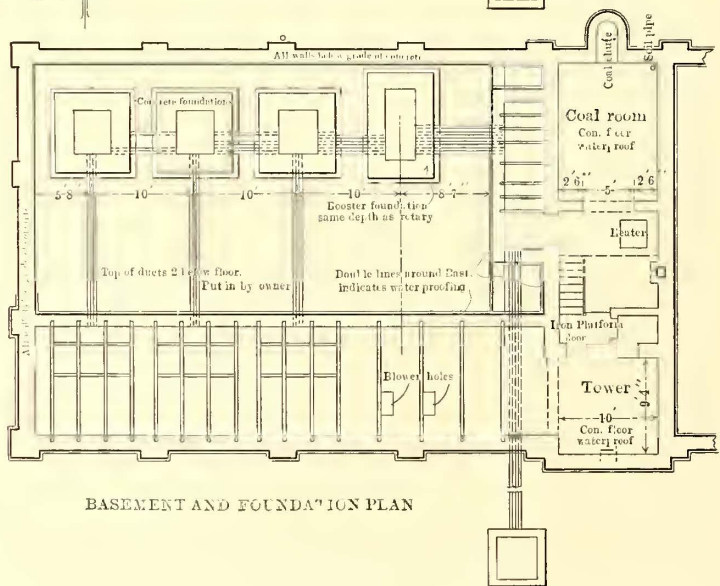
Considerable work has been done in straightening double tracking and improving the old portion of the road between Evanston and Waukegan. As originally built, this line contained numerous sharp curves and several heavy grades. Practically all the curves of small radius, with the exception of those in the towns, have been removed. Others will be removed during the coming season. At Highwood, for about 1/2



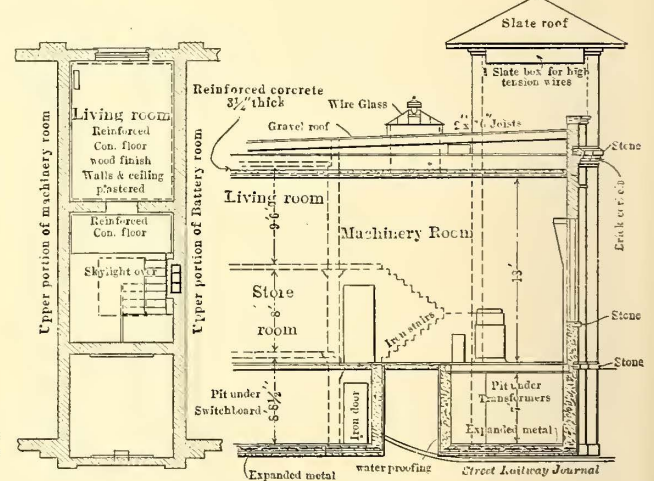
DETAILS OF GROOVED TROLLEY EAR



FIRST FLOOR PLAN



BASEMENT AND FOUNDATION PLAN



MEZZANINE FLOOR

CROSS SECTION

PLANS AND SECTION OF NEW SUB-STATION SOUTH OF KENOSHA

consequence. The track and pole line are well shown in the illustration on page 107. In very many instances overhead crossings are made at highways. The abutments for these as well as for the culverts under the tracks are of concrete. The line is built through the western limits of all the towns and on a private right of way 100 ft. wide, so that speed will not be limited by the passing of ordinances.

mile on each side of the power house and shops, the location of the tracks will be changed some distance to the west of their present position. They now follow the highway, but a new private right of way has been acquired paralleling the tracks of the Chicago & Northwestern Railway. Four curves will be cut out, seven stops avoided and the distance shortened considerably when the new route is completed.

With the exception of a short stretch in one of the towns, double tracks have been laid the entire distance between Evanston and Waukegan. Over a distance of several miles new tracks were constructed on what was originally a highway. In order to obtain a wide right of way at a point above Lake Bluff, the company acquired a strip of ground several miles long to the east of the old tracks, built a 60-ft. gravel highway upon it and then placed tracks on the ground formerly occupied by the old highway.

THE POWER HOUSE AND SUB-STATIONS

At the present time power is developed in the station at Highwood. Sub-stations are located on the main line at Winnetka, North Chicago and at a point a few miles south of Kenosha, and at Libertyville on the west branch. It may be remarked that this was the first system to employ the method of distributing power by high-tension a. c. lines from a central station to outlying sub-stations. The power station has a total machine capacity of 2815 kw, the largest machine being a 1500-kw unit, installed about one year ago. Of the total station capacity, 525 kw is in direct current for use on the lines in the immediate vicinity.

Plans are now being completed for a new power house and a complete overhauling of the high-tension distributing system. The new generating station, in the plans of which provisions are made for an ultimate capacity of 45,000 kw, will be erected most probably at Waukegan. This will be the central point of the system when contemplated extensions to Milwaukee are completed. The first portion of the station constructed will have a capacity for two 3000-kw and two 5000-kw General

motor-operated oil switches and the operating room will be located on that side of the central bay opposite the boilers. A bay window in the operating room will overlook the turbine room. Current will be transmitted to sub-stations at 33,000 volts. In addition to the sub-stations now in operation, plans provide for the erection of one at Racine and one near Mil-

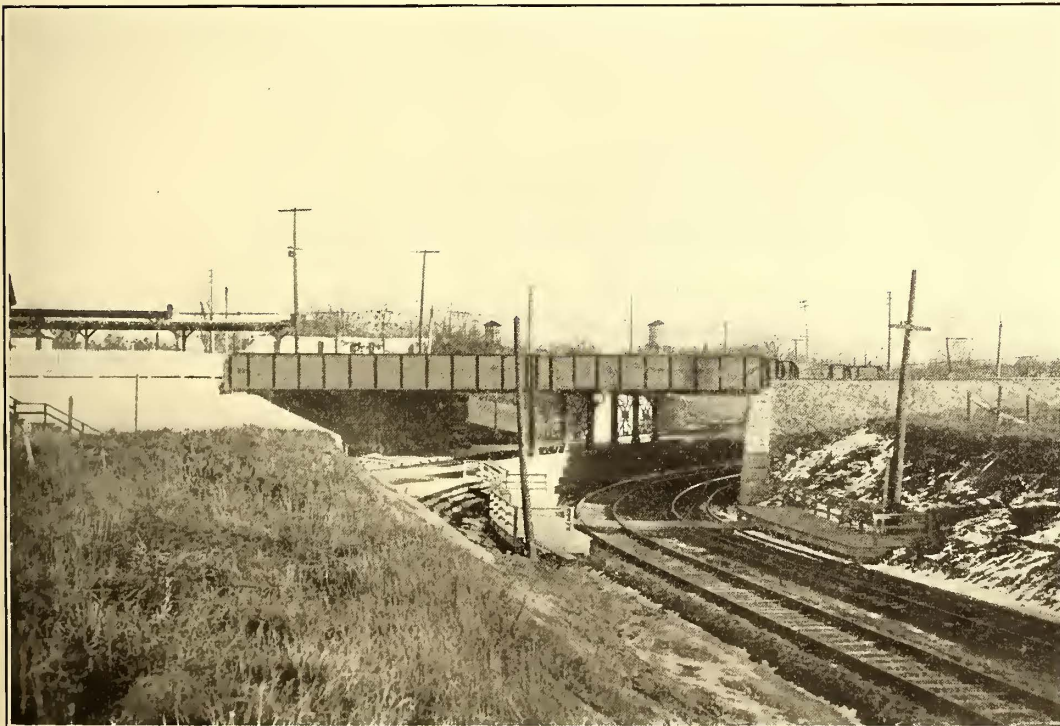


EXTERIOR OF NEW SUB-STATION

waukee, each to be of 1000-kw capacity. Another will be built at Highwood to replace the direct-current machines now being operated in the power house.

The new sub-stations will be similar in design to that one just completed south of Kenosha, the illustration of which shows the building to be a brick structure comparatively free of ornamentation. A storage battery occupies the south half of the building, while the northern portion contains the rotary converters, transformers and other apparatus. The interior walls, as well as the ceiling, are plastered and painted a dull yellow. Lighting is accomplished by incandescent lamps placed near the ceiling and provided with shades, and a hot-water heater in the basement supplies heat to the building. The converter room is served by a hand-operated crane of 5-ton capacity.

The high-tension lines enter the central tower in a manner well shown in the reproduction on page 106. Entrance is made through the under side of a slate box. The circuits, when once inside the tower, descend along the wall, and after passing through the choke coils of lightning arresters drop to the basement. When the stations north are completed, these circuits will return to the top of the tower along the north wall, making their exit in a manner similar to their present method of entering. Disconnecting switches will be inserted, so that the north-



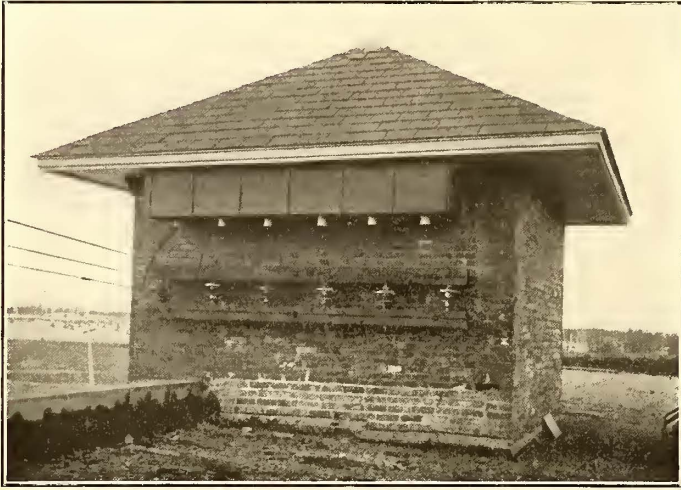
THE ROCKEFELLER DIVISION CROSSING, UNDER THE CHICAGO & NORTHWESTERN TRACKS AT LAKE BLUFF

Electric turbo-units. The two of 3000-kw will be the only ones installed for the present. Additions will be made as the service demands.

The turbines will be located in a single line down the middle of a central bay. An extension on one side will contain two rows of boilers, the coal bunkers being placed above the passage between the lines of boilers. Bus-bar structures, high-tension

ern portions of the line may be cut off from the power house should a ground short-circuit or other trouble occur.

At the present time the installation of transformers and converter and other apparatus is temporary. The high-tension lines after passing into the basement go to a hand-operated oil switch. From this they lead to the three 185-kw air-cooled transformers. The rotary converter is of 500-kw capacity, and is of the General Electric manufacture. It is started from



TOWER OF SUB-STATION

the a. c. end, the shunt fields being open-circuited at several places when this is done. Intermediate taps from the low-tension side of the transformers give low voltages for starting.

A switchboard containing seven panels is located at the southeast corner of the room. All the leads between the switchboard, transformers and other apparatus are carried underneath the floor in vitrified tile conduits. Two bare ground return wires, each of 550,000-circ.-mil capacity, are carried underground in concrete conduits to the tracks about 100 ft. distant from the station. The two lead-sheathed d. c. feeders are also placed underground. These ascend a trolley pole near the station, to the cross-arms, and are then carried one in each direction.

The ultimate capacity of the State Line station will be 1000 kw. Oil-cooled transformers controlled by motor-operated oil switches will be installed. The present voltage of the high-tension line entering the station is 13,200 volts, but this will be raised to 33,000 volts when the contemplated improvements are completed.

NEW PASSENGER STATIONS

In all, more than thirty new passenger stations have been erected. These vary in size according to the requirement, and although the greater number of them are constructed along the same general lines, the architecture is varied sufficiently to prevent a monotonous appearance.

One of the most complete stations is that at Libertyville on the west extension from Lake Bluff. This station was built at a cost of \$12,000. The rear portion is occupied by a rotary converter sub-station, while living rooms for the station agent are provided in the second story.

Quite an elaborate station will be built at Zion City during the coming season, the foundations being already constructed. The station platform will have a total length of 252 ft. The waiting room, which will occupy the central portion of the building, will be provided with an elaborate brick fire place at each end. The ticket office will be located at the middle point

of the waiting room, immediately under a central tower. An extension to the north of the waiting room will contain an express office, men's toilet and baggage room, while the ladies' retiring room will be at the opposite end of the station. The building will be of brick, with shingle roof, the gutters and cornices being of copper, and will cost approximately \$25,000.

The greater number of the new stations, however, were constructed much after the style of that one at Lake Bluff, shown



NEW WAITING STATION AT LAKE BLUFF

in the accompanying reproduction. The enclosed portion measures 24 ft. x 12 ft. At each end the canopy covers a platform 24 ft. long. A platform 6 ft. wide extends in front of the enclosed room. The rafters over both the interior and exterior portion are ceiled, and the interior walls of the waiting room



NEW WAITING STATION AT GLENCO

are finished in a similar manner. The shingle roof is painted deep red, while the walls and posts are given a coach green color. A few stations are built with the waiting room at one end. The canopy roofs over some of the narrower ones are supported by a single line of posts, and while the architecture of the stations is of the same general style, slight changes are made as the location of the station may require. A station of rather odd shape is the one a short distance below Glenco, and shown in one of the accompanying illustrations. It is but about 4 ft. wide, this narrow width being necessitated by the restricted right of way.

In some instances similar stations are erected on each side of the track. At other places only a platform and a canopy

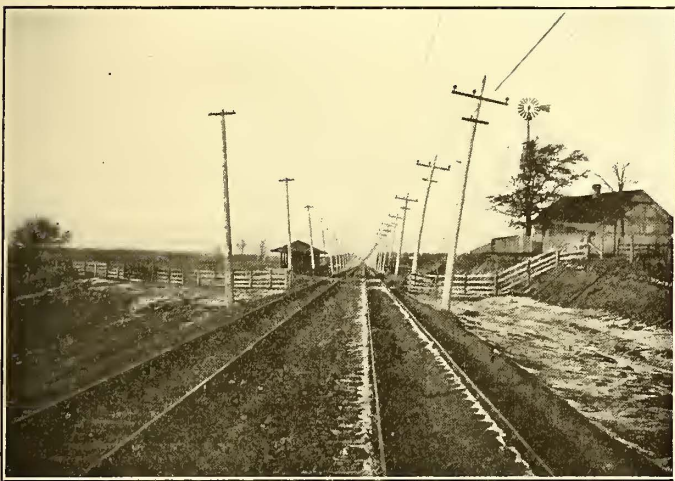
are erected opposite a station, and at some of the smaller places the platform alone is constructed. The stations are all lighted by incandescent lamps connected to the trolley, and the smaller ones will most probably be supplied with electric heaters.

At many points a great deal of attention has been given to beautifying the grounds around the station. At Libertyville more than \$1,000 was spent in planting flowers and shrubs. The grounds at many other stations will receive similar attention during the coming season.

THE MOTIVE POWER DEPARTMENT

The car equipment, as well as the power house and sub-stations, are under the immediate charge of J. L. Matson, who assumed the office of superintendent of motive power in the spring of last year. The present rolling stock for passenger service consists of thirty-four closed motor cars, ranging in length from 36 ft. 11 ins. to 46 ft. 7 ins., and twenty-five trailers for summer service, the greater number of which are 52 ft. long. There are also fourteen smaller motor cars.

Ten of the larger cars are of the St. Louis World's Fair type.



VIEW ON EXTENSION TO KENOSHA

A few changes, such as the addition of steps, were necessary before they were adapted to the present service. These ten cars, and likewise several of the others, are equipped with General Electric type M control, while the smaller cars are supplied with K-14 controllers. Motors of the General Electric type No. 70 are mounted on the trucks of the old World's Fair cars. The remainder of the large cars are provided with either four GE 57 motors or GE 74 motors.

Within a short time this equipment will be supplemented by ten cars now being built by the Jewett Car Company. The new cars are to be 52 ft. long and will seat fifty-six people. A smoking compartment will occupy the forward portion of the car, a glass partition being placed between the smoking and passenger compartments. The General Electric type M control will be employed. The trucks will be mounted with four General Electric 73 motors.

The equipment is cared for at the shops near the power house and office building at Highwood. Several additions and improvements are being made to the shops. A brick and steel storage shed and a four-fire blacksmith shop have been erected, and some machine tools have been added to the shop equipment, among them a 48-in. Niles wheel lathe. Overhead travelers and pit jacks have been installed to facilitate the handling of armatures, and other minor improvements have been made. When the present power house is abandoned, however, several of the departments of the shop will occupy the vacated building, and because of these contemplated changes, the present shops are not being equipped as they otherwise would be.

During the past year an unusual amount of work has been done in the shops. All the wheels under the twenty-five trail

cars have been changed, wheels of standard interurban section being substituted for wheels with 2¼-in. tread. Chilled wheels have been removed from under all the motor cars and either steel-tired, forged or rolled-steel wheels substituted. Trucks under several of the cars have also been rebuilt. During the past summer all of the bodies of the passenger cars were overhauled and painted. In addition to this work, the ten cars formerly operated at the World's Fair were received and put in running condition.

HOT-WATER VS. ELECTRIC HEATING

In the booklet recently issued by the Chicago City Railway Company descriptive of its new standard car, the following data concerning the cost of hot-water and electric heating of cars are given. These figures were used in deciding upon the method of heating to be employed in the new cars. The results show 7 cents per day per car in favor of electric heating, and this method was adopted:

- Average hours per car per day, 9.
- Average current per car, 12 amps.
- Weight of electric heaters, 360 lbs.
- Weight of hot-water heaters, 1454 lbs.
- Coal consumed by hot-water heaters, 80 lbs.
- Price of coal, \$8.00 per ton.
- Price of electric heaters, \$80.00 per car.
- Price of hot-water heaters, \$140.00 per car.
- Repairs on electric heaters, 5 cents per car per day.
- Repairs on hot-water heaters, 10 cents per car per day.
- Attendance on hot-water heaters, 10 cents per car per day.
- Average miles per car per day, 100 miles.
- Average heating season, 150 days.

Upon this assumption, without going through the calculations in detail, the result may be summarized as follows:

ELECTRIC HEATERS

Cost per day of heating season using electric heaters:

	Cents
12 amps., 9 hours = 54 kw-hours per day, at .992 cents.....	53.6
Interest at 5 per cent, plus depreciation at 7 per cent, on \$80.00, cost price of heaters 365 days, divided by 150 days heating season	6.4
Hauling dead weight, 360 lbs., 100 miles per day, 365 days per year, at 0.95 cents per day of heating season.....	4.2
Repairs at 5 cents per car per day.....	5.0
Interest 5 per cent, plus depreciation 3 per cent on additional copper required for electric heaters per day of heating season	3.8
Total cost per car per day.....	73.0

HOT-WATER HEATERS

Cost per day of heating season using hot-water heaters:

	Cents
80 lbs. coal, \$8.00.....	32.0
Interest at 5 per cent, plus depreciation at 7 per cent, \$140.00..	11.2
Hauling dead weight, 1454 lbs., 100 miles per day, 365 days in year, per day of heating season.....	16.8
Repairs	10.0
Attendance	10.0
Total cost per car day.....	80.0

MT. LOWE TRAFFIC RESUMED

The efforts made by the officials of the Pacific Electric Railway Company, of Los Angeles, to repair at once the damage to the incline railway done by the recent Echo Mountain fire, were rewarded in the completion of the work on Wednesday, Jan. 3, on which date traffic was resumed to Mt. Lowe. Right after the fire a force of 200 workmen was put to work building the upper part of the incline and in grading Echo Mountain. It is now proposed by the company to locate on Echo Mountain a great pleasure resort, although the work will probably not be commenced for several months.

SINGLE-PHASE ELECTRIC LOCOMOTIVES AND POWER EQUIPMENT FOR THE SARNIA TUNNEL

A short notice was published in the last issue of the *STREET RAILWAY JOURNAL* of the award of the contract for electrical locomotives for hauling the trains of the Grand Trunk Railway system from Sarnia, Ont., to Port Huron, Mich. This contract is the result of a long study of the conditions by the Grand Trunk management and its electrical engineer, B. J. Arnold,

the practically level stretch under the river, and then draw the train up a 2 per cent grade at the rate of 10 m.p.h. to the level track beyond the tunnel approach on the other side. It must then gradually accelerate the train until a speed of 18 m.p.h. is reached. Each unit must be capable of exerting a tractive effort of 25,000 lbs. for a period of 5 minutes, in addition to the energy required to accelerate the train at the starting point, and to run with it into the terminal yard. From this point it must immediately run back to a position 1200 ft. from the sum-

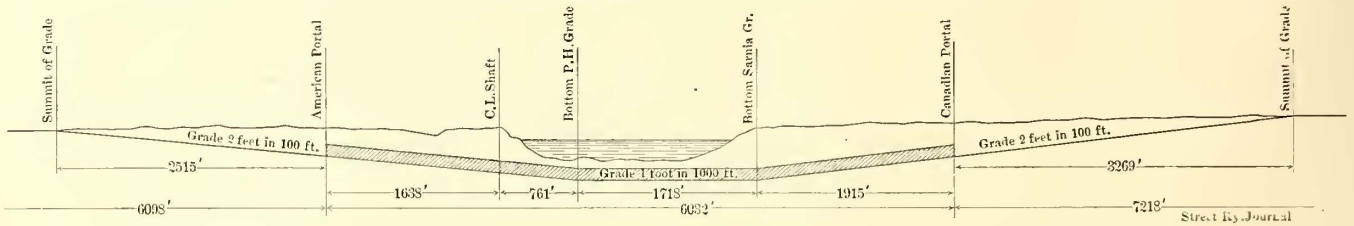


FIG. 1.—PROFILE OF TUNNEL

and the decision to adopt electricity was reached from the desire both to eliminate the use of combustion engines in the tunnel and also to increase its capacity. A profile of the tunnel, which contains a single track only, is given in Fig. 1.

The tunnel proper is 6032 ft. long, and of this length 1718 ft. are under the river bed. This portion of the tunnel is practically level, as the grade is only 0.1 per cent, or just sufficient for proper drainage. The rest of the tunnel is built on a 2 per cent grade, of which 1915 ft. are on the Canadian side and 2399 ft. are on the American side. The grade of 2 per cent is continued from the Canadian portal of the tunnel for a distance of 3269 ft., and from this point the tracks are practically level. The electrical equipment will extend through the yards from this point for a distance of 3949 ft. On the American side, the 2 per cent grade continues from the portal of the tunnel for a distance of 2515 ft. The electric section will extend thence to the end of the yards, a distance of 3583 ft., which is also level. The linear distance to be equipped with electric power is therefore 19,348 ft. Although the tunnel is single track, the tracks on the approaches are double up to a point within about 300 ft. of each portal.

At the present time, as stated, the trains of the Grand Trunk Railway are hauled through the tunnel by steam power. Especially designed steam locomotives, which burn anthracite coal, are used. These engines are designed to haul trains of 820 tons weight, but owing to the varying condition of the climate, the rail is affected from time to time, so that the average weight of train which these locomotives actually haul is about 750 tons. For this reason it has been necessary to split up a great many of the trains which arrive at the tunnel portal, and this has congested traffic at the terminals. Owing to the more uniform draw-bar pull of electric locomotives, it is expected that longer trains can be hauled, although the length of the trains will be naturally limited by the strength of the draw-bars on the ordinary freight trains when ascending the 2 per cent grade. As it has been considered desirable to limit this strain to 50,000 lbs., the trains to be hauled by the electric locomotives will be limited to 1000 tons each. Heavier trains must be divided or sent through with locomotives in front and behind.

The service requires that each electric locomotive unit shall take a train of 500 tons, or two units a train of 1000 tons, through the tunnel block from summit to summit in 15 minutes, under the following conditions:

It will be coupled to the train on a level track at a point 1200 ft. from the summit, and must accelerate it up to a speed of 12 m.p.h. in 2 minutes, at the end of which time it will have reached the summit of the grade leading down into the tunnel. It will then run down a grade of 2 per cent to the level track in the tunnel at a speed not exceeding 25 m.p.h., continue on

mit, couple to another train and be ready to start through the tunnel in the opposite direction. It must therefore make a run of the character described every 30 minutes.

It is obvious that a service of this kind will produce an intermittent load on the power station in which the current demand of a locomotive drawing a train up the 2 per cent grade, or approximately 1200 kw, is superimposed upon that of the loco-

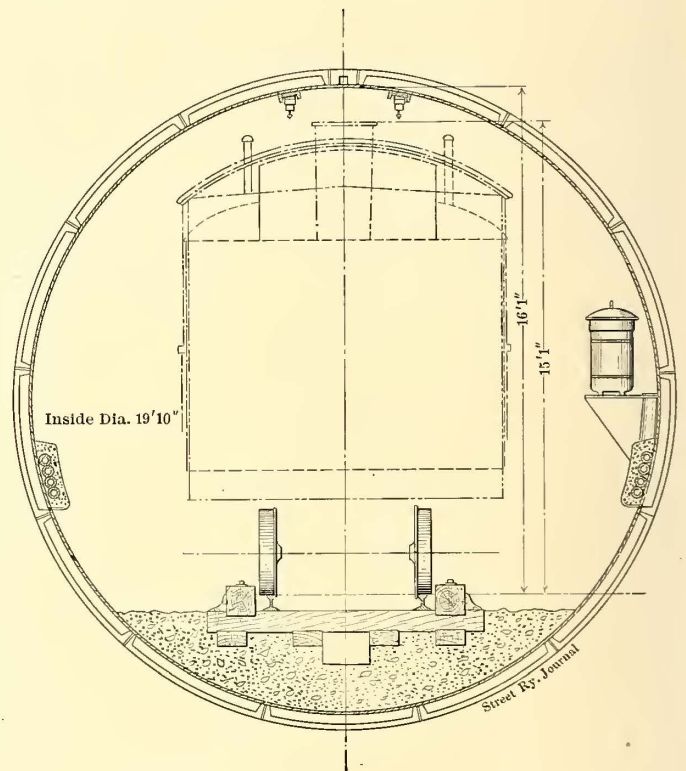


FIG. 2.—CROSS-SECTION OF TUNNEL

motive starting from the yard. On the other hand, there will be periods of no power demand lasting from 6 to 7 minutes when the train is descending the 2 per cent grade and coasting on the level. This locomotive load is graphically shown in Fig. 3.

As stated last week, the Tunnel Company also proposes to install a pumping and lighting system. The former is designed to take care of the rainfall in the cuts at the two approaches, as well as the small amount of water in the tunnel due to seepage and condensation. The pumps will be operated by three-phase motors, and those at the Sarnia portal will have a capacity of delivering about 11,000 gals. of water per minute against a 90-ft. head. The pumps at the Port Huron portal

will have a capacity of delivering about 8000 gals. per minute against a 75-ft. head, and the drainage pumps in the tunnel a capacity of about 150 gals. against a 40-ft. head. In addition, two small pumps, with a capacity of 150 gals. per minute against a 90-ft. head, will be installed at the foot of the pump shaft near the Sarnia portal. As it is important that the tunnel should be kept free from water at all times, the pumps installed at each portal will consist of duplex units throughout. The tunnel will also be lighted by incandescent lamps from independent three-phase feeders. These lamps will be connected four in series on 440-volt mains, and will be installed in a single row on each side of the tunnel about 10 ft. above the top of the rails, and will be spaced 25 ft. apart in each row.

The introduction of electricity will increase the capacity of the tunnel from 12,000 1000-ton trains per year to 35,000 1000-ton trains per year.

The single-phase electric locomotives, which will be supplied by the Westinghouse Electric & Manufacturing Company, will be in three pairs of two units each. Each unit will weigh approximately 62 tons, and, as stated, will develop a draw-bar pull of 25,000 lbs. on a 2 per cent grade at a speed of 10 m.p.h. It is of the rigid frame type, with driving axle boxes held in the same frame that contains the draft gear. It will be mounted on three pairs of driving wheels, which will sustain the entire weight, distributed by equalizer bars similar to those used in steam locomotive practice; will have an outside frame supported on semi-elliptical springs, and will be equipped with

Westinghouse combination automatic and straight air and American driver brakes will be used. The air supply will be provided by a two-cylinder motor-driven air compressor having, with a 5-in. stroke and a speed of 190 r. p. m., a capacity of 45 cu. ft. of air per minute. Air reservoirs, signal outfits, whistle, bell with pneumatic ringers, automatic pump governor, tools, instruments, gages, headlights, push poles and other details complete the auxiliary equipment.

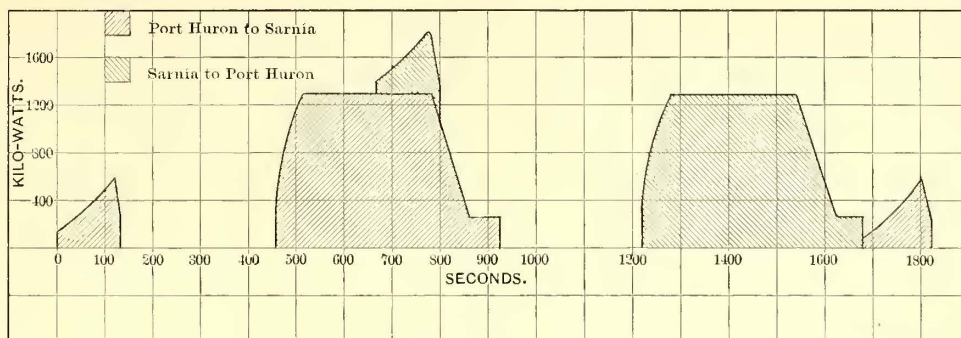
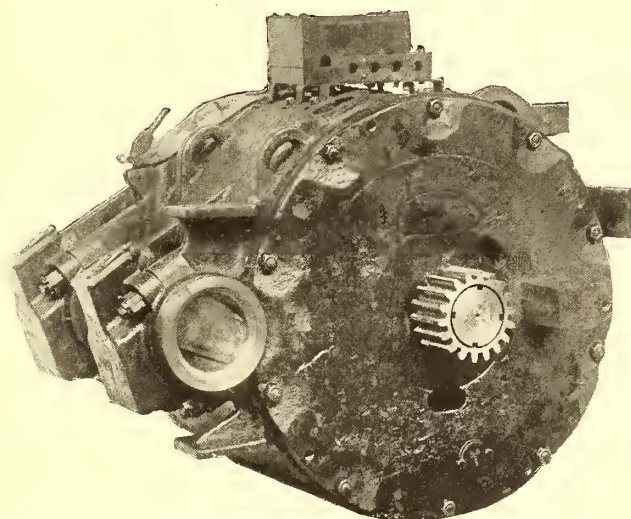
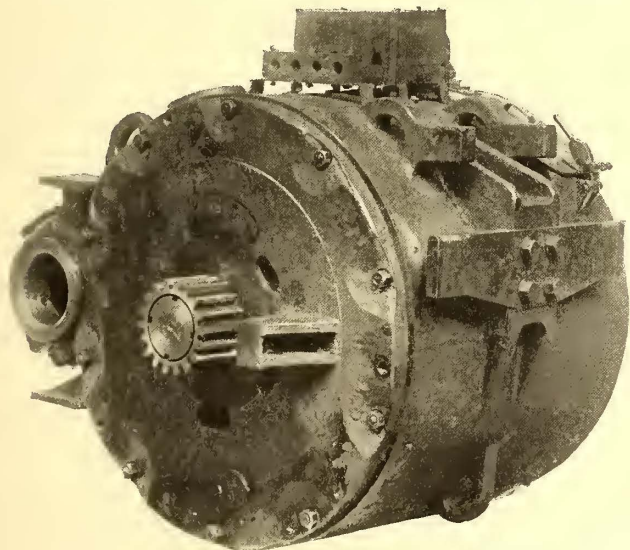


FIG. 3.—CURVE SHOWING POWER REQUIRED BY A. C. LOCOMOTIVES TO DRAW 1000-TON TRAINS THROUGH TUNNEL

A motor will be geared to each axle, giving each unit an aggregate rated capacity of 750 hp. The motors are of the single-phase, compensating type, and will weigh complete approximately 14,500 lbs. The armature will weigh approximately 5600 lbs. The motor frame consists of a steel cylinder type, cast in one piece, and enclosed at the end by brackets of the same material, which carry the bearings and oil reservoirs. The suspension noses and safety lugs form a part of the main casting. Seats for the axle bearings are cast solid with the frame. All bearings are of phosphor bronze, lined with bab-



FRONT AND REAR VIEWS OF LOCOMOTIVE MOTOR

Westinghouse friction draft gear, M. C. B. automatic couplings, air-sanding apparatus, and bumper steps, front and back. The cab will be of sheet steel, mounted on a frame work of iron, which supports both walls and roof.

The principal dimensions will be approximately as follows:

- Length over end sills, 27 ft. 9 ins.
- Rigid wheel base, 12 ft.
- Width over rail, 9 ft. 6 ins.
- Height from top of rail to top of cab, 12 ft. 6 ins.
- Diameter of driving wheels, 62 ins.

The operating apparatus will be arranged along the sides of the cab, leaving a free passageway 3½ ft. wide the entire length. The cab will be lighted and heated by electricity. The instrument lights will be screened while the locomotive is running.

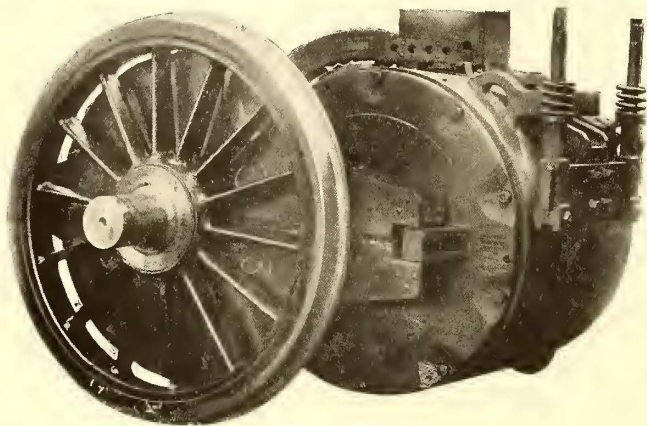
bitt, and are divided into two parts. They are of exceptionally large dimensions, are arranged for oil waste lubrication, and are provided with large openings on the low-pressure side, giving a thorough lubrication of the entire bearing surface. Oil is fed into the reservoirs through openings separate from the waste pockets, and therefore reaches the waste from below, and is thoroughly filtered before entering the bearing.

The motors are swung between the locomotive frame and the driving axles by a flexible nose suspension from two hangers supported by a truck transom, and passing through heavy lugs with helical springs above and below the lug. The motors are held to the axle by means of caps, which are split at an angle of 35 degs. with the perpendicular, so that the greater part of the weight is borne by solid projections from the motor frame,

which extend over the axle, rather than by the cap bolts. Large openings above and below provide access to the commutator and brush holders. The field coils are wound with copper strap, insulated between turns and about the coils by mica, and finished by taping and dipping.

In addition to the main coils, the field carries a neutralizing winding, which consists of copper bars placed in slots in the pole faces and joined at the ends by connectors of copper strap, so as to form one continuous winding, which is connected in series with the main field winding and with the armature circuit. The magnetizing effect of this auxiliary winding is directly opposite to and neutralizes that of the armature winding, thus eliminating the effect of armature reaction and improving commutation and power factor. The main coils can be easily removed without disturbing the auxiliary winding.

The armature coils are of copper strap, embedded in slots and cross connected, like the multi-circuit winding of a direct-



MOTOR ON AXLE

current generator. A preventive winding is connected between the commutator and the main coils, introducing a preventive action, which is effective only when the coil is passing under the brush.

During operation, a forced circulation of air, supplied by motor-driven blowers, enters at the rear, distributes itself thoroughly throughout the motor and escapes through the perforated cover over the commutator. This system of forced ventilation of both motors and auxiliary apparatus forms one of the most interesting innovations in electric railway construction. It secures a maximum output from a given weight of material and a high ratio of continuous output to the one-hour motor rating common in railway practice. It also provides effective ventilation while the locomotive is not in operation, as the blower may be driven while the locomotive is standing at the station or the end of the line.

The motors are wound for 240 volts and 25 cycles per second, and have a nominal rating of 250-hp each, on the basis of usual electric railway practice.

The essential elements of the control equipment include the collecting devices, the auto-transformers, the unit switches, the preventive coils, the reverser and the master controllers. A multiple-unit system of control is provided with pneumatically-operated switches and circuit breakers, low-voltage control circuit and other characteristics standard in Westinghouse practice. Any unit may be controlled from either end, and two or more units may be coupled together and operated from a single cab and by a single crew. The tractive effort which can be readily applied to a single train is therefore limited only by the number of units available, and the hauling power is limited only by the mechanical strength of the coupling between locomotive and cars. A control circuit is carried from one unit to the next by means of connecting sockets and jumpers in the usual manner.

Speed control of the driving motors is secured by variation of the voltage at the motors, obtained by means of taps taken

from the winding of the auto-transformer, which receives current from the trolley at 3000 volts, and reduces it to 240 volts or lower, according to the tap employed. These taps are connected to unit switches, from which current is led through the preventive coils to the motors. Four unit switches serve to reverse the field of each motor.

The unit switches are of standard Westinghouse design, and are, in effect, pneumatically-operated circuit breakers of great power and reliability. The switch cylinders are controlled by magnetically-operated valves, current for which is obtained from a 50-volt tap from the auto-transformer. The sequence of operation is governed by the master controller in conjunction with a system of interlocks, which prevents short-circuit of the steps between taps from the auto-transformer, or improper operation of the controlling mechanism. At any running point four controlling switches are closed. Through the preventive coils approximately the same amount of current is drawn from each of these switches and the leads to which they are connected. To change to a higher voltage on the motors, the master controller is moved to the next notch, opening the last switch of the group that is closed and closing the switch next higher, with the result that the motor voltage is shifted up one step. By this arrangement the voltage at the motor will be completely under control of the locomotive driver, and may be varied up and down at will without opening more than one-quarter of the load current. Small switches in the circuits to the magnets of the reversing switches will enable any motor or combination of motors to be cut out without disturbing the others.

Every one of the seventeen controlling connections provides an efficient running point. This number is ample to prevent any slipping of the driving wheels due to increase of current from one notch to another. Whether empty or heavily loaded, operated in single or multiple units, torque and draw-bar pull may be gradually applied and the locomotive started without jar.

Each locomotive unit will be equipped with a pneumatically-operated pantagraph trolley to collect current from the overhead lines outside the tunnel and throughout the yards. The proportions of the pantagraph will be such that, when extended, it will make contact with the trolley wire 22 ft. above the rail, and, when closed down, the contact shoe will not extend more than 18 ins. above the roof of the locomotive. The pantagraph will have a broad base, and will be constructed of light and stiff material.

A No. 0000 grooved overhead trolley wire will be suspended from a single $\frac{3}{8}$ -in., high-strength, double-galvanized, steel-strand, messenger cable by hangers of varying length in such a manner that the trolley wire will be approximately horizontal. The messenger cable will be swung from structural iron bridges located throughout the yards, and are of suitable length to span the proper number of tracks. There will also be a small section of track equipped with a trolley line swung by catenary suspension from bracket arms which are supported on lattice-work poles.

For the operation of the electric locomotives a complete power plant will be installed by the St. Clair Tunnel Company, including two 1250-kw, 3300-volt, three-phase, 25-cycle, 1500-r. p. m., rotating-field, Westinghouse steam-turbine units, with the necessary complement of switchboards, exciters, lightning protective apparatus, etc. This station will also supply the current to light the buildings, yards and tunnel, to operate motor-driven centrifugal and triplex pumps which drain the tunnel and approaches and operate the sewage systems, to run motors in the roundhouses and for other purposes.

The Toledo & Indiana Railway has instituted limited service between Toledo and Bryan. Every other car is a limited. This plan is common to Indiana.

THE QUESTION BOX

As recently announced, in response to many requests, the STREET RAILWAY JOURNAL has decided to again institute an open Question Box in its reading columns. The first of the new series of questions was published in the issue of Dec. 9, 1905. The answers will be presented from time to time as they accumulate.

This week methods for increasing traffic in winter and the handling of sand for sanding track are discussed.

MANAGEMENT

INCREASING WINTER TRAFFIC

A 1.—A number of methods for creating traffic during the summer months have been tried with success. What can be done in this same direction during the winter months? What schemes for encouraging travel in winter, such as ice skating, inducing theater traffic, etc., have you tried or have in contemplation?

We have an arrangement with a popular local stock theater, under which we make a combined rate for round trip and entrance to theater, making a minor reduction in our rate, and the theater makes a major reduction in its rate. This applies to the first three performances of the week, namely, Monday night, Tuesday afternoon and Tuesday night. Certain rows of seats are always reserved for the same performance each week and for the same town. For instance, one day recently we had a party of thirty-six booked under this arrangement from a town 33 miles away. To stimulate winter travel we believe in giving reduced rates to lodges and societies to visit each other between neighboring towns.

Theodore Stebbins, Gen. Mgr.
D. S. & U. Elec. Ry., Columbus, O.

We secure considerable theater traffic by making reservation of seats through our agents. Parties desiring to attend any one performance call upon the agent and order seats, giving the location that they would like to have. Reserved seats are then purchased and sent to them through the agent. Keeping the ice on the lakes in parks or rivers clean and advertising good skating produce considerable traffic. Various secret societies visiting each other in different towns are conducive to a good revenue.

A. L. Neereamer, Traffic Mgr.,
Columbus, Delaware & Marion Ry. Co., Columbus, O.

We recently tried a novel scheme for winter excursions. We advertised a free Sunday dinner at Findlay, our largest terminal. Of course, the free dinner was only given with ex-

restaurants all honored our meal coupons at a reasonable price, as the arrangement induces out-of-town custom for them.

Toledo, Fostoria & Findlay Ry. Co.

We have been quite successful in handling skating carnivals during the cold weather as a method of inducing traffic. In one instance we advertised in local papers and with dodgers for several days calling attention to a skating carnival, offering silver cups as prizes for 100-yard dash, fancy skating and for fancy costumes at night. The attendance was 5000; expenses were \$56.43, leaving a balance of \$443.57. This we regard as a very profitable method of inducing travel. We also consider the moral effect on the community a very important feature, as our attention to the skating creates a good feeling among our patrons. It is rather difficult to handle a matter of this kind, as no matter how well planned, in this climate the weather may change quickly and cause the programme to be postponed on account of a thaw. The writer had only four days to prepare and get advertisements before the people in this vicinity, but was fortunate enough to have continued cold weather and the arrangements were carried out as scheduled. The writer is convinced that there is quite a field for increasing traffic during the winter season and also in the fall and early spring by the arrangement of golf tournaments, football games and various other forms of amusement. There is also a point in immediately advertising wrecks, fires, etc., that might attract people to ride.

P. Ney Wilson, Supervisor Pub. Serv. Corp.,
South Jersey Div., Camden, N. J.

Net steel signboards, carrying the regular half-sheet bill, are dropped into grooves on front and rear dasher of cars, and this space is given over to advertising the various theaters along the line, also football games, revival meetings, lot sales and, in fact, anything that may cause people to ride. During the summer months these boards have been covered with pictorial posters setting forth the beauties to be seen along the line and the pleasure of a trolley ride to the various points of interest. During the fall, "golden rod" trips to the mountain were advertised by means of bright-colored posters.

J. W. Brown, Supt. Trans.,
West Penn Rys., Connellsville, Pa.

In regard to theater parties, would say that for a party of twenty or more we furnish a special limited car, which stops only at the villages along the line, making no local stops at all. The parties buying return tickets for this car have their seats reserved for them on the return trip.

F. J. Gerdon,
Supt. Trans., Utica & Mohawk Valley Ry.

Our winters are not cold enough to provide much skating. Preparations are being made this year to protect and care for the ice for skating on the lakes at City Park and at one of the other private parks, both of which will be extensively advertised on the cars. There are a large number of theaters open during the entire winter, all of which are very well patronized.

John A. Beeler, V.-Pres. & Gen. Mgr.,
Denver City Tramways.

We have found ice skating a desirable form of amusement for our park during the winter months. The ice is kept smooth by means of a planer drawn by a horse, and one of the summer amusement buildings furnishes a place for skaters to get warm, and where they may be served with light lunch, which is prepared with the aid of electrical cooking utensils. Our rink is part of a pond kept clear for the purpose, about 125 ft. x 225 ft. We found it of advantage to cut a narrow channel completely around the rink except at a few places, to prevent the formation of cracks. We charge a small admission fee and find the sport very popular.

Samuel P. Hunt,
Manchester Tract., Lgt. & P. Co.

GOOD FOR ONE MEAL

Only on Sunday, Oct. 22, 1905

AT

The Dairy Lunch
Meyers Dining Hall
Star Restaurant or
Home Restaurant

FINDLAY, OHIO

T. F. & F. RY. CO.

No. 43

MEAL TICKET USED AS A MEANS FOR CREATING TRAFFIC IN WINTER

cursion tickets sold at a number of small towns, 20 miles or farther from Findlay. Although the weather was bad, a good carload resulted, and it is probable that we will experiment further with these "Sunday Dinner Excursions." The best

THE SNOW PROBLEM

A2.—*What special plans have you made for fighting snow this winter? What particular changes are you making in your snow-fighting methods or apparatus, based upon your previous experience?*

At the beginning of winter selections are made from among the most competent motormen living closest to the various car houses, and they are entrusted with the operation of the snow-fighting equipment, which consists of three double-broom sweepers and one double-end rotary plow. This arrangement proved satisfactory last winter, and we see no reasons for making any change.

J. W. Brown, Supt. Trans.,
West Penn Rys. Co., Connellsville, Pa.

As respects interference by snow, we find that the interurban cars will keep the track clear with a small amount of shoveling in a few cuts throughout the line, except in city and village streets, and there we have to use city methods of removing snow.

Theodore Stebbins, Gen. Mgr.,
D. S. & U. Elec. Ry., Columbus, O.

Not having had our snow-plows out for three years, we feel safe in the apparatus that we have and the methods pursued heretofore.

John A. Beeler, V.-Pres. & Gen. Mgr.,
Denver City Tramway.

A3.—*Should the responsibility of keeping curves, crossings, switches and special work clear from ice and snow during snow storms be placed in charge of the track department, or should the snow-plow crews attend to this matter?*

Our experience last winter indicated that the work of keeping crossings and special work clear from ice and snow can be handled more economically by transportation department than track department.

C. A. Coons, Supt. Trans.,
International Ry. Co., Buffalo.

On this road the responsibility of keeping curves, crossing, etc., clear from ice and snow devolves on the track department, but snow-sweeper crews carry salt, shovels and brooms with them and clear switches and special work as they go along, and are thus of great assistance in this work.

J. W. Brown, Supt. Trans.,
West Penn Rys. Co., Connellsville, Pa.

This matter should, in the writer's opinion, be placed in charge of the engineer of maintenance of way.

F. J. Gerdon, Supt. Trans.,
Utica & Mohawk Valley Ry.

The responsibility for keeping curves, switches and crossings clear of ice and snow is handled here by the track department, unless the snow comes with a serious storm. In this event, the transportation and mechanical department unite with the track department, with the one aim of clearing the tracks. Under ordinary conditions, we find it more advantageous to handle this character of work with the track department. The men in this department are available on very short notice, and from the fact that the mechanical and transportation departments do not carry many extra men, it has been found a much more successful proposition to handle track cleaning by men who are available quickly and who are hardened to outside work and capable of standing the exposure. Of course, during serious storms there is very little track work to be done, and this further justifies our conclusions.

P. Ney Wilson, Supervisor,
Public Service Corp., South Jersey Div.,
Camden, N. J.

On this road the roadmaster is in charge of cleaning and greasing all the special work and looks after the necessary hand work required to keep crossings, switches and curves free from snow and ice. The transportation department has charge of the sweepers and plows and the cleaning of the straight track and taking care of the snow.

John A. Beeler, V.-Pres. & Gen. Mgr.,
Denver City Tramway.

OBTAINING NAMES OF WITNESSES

B5.—*Suggestions are requested on a good and proper way for a conductor to approach passengers to obtain their names and addresses as witnesses in accident cases.*

It is rather difficult to give advice on this subject, as the conductor will have to use more or less discretion in handling special cases. First and foremost, of course, the conductor must approach his passengers in a gentlemanly and courteous and proper manner. One of the rules in the standard code of rules as adopted by the New York Street Railway Association and the American Street Railway Association reads as follows: "Treat all passengers with politeness; avoid difficulty, and exercise patience, forbearance and self-control under all conditions. Do not use uncivil, indecent or profane language, even under the greatest provocation." This is a good rule for a conductor to have in mind at all times, and it is applicable when a conductor is endeavoring to obtain the names of witnesses.

The book of rules used by the Philadelphia Rapid Transit Company includes a clause that is in line with the information requested. In the instructions to conductors as to what should be done after an accident, the company tells its men that after rendering assistance to the person injured and obtaining the name and address of the injured party, the next duty is to obtain the full names and addresses of all eye-witnesses. If the witnesses refuse or seem unwilling to give their names, the conductor is instructed to tell them it is the strict rule of the company and if he fails to obtain names of witnesses the company will think that he has not tried to do his duty and he would be subject to discipline. This is an argument that will very frequently induce reluctant witnesses to give their names and addresses. If the witness looks like a business man, it is much easier to merely ask him for his business card, as this avoids the trouble of writing out the name. Some conductors make it a practice to pass out blank slips of paper after an accident, with the request that each passenger write his own name and address thereon.

An enterprising and up-to-date conductor on one of the large systems states that he has saved himself and his passengers considerable trouble by making it a point to know all of his regular riders by name. He keeps a small note-book for this purpose, and whenever he learns the name of a regular rider—either by asking other passengers or in any other way—he puts the name down in his note-book, so that if an accident happens while any of the regular riders are on the car, he is able to turn in the names and addresses of at least those passengers whom he knows by sight.—Editors.

MECHANICAL

DIGGERS

C4.—*Do you know of any satisfactory "home made" or other device to be attached to each car for cleaning the groove of girder rails?*

Keeping the grooves of grooved rails clean has always been a vexing question with us. At special work we have switchmen whose duty it is to clean out switches with a broom and grease curves with cheap grade of thick oil.

H. A. Johnson, Ch. Engr.,
Public Service Cor., So. Jersey Div.

LINE

SLEET ON WIRE

E1.—*What is the best method of overcoming trouble caused by sleet on the trolley wire?*

There is little or no sleet in this country. We have on several occasions used sleet trolley wheels with good results.

John A. Beeler, V.-Pres. & Gen. Mgr.,
Denver City Tramway.

We have not found the best method of cleaning sleet from the wire; at least, we have been unable to secure any that has been satisfactory. Our general practice is to install a small steel square in the place of the wheel that will revolve and catch at times, thus scraping sleet from the wire, but this has not been as satisfactory as desired. H. A. Johnson, Ch. Engr. Public Service Cor., So. Jersey Div.

in one of our old car houses. The sand is spread over the floor immediately after it is delivered and allowed to dry. We use no drying apparatus, as we find the air-drying method entirely satisfactory, sufficient dry sand always being on hand.

P. Ney Wilson, Supervisor,
Public Service Corp., South Jersey Div.,
Camden, N. J.

TRACK

SANDING

F3.—What is the character of sand you use for sanding track?

We have a bright yellow sand on our own right of way which is as good as lake sand for the purpose.

Toledo, Fostoria & Findlay Ry. Co.

We are using for sanding tracks on this division a very clean, sharp white sand taken from neighboring sand pits.

P. Ney Wilson, Supervisor,
Public Service Corp., South Jersey Div.,
Camden, N. J.

Sand which we use for sanding tracks is taken from a bank, screened and dried.

E. D. Reed, Engr.
Scranton Ry. Co.

F4.—Is it a good idea to mix salt with the sand in winter?

We do not mix salt with the sand.

John A. Beeler, V.-Pres. & Gen. Mgr.,
Denver City Tramway.

We do not mix salt with the sand in the winter, as it is our opinion that a great deal of motor trouble is obviated by not using salt.

E. D. Reed, Engr.,
Scranton Ry. Co.

We do not believe in mixing salt with sand at any season of the year, as the salt attracts the moisture and makes the sand lumpy and reduces its efficiency. We use considerable quantities of salt, but we do not mix it with sand, as the practice has not proved satisfactory with us.

P. Ney Wilson, Supervisor,
Public Service Corp., South Jersey Div.,
Camden, N. J.

Think that the effect of salt mixed with sand would be to cause sand to cake with the moisture and prevent free running.

Toledo, Fostoria & Findlay Ry. Co.

We do not use salt on the track except occasionally on special work to clear the point of a switch or something of a similar nature, where it is absolutely necessary, and then it is applied very sparingly and by hand, and swept out as soon as it has done its work. The roadmaster has charge of the salt, which he gives out to the trackmen as he considers it necessary, and then only in small amounts to each man. It is found that the effect of the electric current in contact with the brine is the formation of a highly corrosive chemical, which strongly attacks the rails, and the effect of which is soon apparent upon the rails wherever salt is used.

John A. Beeler, V.-Pres. & Gen. Mgr.,
Denver City Tramway.

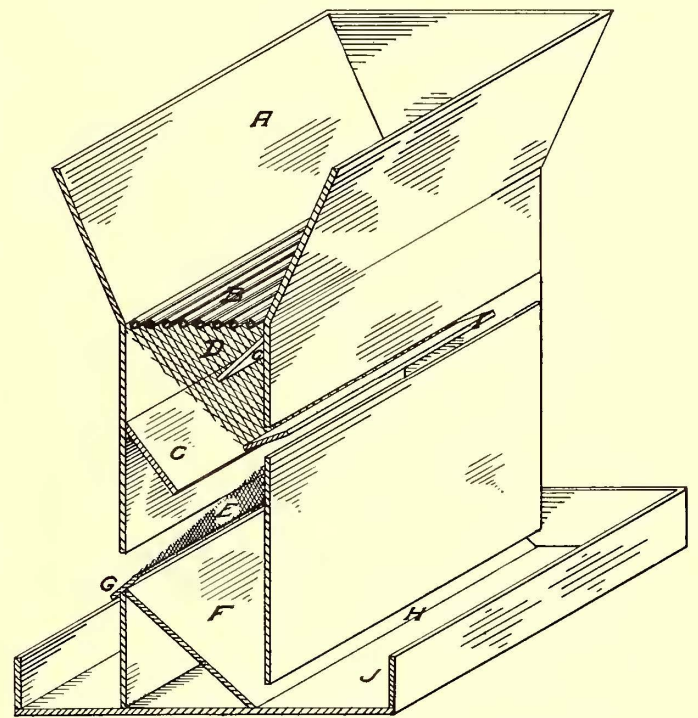
As this is a sandy island and the sand is somewhat mixed with salt from the gulf, we do not have to use sand on our track. It is there already. In operating roads in the North, the only times in which the writer found it was necessary to mix salt with the sand was in grooved rail, and then it was done for the purpose of keeping the groove free from ice, and also where the rail was covered with sleet. If a fine salt is thoroughly and completely mixed with the sand, it will very often hold the sand on the ice, where otherwise the sand by itself would blow off.

H. S. Cooper, Gen. Mgr.,
Galveston Elec. Co.

F5.—How do you dry your sand? Please send description of drying apparatus, with sketch or photograph, if possible.

We keep in stock a considerable quantity of sand at all times

The sketch herewith shows a sand box that the writer used in the North for a great many years. If properly proportioned as to hopper, screens and the deflecting boards, this will automatically dry and sift any sand—wet or frozen—provided the sand has not any large quantity of clay or other soil in it. The distance between the pipes and the steam coil, the size of the pipes themselves, and also the slope of the screens and the deflecting board, depend very largely upon the kind of sand, that is to say, whether it is an ordinary soil sand, round, fine and dusty, or whether it is a sharp, clean sand. In the latter case, the distance between the pipes can be made larger and the slopes of the boards and screens less than in the case where the sand is a soil sand and liable to compact. The operation



SUGGESTED FORM OF SAND DRYER

of the dryer is as follows: The sand is piled in on top of the steam pipes, and as it dries, falls through. A portion of it falls on the screens *D*, and another portion is deflected by the deflecting board *C* onto the same screen. This screen has a coarse mesh, and is intended to take out only stones, straw, sticks, etc., which will lodge between the edge of it. The screen *D* and the screen *E* can be taken out through the opening *I*. The sand that falls through the screen *D*, or over the edge, falls on the finer screen *E*, and also on the deflecting board *C*, which throws it onto the fine screen *E*, which screen has an opening in the bottom *G*, to allow the small gravel and compact lumps of sand to fall out on the one side, while the fine dry sand, thoroughly sifted and dry, drops on the deflecting board *F*, and comes out of the sand-box *J*, through the opening *H*. In practice, the box is built of rough framing, the only dressed portions being the inside of the hopper and the faces of the deflecting boards, and the size of the screen will vary according to the character of the sand, from a 1-in. to ½-in. mesh for the screen *D*, and from ½-in. to ¼-in. mesh for the screen *E*. The steam coil *B* can be spaced from ½ in.

between pipes to 1 in. between pipes, the sharp, clean sand requiring a less space, while the round sand requires a larger. In practice, it is best to make it a point to put all the sand through a coarse sifter first before putting it into the drying box, as, unless this is done, there will be straw, sticks, stones, roots, etc., that will fill up the space between the pipes and clog the whole box. A box of this character, which the writer made some years ago for a railway in the North, on which a very large amount of sand was used, had a hopper capacity of about $\frac{1}{2}$ cu. yd., and this dryer, fed with live steam from a $\frac{1}{8}$ -in. pipe, would dry 4 cu. yds. and 5 cu. yds. of sand within 24 hours, and required no attention but the shoveling into the hopper of the wet sand and the shoveling out from the sand-box of the dry sand. At the end of every day's run the flaps on the side, which were left for the purpose, were opened and the screens were brushed off to remove any accumulated rubbish that would tend to clog the openings. It will be understood, the character of the sand used determines the construction of this dryer. The writer has seen it dry fine, round sand which had a large quantity of soil with it, and do this perfectly, day after day, if the screens were brushed off once or twice a day.

H. S. Cooper, Gen. Mgr.,
Galveston Elec. Co.

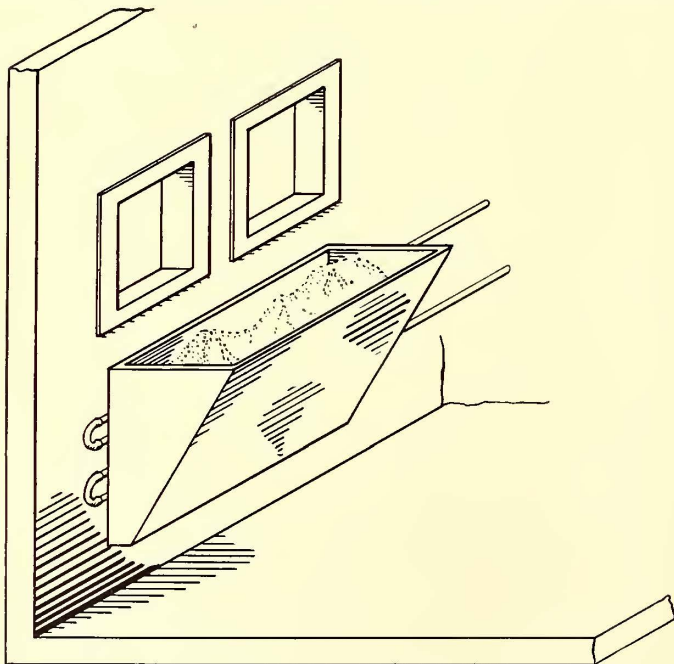
Our sand is hauled in the summer and autumn and dried in the sun; it is then stored in a house built for that purpose, where it keeps dry.

John A. Beeler, V.-Pres. & Gen. Mgr.,
Denver City Tramway.

Our sand is dried at the bank in a Howe sand dryer, made by a local concern.

E. D. Reed, Engr.,
Scranton Ry. Co.

Our dryer is a high bin with a wide top and narrowing at the bottom, which is open. It is set 3 ins. above the floor. The bin is built against the wall of the car house and has a row of steam pipes, as shown in sketch. The green sand is shoveled



SAND DRYER USED BY TOLEDO, FOSTORIA & FINDLAY
RAILWAY COMPANY

into the bin from the outside of the car house through windows left for that purpose, and the dry sand runs out at the bottom as fast as it is used.

Toledo, Fostoria & Findlay Ry. Co.

EARNINGS OF OHIO ELECTRIC RAILWAYS

About a year ago a table of statistics was presented of earnings of Ohio properties for the year ending April 30, 1904. It attracted a great deal of attention, as it was the first time that an attempt was made to show the detailed earnings of all the properties in a State, together with the earnings per capita of population tributary to the road and earnings per mile of track. Numerous requests have been received for a similar table for the past year; accordingly it has been brought up to April 30, 1905, the latest date for which such figures are attainable. As before, the earnings per capita for interurban roads are shown, both including and excluding terminal cities of over 75,000 population, as a great many engineers do not consider it fair to take into consideration the population of a large terminal city. As before, also, the census reports of 1900 were used in compiling the estimates of population, and territory within 4 miles on either side of a road was considered tributary to it. With the growth of long-distance interline business, such calculations become more and more misleading, nevertheless they are practically the only basis upon which the probable earnings of a new property can be estimated without careful consideration of local conditions.

A great many interesting figures may be compiled from the table. Out of eighty-five properties in Ohio, only ten showed a decrease in earnings from the previous year. The total gross earnings for the previous period was \$21,494,357, while for the latest period the gross is \$23,765,007. Freight and express earnings are as yet in their infancy, but fifty-four companies handling these lines earned \$564,254 from freight and express, as compared with \$476,377 last year. These amounts are not accurate, because in several instances the figures represent the net earnings received from express companies handling the business on the various roads. The Toledo & Western, famous for its freight business, derived about \$64,000 from this branch, while the Eastern Ohio Traction Company, another prominent freight-handling road, earned \$54,000 gross.

Thirty-five of the purely interurban roads, with more than 20 miles each, earned \$7,074,000 on a total mileage of 1804. Deducting lighting earnings, which several of them indicated, this is on a basis of \$3,515 gross per mile of track. Including terminal cities of over 75,000, the average per capita for these lines was \$1.31, while excluding terminal cities of over 75,000, the average per capita was \$5.59. The thirty-five properties in question had a total issued capitalization of \$63,581,000 and a bonded indebtedness of \$46,122,000, and allowing 55 per cent of the gross for operating expenses, which is about the average for interurbans in this district, the figures indicate that the average interurban is paying its bond interest and is earning a surplus of 13-10 per cent for stock. All of these roads showed an increase in earnings the past year, and only ten of them are more than five years old, so that they are not yet fully developed. The average bonded indebtedness per mile of track on these roads was \$25,566, while the total debt, bonds and stocks issued, was \$60,755 per mile of track. Four roads had no bonded indebtedness. Some of the roads showing the best earnings per mile of track were as follows: Cincinnati Northern (interurban portion), \$6,798; Columbus, Buckeye Lake & Newark, \$6,366; Northern Ohio Traction Company (interurban portion), \$5,852; Cleveland, Painesville & Eastern, \$5,237; Cincinnati Interurban Railway, \$5,237; Dayton & Troy, \$4,585; Toledo, Bowling Green & Southern, \$4,502; Stark Electric Railway, \$4,465; Lake Shore Electric Railway, \$4,377; Columbus, London & Springfield, \$3,767; Cleveland & Southwestern Railway, \$3,744; Cincinnati, Lawrenceburg & Aurora, \$3,739; Dayton & Western, \$3,589; Scioto Valley, \$3,561; Pennsylvania & Ohio, \$3,394.

Some interesting conclusions may also be reached from the figures on city properties. The indications are that lines in

A recent issue of the Sunday Baltimore "American" had as a feature story an illustrated article dealing with the street railway accident fakir and the efforts of the Association of Claim Agents to suppress this type of grafter.

TABLE SHOWING STATISTICS OF OHIO STREET RAILWAY PROPERTIES

Table with columns: NAME, Capital Stock (issued), Bonded Indebtedness (issued), City Mileage, Interurban Mileage, Total Mileage, Population Excluding Terminals over 75,000 (1900), Population Including Terminals (1900), Passenger Earnings Year Ending April 30, 1904, Passenger Earnings Year Ending April 30, 1905, Freight and Express, 1904, Freight and Express, 1905, Other Earnings, 1904, Other Earnings, 1905, Total Earnings Year Ending April 30, 1904, Total Earnings Year Ending April 30, 1905, Earnings per Capita Excluding Term., Earnings per Capita Including Term., Earnings per Mile Track.

1 Ohio portion only. 2 Lighting and power month in operation. 3 Based on estimated earnings for year. 4 Operated lines included. 5 Earnings for first for first 5 months. 6 Earnings for 10 months. 7 Based on estimated earnings for year. 8 Earnings for first 9 months. 9 Earnings for first 6 months. 10 Earnings operated only in summer.

small towns are not very profitable; the earnings, both per mile of track and per capita, increase as the towns grow larger. Four roads in towns under 10,000 population earned an average of \$2,047 per mile of track and \$1.27 per capita. Seven city properties in towns ranging from 10,000 to 25,000 population earned \$6,737 per mile of track and \$3.58 per capita. Three roads in cities ranging from 25,000 to 75,000 averaged \$9,063 per mile of track and \$5.71 per capita. Seven systems in cities from 100,000 to 400,000 population averaged \$14,855 per mile of track and \$12.50 per capita, not including lighting earnings in any case.

THE INSTRUCTION OF MOTORMEN IN MONTREAL

MONTREAL STREET RAILWAY COMPANY

Montreal, Can., Jan. 15, 1906.

EDITORS STREET RAILWAY JOURNAL:

The article in the last issue of the STREET RAILWAY JOURNAL describing the motormen's school at Montreal, emphasizes the importance of properly training employees.

Since the adoption of electricity as a motive power both for city and interurban railways, there seems to be a vast difference of opinion among the officials of the various roads as to just what kind of men should be employed as motormen, and how they should be trained and instructed so as to be able to run a car at a fair rate of speed through the most congested streets on which cars are operated at present, without causing loss of life or damage to rigs or other cars.

Several companies believe it unwise to instruct a motorman so that he may become familiar with the mechanical and electrical equipment, as they presume he might be tempted to tamper with the apparatus and cause damage. Other companies have established training schools and have a chief instructor in charge, who thoroughly explains the electrical and mechanical equipment in all its details, so that the new men are not only acceptable motormen, but fairly good electricians who can do slight repairing in case of emergency so as to enable if necessary the conveying of a car to the house without the aid of the car following, and the consequent loss of mileage of two cars and a longer gap in service. These companies further claim that when thoroughly instructed, motormen can be held responsible for the proper operating of their cars and, if necessary, be disciplined accordingly. We all will agree there can be very costly damage caused to the mechanical and electrical equipment by the improper operating of a car through lack of knowledge. Why should there be so much difference of opinion? Does a company expect that its cars will be operated in an economical manner without thoroughly explaining the mechanical and electrical equipment of the car to the new men, and how can it hold a motorman responsible for damage which he may cause to the equipment through want of knowledge? Again, how can a company in fairness discipline such an employee, and there must be a certain amount of discipline, for not properly protecting the company's property if the employee knows nothing about it?

Another important point is this. Cars very frequently lose trips by pulling into shop for some slight cause, which could have been repaired on the road by the motorman in a few seconds had he been so instructed. In my opinion, a motorman cannot be made too familiar with the mechanical and electrical equipment in his charge, and no doubt better results would be obtained, as no excuse can then be given for damage caused to a car.

With regard to tampering with the equipment and causing damage, proof can be given that in every case such damage is always caused by men who have not been thoroughly instructed about the mechanical and electrical equipment of a car, and they experiment in order to satisfy their own curiosity.

J. CALLAGHAN,
Inspector and Chief Instructor.

REPORT OF THE NEW YORK STATE RAILROAD COMMISSIONERS

The report of the Board of Railroad Commissioners of New York State has just been published. It shows that the total gross earnings from operation of the street surface, elevated and subway railroads were \$70,730,085.66, which is an increase of \$4,577,655.07 over 1904. In these and the following figures, the statistics of the following electric roads are not included, as they operate under steam railroad charters: Albany & Hudson; Fonda, Johnstown & Gloversville; Long Island Railroad, and Rochester, Charlotte & Manitou. These companies had a total of 207 miles of track equipped with electric power on June 30, 1905.

The operating expenses of the street surface, elevated and subway roads of the State, with these exceptions, were \$40,195,443.54, which is an increase of \$2,951,769.72 over 1904. The figures for 1904, of course, do not include the subway. The percentage of dividends to capital stock of said companies is 4.83; in 1904 it was 4.09.

In referring to New York City, the report says that the passengers carried on the street surface railroads in the boroughs of Manhattan and the Bronx, New York City (including "transfers"), was 601,761,867, a decrease of 16,998,191 compared with 1904. The number of transfers was 188,738,309. The number of transfers in these boroughs decreased 5,410,263. The average number of passengers carried on street surface railroads in the boroughs of Manhattan and the Bronx per day (365 days) was 1,648,663 during 1905. These figures as to Manhattan and the Bronx include some passengers carried in Westchester County. The number of passengers carried in the borough of Brooklyn (including transfers and including those carried on the elevated railroads) was 427,895,530. The number of transfers was 76,482,207. The average number carried per day (365 days) in the borough of Brooklyn was 1,172,317. These include some carried in the borough of Queens by the Brooklyn roads.

Following will be found tables giving percentages of operating expenses for all roads:

PERCENTAGES OF OPERATING EXPENSES TO GROSS EARNINGS

	1904	1905
Maintenance of way and structures.....	4.42	4.93
Maintenance of equipment	6.91	7.95
Operation of power plant	9.15	9.50
Operation of cars	26.42	25.05
General expenses	9.40	9.40
	56.30	56.83

PERCENTAGES OF SUBDIVISIONS OF OPERATING EXPENSES

	1904	1905
Maintenance of way and structures.....	7.87	8.70
Maintenance of equipment	12.28	13.99
Operation of power plant	16.23	16.70
Operation of cars	46.94	44.07
General expenses	16.68	16.54
	100.	100.

PERCENTAGE OF OPERATING EXPENSES TO GROSS EARNINGS FROM OPERATION FOR TEN YEARS

1896	61.96
1897	60.57
1898	60.07
1899	59.62
1900*	58.78
1901*	56.89
1902*	58.91
1903*	57.70
1904†	56.30
1905†	56.83

* Including elevated roads in Brooklyn.
† Including elevated roads in Brooklyn and Manhattan and (in 1905) the subway in Manhattan.

The following table gives statistics relative to the operation of some of the more important companies: same companies owned and operated on June 30, 1905, 6737 electric motor or cable box cars; 3886 electric motor or cable

Street Surface Railway (some principal companies) Receipts and Expenditures per passenger and cost of operation per car mile for year ending June 30, 1905.

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.
			Cents.	Cents.	Cents.	Cents.	Cents.	Cents.	Cents.
Albany & Hudson.....	1,354,169	704,050	14.18	11.28	17.93	17.61	26.57	22.62	33.87
Auburn & Syracuse.....	3,482,504	1,066,330	7.71	4.66	7.74	6.74	25.18	15.47	22.02
Binghamton.....	6,479,427	1,285,067	3.99	2.11	4.03	3.42	20.14	10.65	17.23
Brooklyn Heights†.....	286,392,708	44,567,665	4.11	2.42	4.19	3.91	26.40	15.57	25.11
Coney Island & Brooklyn.....	38,842,527	6,629,842	5.18	2.99	4.13	3.74	24.13	17.53	21.79
Crosstown Street (Buffalo).....	15,797,279	2,410,938	3.38	1.81	3.41	2.92	22.03	11.78	19.06
Forty-second St., M. & St. N. Ave. (N. Y. City)‡.....	26,125,979	3,339,349	3.02	2.51	3.36	4.01	23.61	19.64	31.06
Geneva, Waterloo, Seneca Falls & C.L.	1,785,940	485,912	4.65	2.95	4.84	4.11	17.08	10.84	15.11
Hudson Valley.....	5,955,891	1,927,473	8.38	5.62	8.01	9.84	25.89	17.36	30.40
International (Buffalo).....	89,785,647	14,682,630	4.12	2.24	4.23	3.21	25.16	13.71	20.16
Jamestown.....	4,015,872	870,554	3.78	2.39	3.82	3.31	17.46	11.05	15.28
Kingston Consolidated.....	2,537,426	535,527	4.87	2.89	4.88	4.47	23.15	13.70	21.17
Nassau Electric.....	68,231,120	10,467,139	4.09	2.52	4.23	3.81	26.72	16.33	24.85
New York City§.....	476,929,345	50,293,559	3.50	1.95	3.73	4.29	33.21	18.52	40.71
New York & Long Island.....	1,534,106	480,273	6.78	4.49	6.83	4.96	21.66	14.37	15.86
New York & Queens Co.....	18,319,217	3,263,185	4.02	2.43	4.07	3.53	22.54	13.64	19.82
Rochester.....	45,276,270	6,991,775	3.81	2.14	3.80	3.03	24.68	13.88	19.64
Rochester & Eastern.....	1,030,414	762,586	20.64	15.08	21.48	23.09	27.89	20.39	31.21
Schenectady.....	11,064,269	3,286,537	6.32	4.48	6.57	6.02	21.29	15.09	20.29
Syracuse & Suburban.....	1,771,075	453,820	5.20	2.95	5.23	4.82	20.29	11.51	18.82
Syracuse Rapid Transit.....	23,268,828	4,011,635	2.82	2.21	3.84	3.26	22.15	12.82	18.91
United Traction (Albany and Troy) ..	34,206,367	8,035,896	5.01	3.19	5.06	4.21	21.34	13.61	17.81
Utica & Mohawk Valley.....	14,649,423	3,389,069	5.43	3.55	5.45	4.77	23.46	15.37	20.60
Union (N. Y. City).....	44,929,958	6,197,621	3.08	2.17	3.12	2.76	22.36	15.75	19.98

*Includes earnings and expenses of freight, express, mail and all other business. †Includes all lines operated by Brooklyn Heights not making separate reports. ‡Includes portion operated by horses. §Includes all lines operated by New York City not making separate reports and also includes lines operated by horses.

The following table shows increases in the street surface, elevated and subway railway mileage in the State during the year:

INCREASES

Binghamton	1.000
Brooklyn City208
Brooklyn, Queens County & Suburban	1.969
Chautauqua Traction	14.648
City of New York, Williamsburg Bridge	1.623
Coney Island & Gravesend040
Hambourg	2.750
Interborough, lessee of subway in New York City.....	16.960
International, Buffalo311
Nassau Electric, Brooklyn930
New York & Long Island Electric.....	5.843
Ocean Electric450
Olean	2.950
Oneonta, Cooperstown & Richfield Springs.....	12.170
Rockaway Electric180
Schenectady	1.690
Syracuse Rapid Transit	3.570
Tarrytown, White Plains & Mamaroneck.....	1.530
Union of New York City385
Westchester Electric	2.082
	<hr/>
	71.289

The average number of persons, including officials, employed during the year ending June 30, 1905, on all the street railroads of the State (including street surface electric and horse railroads, the Brooklyn Union Elevated Railroad, the Manhattan Elevated Railway and the subway) was 41,699; in 1904, 38,427, not including the subway. The aggregate amount of salaries and wages paid them during the year was \$27,651,598.86; in 1904, \$23,721,992.80. The percentage of gross earnings from operation paid in salaries and wages in 1905 was 39.09. The

open cars; 557 electric motor combination box and open cars; 31 electric motor combination passenger and baggage cars; 13 electric motor mail cars; 531 electric motor express, freight and other cars; 402 electric motor snow plows, sweepers and sprinklers; the total being 12,157; in 1904, the total was 11,667; 15,945 fenders were reported in 1905 as in use on cars. Some of these fenders are transferred from one end of the car to the other at terminals, and some of the devices reported as fenders are wheel guards; 3,350 other cars (being cars operated by horses, and box, open, freight, express, service cars and snow plows not equipped with motors) were also owned and operated on June 30, 1905.

The number of tons of freight reported as carried on the street surface railroads of the State during the year ending June 30, 1905, was 829,291; the number carried during each of the years beginning with the year 1899 was as follows:

1899	129,040
1900	153,343
1901	287,311
1902	394,641
1903	516,460
1904	633,674
1905	829,291

On some of the roads separate express companies operate, and in some of these cases the amount carried is not reported.

The general recommendations as to the operation of street surface railroads made in the previous reports of the board are renewed, as the board says that these recommendations have been quite generally adopted.

The acquisition of electric railroads by interests connected with steam railroads, first noted last year, has continued during the year, the electric railroads acquired being city as well as interurban roads.

REPORT OF THE MASSACHUSETTS RAILROAD COMMISSIONERS

The report of the Massachusetts Railroad Commissioners for the year ending Sept. 30, 1905, was made public Jan. 15. The commissioners report that returns have been received from ninety-eight street railway companies. During the year five new companies were organized under the general law and added to the list, namely, the Haverhill & Boxford, the Maplewood & Danvers, the Nahant & Lynn, the Plymouth County and the Western Massachusetts. Four other companies were organized during the year under the general law and added to the list, being purchasers of railways sold at receivers' sale: the Dedham & Franklin, purchaser of the Norfolk Western; the Lowell & Woburn, purchaser of the Lowell & Boston; the Taunton & Buzzards Bay, purchaser of the Middleborough, Wareham & Buzzards Bay; and the Taunton & Pawtucket, purchaser of the Bristol County.

The Massachusetts companies now own 2,219,792 miles of street railway line, 405.442 miles of second main track and 151.474 miles of side-track, making a total length of track owned 2,776.708 miles. This statement excludes the track in the subway. All the track owned is surface street railway track with the exception of 6.644 miles of elevated line and 6.468 miles of elevated second track. Of the sidings, all are surface track with the exception of 2.903 miles of elevated track. All of the elevated track is confined to Boston.

The Old Colony leases and operates the Newport & Fall River, having a mileage of main and second track of 19.268 miles located in Rhode Island; and the Boston & Northern leases and operates the Nashua, having a mileage of main and second track of 14.899 miles located in New Hampshire. Accordingly, 52,933 miles of main and second track are operated outside the State.

CAPITAL STOCK AND DIVIDENDS

The aggregate capital stock of the ninety-two companies, Sept. 30, was \$70,326,984.78, a net increase of \$1,784,947.28 over the preceding year.

The total amount of dividends declared the last year was \$3,174,505.24, a decrease of \$39,991 from the preceding year. Thirty-five out of the ninety-eight companies paid dividends ranging from 2 per cent to 10 per cent, and sixty-three companies declared or paid no dividends.

One company paid 10 per cent; five companies 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; one paid 7 per cent; eleven paid 6 per cent; one paid 5.5 per cent; seven paid 5 per cent; one paid 4 per cent; one paid 3.75 per cent; one paid 3.50 per cent; one paid 3 per cent; and two paid 2 per cent.

COST AND CAPITAL INVESTMENT PER MILE

The average cost of the street railways of the State, 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, was \$27,875.95 for construction, \$10,111.59 for equipment, and \$13,321.48 for lands, buildings (including power plants) and other permanent property, making a total average cost of \$51,309.02 per mile of main track.

INCOME AND EXPENDITURES

The total income of the companies from all sources, for the year ending Sept. 30, 1905, was \$28,638,251.58, and the total expenditures (including dividends) were \$28,256,066.46, making a net surplus of \$382,185.12 to be added to the surplus of previous years.

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, 1904 AND 1905

EARNINGS AND EXPENSES.	1904.	1905.	Increase.
Revenue from passengers,...	\$25,619,597	\$26,384,587	\$764,990
from mails and merchandise,	93,344	105,625	12,281
from tolls and advertising, etc.,...	494,306	551,079	56,773
Gross earnings from operation.....	\$26,207,247	\$27,041,291	\$834,044
Operating expenses,.....	18,397,291	18,269,259	128,032*
Net earnings from operation,.	\$7,809,956	\$8,772,032	\$962,076

* Decrease.

VOLUME OF TRAFFIC

The total number of passengers carried during the last year on the railways of the ninety-eight companies making reports to the board was 532,731,017, an increase of 12,674,506 passengers over the previous year.

The total number of miles run by street cars was 109,258,739, an increase of 1,361,283 miles over the previous year.

The following tables give for each of the last ten years the average gross earnings, operating expenses and net earnings from operation per car-mile run and per passenger carried, thus showing more in detail the changes from year to year in the earnings, cost and net results of operation:

GROSS AND NET EARNINGS FROM OPERATION PER MILE OF MAIN TRACK OWNED, 1896-1905

YEARS.	AVERAGE PER MILE OF TRACK OWNED.		
	Gross Earnings.	Expenses of Operation.	Net Earnings.
1896.....	\$11,627	\$8,274	\$3,353
1897.....	11,187	7,713	3,474
1898.....	10,098	7,589	3,409
1899.....	10,459	7,132	3,327
1900.....	10,452	6,878	3,574
1901.....	9,998	6,600	3,398
1902.....	9,609	6,510	3,099
1903.....	10,124	6,944	3,180
1904.....	10,178	7,145	3,033
1905.....	10,300	6,959	3,341

GROSS AND NET EARNINGS FROM OPERATION PER CAR-MILE RUN AND PER PASSENGER CARRIED, 1896-1905

YEARS	AVERAGE PER CAR MILE.			AVERAGE PER PASSENGER.		
	Gross Earnings.	Expenses of Operation.	Net Earnings.	Gross Earnings.	Expenses of Operation.	Net Earnings.
1896..	27.69	19.70	7.99	5.08	3.61	1.47
1897..	25.68	17.71	7.97	5.12	3.53	1.59
1898..	24.80	17.11	7.69	5.11	3.52	1.59
1899..	24.74	16.87	7.87	5.09	3.47	1.62
1900..	24.46	16.10	8.36	5.06	3.33	1.73
1901..	23.40	15.66	7.74	5.02	3.36	1.66
1902..	23.42	15.87	7.55	5.05	3.42	1.63
1903..	23.76	16.30	7.46	5.06	3.47	1.59
1904..	24.29	17.05	7.24	5.04	3.54	1.50
1905..	24.75	16.72	8.03	5.08	3.43	1.65

GENERAL DISCUSSION

The commendable features in the management of the Boston Elevated Railway would undoubtedly receive favorable criticism that is now withheld were it not for the crowding of stations and of cars at certain hours in the morning and evening. While the company during the year has brought into use more cars and trains, added to its force of employees, made changes at stations and introduced the change to side doors at the ends of cars, the public must await the completion of the Washington Street subway, now being constructed in a manner that challenges the admiration of those interested in such work; the

building of the extension to Forest Hills, with accompanying changes in stations, and the abolition of the Dudley Street railroad crossing, for which the board has recently approved plans, before the running of longer trains and a greater freedom in distribution of traffic will effectually relieve the still present evil of overcrowding.

In the last report attention was called to the unsatisfactory showing by street railway companies in their annual returns. The returns of the year that has just closed exhibit some improvement, but the fact remains that unwise promotion, increase in cost of operation and the sins of past managements in paying dividends with earnings that ought to have been used in renewal of properties, make the task of placing many of these railways upon a prosperous footing a difficult and tedious one.

There have been here and there increases in fares. Some of these, when reviewed by the board, upon complaint of communities affected, have been approved, some approved in part, others disapproved. As predicted, increase in cost of travel has resulted not infrequently in such decrease of patronage as to make the change unprofitable as well as unpopular. Upon the whole, however, there seems to be promise that companies under wise management will in time realize a reasonable return upon investment. The present heavy burden of reconstruction will doubtless afford the foundation for future profitable operation and tend to create a permanent dividend-paying basis. A management that recognizes this should be supported by stockholders for selfish reasons.

The practice of locking from the outside the door leading from the body into the front vestibule of street cars was recently criticized in an order of the board, in which it was held that companies in permitting this were adding a new peril to travel in case of mishap to the motorman or in case of collisions, in either of which it might be of great importance to reach the front vestibule from within the car.

This practice had been adopted by companies in the effort to prevent passengers from occupying the front vestibule, where they are likely to interfere with or discommode the motorman in his work, and so increase the liability of accident. The record furnishes abundant evidence that the crowding of vestibules has often been a cause of accident, and the taking of measures to prevent it is certainly to be commended.

To meet the objection to the present method of locking doors, it is proposed to adopt some device which will enable the conductor as well as the motorman to open them. In the opinion of the commission, legislation which would make the violation of a proper rule for the protection of motormen a criminal offense, would be desirable in the interest of safety.

The record of disaster upon steam railroads and electric railways had already greatly disturbed the public mind throughout the country, when several catastrophes within Massachusetts followed in rapid succession. The investigation of the board is not to fix either civil or criminal responsibility, but wholly for the purpose of suggesting measures to lessen the dangers of the future.

The first of a group of recent accidents occurred upon the Worcester & Southbridge Street Railway. An attempt, as the result of an understanding between the despatcher and the motorman, to make connection between a special car sent out late at night and a regular car upon another railway, was the underlying cause of reckless speed in approaching a sharp curve upon a down grade, which resulted in derailment of the car and death to two and injury to other passengers. The carelessness of employees and the failure of the management to effectually establish and enforce proper rules contributed to this accident. The board makes the general recommendation that in approaching sharp curves at the foot of heavy grades, street cars should always come to an absolute stop, at a point indicated by the maintenance of a stop sign.

Another accident of most unusual character took place upon the Boston Elevated Railway. As a train of four cars reached a cross-over between the drawbridge and City Square station in Charlestown, the forward truck of the rear car was derailed, the wheels being thrown to the right of the running rails. With the truck in this condition the train continued to move forward until it reached the inside steel guard rail at the curve near the station. At this point the derailed truck was thrown to the left, where it remained until the train was brought to a stop. A subsequent examination of the rear truck of the third car showed a broken pinion on the armature shaft of one of the motors and one tooth broken from the axle gear. As a result of these breaks, which arose from conditions that could not have been foreseen, the gears became wedged, causing the wheels to slide, and in so doing to make a flange on the outside of the tread of the wheel. This flange undoubtedly opened the switch enough to cause the forward truck of the rear car to leave the rail. The motorman in charge of the train, noticing trouble at Scollay Square, sent word for an inspector, and he was actually engaged in looking up the trouble, having reached the rear end of the second car when the derailment took place. One prominent factor in keeping the train upon the structure and preventing the loss of life that would have followed had it been thrown to the street below is found, we believe, in the type of construction. If there had been here the solid floor often advocated in the interest of quieter operation, it is altogether likely that in rounding the curve the cars would have been thrown into the street. Tied together as it was, the existing structure offered a resistance which a railway with solid flooring would not have given.

In approving a construction similar to this for the extension of the elevated railway to Forest Hills, against the objection of those who urged a solid floor, the action of the board was based upon the belief that in the climate of Boston this form of structure is safest. Its strength as proved in this test adds another to the reasons which seem to justify the selection.

ANNUAL MEETING AND BANQUET OF THE INDIANA ELECTRIC RAILWAY ASSOCIATION

At the January meeting of the Indiana Electric Railway Association the decision was made to ally this association with that of the Ohio Interurban Association, the combined association to be called the Central Electric Railway Association. The meeting just held will consequently be the last in the history of the Indiana Electric Railway Association. Negotiations for the amalgamation of the two societies were carried on in committee meetings and interfered very little with the regular programme. The meeting was the annual one, and in addition to the regular afternoon session, it included a 6 o'clock dinner in the ladies' dining room of the Claypool Hotel.

The afternoon session, which was held in the palm room of the hotel, was called to order by President Henry at 2:15 o'clock, with F. D. Norveil acting as secretary in the absence of Secretary Paul H. White. After the minutes of the previous meeting had been read and approved, President Henry suggested that as the election of officers was to be held at the close of the meeting that a committee on nominations be appointed. The committee as appointed later by President Henry consisted of A. A. Anderson, C. D. Emmons and H. A. Nicholl.

As chairman of the committee appointed at the December meeting to confer with a similar committee from the Ohio Association regarding a union of the two associations, Arthur W. Brady, president of the Indiana Union Traction Company, reported that the two committees had met the previous evening and that the Indiana committee was ready to report in favor of the proposed alliance. Some of the reasons for the decision, as stated by Mr. Brady, were that the maintenance of a per-

manent secretary, which would be possible by the union of the two associations, would be invaluable; information could be compiled, subject to the call of any member; facilities for advertising would exist, and many matters now handled in a disjointed manner could be taken care of systematically. As against these advantages, however, he pointed out some drawbacks to an alliance. The meeting place could not be as convenient a point to all, and wherever it was it would be difficult of access to some. But the objections did not counterbalance the advantages. Mr. Brady considered that the meetings could be held less frequently, and that members would then make a little more effort to attend them. Moreover, attending a meeting away from home would have more of an educational value.

At the conference of the committees, the question of a name for the combined association arose, and the name Central Electric Railway Association was proposed. As to the method of governing, the suggestion was made that there be two vice-presidents, one from Indiana and one from Ohio. As a vice-president is usually selected as president, this arrangement would cause the presidency to alternate between the two States. An executive board consisting of five members from each State was suggested. It appeared also that it would not be best to confine the association to Indiana or Ohio, as in the future it might be found advisable to include adjacent States.

Mr. Brady stated further that the Ohio Association had given its committee power to act, and that if the Indiana Association would give its committee the same power it would be possible to take action at once.

The report of the committee was adopted, and a motion was carried that a committee of five, with power to act, be appointed. The same committee that had previously carried on the negotiations with the Ohio committee was reappointed. This consists of C. L. Henry, president and general manager of the Indianapolis & Cincinnati Traction Company; C. C. Reynolds, general manager of the Indianapolis & Northwestern Traction Company; C. D. Emmons, general manager of the Fort Wayne & Wabash Valley Traction Company; Arthur W. Brady, president of the Indiana Union Traction Company, and W. G. Irwin, vice-president and general manager of the Indianapolis, Columbus & Southern Traction Company.

As there was no further miscellaneous business, the regular programme was taken up by Charles C. Mordock, superintendent of power of the Terre Haute Traction & Light Company, who presented a paper entitled "Steam Turbines." The paper described the turbine plant of the Terre Haute Traction & Light Company. The original plant, consisting of one 500-kw Curtis turbine, was described at some length in the *STREET RAILWAY JOURNAL* for Feb. 4, 1905. Since that time, however, a 1500-kw unit has been installed. A short time ago some tests were made on the smaller turbine by students of Rose Polytechnic Institute. These tests did not show as good results as it is believed the turbine is capable of giving, due to the fact that at the time of the test the condenser was in a leaking condition.

G. H. Kelsay, superintendent of power of the Indiana Union Traction Company, discussed the paper read by Mr. Mordock, and made some supplementary remarks concerning turbines.

Regarding the points of superiority of the turbine over the reciprocating engine, Mr. Kelsay mentioned that the turbine has a high steam economy over a widely varying range of loads, and hence was desirable for the rapidly fluctuating loads encountered on street railway systems. The uniform angular velocity of the turbine was also of great advantage when alternators were to be driven in parallel. The simplicity of operation, the low expense of maintenance, the fact that the steam economy is not affected by long service, and the ability to keep the condensed water free from oil and return it to the boiler were also strong points in favor of turbines.

Mr. Kelsay gave some comparative results of steam con-

sumption of reciprocating engines and turbines. The best results of turbine tests published, he said, gave a steam consumption of 11.17 lbs. per bhp. In this test the vacuum was 28 ins. and the superheat 182 degs. For reciprocating engines the best results gave 9 lbs. per bhp. This consumption was obtained on a four-cylinder, triple-expansion engine made in Switzerland. The efficiency of a turbine, he said, depended largely on the amount of superheat of the steam. If operated on saturated or moist steam there was considerable friction and erosion of the blades. The effect of superheat and vacuum on a turbine were shown by the fact that there was a difference of efficiency of 23 per cent between a test with 25 ins. of vacuum and 0 deg. of superheating of the steam and a test with 28 ins. of vacuum and 125 degs. of superheat. For each inch increase in vacuum there is an increase of about 5½ per cent in the efficiency.

A general discussion of the subject followed Mr. Kelsay's talk. In response to the question as to whether or not the efficiency of a turbine varied after it had been in service a few years, H. A. Nicholl stated that while he was connected with the Cleveland & Southwestern Traction Company, the 1000-kw turbines in that company's power plant, after a period of two years of operation, gave the same economy as when first put in service. They were, moreover, more economical on any load than were reciprocating engines.

Mr. Kelsay gave the following results of tests on the turbines referred to by Mr. Nicholl: With a load of 1557 kw, or 50 per cent overload, the consumption was 13.6 lbs. per ehp-hour; load 1239 kw, consumption 13.9 lbs.; load 767 kw, consumption 16 lbs.; and load 383 kw, consumption 20 lbs.

President Henry, in concluding the discussion, said it was a most interesting fact that in the adoption of the turbine we are going back to first principles, the first engines having been constructed on the principle of the turbine. Had it not been for the development of electricity, with the demand for a high-speed generating unit, most probably manufacturers would not have returned to this form of motor.

At the December meeting two questions in the question box were referred for answer to Mr. Brady and General Attorney J. A. Van Osdol, of the Indiana Union Traction Company. When called upon, Mr. Brady stated he was prepared to answer both questions, Mr. Van Osdol being absent. The first question read as follows: "Is a conductor on an electric car liable for embezzlement under the Indiana statutes in case he finds a ticket upon the street or in his car and gives it away, to be used by a passenger?"

Mr. Brady said that one statute provided that an employee was liable for embezzlement if he came in possession of a ticket belonging to the company while on duty and disposed of it. The ticket must belong to the company and must be appropriated with the intent to defraud. The statute is meant to apply to tickets not disposed of by the company.

The second question was: "What amount is a legal tender for the payment of fare on an electric railway in Indiana? Is a conductor justifiable in receiving a \$20 bill in payment of a 20-cent fare and giving the passenger an order on the company for \$19.80?"

The question of what is proper tender in payment of a fare, Mr. Brady said, must be solved by common sense. It is a rule of law that the exact amount due must be tendered. In a case in California it was held that a \$5 gold piece for a 5-cent fare was a legal tender, and the passenger recovered damages for ejection. In New York, however, the court held that the conductor did right when he ejected a passenger because a \$5 bill was tendered. The amount constituting a legal tender, Mr. Brady thought, depended upon the practice of the company and the size of the fare. The Indiana Union Traction Company charges \$1.40 for fare from Indianapolis to Logansport, and does not require that tickets be purchased at stations. In such a case, Mr. Brady thought, a conductor should furnish

change for more than \$5. Regarding the second portion of the question, Mr. Brady said that if \$20 was a reasonable tender, the conductor should give change and would have no right whatever to give an order on the company.

An additional question submitted was: "Have interurban and street railway companies become sufficiently numerous and wealthy as to make it possible to reduce the important item of insurance premiums by the formation of a mutual insurance company similar to the well-known factory mutual insurance association, which takes care of a certain line of risks?"

The report of the committee on nominations having been called for, the report was presented as follows: President, C. L. Henry; vice-president, Arthur Brady; secretary, F. D. Norveil; and also that H. A. Nicholl succeed A. L. Drum on the executive committee, and Charles Murdock and W. G. Irwin remain on the finance committee. The report was adopted unanimously.

The meeting closed with the report of the treasurer, which showed a considerable balance in the treasury.

THE BANQUET

At the banquet in the evening, Arthur W. Brady, as toastmaster, remarked that the dinner might be regarded as the wake of the Indiana Electric Railway Association, as the committees of the Indiana and Ohio Associations had met and the merging of the two societies was practically assured. After some preliminary remarks, he presented President Henry, adding that Mr. Henry was the pioneer in the interurban railway field in Indiana, and that he assisted in the birth of the first interurban road in Indiana.

Mr. Henry first referred to the loss which the association had met during the year in the death of J. W. Chipman, and to the fact that A. L. Drum had gone to another State. He then described in a most interesting way the history of the Indiana Union Traction Company. Mr. Henry's first plans for this road were made in 1893, and the company was organized in September, 1897. Among those associated with him in the early history of the road were N. J. Clodfelter, Philip Matter, John P. Frenzel, George F. McCullough, Hugh J. McGowan and Randall Morgan. There were many serious problems in the equipment and operation of interurban railways at that time, and the experience on the Indiana Union Traction Company assisted greatly in their settlement. Mr. Henry applied the word "interurban" to this class of road, and this term has since come into very general use, although it is not found in any of the dictionaries.

C. A. Baldwin, superintendent of transportation of the Indiana Union Traction Company, then offered the toast "Our Ohio Association." He welcomed the visitors of Ohio to the Indiana meeting and believed that the decision to amalgamate the two associations, as already outlined, would be profitable to all.

Edward C. Spring, president of the Ohio Interurban Association, upon being called upon, said that it was at first with fear that he crossed the border and stretched forth the hand of fellowship, but that all fear had been dispelled by the hand extended in return. He congratulated the Ohio Interurban Association upon having men like those of Indiana for co-laborers.

Mr. Drake responded to the toast "Supply Men," and Ernest Bross, editor of the "Indianapolis Star," replied to that of "The Press."

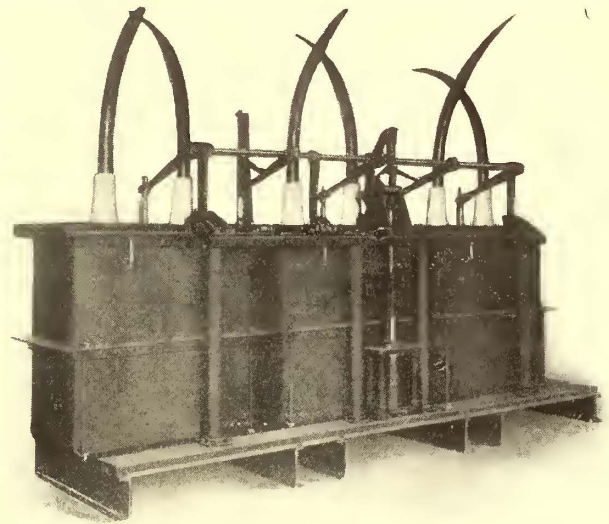
Just before adjournment, President Henry stated that the joint committee of the Ohio and Indiana Associations had decided to hold the first combined meeting of the two associations at Dayton, Ohio, Jan. 25. The following recommendations for officers for the combined association had been made: President, E. C. Spring, of Ohio; vice-president, F. D. Carpenter, of Ohio; vice-president, C. L. Henry, of Indiana; secretary, W. F. Millholland, of Indiana. The committee also recom-

mended that the executive committee of the new association be composed of thirteen members, of which the president and the two vice-presidents would be members ex-officio.

LARGE OIL CIRCUIT BREAKER

The breaker shown in the illustration was designed by the Westinghouse Electric & Manufacturing Company primarily for the Ontario Power Company's work. It is intended to handle energy up to 60,000 hp per three-phase circuit, and will open a circuit under any conditions of overload or short-circuit which may occur with a power house capable of delivering 200,000 hp. The insulation to ground and between terminals is designed to withstand a break-down test of 150,000 volts, and the insulation between poles is twice that amount since the poles are electrically separate.

The three poles of the switch are closed together by means of a toggle joint operated by a single direct-pull solenoid. The



LARGE OIL CIRCUIT BREAKER

switch is held in a closed position by the toggle being carried just beyond the center, and is tripped out by the tripping coil armature striking this toggle and knocking it backward, allowing the switch to open by gravity. Each pole of the switch gives a double break, each break being approximately 17 ins. The closing magnets require approximately 5000 watts direct current, while the tripping magnets require about 300 watts.

The oil tanks, of which there are three, are made of boiler iron, lined with an insulating material, with barriers interposed between the stationary contacts. The contact parts are of the manufacturers' standard type C construction, having renewable arcing tips and contacts. The leads, with their insulation and the upper porcelain insulators, may be readily removed from the switch, giving access to the contact parts for inspection and repairs. The top covers of the tanks are made of treated soapstone slabs, part of which are also removable. Each tank is provided with an oil drain opening in the bottom and an overflow just above the normal oil level. These openings are provided with standard 3-in. pipe flange threads, but no pipe is provided. Each tank has an oil level gage, and requires approximately 160 gals. of oil. The total weight of each three-pole switch complete, the tanks being filled with oil, is approximately 15,000 lbs. The oil alone weighs approximately 4000 lbs.

A two-pole, double-throw, indicating switch is provided upon each three-pole oil switch for use in connection with the controlling and indicating devices. The circuit breaker is not automatic in itself, an overload relay operated from series transformers being necessary.

AN EFFECTIVE ICE-LEVELER FOR BREAKING UP ICE AND HARDENED SNOW

For several years past the Gifford-Wood Company, of Arlington, Mass., and Hudson, N. Y., has manufactured along with other ice-handling devices, the "Eureka" ice leveler, which is specially adapted to break up ice and hardened snow on streets and around railway tracks. Among the railway companies who used this device last winter may be mentioned the Halifax (N. S.) Electric Tramway Company; Consolidated Street Railway Company, of Worcester, Mass., and the International Railway Company, of Buffalo, N. Y.

To do effective work with this leveler four horses are required. The wide runners can travel on the car rails by setting



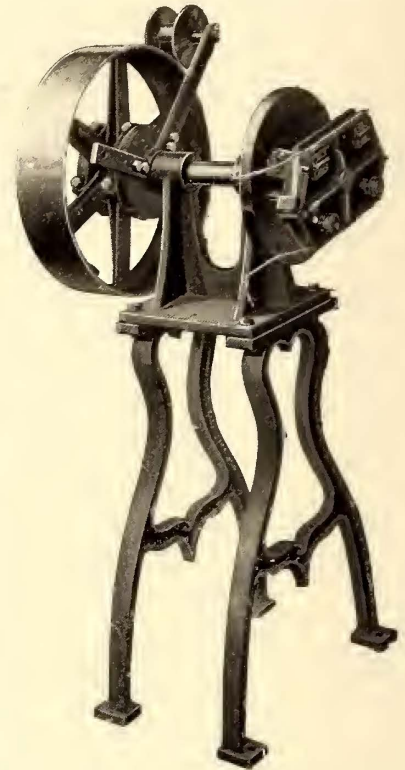
ICE-LEVELER IN SERVICE ON STREET

the levers in the proper notches, or they can be set for street work independent of the rails, the driver regulating the levers from his seat. The flanged teeth used to break up the ice are made of the best tool steel, well tempered to withstand hard wear before regrinding is necessary. An extra cutter bar, fitted with a full set of teeth, is furnished with every leveler, so that if the bar in use becomes dulled or damaged by stones, the duplicate bar can be immediately substituted, while the dull one is being sharpened. The teeth must not be allowed to become very dull, else they will not feed down below the surface of the ice. It is therefore advisable to have a dozen extra single teeth and bolts on hand besides the additional cutter bar, so that damaged single teeth can be replaced at once. The leveler alone weighs 750 lbs., and with the pole 825 lbs. The length of the cutter bar is 3 ft. 6 ins.; the distance between the runners on the centers, 3 ft. 9½ ins.; extreme width, outside to outside of the runners, 4 ft. 1½ ins.

The Jest and Song Club, of Schenectady, made up largely of mechanical and electrical engineers of the General Electric and the American Locomotive companies, has received a priceless gift from Robert E. Russell, son of the late Sol Smith Russell, the actor, whose art was known from one end of this country to the other. It is in the form of costumes and music that were used by this eminent actor in his many years upon the American stage, and were accumulated during a historic career of over thirty-five years. Young Mr. Russell is an active member of the club. The costumes will be used for the club's chief theatrical productions and at the coming performances on Feb. 20 and 21.

ARMATURE COIL WINDING MACHINE

The armature coil winding machine made by the Frank Ridlon Company, of Boston, Mass., and shown in the accompanying illustration, is very similar to the field coil winding machine made by the same company, except that it has no back gears and the face plate is designed to take armature coil forms. It is run with a loose belt, but provided with a pulley operated by a treadle for tightening the belt, so that the speed may be under control and any desired tension secured. In winding armature



ARMATURE COIL WINDING MACHINE

coils, the armature coil form is bolted to the face plate, as shown in the cut. The machine makes a very convenient tool for the shop of every railway doing its own armature winding. The height of the machine over all is 4 ft. 3 ins.; width, 20 ins.; length, 20 ins., and weight, 150 lbs. The frame is of cast iron, the shaft is made of steel and the face plate of wrought iron.

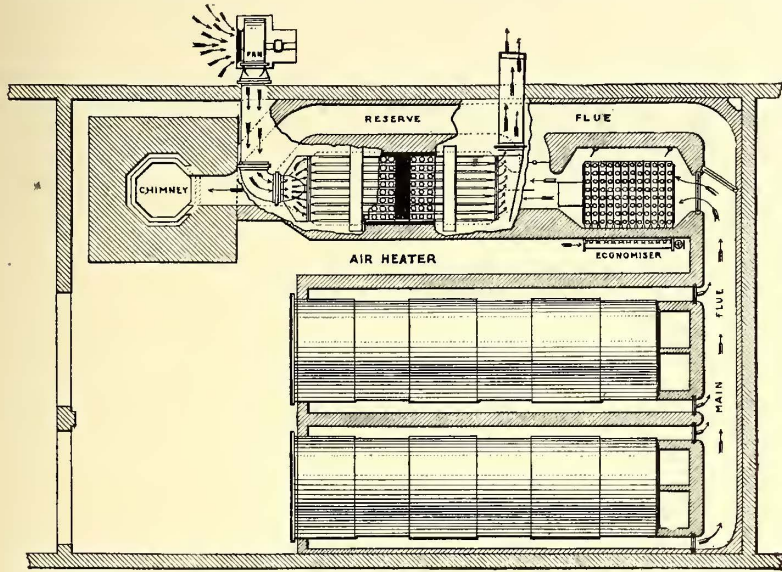
SPECIAL TOOLS FOR REPAIR SHOP WORK

The American General Engineering Company, of New York, is now placing on the market a number of unique machines for street railway shops. Many tools of this kind have been home-made, and this fact has suggested the idea that a market existed for time-saving tools especially fitted for repair shop work. The list includes a self-contained banding machine, giant car pit jack, armature and field coil winding machine, handy armature buggy, adjustable armature coil form, quick break fuse box, and the "perfect" oil cup for armature, axle and pinion bearings. In these machines especial attention has been given to the elimination of all complicated features, and the experience of a large number of roads has been drawn upon in their design. A considerable number of these tools have already been sold to street railway repair shops.

A new transfer check is being issued by the Worcester Consolidated Street Railway Company for the purpose of reducing the use of the transfer as a stop-over ticket. On the new checks every line is given, and they are not good unless used on the next car of that particular line.

AN ECONOMICAL AIR HEATER

Air may be heated and dried, in the same way that water is heated in an economizer, by the waste heat in the flue gases. The Green Fuel Economizer Company, of Matteawan, N. Y., has recently introduced a device for this purpose, called Green's air heater. It is constructed substantially like the well-known Green economizer, with the exception that, while in the econo-



AIR HEATER INSTALLED WITH ECONOMIZER

mizer all the water enters at the bottom header and passes out from the top header, in the air heater the air is forced by a fan first down through one set of tubes and up through another set, and then down again, and so on until it leaves the heater to be distributed by pipes to armature and field coil drying chambers, ear pits, etc.

The cast-iron tubes of the heater are 9 ft. long between headers, with an internal diameter of $3\frac{3}{8}$ ins., and are hydraulically pressed into the top and bottom boxes, which are of a sloping design to insure uniform velocity and distribution of the air in passing over from one series of tubes to the next. The air is kept moving at a good speed, and by this system of frequent redistribution through the tubes there is no possibility of short-circuiting or eddying. There are separate top and bottom boxes for each row of tubes, so that any number of rows may be set up together for any capacity of plant or amount of air required, while the number of groups in series may be increased if it is desired to prolong the time that the air is in the heater in order to bring its temperature nearer to that of the flue gases from which it receives its heat.

The cold air from the blower enters the heater at the end where the flue gases leave to pass to the chimney, while the heated air is taken out at the end nearest to the boiler, where the flue gases are the hottest. In this manner a uniform and high difference of temperature is maintained between the flue gases outside the tubes and the air inside the tubes, a condition required for the most rapid transfer of heat through a given amount of conducting surface.

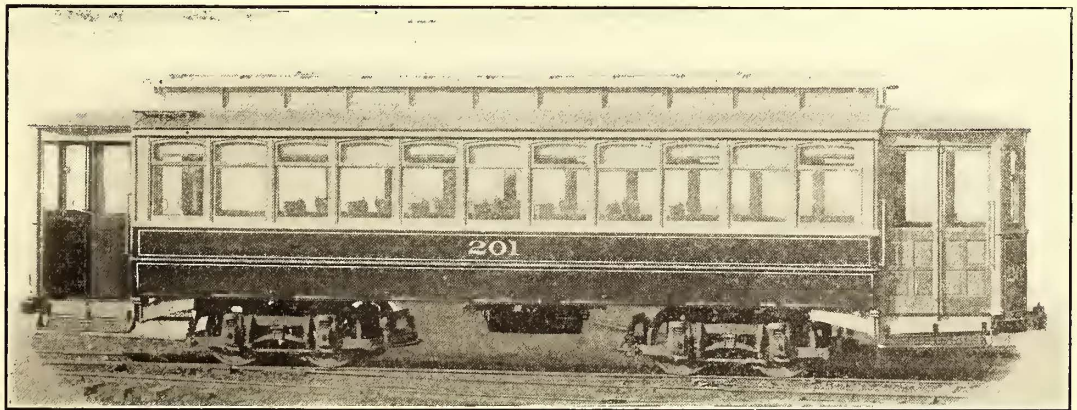
By means of suitable dampers and passages, it is possible to operate the economizer and heater together, separately, or to pass the gases to the chimney directly. Either or both of the devices can be cleaned or repaired while the boiler plant is in operation. It should be remembered that this air heater usually replaces steam heating coils for drying, and thus not only saves as much steam as would be required for the drying, and a corresponding amount of fuel, but, by relieving the boiler plant of this demand for steam, it increases by the same amount the steam available for other uses.

THE LEHIGH VALLEY TRACTION COMPANY'S NEW CARS

The two illustrations of ear interiors on page 124 give an idea of the difference between the height of the window sills and the width of the aisles between two semi-convertible ears, one with sashes, which drop into pockets in the side walls, and the other of the Brill type. Both were built by the G. C. Kuhlman Car Company for the Lehigh Valley Traction Company, and both measure 8 ft. 4 ins. over the posts. The one with wall window pockets has 35-in. seats, 19-in. aisle and window sills 30 ins. from the floor, while the seats of the Brill semi-convertible are 37 ins. long; the aisle, 22 ins. wide, and the window sills, 25 ins. from the floor.

There were twenty cars, ten drop-sash and ten semi-convertibles, in the order which was recently completed, and the general dimensions are as follows: Length over the end panels, 30 ft. 8 ins., and over the vestibules, 41 ft. 11 ins.; width over the sills, 8 ft. $\frac{1}{2}$ in., and over the posts at the belt, 8 ft. 4 ins.; the sweep of the posts, $1\frac{3}{4}$ ins.; the distance between the centers of the posts, 2 ft. 8 ins. The side sills are 4 ins. x $7\frac{3}{8}$ ins.; the center sills, $3\frac{1}{2}$ ins. x $4\frac{1}{4}$ ins., and the end sills, $5\frac{1}{4}$ ins. x $6\frac{7}{8}$ ins. Sill plates 15 ins. x $\frac{3}{8}$ in. are in the inside of the side sills.

The car interiors are finished in ash, with ceilings of decorated birch. The longitudinal seats at the corners accommo-



DOUBLE-TRUCK VESTIBULE SEMI-CONVERTIBLE CAR FOR THE LEHIGH VALLEY TRACTION COMPANY

date four passengers each. The transverse seats have high backs with head roll, and are of the Brill manufacture. The platforms are 5 ft. 6 ins. long, and are supported by a pair of angle irons at the center which extend 4 ft. 9 ins. inside the body bolsters. The outer platform knees are reinforced with angle iron. Iron-pipe uprights at the center of the platform entrances serve as grab handles, and at the same time divide the entrance, so that two passengers may enter or leave at the same time. The ears are mounted on No. 27-G trucks, having a 4-in. wheel base and 33-in. wheels.

The Lehigh Valley Traction Company operates practically all of the lines in Allentown and vicinity. It operates over 150

miles of track and has about 180 cars. The company furnishes power for operating a light plant, and owns Central and Manhattan Parks at Rittersville, both of which are reached by its

having a scraping edge adapted for contact with the rail. They are connected by a bar and are arranged for raising and lowering the scraping edges. To the connecting bar between the



INTERIOR OF CAR, WITH WALL POCKETS FOR THE PANELS



INTERIOR OF CAR, WITH ROOF POCKETS FOR THE PANELS

lines. The Philadelphia & Lehigh Valley Traction Company, which is controlled by the same interests, has a 50-mile line between Philadelphia and Allentown.

blades is attached a lifting chain operated by the motorman. The connection between the lifting chain and the bar permits lateral movement of the bar with reference to the chain, which would be caused by the relative movement of the car body and truck frame, due to passing around a curve. When the blades are in their lowered position, the bar rests on a ledge, which limits the downward movement of the blades.

A NEW TRACK CLEANER USED BY THE ROCKLAND, THOMASTON & CAMDEN STREET RAILWAY

For about a year the Rockland, Thomaston & Camden Street Railway, of Rockland, Maine, has been using successfully a track cleaner invented by Valentin Chisholm, the superintendent of this railway. The application of this device is made clear in the accompanying illustrations, of which Fig. 1 shows the track cleaner raised, and Fig. 2 lowered on a single-truck car, while Fig. 3 shows it in the raised position when used on a double-truck car.

When the blades are not in use, the motorman raises them by means of the chain and supports them in their elevated posi-

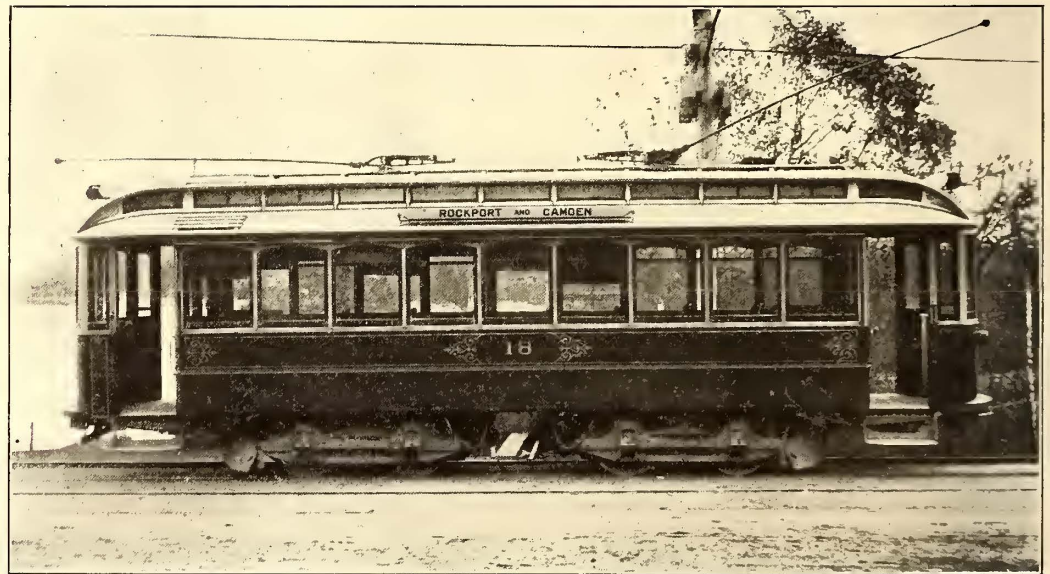


FIG. 3.—TRACK CLEANER APPLIED TO FRONT AND REAR TRUCKS OF CAR

The scraper blades, of which one is provided for each rail, are suspended directly from a wooden fender secured to the truck frame and placed in front of the wheels of the truck. The blades are therefore brought very close to the wheels, and as they are suspended from the truck frame rather than from the car, they are not thrown out of alignment with the rails

tion by hooking the chain over a suitable pin. It will be noted from the illustrations presented that the blades are placed at

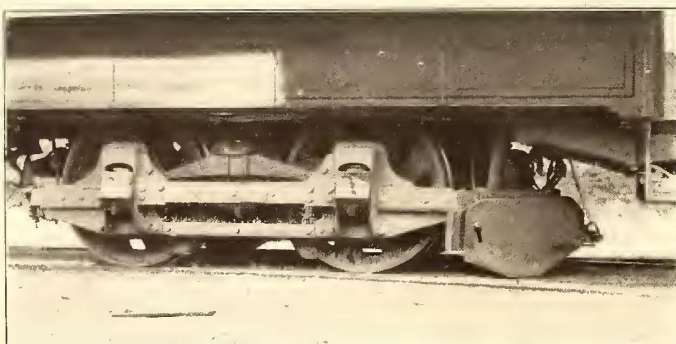


FIG. 1.—TRACK CLEANER RAISED

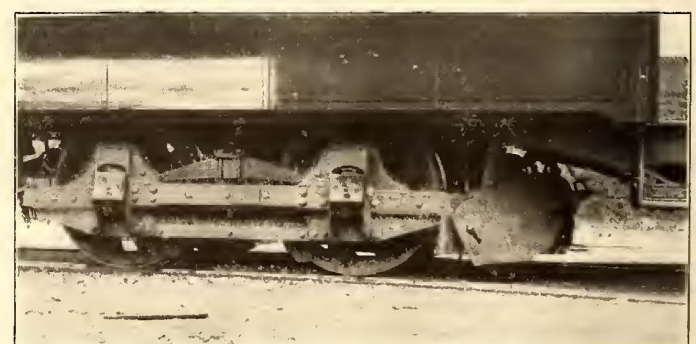


FIG. 2.—TRACK CLEANER LOWERED

even when the car is rounding a sharp curve. The blades are comparatively wide at the top and narrow at the bottom, each

an angle with the track so that the snow scraped away is thrown up on the outside of the rails.

FINANCIAL INTELLIGENCE

WALL STREET, Jan. 17, 1906.

The Money Market

Monetary conditions have continued to improve during the past week, rates for all classes of accommodations sustaining further sharp recessions, despite an increased demand for funds, resulting from an active speculation in stocks. The comparative ease which has characterized the market was due in a large measure to the heavy influx of funds from the interior, which have materially strengthened the cash reserves of the New York city banks. During the week ending Jan. 12, the gross receipts of currency amounted to more than \$17,000,000, being the largest on record for any one week. Since then the inward movement of funds has continued upon a large scale, and as there is every indication of a continuance of the movement in this direction for some time to come, a further relaxation in rates for both call and time loans may be expected. In fact, there is already some pressure of funds upon the market, money being offered in some quarters at $4\frac{3}{4}$ per cent for six months. The foreign exchange market has ruled firm throughout the week, prime demand sterling being quoted at $486\frac{3}{4}$, but at the same time the Paris money market has worked easier, thus preventing the exports of gold to that center which were threatened at the close a week ago. A noteworthy feature of the market during the week has been the active demand for American bonds by European investors. Large blocks of American railroad bonds have been purchased during the past week for London, Paris and Berlin accounts, which is regarded in local banking circles as highly important at this time, as the purchases of these securities are likely to have an important bearing upon the foreign exchange situation. The bank statement published on last Saturday was an extremely favorable document. Loans increased only \$383,300. Deposits increased \$13,463,400. Cash increased \$15,603,500, which was considerably more than expected. The reserve required was \$3,365,850 more than in the preceding week, which deducted from the gain in cash, resulted in an increase in the surplus reserve of \$12,237,650. The surplus now stands at \$12,808,650, as against \$571,100 in the previous week, \$24,459,275 in the corresponding week of last year, \$23,181,750 in 1904, \$20,217,125 in 1903, \$19,061,450 in 1902, \$27,256,600 in 1901, and \$16,707,350 in 1900.

Money on call has been in active demand and liberal supply at rates ranging from 4 to 8 per cent, the bulk of the business being transacted at $4\frac{1}{2}$ and 5 per cent. Sixty-day money opened at 6 per cent, but later declined, and was offered freely at $5\frac{1}{2}$ per cent. Three to six months' maturities were obtainable in quantities at 5 per cent, as against $5\frac{1}{4}$ and $5\frac{1}{2}$ per cent quoted a week ago. Commercial paper has been fairly active, specialists reporting an active demand for choice names by out-of-town institutions at 5 and $5\frac{1}{2}$ per cent.

The Stock Market

While some irregularity attended the movements in prices on the Stock Exchange during the past week, the tendency was again unmistakably upward, and the undertone may be described as decidedly strong. The volume of business was not extraordinarily heavy; nevertheless, the market at all times was an active one, and there was unquestionably a further increase in outside interests, as reflected in even larger buying orders through commission houses than was noted in the previous week. In some cases there was distribution of stocks by those who had made purchases at materially lower levels, but on the whole the demand was far better than the supply, with a result that in not a few instances the highest prices of the current upward movement, and in some stocks the best figures on record were reached. Considerable attention was devoted to the foreign political situation, particularly as applied to the Moroccan affair, and this had a tendency to check the rising current at intervals, but apart from this the governing factors were once more of a strong bullish nature. Monetary conditions improved perceptibly, not only as regards rates for both call and time money, but also with reference to the local bank situation, the clearing house institutions having made large additions to their cash resources, chiefly from interior cities. In practically all lines of general trade the same favorable conditions that have been referred to from time to time still prevail, and there was evidence of an extremely healthy condition of affairs in our foreign trade, the Government figures of our exports for December

last showing a total value of nearly \$200,000,000, much the largest of any month on record, and an excess of exports over imports of \$98,553,705, this also being a new high record. The foreign exchange market continued firm, but at the same time the demand for gold at Paris was nothing near so urgent as of late, and in consequence the threatened export movement of the precious metal from this country did not materialize. As on numerous occasions in the recent past the sharpest advances that took place in stock prices were confined to the industrial shares, notably those of the iron and steel and railway equipment companies; however, there were considerable gains in a number of the standard railway shares, not the least important of which were scored by the anthracite coal stocks, on the general belief that a satisfactory arrangement will be made with the miners between now and next April, when the present contract expires. Union Pacific, Great Northern preferred, and several of the trunk line stocks were among the strongest features of the week.

The principal feature of the week in the local traction group of stocks has been the great activity and sharp advance in Brooklyn Rapid Transit, which was generally considered to have some bearing upon the rumors that the company would in some way be included in the merger of all the local traction lines. The shares of the other companies, while generally strong, were comparatively inactive, and the principal disposition appeared to be to await the details of the consolidation, which are expected at almost any time.

Philadelphia

Trading in the local traction stocks has been upon a much smaller scale during the past week, but prices generally have displayed decided firmness. Philadelphia Rapid Transit was again the active feature, upwards of 14,000 shares changing hands, at prices ranging from 32 to $32\frac{7}{8}$, the final transaction taking place at $32\frac{5}{8}$. Philadelphia Company was more animated than in the preceding week, about 12,000 shares being dealt in at from $51\frac{3}{8}$ to $53\frac{1}{2}$, which was the closing figure. Small amounts of Philadelphia preferred brought $50\frac{1}{2}$ and 51. Fairmount Park Transportation gained a point further, 110 shares selling at $18\frac{1}{2}$. Philadelphia Traction was strong, odd lots aggregating more than 300 shares bringing prices ranging from $100\frac{1}{8}$ to 101. Small lots of Consolidated Traction of New Jersey brought 80 and $80\frac{1}{4}$, and near the close 100 shares sold at $80\frac{1}{2}$. Union Traction was fairly active and firm, about 700 shares being dealt in at $62\frac{1}{2}$ and $62\frac{3}{4}$. Railways General sold at 7, and American Railways changed hands at 52. United Companies of New Jersey sold at 270 and $270\frac{1}{2}$.

Baltimore

Increased activity and strength characterized the trading in traction issues at Baltimore. United Railway issues were, by far, the overshadowing feature, both as regards activity and price movement. In the early dealings the market was extremely quiet, but toward the close there was heavy buying of the stocks and bonds at materially higher prices, on rumors of the purchase of the property by a New York and Baltimore syndicate, and a combination of the public utilities. Subsequent denials of the above rumors caused sharp reactions in prices for all of the company's issues. The 4 per cent bonds opened at 94, and advanced to $94\frac{3}{4}$, and closed at $94\frac{3}{8}$, about \$90,000 of them changing hands. The free incomes advanced from $67\frac{3}{8}$ to $71\frac{1}{2}$, the highest price recorded in a long time, but later reacted to $69\frac{3}{4}$, and closed at $70\frac{5}{8}$. Nearly \$600,000 of them were dealt in. The pooled incomes were traded in to the extent of \$380,000, at from $68\frac{1}{4}$ to 70 and back to 69. The free stock sold to the extent of 9000 shares, at from 15 to 19, and back to $16\frac{1}{2}$, while the deposited stock rose from $15\frac{3}{4}$ to 19, on the purchase of 23,000 shares. The final sale was at $17\frac{1}{8}$. Norfolk Railway & Light 5s were unusually active, \$60,000 bringing $97\frac{7}{8}$ and $97\frac{1}{2}$. Charleston Consolidated Electric 5s sold at 97 for \$57,000. Baltimore Traction 5s sold at $116\frac{1}{2}$ for \$2,000.

Other Traction Securities

The market for tractions at Chicago was extremely quiet and without feature. South Side Elevated sold at $97\frac{1}{2}$ and $97\frac{3}{4}$ for 300 shares. Chicago & Oak Park common changed hands at $7\frac{3}{8}$ and $7\frac{1}{4}$, and the preferred advanced from $26\frac{1}{2}$ to $28\frac{1}{2}$ on the purchase of odd lots. Metropolitan Elevated common was quiet at prices ranging from $26\frac{1}{4}$ to $27\frac{1}{4}$, but the preferred was fairly active, about 1700 shares changing hands at from $71\frac{7}{8}$ to $72\frac{1}{8}$. Northwestern Elevated rose from $66\frac{1}{4}$ to 67, on the expectations

of a dividend on the stock early next month, at a rate not to exceed 4 per cent per annum. The feature of the Boston market has been the activity and sharp advances in Massachusetts Electric stocks. The common, on transactions aggregating nearly 4000 shares, rose from 18 to 19½, and closed at the highest, while about 2500 shares of the preferred brought from 62½ to 70, the final transaction being made at 68¼. Other transactions were: Boston Elevated at 157, West End common at 99¾ and 99 and 99½, the preferred at 113½ and 113; one \$1,000 4 per cent bond of 1915 at 102, Boston & Worcester common at 25½, preferred 74½ and 74¾. In the New York curb market Interborough Rapid Transit has been fairly active and decidedly irregular, about 9000 shares changing hands at from 235½ to 236. The securities to be issued by the Consolidated Company were fairly active also, about 2100 shares of the new common selling at from 59½ to 57½, while about 1000 shares of the new preferred brought 99¾ and 99. The new 4½ per cent bonds were fairly active, upwards of \$400,000 changing hands at from 95 to 96 and back to 95½. New Orleans Railway 4½s sold at 91¾, and an odd lot of American Light & Traction preferred brought 105.

Security Quotations

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

	Jan. 10	Jan. 17
American Railways	52	52½
Boston Elevated	157	158
Brooklyn Rapid Transit	88¾	90¾
Chicago City	197	197¾
Chicago Union Traction (common)	107½	10
Chicago Union Traction (preferred).....	—	40
Cleveland Electric	83	83
Consolidated Traction of New Jersey.....	81	81
Consolidated Traction of New Jersey 5s.....	107½	107½
Consolidated Traction (sec. com.), W. I.....	—	57½
Consolidated Traction (preferred), W. I.....	—	98½
Consolidated Traction 4½s, W. I.....	—	95
Detroit United	94¾	94¾
Interborough Rapid Transit	234	234
International Traction (common).....	36	37
International Traction (preferred) 4s.....	75½	75
Manhattan Railway	160	160
Massachusetts Electric Cos. (common).....	18	18½
Massachusetts Electric Cos. (preferred).....	62½	69
Metropolitan Elevated, Chicago (common).....	27	28
Metropolitan Elevated, Chicago (preferred).....	70	71
Metropolitan Street	124¾	126½
Metropolitan Securities	73½	74¾
New Orleans Railways (common).....	38½	39
New Orleans Railways (preferred).....	84	85½
New Orleans Railways, 4½s.....	91	91
North American	101¾	101¾
North Jersey Street Railway	25	25
Philadelphia Company (common).....	51¾	53¾
Philadelphia Rapid Transit	32	32½
Philadelphia Traction	101	101
Public Service Corporation 5 per cent notes.....	95½	95½
Public Service Corporation certificates	69	70
South Side Elevated (Chicago).....	96	96
Third Avenue	138	138
Twin City, Minneapolis (common).....	120	119
Union Traction (Philadelphia)	62½	63
West End (common).....	99	99
West End (preferred)	113½	113

W. I., when issued.

Iron and Steel

The Pittsburg correspondent of the "Iron Age" reports that the United States Steel Corporation has purchased from the valley furnaces 85,000 tons of Bessemer pig for delivery during the first quarter at \$17.25, and also 40,000 tons for delivery during the second quarter at an advance. Negotiations for about 50,000 tons additional for the second quarter are pending. When the latter purchase has been consummated, practically all of the surplus Bessemer and basic pig iron in the valleys for the first half of this year will be out of the mine. The cast-iron pipe interests have been the heaviest buyers of pig iron lately. There have been numerous reports of large transactions for American account in the English markets. The structural shops are booking a good deal of work. The open winter thus far has greatly encouraged work which calls for wire products, and the new orders and shipments continue at a rate extraordinary for this season of the year.

CLEVELAND ROADS MAKE BIG GAINS

City and interurban properties in Northern Ohio made remarkable gains in earnings in 1905. The earnings for several of these properties for the years ending Dec. 31, 1904 and 1905, with the per cent of increase, are shown in the accompanying table:

	1904	1905	Increase, Per Cent
Lake Shore Electric Railway.....	\$669,000	\$786,000	17.2
Cleveland & Southwestern	475,361	543,226	14.3
Cleveland, Painesville & Eastern.....	225,000	243,000	8.
Northern Ohio Traction & Light Co... ..	895,731	964,000	6.5
Cleveland Electric Railway	4,750,000	5,300,000	11.8
Toledo Railway & Light Company.....	1,752,833	1,917,000	9.3

CHICAGO TRACTION MATTERS

At the meeting of the Chicago City Council Monday evening, Jan. 15, it was decided that the Council meet in a committee of the whole Thursday morning, to consider the traction franchise ordinances and the changes suggested in them, together with the Mayor's \$75,000,000 Mueller law certificate ordinance.

Regarding the Harlan amendments to the ordinances and other suggested changes, John P. Wilson, of the Chicago City Railway Company, said:

"I desire to state that we have carried on negotiations with this committee trying to formulate a contract by the terms of which the company would rehabilitate the road and surrender all its rights to the city of Chicago at the end of twenty years.

"I now state that the terms of the ordinance presented to this committee are as burdensome as the Chicago City Railway is willing to accept. If the Aldermen, in committee of the whole or elsewhere, deem it necessary to make vital changes in the ordinance, when they do so the company can give its answer. We do not believe any progress can be made by proceeding on the present lines."

Doubt is expressed as to whether an ordinance satisfactory to all concerned will be agreed upon in time for presentation to the people at the spring election. If no ordinance is agreed upon, the Mayor's \$75,000,000 Mueller certificate ordinance will, as stated by one Alderman, be put on the ballot. In regard to this, the Alderman said: "We think public attention has been called so thoroughly to the situation that it will be beaten, and that will clear the air considerably."

CONSOLIDATION IMPENDING AT BALTIMORE

Well-defined rumor has it that the proposed change in control of the United Railways & Electric Company, of Baltimore, will be followed by the consolidation of the United Railways Company, the Consolidated Gas, Electric Light & Power Company and the Baltimore Electric Light & Power Company, under the charter of the Maryland Securities Company, organized in 1902, which has remained dormant since then. Bertron, Storrs & Griscon, of New York, who are negotiating the deal for the purchase of the United Company, are understood to be in control of the rights of the Maryland Securities Company, so credence is given to the statements made. The United Railways & Electric Company now controls all the street car lines in Baltimore and the neighboring county. This consolidation was effected about ten years ago, when the City Passenger line was acquired by the combination of the Baltimore Traction Company and the City & Suburban lines, which had been merged some years previous. The financial plan of the merger was prepared by Messrs. Alexander Brown & Sons. Like the Railways Company, the Consolidated Gas, Electric Light & Power Company is the result of many small combinations. A little more than a year ago Messrs. Bertron, Storrs and Griscon purchased a majority of the stock of the Consolidated Company, but resold it to the Baltimore syndicate headed by S. Davies Warfield, president of the Continental Trust Company. It was soon after this that the gas company was consolidated with the United Electric Light & Power Company. The Consolidated's only opposition is the Baltimore Electric Power Company, but this company may be included in the final plan for the proposed merger. It is said that the syndicate has offered \$25 a share for the common stock of the United Railways & Electric Company, a majority of which is pooled by Alexander Brown, George C. Jenkins and Douglas H. Thomas, as trustees, who control, it is said, 75 per cent of the stock, or about \$11,250,000.

ENTERTAINMENT FOR BROOKLYN EMPLOYEES

The entertainment arranged for the employees of the Brooklyn Rapid Transit Company by the Brooklyn Rapid Transit Employees' Association is being held this week at the main clubhouse of the association in East New York. As previously stated in the *STREET RAILWAY JOURNAL*, there are two performances every day of a vaudeville bill of eleven numbers, one in the afternoon and one in the evening. Last year only one performance was given daily, except on Saturday, when a special matinee was held for the children, at which prizes were awarded in a series of novel contests between the young folks. Geo. W. Edwards, the secretary of the association, says that the record of attendance last year led to the decision of the extra performance each day so as to keep the evening attendance below 1000, which number can be accommodated with comfort.

The clubhouse is tastefully decorated with flags and bunting. There are a permanent stage and settings, with footlights and theater dimmers. Many of the small cities throughout the country have not, in fact, a place so well suited for entertainments nor so commodious and well equipped. As to the programme of attractions, it is all that could be desired for that particular class of entertainment. Included among those showing are many artists prominent in vaudeville in the Metropolitan district. A review of the programme will serve to illustrate the variety of the entertainment and give an idea of the character of the different features. To begin with, there is an overture on the piano. Then two clever German comedians, vocalists and dancers, entertain. Following them are two young women dancers who entertain with a novelty in which foils are used. A laughable baby farce is next introduced. Picture melodies follow by a very clever male singer, who introduces such popular airs as Starlight, etc. A rural comedy is next. This is followed by a series of remarkable feats at juggling, a feature of which is an act in which five hoops are kept in motion at the same time. Four pickaninnies are the next to entertain; they sing and dance. Feats of tumbling that rank the performances high in their art are then put on. The entertainment is closed with a series of moving pictures.

Thursday evening will be officers night. It is expected there will be an extra large attendance, as the officers have all signified their intention of being present. A feature that evening will be a special concert by the employees' band. The officers of the railway department of the Public Service Corporation of New Jersey have been invited to attend, but it is not known what evening they will come. The officials of the Jersey company are greatly impressed with the work being done in Brooklyn and are watching developments there, as it is said that they have under way on their own system work of a similar nature for the benefit of the men.

A publication to be devoted to the interests of the employees of the Brooklyn Rapid Transit Company is to be issued monthly, beginning March, under the auspices of the Brooklyn Rapid Transit Employees' Association. The new paper is to be known as "The Third Rail." There will be "feature" articles including fiction, and a complete résumé for the month of happenings in the various departments of the company. Distribution of the paper to the employees will be free, and according to plans now under consideration, will be made by the paymaster on salary day. This will insure everyone getting his copy, and eliminate the clerical work that would be entailed by keeping a subscription list. The initial circulation to employees will be upward of 10,000 copies each month. In addition to this, there will be the sales made on the stands of the company's elevated lines, which will make the total circulation more than 25,000 copies, for it is proposed to reach the general public by this and other methods. The price of a single copy will be 10 cents, and for the year \$1. The editorial department of the paper will be under the direct supervision of C. A. Parker, of the company, who will have as his assistant Percy Edrop, of the New York "American." The advertising will be managed by J. A. R. Studwell, who now controls the advertising privileges in the company's cars and on the elevated stations, and also operates the paper and candy stands on the stations.

In connection with the new paper, a novel subscription scheme has been started. To every member of the benefit association has been sent five certificate blanks, each of which represents the value of one year's subscription to the magazine, with the request by the officers of the association that the member use his best endeavors to sell the certificates, the price being only \$1 each, 20 cents of which he will be allowed to retain for the time and labor devoted to the cause. The name of the person to whom the certificate is sold must be written on the face of the certificate, and a record of the sale entered on the stub, the stub then to be torn from the certificate and returned, together with the 80 cents, to

the head of the department in which the member addressed is employed. As a further inducement to increase the circulation of the paper, the following prizes will be awarded by the association for the largest number of subscriptions sold by individual members: First prize, \$50; second prize, \$20; third prize, \$15; fourth prize, \$10; fifth prize, \$5. The prize contest will close on April 1.

LOUISVILLE COMPANY TO MAKE IMPORTANT IMPROVEMENTS

Improvements and extensions, involving the expenditure of not less than \$750,000, and possibly \$1,000,000, are to be made by the Louisville Railway Company this year. The plans, as outlined in a general way, comprehend the addition of a storage battery to the power equipment; the installation of two turbines; the extension of the Eighteenth Street road line 4 miles beyond its present terminus; the probable extensions of all the interurban lines of the company; the purchase of a large number of new cars, and the building of 10 miles of new lines in the city. It is understood that the improvements will be financed by the issuance of common stock to the value of \$1,000,000, which has been authorized but never used. Final action on this matter will be taken at the annual meeting of the stockholders of the Louisville Traction Company, the holding corporation of the Louisville Railway Company, in February. The company has power to issue \$400,000 in second mortgage bonds, which would pay for part of the improvements, but it is understood that the most popular plan is to dispose of common stock. The plan to dispose of the common stock at par would give the stockholders the right to subscribe for nine shares for each 100 shares owned by them.

NEWTON & NORTHWESTERN COMPLETING PLANS

The officials of the Newton & Northwestern Railway Company, which operates a steam line from Newton northwest to Rockwell City, Ia., have completed plans for making Fort Dodge the northern terminal, and work will be started in the spring on the construction of an extension from a point on the present line in Boone County to Fort Dodge. President H. Loring was in Fort Dodge recently making the necessary arrangements for carrying out the work. The plan includes the purchase of the property of the Fort Dodge Heat, Light & Power Company, which is now operating the heating and lighting plants in that city and also the street railway system; the construction of the extension above noted, which will be equipped for electric interurban service for passengers and operated as a steam line for freight. The City Council has already granted the Newton & Northwestern the right to lay track from a connection with the street railway tracks on Central Avenue and Sixteenth Street, along Central Avenue to Twenty-First Street. From Twenty-First Street the new road will run south, crossing the Great Western and Illinois Central tracks by means of overhead crossings on its way to the gypsum fields south of Fort Dodge. Thence the road will run south across the Des Moines River to a point on the present line of the company near Lanyon, Webster County. This extension will be about 20 miles in length. The survey has already been completed and much of the right of way contracted for. Associated with Mr. Loring is the banking house of Poor & Company, of Boston and New York. These houses financed the construction of the extension of the Newton & Northwestern from Fraser to Newton, and from Gowrie to Rockwell City. They recently took the property over and elected Mr. Loring president. Mr. Loring has departed for the East, where he is to let the contracts for the electrical equipment of the new extension. It is understood that the Newton & Northwestern will either equip its main line from Lanyon to Goddard and connect at that point with the Colfax line of the Interurban Railway Company of Des Moines, or else the section between Lanyon and Boone, and connect at Boone with the Des Moines-Woodward line of the Interurban Company, when the extension is built from Woodward to Boone. It is more than likely, however, that the officials of the Newton & Northwestern will conclude to electrify the entire line, as the road has never been a paying investment. If this be done, connections could be made for the Des Moines service at Boone and Goddard. While in Fort Dodge Mr. Loring made the statement that through electric service would be established between Fort Dodge and Des Moines just as soon as the necessary arrangements could be made after the construction of the extension noted above.

LONG ISLAND RAILROAD ORGANIZES HOLDING COMPANY FOR ELECTRIC PROPERTIES

The Long Island Consolidated Electrical Companies, the entire capital stock of which is owned by the Long Island Railroad Company, has been organized as a holding company for the purpose of taking over the control of the various subsidiary electric lines owned or controlled by the Long Island Company, as well as such other electric lines as may be purchased or constructed as feeders to the lines of the Long Island Company in the future.

An authorized issue of 4½ per cent 40-year collateral trust mortgage gold bonds, not to exceed in the aggregate the amount of \$10,000,000, is designed to cover the cost of acquired and constructed subsidiary electric lines, and to provide for the future development and extension of these and similar properties.

The electric lines above referred to as owned by the Long Island Company to be turned over to the Long Island Consolidated Electrical Companies are as follows: Huntington Railroad Company, Ocean Electric Railway Company, the Northport Traction Company, the Nassau County Railway Company, the Glen Cove Railroad Company, the Jamaica & South Shore Railroad Company. These lines were purchased, constructed and equipped at a cost, to Nov. 1, 1905, of \$779,235. The Long Island Company also owns one-half of the capital stock and bonds of the New York & Long Island Traction Company, and will acquire one-half of the capital stock and bonds of the Long Island Electric Railway Company, at a total cost, for its interest in both companies, of \$1,360,507. These securities are also to be turned over to the Long Island Consolidated Electrical Companies. These latter named properties were purchased jointly by the Long Island Company and the Interborough Rapid Transit Company, controlling the subway, elevated and surface lines in New York for the purpose of controlling and aiding in the local development of Long Island.

As shown above, the amount expended upon these properties for which bonds will be issued approximates \$2,140,000, and it is expected that about \$500,000 additional will be expended for new lines and extensions during the year 1906. The surplus earnings of these lines are estimated at \$100,000 per annum, and should be ample to take care of all fixed charges. By this means the Long Island Company will be enabled to provide the necessary capital, for some time to come, to acquire or construct such local electric lines as may be useful and necessary in building up and protecting its local traffic without having to draw upon its own treasury.

A special meeting of the stockholders of the Long Island Railroad Company is to be held in the office of the company in Long Island City, on Wednesday, March 14, for the purpose of considering and taking action upon a proposition to guarantee the payment of principal and interest of the bonds of the Long Island Consolidated Electrical Companies to an amount not to exceed \$10,000,000.

TERMINAL STATION FOR PHILADELPHIA

The Philadelphia Rapid Transit Company is reported to have completed negotiations with the Philadelphia & West Chester Traction Company for extensive terminal facilities at the intersection of Sixty-Fifth and Market Streets, Philadelphia. As a result, the Rapid Transit Company will erect a joint passenger station that will cost upwards of \$100,000, and the Philadelphia & West Chester Company will erect a trainshed west of the station that will cost more than \$50,000.

The management of the Philadelphia & Western Railroad, which is building a line from Sixty-Third and Market Streets westward to Wayne and Parkesburg, has about completed negotiations with the Rapid Transit Company for the use of the proposed passenger station, and it also wants the use of certain terminal track facilities. The contract will probably be signed within the next sixty days.

Plans for the passenger station have been drafted under the direction of Chief Engineer Twining. The station will be so constructed that the three railroads named will be able to have a joint waiting room. The West Chester Traction Company will erect its trainshed immediately west of the station. It will have accommodations for five trains. The shed will be used by the express trains to be installed between that terminal and West Chester, and by the Philadelphia & Garrettford electric road, which will run trains to Clifton Heights. The station and trainshed will be on the south side of the loop to be formed by the elevated railroad on the old Sellers tract of land.

The Philadelphia & Western Railroad will have its tracks on the north side of the elevated loop. An overhead bridge will connect the platform used by this road with the passenger station. Passengers from either of the suburban lines desiring to board the

elevated cars will do so by way of wide stairways descending from the overhead passageway. It is the purpose of these three roads to operate express trains without change from the center of the city to the terminals of the suburban lines as soon as the subway work is completed.

A. I. E. E. BUILDING FUND

The General Electric Company, in view of the great importance and utility of the United Engineering Building as a home and center for the engineering professions and arts, has made a contribution of \$25,000 to the land and building fund of the American Institute of Electrical Engineers. President C. A. Coffin, who takes a warm personal interest in the matter, has also sent his own check for \$5,000. The committee, which had already received gifts and pledges amounting to nearly \$70,000, is greatly encouraged by this generous support of its work. The fund is now, with other new subscriptions, well over \$100,000, and with renewed energy the committee has begun its canvas of the field, with the object of securing a second necessary \$100,000. About 600 members have already subscribed to the fund, and the committee expects to have no difficulty in at least doubling this number. It has just issued to the whole membership a handsome pamphlet, illustrating and describing the new building in course of erection in New York City, and detailing the steps that have been taken by the associated engineering bodies to give effect to Mr. Carnegie's original gift.

REORGANIZATION OF HUDSON VALLEY RAILWAY

The consent of the security holders of the Hudson Valley Railroad Company to a plan which will permit the reorganization of the company without foreclosure is being sought by a committee composed of John W. Herbert, James H. Caldwell, E. Clarence Jones and Frederick J. Lisman. The circular to the security holders says that if a receivership and foreclosure are rendered necessary by the failure of all the security holders to co-operate under the proposed plan of reorganization, a new mortgage will have to be recorded and the fixed charges of the company will be annually increased between \$15,000 and \$20,000, owing to the operation of the recently adopted law imposing an annual tax of one-half of 1 per cent on all new mortgages. The committee says that if a foreclosure is permitted a much heavier scaling down of the company's securities would be necessary than that which is now proposed.

It is proposed, in addition to the existing 5 per cent consolidated mortgage bonds amounting to \$4,000,000 and \$3,000,000 of common stock, to issue \$700,000 of 5 per cent non-cumulative debenture A bonds and \$2,500,000 of 2 per cent debenture B bonds. It is provided that after two years the B debentures may be converted into 5 per cent non-cumulative preferred stock. The holders of the present consolidated bonds are asked to surrender to the treasury of the company 20 per cent of their holdings of these bonds and to accept for the surrendered bonds an equal amount of debenture A bonds.

The holders of Hudson Valley Railway demand notes outstanding to the extent of \$202,125 are asked to accept an equal amount of debenture B bonds. Other amounts of the B debentures will be issued in even exchange for the rentals due by the Hudson Valley Railway Company and for the guaranteed stock of the North River Railway Company, which is leased to the Hudson Valley Railway Company. The Hudson Valley Railway Company car trust notes amounting to \$30,000 will be paid off in cash to be provided by the sale of debenture B bonds at 30.

It is proposed to sell at this price \$1,500,000 of these bonds, which will supply \$450,000 in cash. The right to subscribe to these bonds at the rate of \$5,000 for every hundred shares of stock is given to the holders of the company's common stock. The cash provided in this way other than that needed to pay off the car trust notes will be used to liquidate the floating debt, for improvements, and for general expenses.

The present common stock, according to the plan, is to be put in a voting trust for five years, the trustees named being John W. Herbert, E. Clarence Jones and James H. Caldwell. The trustees will have the right to sell all the stock upon the written consent of two-thirds of the holders of the voting trust certificates. The committee, it is said, directly controls three-quarters of all the company's securities.

Bonds of the Hudson Valley Railway Company were among the assets of the Merchants' Trust Company when that institution went into the hands of receivers. The Merchants' Trust Company held \$861,000 of these bonds as security for notes for \$746,862. These bonds were sold by the receivers of the Merchants' Trust Company last fall.

MOVING PLATFORMS FOR PASSENGER TRAFFIC

A dinner was given at the Waldorf-Astoria on Jan. 15, when Capt. Max E. Schmidt described and illustrated by lantern slides the application of the moving sidewalk to the passenger traffic of New York and Brooklyn bridges, as well as to other purposes of arterial travel in Greater New York. Capt. Schmidt was the inventor and engineer of the moving platform of this character installed on the long pier at the Chicago World's Fair in 1893. The subject was discussed by such prominent city officials as Comptroller Metz and ex-Comptroller E. M. Grout. There was a consensus of opinion that, while it might be difficult to apply the system to the old Brooklyn Bridge until such time as it is taken in hand for renovation and double-decking, it could be adopted immediately for such structures as the Williamsburg Bridge and the still incomplete Manhattan Bridge. Among those present were: General Eugene Griffin, L. B. Stillwell, Edward D. Adams, James C. Bayles, Stuyvesant Fish and T. C. Martin. Capt. Schmidt is to deliver his lecture again at an early date before the New York Electrical Society.

NEW SUBWAY CONSTRUCTION COMPANIES

A new company for the construction and operation of subways is being formed in Brooklyn, with J. Edward Swanstrom at its head. Mr. Swanstrom was president of Brooklyn Borough under Mayor Low. The company will, it is said, be capitalized at \$100,000,000. William C. Redfield, a manufacturer of Brooklyn, is one of Mr. Swanstrom's colleagues in the venture. Mr. Redfield, who was Commissioner of Public Works during the Low administration, is vice-president of the Home Trust Company, of Brooklyn, of which Mr. Swanstrom is president. Other men whose names are talked of in connection with the undertaking are Silas B. Dutcher, president of the Hamilton Trust Company, and David H. Boody, ex-Mayor of Brooklyn.

It is also announced that a syndicate had been formed to finance a railroad corporation to bid for the franchises of the routes laid out by the Rapid Transit Commission on the West and East Sides of Manhattan and in Brooklyn. The syndicate is composed of the same elements that constitute an embryo railroad company and a tunnel company already in existence. The tunnel company is the New York & Brooklyn Tunnel Company. It will not bid, however, for the rapid transit routes, but confine itself to the building of the tunnel. James E. Clark is mentioned as the head of the movement to organize the syndicate. Within a few days a franchise authorizing the construction of a tunnel under the East River has passed by purchase into the hands of the powers controlling the Interborough Railroad Company. This franchise permitted the building of a tunnel from a point on Park Row, near Ann Street, under the East River, to a point in Brooklyn not far from Park Avenue. The owner of this franchise is the New York & Brooklyn Railroad Company. A controlling interest, or about 51 per cent of the stock of this company, was owned by the Manhattan Transit Company, of which Joseph H. Hoadley is the head.

STATEMENT FROM BELMONT REGARDING SUBWAY BIDS

In a letter sent to the Brooklyn Transit Reform League a few days ago, August Belmont made his first announcement since the merger of the Interborough and Metropolitan Railway systems concerning his attitude on the question of subway building in all parts of New York City, and particularly in Brooklyn. He declared that the old policy of the Interborough Company of competing for all subways which are to be built, with a view to making a complete system throughout the city, would be the policy of the merger of which he is now in control. He said the Flatbush Avenue extension, in Brooklyn, would be pushed to completion without delay. Mr. Belmont's letter follows:

"In answer to your first question, the merger of the Interborough and Metropolitan does not alter the situation as far as the early completion of the Flatbush extension is concerned. It is being pushed with all possible vigor.

"In answer to your second question, the merger will not change the policy of the Interborough with regard to extensions. If there is any change it would be forced by the hostility of those who have arrogated to themselves representation of the city's interests, as well as of personal interests. They have assumed that the combined companies are incapable of conducting transportation properly and have charged them with the intention of refusing to serve the public. There need be no public anxiety occasioned by the adjustment of transportation matters in New York City.

"The combined companies seek to promote the efficiency of their service on sound and stable lines of operation, to the end that the public may be better served and that rapid transit facilities may be more speedily extended between the several boroughs."

CHANGE IN PERSONNEL IN BALTIMORE

Dating from Jan. 1, James R. Pratt will fill the office of assistant general manager of the United Railways & Electric Company, of Baltimore. This is a newly created office, and has been established to relieve General Manager William A. House of much of the routine of managerial work. Mr. Pratt began service with the company as motorman in 1891, and then changed to become a conductor. He kept this position for two years and was then taken into the claims department. He studied law in the meantime and was made an assistant claim agent. In 1900 he was made assistant to the general manager, and the following year became head of the claims department, which position he relinquishes to become assistant general manager of the entire property.

Coincident with this change, announcement is made that E. J. Paige, formerly assistant claim agent, has been made claim agent; H. C. Wells has been appointed assistant claim agent, and George Blatchley has been made assistant superintendent of transportation, vice Howard Foreman, deceased.

Mr. Paige started with the company in 1893 as a conductor, serving in that capacity for five years, when he went into the claims department, in which he has since served. Mr. Wells began service with the company as conductor in 1892, and after six years' service went into the department of which he has been made assistant. Superintendent Blatchley began his service on the cars and for some time has been chief inspector in the transportation department.

CONVENTION OF THE SOUTHWEST ELECTRICAL & GAS ASSOCIATION

A meeting of the executive committee of the Southwestern Electrical & Gas Association was held recently at the Oriental Hotel, Dallas, Tex. In addition to regular routine business, the following matters of interest were passed upon. It was voted that the association establish a question box, to be divided into the following departments: Electrical railway, electrical lighting, gas, telephone. C. A. Stichter was elected editor, H. S. Cooper, associate editor for the electrical railway department; C. A. Shock, for the telephone department; W. S. Rathell, for the gas department; J. W. McLendon, for electric lighting.

There were several invitations for holding the next annual convention before the committee. It was voted that in as much as the convention has never been held in Galveston, that the invitation from that city be accepted, and the convention be held there about the middle of May. The president appointed the following committee on entertainment: H. S. Cooper, Galveston; David Daly, Houston; Frank J. Duffy, Beaumont.

The president also appointed the following committee to secure papers for the next annual convention: H. T. Edgar, Ft. Worth; J. P. Crerar, Denison; E. W. Dunaway, Dallas.

Several applications for membership in the association were acted upon favorably.

PROPOSED INTERURBAN FOR DELAWARE

U. G. Glick, president of the Smyrna, Kent County & Delaware Bay Traction Company, of Dover, Del., was in New York last week in conference with Constructing Engineer Charles H. McCarthy, of Chicago, regarding the construction of the company's proposed line. Mr. Glick says that work will be begun soon, and that the line will be constructed from Clayton to Woodland Beach through Smyrna, a distance of 9 miles, and to Dover, the State Capital. Eventually, the entire county will be traversed, the new line to connect with a similar road to be constructed in Sussex County.

The organization of the company and the taking out of articles of incorporation in Delaware have necessarily been delayed, pending an opinion from the Secretary of State relative to a forfeit of \$35,000 now held by the State for non-compliance in constructing the road. President Glick now says that the new company will make a deposit with the Secretary of State and when the road is completed for the first 9 miles, ask for a refunding of the forfeit of the old company, the rights of which are now owned by the Smyrna, Kent County & Delaware Bay Company.

In order to lessen the delay in constructing the road, the company will make a proposition to the City Council of Smyrna to purchase the electric light and power plant there, with the intention of enlarging it to meet the requirements of the railway and to furnish power to the towns of Smyrna and Clayton and to private consumers along the route of the road.

CHANGES IN PERSONNEL OF PUBLIC SERVICE CORPORATION

A number of important changes were announced last week in the personnel of the railway department of the Public Service Corporation of New Jersey. The position of superintendent of transportation has been created and promotions have been made of a number of division superintendents. Newton W. Bolen, heretofore district superintendent of the lines of the company in Hudson, Bergen and Passaic Counties, has been appointed to the position of superintendent of transportation, in which he will have entire charge of this department, with offices in Newark. Under his jurisdiction will come all the lines in the State. The district superintendents will all report to Mr. Bolen. This change will permit Albert L. Stanley, the general superintendent of the railway department, to devote more of his time to the executive duties of his office.

Mr. Bolen became connected with the Public Service Company in 1903, under General Manager W. W. Wheatly. The first few months of his service were devoted to a study of the traffic problem of the separate systems then recently consolidated, with a view to recommendations as to the operation of the lines as a unit. After he had finished this work Mr. Bolen was appointed to the position he has just relinquished. He has been connected with the company continuously since 1903, except for a short term of service under Mr. Wheatly with the Mexico City Tramway Company.

Before becoming connected with the Public Service Corporation, Mr. Bolen was with the Brooklyn Rapid Transit Company. He entered the employ of a constituent of the present Brooklyn company when a mere boy, and was advanced until at the time of his leaving he was superintendent of the Flatbush and Bergen Street divisions under General Superintendent Dow L. Smith. It was during Mr. Bolen's connection with the Brooklyn company that the movement had its inception which has resulted in the present elaborate employees' beneficial organization there, and to Mr. Bolen's care was entrusted the details of arranging the employees' rooms at the Crosstown depot, the first in Brooklyn to be so equipped. During the Spanish-American War, Mr. Bolen rendered valuable service to the Government as an attaché of the War Department, in which capacity he assisted in the work of arranging the movement of troops from the East to the point of embarkation.

A change has been made in regard to the management of the lines heretofore under Mr. Bolen's supervision, the duties being divided between E. L. Williams and W. B. Graham. Mr. Williams, who was division superintendent of the Jersey City lines, will act as district superintendent of lines in Hudson and Bergen Counties, while Mr. Graham will have charge of the Passaic County lines, included in which are the lines in Paterson. Both Mr. Williams and Mr. Graham were also formerly connected with the Brooklyn Rapid Transit Company. Mr. Williams was assistant to E. F. Reeves when the city operated the shuttle train service over the Brooklyn Bridge, and became associated with the Brooklyn railway system when the bridge railway property was taken over by the Brooklyn Rapid Transit. He has been connected with the Public Service Corporation since 1903. Mr. Graham was until recently general superintendent of surface lines of the Brooklyn Rapid Transit Company. He was formerly connected with the Twin City Rapid Transit Company, from which he went to Brooklyn in 1902.

A. J. Bliss, division superintendent of the Hoboken lines, has been appointed to succeed Mr. Williams at Jersey City, and G. C. Dust has been transferred from Paterson to Hoboken. Mr. Bliss has been in the employ of the company a number of years. Mr. Dust formerly was with the St. Louis Transit Company, serving in the traffic department.

By the changes, the office of traffic superintendent is abolished. John N. Akarman, who held that position, will fill the newly created office of general passenger agent. Mr. Akarman was formerly general manager of the Worcester Street Railway system. The office of James Leahy, who resigned as superintendent of maintenance and way more than three months ago, is filled by the series of promotions. Martin White, who was one of Mr. Leahy's division men and was roadmaster of Division A, will take his

place. P. A. Clerkin, of Jersey City, takes Mr. White's place as roadmaster of Division A. He will have his offices in West Hoboken. The changes also create the position of chief engineer of maintenance and way. This position will be filled by Martin Schreiber, one of the company's corps of engineers.

BANQUET OF THE OHIO ASSOCIATION

The second annual banquet of the Ohio Interurban Railway Association will be held at the Algonquin Hotel, Dayton, Thursday, Jan. 25, at 6 p. m. The banquet committee consists of Edward C. Spring, chairman; Harrie P. Clegg, F. W. Coen, A. W. Anderson, R. A. Crume, John F. Ohmer, E. B. Wright, E. B. Grime. A number of prominent street and interurban railway officials and other well-known men will attend. Business meetings of the association will be held in the morning and during the afternoon of Jan. 25.

DEVELOPING FREIGHT PLANS IN MASSACHUSETTS

A certificate of incorporation has just been issued from the office of the corporation department in Massachusetts which is expected to have an important bearing on the development of electric railway express business in that State. The certificate goes to E. P. Shaw, Walter E. Simmons and William R. Buckminster, constituting them and their associates a corporation to be known as the Boston Suburban Securities Company, "to finance or assist in financing any firm, association or corporation engaged in the transportation of express matter," and "to dispose of the securities, or property, or business of established express lines."

The interesting thing about this new corporation is its possible relation to the voluntary association organized some time ago under the name of the Boston Suburban Express & Parcel Company, which was regarded as a merger of a number of suburban and other express companies with a view to establishing systems for distribution and collection of matter to be transported between cities by the express-carrying trolley lines. E. P. Shaw is president of that company, and express interests already established are understood to hold a goodly proportion of the stock. Now comes the new company, also with Mr. Shaw at its head, evidently planning to act as a holding company for the association or any other companies that appear in the trolley-express situation in Boston.

The new corporation's capital stock named in its certificate is \$40,000, divided into 400 shares. Of these Mr. Shaw is down as holding 266, Mr. Simmons 133, and Mr. Buckminster 1. Mr. Simmons is understood to act as financial representative of A. Shuman, who is at the head of the well-known clothing house in Boston and a leading member of numerous commercial organizations in the city. Mr. Buckminster is the lawyer who attended to the legal details of the incorporation.

The fact that E. P. Shaw is the father of James F. Shaw, of the Boston & Worcester Street Railway, has led to an assumption that the express company combination is intended to further the plans of the Boston & Worcester Company. At present the project appears much broader than this, however. That the new company is likely to have a field of considerably greater breadth, is indicated by the rapid progress toward freight and express privileges recently made by the Old Colony Street Railway. The work of the Old Colony among the local authorities in its territory—the southeastern district of Massachusetts—has already been noted in these columns; and on Monday last the company took the next step required under the Massachusetts law and petitioned the Railroad Commissioners for their approval of its rights to act as common carrier of express and freight in the cities of Brockton and Taunton, and the towns of Easton, Raynham, Dighton, Rehoboth and Sekonk. These towns indicate a line of traffic from the important shoe city of Brockton to Taunton, a mill city, and thence to Providence and the steamship lines centering there, the entrance into Rhode Island territory being effected over lines with which the Old Colony already is understood to have an agreement. This development of express business around Taunton may affect the similar development which has recently been pushed on the Taunton & Pawtucket Street Railway, and the old Bristol County line, which was taken over some time ago by the firm of Choate, Hall & Stewart, of Boston.

It is reported that the Georgia Railway & Electric Company will extend its line on Peachtree Road from Brookwood to Buckhead, which is 10 miles from Atlanta. The roadway will be widened 30 ft., making it 80 ft. wide.

AN IMPORTANT MOVE OF A LARGE COMPANY

Announcement was made last week that Rossiter, MacGovern & Company had decided to enter the engineering and contracting field as engineers and contractors for all classes of work. A specialty will be made, however, of engineering and contracting for steam and electric railways and electric power plants. The company has recently increased its capital to double what it has previously been, and has elected J. C. Brackenridge president. The new capital is being supplied in large part by Mr. Brackenridge and others whom he has brought in as stockholders in the reorganized company.

Mr. Brackenridge is well known in the traction field through his connection with the Brooklyn Rapid Transit Company, first as chief engineer and later as general manager. His association with



J. C. BRACKENRIDGE



F. S. MACGOVERN

the Brooklyn Rapid Transit Company extended over a period of ten years, during which all of the more recent power stations of the company were built, the greater part of the elevated railway system electrified, and the operation of the cars extended over the present Brooklyn Bridge, all of which was accomplished under his immediate supervision. Mr. Brackenridge resigned from the Brooklyn Rapid Transit Company two years ago to accept the position of Commissioner of Public Works, of Brooklyn, which office he occupied until the first of the current year.

Frank S. MacGovern, under whose able direction the present success of the company has been attained, continues as vice-president and general manager, and James R. Floyd, Jr., as treasurer. Clinton L. Rossiter, who was formerly president, has resigned from that office, but remains a member of the executive committee and is still actively connected with the company.

Rossiter, MacGovern & Company have enjoyed a most prosperous career since they commenced business. The enterprise was started about fourteen years ago to engage in the purchase and sale of electrical and steam apparatus. An excellent reputation was soon established, and business increased so rapidly that it became necessary to incorporate the firm seven years ago. During recent years the amount of the company's actual sales of electrical apparatus has been exceeded by that of few, if any, of the electrical manufacturing companies in the country outside of the very largest. As an adjunct to its business, the company established sometime ago a repair shop in Jersey City and offices in St. Louis and Boston. The plans of the company to engage as engineers and contractors will not interfere with its present well established business of the purchase and sale of electrical and steam apparatus of all kinds. In fact, the company proposes to erect another large repair shop in the neighborhood of New York, on the water front, to replace its present shop in Jersey City, but the location of this shop has not yet been decided.

The board of directors of the company is a strong one, and includes J. C. Brackenridge, Frank MacGovern, Clinton L. Rossiter, D. H. Valentine, who is a director of the Brooklyn Rapid Transit Company, and Edward Rossiter, treasurer of the New York Central & Hudson River Railroad.

INTERURBANS SEEK TO ENTER MILWAUKEE

Franchises for two electric railways have been asked of the Common Council of Milwaukee, one by the Milwaukee-Northern Railroad Company, to enter the city from the north, and the other by the Chicago & Milwaukee Electric Railway Company, coming from the south.

The Milwaukee-Northern Company asks a franchise ordinance granting it the right to build an electric street railway from the

north city limits, near Sixth Street, almost in a direct line south to the southern city limits, passing through the downtown district. It is proposed to make this line a part of an interurban system which eventually will run from Fond du Lac to Sheboygan, thence down the lake shore to Kenosha, where it will connect with the line to Chicago. Franchises are also being asked of the Common Councils of Port Washington, Sheboygan, Fond du Lac and Cedarburg.

A thirty-year franchise is asked. The proposed ordinance provides for a 3-cent fare in the city "until the company shall have constructed cross lines so that transfers can be issued"; that the company must construct lines wherever the Common Council believes there is a reasonable necessity therefor; that the tracks of the company may be used by any other interurban system which shall acquire a franchise and which shall fairly compensate the Milwaukee-Northern for the use of the tracks; that the Milwaukee-Northern must pay one-third of the expense of building the disputed portion of the Sixth Street viaduct if the Milwaukee road cannot be compelled to pay for it, and that the company shall care for the streets between its tracks.

In consideration for the franchise the company agrees to furnish the city with sufficient electricity to operate all of its swing and bascule bridges. Firemen, policemen and health officials will be permitted to ride free in the city, and the city will be given the right to purchase the property of the company within the city limits at a cost price to be determined by arbitration. The franchise contains clauses relating to the care of streets, and the replacement of pavements in good order after they are disturbed by the company. The company is required to file a bond of \$25,000 to carry out the provisions of the ordinance, and it is provided that 2 miles of road must be in operation within 15 months after the franchise is accepted. The principals back of the Milwaukee-Northern Company are Messrs. Comstock, Haigh and Walker, of Detroit.

STREET RAILWAY PATENTS

[This department is conducted by Rosenbaum & Stockbridge, patent attorneys, 140 Nassau Street, New York.]

UNITED STATES PATENTS ISSUED JAN. 2, 1906

808,679. Disappearing Seat; Charles K. Pickles, Philadelphia, Pa. App. filed Feb. 9, 1905. An aisle seat and back adapted to be folded, lowered and stored beneath an adjacent seat.

808,716. Brake System; Charles E. Barry, Schenectady, N. Y. App. filed Aug. 13, 1903. Relates to an air brake system provided with novel means for reducing the brake pressure gradually as the speed decreases.

808,773. Surface Contact Electric Railway; George H. McFeaters, Johnstown, Pa. App. filed Aug. 15, 1904. A contact box having an upper fixed electrode and lower movable electrode, a flexible conductor connecting the moving electrode with the supply side of the system, and a diaphragm of insulating material below the movable electrode and covering the flexible conductor to prevent arcing.

808,778. Motor Control System; William B. Potter, Schenectady, N. Y. App. filed Aug. 10, 1904. Relates to a system of operating cars from 500-volt circuits, and high potential alternating circuits at different times. Transformers are employed for stepping down the high potential alternating current to about 200 volts, at which it may be utilized on the ordinary series motor.

808,783. Trailing Fender; Emmet G. Solomon, Omaha, Neb. App. filed Nov. 20, 1903. A folding framework projecting from the rear of a car to prevent persons passing behind said car in front of a car approaching on the other track.

808,797. Track-Sanding Apparatus; Friedrich W. Wittkowski, Des Moines, Ia. App. filed Feb. 27, 1905. The discharge pipe is rendered flexible by telescoping connections whereby it will swing with the truck when rounding curves.

808,852. Trolley Device; Frank J. Ludolph, Rochester, N. Y. App. filed July 18, 1905. The harp is made in two parts and provided with adjustable journal boxes for the trolley axle. The spokes of the wheel are formed of stud bolts, which can be screwed inward so as to remove and replace the tread portion of the wheel.

808,904. Combination Rail and Tie Fastener; Francis M. Crossley, Dayton, Ohio. App. filed Sept. 21, 1905. A clamp adapted to be slipped over the end of a metallic cross-tie is provided with a lip for engaging the flange of the rail and a set screw for holding the same in position.

808,905. Walk-Over Car Seat; Samuel M. Curwen, Philadelphia, Pa. App. filed May 16, 1904. A wall plate for walk-over seats, having mortises of varying depth and socket-pieces fitting the mortises and adapted to receive portions of the back of the seat.

809,028. Automatic Safety Railway Crossing; Thomas Squires, Mariposa Township, Ontario, Can. App. filed April 29, 1905. When the vertically swinging gates are lowered at the intersection of steam and trolley roads, switches are closed on each trolley track to switch an approaching car onto a track parallel to that of the steam road.

809,120. Electric Railway. Charles Levinson, New York, N. Y. App. filed July 18, 1905. Means for preventing the starting of a train until the gates have been closed, consisting in locating a plurality of switches in the driving motor circuit of every car of the train, said switches being operated by the gates.

809,226. Wire Carrier; Frank L. Sessions, Columbus, Ohio. App. filed July 17, 1902. The hanger is provided with clamping levers thereon which engage the wire ends and tighten them into alinement with one another when the clamping levers are spread apart.

809,236. Electromagnetic Switch-Setting Apparatus and Electric Rail Heater; Bruno O. Wagner, Swissvale, Pa. App. filed March 9, 1905. A reciprocating electric motor contained in a casing adapted to operate the switch point. Also comprises a casing secured to the under side of the switch rail base-plate, and containing a plurality of heating coils embedded in suitable material.

UNITED STATES PATENTS ISSUED JAN. 9, 1906

809,434. Rail-Joint Chair; Aurelius M. Ewing, Seattle, Wash. App. filed Sept. 11, 1905. Comprises superimposed plates adapted to be interposed between the rail and a tie and each extending laterally upon both sides of the rail, the upper plate being folded upon itself for engagement with the base flanges upon one side and the lower plate folded over and embracing one extended side of the upper plate and for engagement with the base flange of the opposite side.

809,536. Rail Joint; Charles H. Stephens, Bartlett, Tex. App. filed Aug. 17, 1905. Embodies a tie plate or base provided with a longitudinal groove to fit the base of the rail and with a spring splice-bar and fish-plate rigidly secured to the base and gripping the side of the rail under the shoulders of the latter.

809,627. Brake-Shoe; William H. Namack, Ballston, N. Y. App. filed May 2, 1905. Comprises a body and a lug having longitudinal and transverse openings therein and consisting in part of bifurcated portions partially embedded in said body.

809,630. Trolley Attachment; Edward D. Rockwell, Bristol, Conn. App. filed May 17, 1905. A yoke-shaped contact block adapted to be easily and quickly fitted into the trolley harp in case the wheel wears out when the car is at a distance from the stable or repair shop. The device may also be used to remove ice from the trolley wire.

809,632. Anchor Emergency Air Brake; Charles Z. Sanders, Sacramento, Cal. App. filed May 1, 1905. A pair of clamping jaws pneumatically actuated to grip the rail.

809,658. Brake-Shoe; Horace L. Winslow, Chicago, Ill. App. filed Feb. 17, 1905. Comprises a back plate having depending lips, inserts having a dovetailed connection with the lips and a body having a dovetailed connection with the inserts.

809,707. Pneumatic Train-Control System; John B. Linn, Schenectady, N. Y. App. filed Oct. 16, 1902. A spring-pressed piston is moved varying distances within each car by the train-pipe pressure which serves to successively uncover ports in the side walls which lead to the successively pneumatically-operated conductors.

809,728. Electrical Heating System; Arthur D. Newton, Hartford, Conn. App. filed July 9, 1904. A car-heating system having a circuit which includes the heaters and an automatic switch that is opened and closed by a magnet which is included in a circuit which includes a thermostat that is engaged by contact which moves into various positions according to the amount of current the motors are using.

809,747. Hanger or Ear for Overhead Electric Trolley Wires; Abraham Richardson and Thomas S. Jones, Blackpool, England. App. filed Feb. 6, 1905. Consists of a pair of jaws having tapering shank portions and a threaded nut or sleeve adapted to force the jaws into clamping relation.

809,773. Emergency Operating Means for Reversing Switches; Frank E. Vase, Schenectady, N. Y. App. filed Aug. 23, 1904. Connections from the reversing switch to each end of the car in such a manner that by operating a lever upon either platform the switch will be thrown to give motor connections for movement in a direction reverse relatively to that platform.

809,774. System of Control; Frank E. Case, Schenectady, N. Y. App. filed June 12, 1905. A pneumatic train-control system in which a circuit breaker in the motor circuit is opened upon exhaustion of the pneumatic system when the motor circuit remains energized, but not when the motor circuit is de-energized.

809,794. Railroad System; Hannibal C. Ford, Jamaica, N. Y. App. filed Sept. 12, 1905. Automatic means for stopping a train in case the engineer passes a certain signal above a certain speed.

809,829. Street Car Fender; William Martin, Wilkesburg, Pa. App. filed Sept. 1, 1905. When an obstruction appears upon the track the motor releases a dog and the fender is thrown to operative position by spring means.

809,908. System of Control; Frank E. Case, Schenectady, N. Y. App. filed Oct. 1, 1904. A motor controller having electromagnetic actuating means, pneumatically-actuated devices for governing the operation of the controller actuating means, two pipes associated with the pneumatically-actuated devices and means for supplying said pipes with compressed fluid.

PERSONAL MENTION

MR. JAMES MILNE, of Toronto, has accepted the position of general superintendent of the British Columbia Electric Railway, of Victoria, B. C.

MR. EDWARD TAYLOR, formerly engineer of equipment and tests of the Brooklyn Rapid Transit Company, of Brooklyn, N. Y., has become sales agent for the H. W. Johns-Manville Company, of New York, for Milwaukee and the territory thereabout.

MR. W. E. REYNOLDS, assistant general manager of the Massachusetts Electric Railway, and Engineer Bancroft, of that company, who were in Toronto recently, made a careful study of the fare-box method of collecting fares in use in that city.

MR. FRANK SILLIMAN, JR., has resigned as general manager of the Scranton Railway Company, of Scranton, Pa., following the change of ownership mentioned in a recent issue. Mr. Silliman has been manager of the Scranton system since 1895.

MR. J. V. W. REYNDERS has been elected vice-president of the Pennsylvania Steel Company, and will have full charge of all the company's affairs at Steelton. Mr. John W. Dougherty has been appointed general superintendent of the Steelton works.

MR. W. H. FOLEY has resigned as cashier of the Fort Wayne & Wabash Valley Traction Company, of Logansport, Ind., and has accepted the position of chief clerk and cashier of the Atlantic City & Suburban Traction Company, with headquarters at Pleasantville, N. J.

MR. HARRY B. RENWOOD, formerly assistant division superintendent of the Mt. Clemens division of the Rapid Railway, of Detroit, has been appointed superintendent of the Lansing & Suburban Traction Company, to succeed Superintendent Street, who has resigned to take up another line of work.

MR. S. C. SCHENCK, who was formerly prominently connected with the railway detail department of the Westinghouse Electric & Manufacturing Company in its New York office, has resigned his position to become general manager of the Sterling Varnish Company, of Pittsburg, Pa. He will be located in Pittsburg permanently.

MR. CHARLES R. BELLAMY, general manager of the Liverpool Corporation Tramways, died Dec. 23. Eleven days previously Mr. Bellamy tripped on the steps of his house and injured the calf of his leg. His death was attributed to the clotting of an artery from the heart to the lungs, which was accelerated by the injury to the leg. Mr. Bellamy has been manager of the tramway system since 1898, and had previously been city lighting engineer. Mr. Bellamy visited this country about two years ago, in company with his son, and inspected a number of the American systems.

MR. JOHN P. FEENEY, claim adjuster of the Public Service Corporation of New Jersey, died at his home in Jersey City a few days ago, of a complication of diseases. Mr. Feeny was born in Jersey City in 1859. In 1889 Mayor Orestes Cleveland appointed him Police Commissioner. He was also a member of the Assembly for three terms. In 1892 Gov. Leon Abbett made him chief of the State detective force. At the expiration of his term he became adjuster of claims for the North Jersey Street Railway Company, in which post he was continued by the Public Service Corporation when the lines in New Jersey were consolidated. He leaves a widow and two children.

MR. ROBERT MATHIAS, who has been connected with the Frank Ridlon Company and the Chas. N. Wood Electric Company for the past five years, has accepted a position in the street railway department of the Stuart-Howland Company, of Boston. Mr. Mathias graduated from the University of Pennsylvania in 1895. Since that time he has held the position of station electrician with the New York Edison Company and chief electrician for the Baldwin Locomotive Works, of Philadelphia, but more recently has devoted his attention to street railway work. He is well known in the electrical field, and should prove a valuable acquisition to the selling force of the Stuart-Howland Company.