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Changes of advertising copy should reach this office by 10 a. m. Monday preceding the date of publication, except the first issue of the month, for which changes of copy should be received two weeks prior to publication date. New advertisements for any issue will be accepted up to noon of Tuesday for the paper dated the following Saturday.

Of this issue of the Street Railway Journal, 8000 copies are printed. Total circulation for 1906 to date, 82,300 copies, an average of 8230 copies per week.

Protection of the Right of Way

With the growth in number all over the country of high-speed roads, operating over their own right of way, the question of interference with the high-tension distribution system by storms assumes a serious aspect. A few weeks ago Chicago was temporarily cut off from telegraphic communication with other parts of the country, except in one direction, as the result of a snow storm, and hardly a winter has passed without similar trouble at some other important city. Of

course, power transmission lines are erected in a very much more substantial way than telegraph lines, and their owners have practically nothing to fear from snow, but where the railroads extend through a wooded country there is sometimes danger of injury to the aerial lines through falling timber. For this reason it is an excellent plan for the company to secure the right to protect its wires against danger of this kind, and this can usually most easily be done when the right of way is secured. We know of one company which has had inserted in all of its deeds that the grantee "has the right to cut and keep cut all timber on land adjacent to the right of way which interferes, or is likely to interfere, with the lines, poles, fences or operation of the railroad." A provision of this kind is usually not difficult to secure at the time, but may be of the greatest benefit if the railroad company takes care that the right of way is protected in the way permitted by the grant.

Speaking of deeds for right of way, another suggestion might be made in regard to fences. It has been established in most, if not all, States that a barbed wire fence is a legal fence. Nevertheless, it is true that fences of this kind are not very popular with farmers, who usually prefer a woven wire fence. For this reason it will often not be difficult, in drawing up the deeds for a right of way, to provide that the grantee shall install a woven wire fence, provided the grantor keeps it up, and as this is in the deed, it is a permanent record in case any question should arise as to the future responsibility for the maintenance of the fence. This clause is used in the deeds of one of the large interurban railways in Indiana, which also follows the practice of introducing a clause to the effect that the grantor agrees to keep shut all gates at private crossings, except when these gates are actually in use.

The Montgomery Situation

A curious condition of affairs exists at present in Montgomery, Ala. For a number of years the city, which has about 35,000 inhabitants, has possessed two street railway systems, which have been operated by independent companies. No transfers were given from one line to the other, and there was a considerable amount of duplicate trackage in the center of the city. Several months ago the smaller company passed into the hands of outside capitalists, who immediately made arrangements for consolidating the two systems and installing universal transfers. To do this, they ask permission from the city to lay a few cross-overs and switches to connect the two systems, and offered in exchange to give a universal transfer, to sell tickets to school children for 3½ cents, to erect a new car house and to make other improvements which would better the service. In most other cities, the fact that two rival street railway companies had come under one control, would promptly be made the basis of a request by a municipality upon the owners to

grant a universal transfer, and make such connections as were required for uniform operation. Not so in Montgomery, however. The city fathers immediately became suspicious that an undue advantage was being sought. They said that if the two companies wanted to consolidate, they ought to pay for the privilege. They then announced that consent would be given only upon an agreement on the part of the consolidated company to pay 1 per cent of its gross receipts to the city during the first ten years, and 2 per cent thereafter; give passes to city officials, aldermen, firemen and policemen, and do sundry and various other things which seemed to form a quid pro quo for the privilege of giving the citizens of Montgomery a longer ride for 5 cents than they ever enjoyed before.

We are glad to note that the company has not yet accepted this remarkable answer to its plans to improve the city's transportation facilities. It is also satisfactory to learn that the citizens of Montgomery seem to understand the merits of the controversy. To test the popular sentiment in this regard, the company recently made a postal card canvass of about 1750 of the prominent residents of the city. Out of this number, some 1500 cards were returned, and of these only 6 per cent upheld the policy of the council. In view of this progress which the South is now making and its anxiety for capital to develop its industries, the action of the Montgomery authorities is so peculiar that we look upon it as exceptional, and as not representing the general sentiment of the South toward industrial betterment.

Reserve Equipment in Sub-Stations

The amount of reserve equipment which should be installed in a sub-station is a question of considerable interest in these days, when the efforts of designers are bent so constantly upon securing continuous service at all hazards in important systems. On the one hand, we find the opinion held that a spare unit should always be available for immediate service in case of a breakdown, or at least sufficient overload capacity in the rotaries, transformers or motor-generators to take care of the traffic in case any single machine goes to the bad. On the other hand, the extra cost of reserve power in sub-station equipment deters many engineers from prescribing any margin above the normal daily requirements, which include, of course, the ability to carry the peak loads without injury.

As a general rule, it is not necessary to carry a complete reserve equipment in sub-stations, but in large city installations containing several high-powered units, it is a pretty good plan to have at least one spare rotary and one set of transformers available in case anything goes wrong, or else to provide larger units in the first place than the immediate traffic requires. In a large system, where the volume of traffic is very heavy, a company can afford to carry a larger investment as a security against interruptions than would be permissible on a small road. In some cases the spare unit need not have more than half the rating of any one of the other machines. Perhaps, the best way out of the problem is to maintain a portable sub-station equipment. This obviates supplying the reserve equipment in the different sub-stations as fixed apparatus, but on systems where the sub-stations are a good many miles apart the time required to bring the portable set into action at the place needed is

likely to be so great that the arrangement is of no value in tiding over anything but very severe breakdowns.

When a sub-station is equipped with motor generators, there is still less need of reserve power than with rotary converters, for, in case of trouble, it is not a very difficult matter for the other sub-stations to raise the voltage enough to supply power from outside the area normally served by the crippled station. Somewhere on every system there should be a spare transformer which can be substituted for a burned-out unit, even if this involves the purchase of a large three-phase unit. Every sub-station should carry reserve parts of its switching equipment, lightning-arrester sections, carbon brushes and flexible cable, circuit-breaker parts and the like. These supplies cost comparatively little, and the only real question in the matter of reserve apparatus, is in connection with the generating and transforming units. To a certain extent, the power factor of the rotary sub-station can be held up by stiffening the field excitation of the converters, and the voltage controlled by induction or transformer regulators, but the flexibility is much less than with the motor generators. As for the alternating current sub-station, pure and simple, there is ordinarily not much object in installing extra transformer capacity on the premises, for the exacting conditions of very heavy railway work justify reserve capacity which small city and interurban lines could ill afford.

Choke Coils on Cars

The importance of choke coils in connection with car lightning arresters is not always appreciated as it should be. Cars are occasionally encountered without any choke coils whatever; and, again, the choke coils on many cars consist of but a few turns. General information upon the behaviour of lightning under all conditions is very meagre, and for this reason the value of the choke coil is not definitely known. But the action of lightning on the controller blow-out coil, the field coils and the armature coils appears to be such as to warrant putting a great deal of faith in any coil that has a choking effect. What causes many to belittle the importance of choke coils, is the fact that at times lightning passes through them and does damage to the motors when the lightning arrester is in good order. This will be shown by the arrester taking care of a discharge at some later date, without having been altered or repaired in the meantime. But instances are frequent where the lightning discharge jumps across a $\frac{3}{8}$ -in. gap at the trolley terminal of the blow-out coil of a controller, rather than go through the coil. Evidently, whenever this happens, something is wrong with the lightning arrester. But the fact that such a gap is bridged, proves rather effectively that choke coils do have their place on a car.

Theoretically, the choking effect of a coil should vary with the square of the number of turns, so that a coil with twenty turns should be four times as effective as one with ten turns. This being so, there does not seem to be any very good reason why the coils of car lightning arresters should be limited as they are to twenty or thirty turns or less, where there is considerable trouble from lightning. The use of a coil of many turns, say 50 or 100, would, of course, result in some loss of energy in the coil, but the cost value of this loss would be but a small per cent of the amount saved in

the car-maintenance department if such a coil shielded the motor and equipment from lightning. To eliminate loss of energy in the coils, a short-circuiting switch might be placed across the terminals of the coil, and the car operated in ordinary weather with the switch closed. Motormen could be instructed to open these switches during thunder storms or at times when lightning is threatening.

Lighting circuits, in particular, could be better protected from lightning than is the usual custom. To permit use of the lamps when the circuit breaker is off, it is customary to take these circuits off the main circuit between the trolley and the circuit breaker. This deprives the lamp circuits of any shielding effect from the choke coil, as the coil is usually placed on the ground side of the circuit breaker. It ought, however, to be very little trouble to place a small choke coil in the light circuit just after it leaves the main circuit, and this will usually give the desired protection. Some railway engineers believe in letting lightning play havoc with the lighting circuits without objecting. They argue that whenever lightning grounds these circuits, the motors have been shielded, and a greater repair expense avoided. Arguing along the same lines, however, a still smaller expense would be entailed if the circuits were properly protected and lightning arresters, rather than the light circuits, were made to divert the lightning.

Progress in Reorganization of the A. S. and I. R. A.

Those who have kept in intimate touch since the Philadelphia convention with the work accomplished by the American Street and Interurban Railway Association, are fully satisfied that the plans decided upon at that time and since pursued, were wise. To those who have not had occasion or opportunity to follow this work as closely, the progress made may be somewhat in the nature of a surprise, but will certainly be gratifying. The predominant aim of those who have the administration of the affairs of the association in charge, has been to create an organization which will accomplish results. In this way, and in this way only, will it be possible to add to the membership any large proportion of these companies which have not hitherto affiliated themselves with the body. That these companies can now see a direct benefit from membership is shown by the report of the secretary at the meeting of the executive committee held in New York last month, which stated that more than fifty companies had joined the association since the new constitution was adopted. This is an increase in members of about twenty-five per cent, and indicates that the co-operative plan of work now pursued is appealing to a very large percentage of both members and non-members.

The fear on the part of some—a fear which was implied rather than expressed at the Philadelphia convention—that the merger of the Mechanical or Engineering Association and of the Accountants' Association with the main association would result in the curtailment of the usefulness of one or both of these bodies, has disappeared entirely among those who have had the direction of their affairs in charge. Their new constitutions and by-laws have finally been revised, and it is evident that the effect of the reorganization upon them will be not only greatly to enlarge their scope, but to give their conclusions a standing and a force which they could never secure when formulated by an independent

organization. Both associations, as well as the Claim Agents' Association, will also be greatly assisted throughout the year in their work by the permanent secretary, who is available for compiling such statistics and information as they require. This service will be in addition to and will not interfere with that which was formerly and still will be performed by the secretary of each affiliated organization.

The field of each association is becoming more clearly outlined. In the future, all engineering topics will be discussed by the Engineering Association, to whom they properly belong, while all accounting topics will similarly be treated by the Accountants' Association. This means that many of the subjects hitherto considered by the main association will be delegated to one of the affiliated associations, but it does not follow that the meetings of the main body will decrease in importance. On the contrary, the new plan of division of the work will afford the main association an opportunity of taking up a large variety of topics, which hitherto have received hardly any attention—topics which not only vitally affect the street railway interests of the country, but in which a tremendous amount of good can be secured through co-operative effort. As in practically all other large deliberative bodies, it is proposed to carry on a great deal of the preliminary consideration of these topics by committees. Thus, committees on the following subjects have already been appointed by President Ely: "Standards," "Compensation for Carrying United States Mail," "Insurance," "Papers and Topics," "Public Relations," "Municipal Ownership," "Welfare Work," "Heavy Electric Railroads," and "Promotion of Traffic." Each of these committees is on an operating subject, and each, with the exception of the committee on standards, which will work in conjunction with the affiliated associations, and that on papers and topics, is expected to render a report at the next convention. The papers secured by the committee on papers and topics will also be devoted to operating subjects or questions of policy, and consequently will be of more interest to the majority of the association members than some which have been presented during the past few years, no matter how ably the papers themselves were prepared or how thoroughly they covered the topics chosen. The enthusiasm with which the members of the different committees of the various associations have assumed their duties augurs well for the success of the next convention.

The first year in the life of an organization of this kind is always a critical one. A certain number of individuals in every industry can be depended upon to give active assistance in any co-operative work. It is the tendency of a large number of others to hold back at first to see what will be accomplished. Success is assured, but it remains with those who have not yet joined to determine whether the greatest possible benefit of which the association is capable, will be attained. It should have a very much larger number of members than did the old association and it should be a more representative body. Roughly speaking, the benefits conferred by membership, as compared with the old association, are in the ratio of 365 to 3, because the benefits are continuous throughout the entire year instead of being confined to three convention days. And, if its membership does not increase in this ratio it should only be because there are not that number of railway companies in the country.

OPERATING FEATURES OF THE DAYTON & TROY RAILWAY

The Dayton & Troy Electric Railway, of Dayton, presents an excellent example of a comparatively small road, which has developed into a splendid proposition through the application of modern and progressive business methods. Unlike a great many roads, it has not been the policy of this company to force the operating expenses below the magical 50 per cent of gross receipts, or to pay dividends at the



STRETCH OF DOUBLE TRACK

expense of the physical condition of the property, but rather it has been the plan to spend money freely, some might think almost prodigally, in improvements, maintenance and advertising. Such a course has been possible without objections from security holders, because there are no bondholders to require semi-annual interest, and the stock is very closely held by persons who have been satisfied with a moderate rate of dividends.

The road extends from Dayton to Piqua, a distance of 30 miles, and is part of the through line from Cincinnati to Toledo. On several occasions attempts have been made to buy the road in order to amalgamate the various links into one line, but the holders are not desirous of disposing of their property, being satisfied that it is capable of greater development by their own methods. The company has a capital stock of \$1,000,000, half preferred and half common. The preferred has not been on the market in some time, while there is a standing bid of \$125 per share for the common, with no sales for many months. The property is practically owned outright by the families of C. B. and H. P. Clegg, of Dayton, and the latter is president and general manager.

CURVES, GRADES AND SWITCHES

As laid out, the road had many curves and grades, a portion paralleling a highway and the balance along a canal bank, but it has been improved and developed into one of the fastest stretches of track in the country. During the past two years about 12 miles of double track have been laid and all sidings lengthened, so that it is seldom that a car has to stop for passing points. The track was all lifted from 8 ins. to 15 ins. with coarse washed gravel obtained from a river bottom. Curves were elevated from 4 ins. to 7 ins. The elevations

start back several hundred feet with long spirals, and are figured out for a speed of 55 miles an hour. Practically every curve is double track with 13-ft. centers to allow for passing at full speed. The tracks pass through all of the smaller towns at the rear of the main street on private right of way, so that in a number of towns the limited cars do not even hesitate. Switch leads are 160 ft. long and spring switches are used exclusively. Cars invariably enter these switches at full speed, but there has never been an accident or split switch. It is believed this is due largely to the system of inspection. Two track walkers pass over the road every day, each covering 15 miles. The men are well paid, and they are not permitted to ride under any circumstances. They inspect all joints and switches, and on bad days are required to give extra attention to switch points. Points are never permitted to become worn beyond a degree of perfect safety. In winter there are two gangs of six men each and in summer two gangs of fifteen men each, not including the track walkers. Track maintenance averages 80 cents per mile per day the year around. Views of typical stretches of track and track work are presented.

WHEELS

On local cars the company uses a 37-in. wheel, 3-in. tread, 1¼-in. flange with 1⅛-in. throat, and on limited cars a 39-in. to 40-in. wheel, with 3⅛-in. tread, 1¼-in. flange and 1⅛-in. throat. Steel-tired wheels have been used with great success for a number of years; those furnished by the Standard Steel Works, Philadelphia, are employed as standard. The larger wheels have a 4-in. tire and show a life of from 450,000 to 500,000 miles. The large wheels give a steadier riding effect and greater speed, as the limited cars are geared higher. Solid gears with 5-in. face are used.

REPAIR SHOP

The shop at Tippicanoe City is equipped with a 42-in.

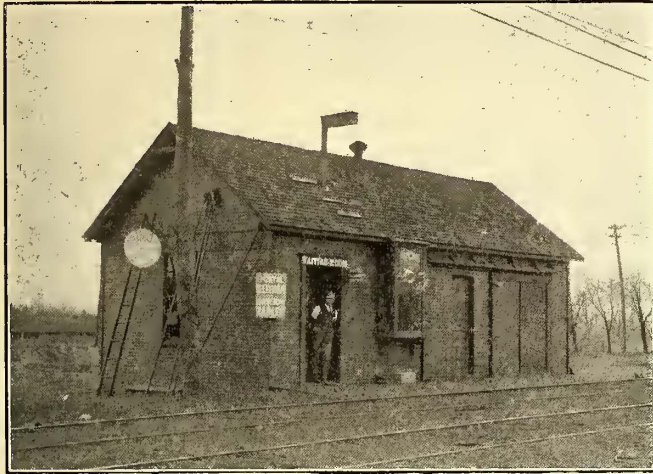


DOUBLE-TRACK REVERSE CURVE

Hamilton wheel lathe, a Bradford 30-in. lathe, a Smith & Mills 16-in. shaper, a 150-ton Niles wheel press, several small lathes, drill presses, etc. The line shaft is motor driven. An air-compressor outfit supplies blast for a blacksmith shop, for blowing out cars, armatures, etc. There is a trolley-carrier system in the shop for handling heavy pieces from one machine to another. The wheel lathe, which is illus-

trated, is served by a swinging crane and wheels are handled with this and turned without removing them from the axles. The practice is to run steel-tired wheels 60,000 miles, and then turn off 1/2 in. The cost per turning per pair is about \$1.10. A spring bolster is used with oiling devices on the bolster plates and side plates, which tends to increase the life of the wheels. A transfer table with air lift has been installed, and all work of removing and inspecting ar-

and saturated twice a day. Lubrication costs 11 to 13 cents per thousand miles with motor oil at 15 cents and journal oil at 9 cents. It is claimed that the saving in cost amounts to about 25 per cent, and there is a saving in power of 30 per cent as compared with grease lubrication. Cars formerly required 5 kw per car mile, while now they require only 3 1/2 kw. The saving in repairs is also very large. Wood



WAITING ROOM AT TIPPECANOE, TELEGRAPH OFFICES IN ALL STATIONS



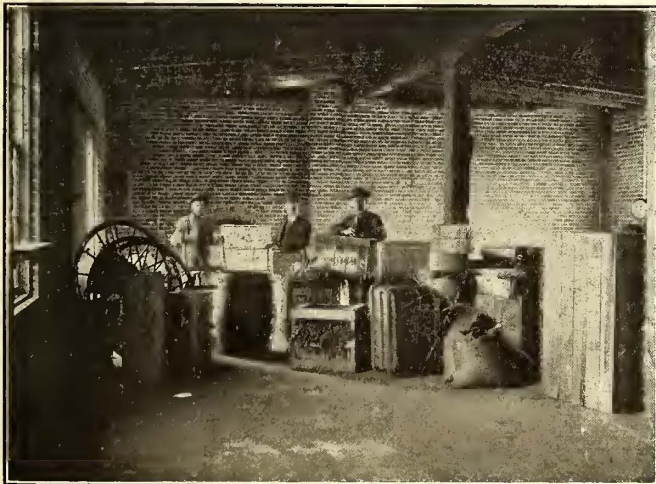
EXTERIOR OF TROY FREIGHT AND PASSENGER STATION

matures, brushes, etc., is done from below, and all trap doors have been dispensed with. To eliminate danger of fires in cars, all wiring is run in conduits, and asbestos and double rubber-covered wire is used. Electric heaters have been replaced with hot water heaters. All cars have recently been double floored, and two thicknesses of building paper are placed on the original floor with a hard pine floor above. All limited cars are carpeted. All local cars have leather-covered seats, while cane-pantasote upholstered chairs are

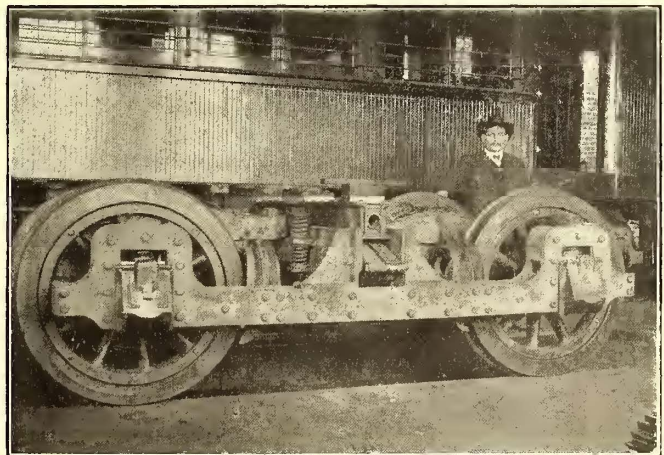
gear cases are not used as they are deemed undesirable for high speed.

TROLLEY WHEELS

Kalamazoo 6-in. trolley wheels are employed, and give a life of from 3500 to 5000 miles. They have oil lubrications and an extra pair of holes is drilled to give additional lubrication. The practice is to use a wheel several days on the limited runs, and then change it to a local car. The Standard trolley stand is employed. This base has a steel pin in a cast-iron hub, and it is the practice to remove the cast-



INTERIOR OF TROY FREIGHT STATION



TRUCKS WITH 39-IN. WHEELS

used on the limiteds. A timber pilot of the type illustrated is used exclusively.

BEARINGS

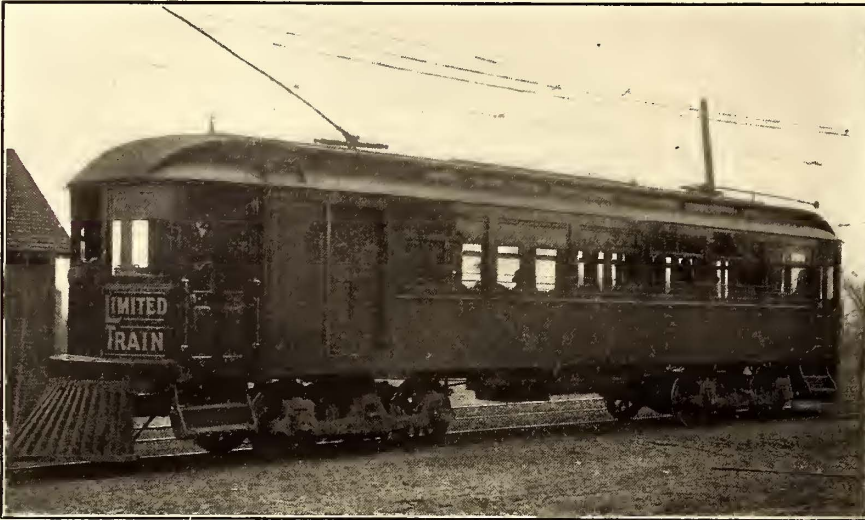
For armature and axle bearings the company uses White's No. 1 babbitt. These bearings are cast in the company's shop and are made three times the diameter of the shafts; a highly polished mandrel is used in casting, so that it is not necessary to turn the bearings. Oil lubrication is used exclusively. Westinghouse No. 76 motors are employed. The standard grease cup is retained, and a screen is placed at the bottom of the cup, which is then packed with wool waste

iron piece and substitute babbitt, which gives a very free movement to the base. On local cars the tension on trolley bases is 28 lbs. and 34 lbs. on limiteds.

CLEANING AND INSPECTION

Great care is used to keep cars clean. Floors are scrubbed daily by women using a special car cleaner made by James Brothers, Dayton. One woman cleans two cars inside, washing all wookwork with damp cloth, while one man washes four car bodies and windows outside. Windows are washed with warm water and sponge, and polished chamois.

"Big Four" orange with brown trimmings is the standard color. This costs 30 per cent more than Pullman color to maintain, but it is deemed a good advertisement. In finishing, three coats are rubbed in with pumice, then three coats of body, and three coats of varnish. The Dayton & Troy monogram is placed on the side of the car in brown and gold, and the lettering is in gold. The limited parlor cars bear names instead of numbers.



PARLOR LIMITED CAR

Limited cars are inspected and lubricated each round trip of 160 miles, and they go to the shop every third day for an overhauling, the master mechanic giving his individual attention to these cars. Local cars are inspected nightly. One man inspects motor brushes, circuit breakers, air governors and car controllers, another does the pit work adjusting brakes, rigging, motor clearances, etc, while a third



INTERIOR OF PARLOR LIMITED CAR

man attends to trolleys and lubrication. Circuit breakers are tested every six months with a water rheostat, and they are set to throw at 425 amps.

The company has done a great deal of car rebuilding, and has altered all of its interurban cars, giving them practically four compartments with five bulkheads. The cars are 51 ft. long. The first compartment is for baggage, the second has the toilet room on one side, and a rack for grips and a box for the conductor on the other, the third is the smoking compartment and the fourth is the passenger com-

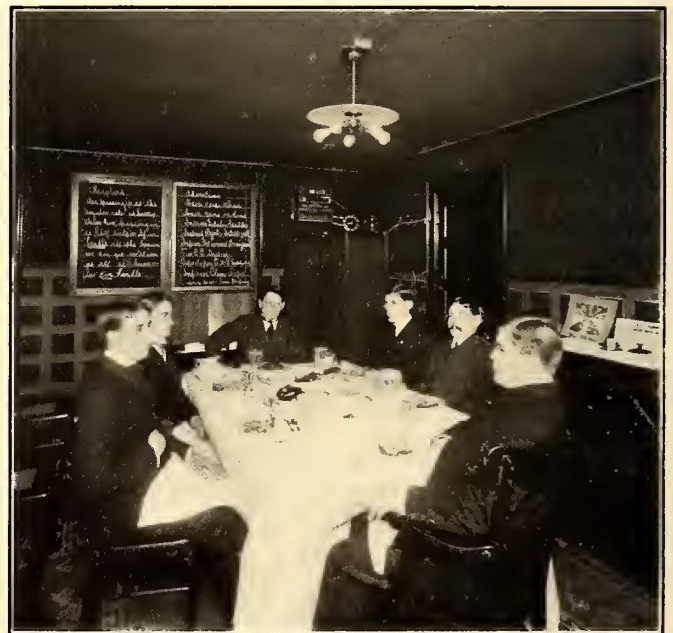
partment. The parlor cars have the same interior arrangement, except that there is a wash room opposite the toilet room. The company is installing several modern wood-working tools, and expects to build its own cars in the future.

SNOW PLOWS

An interesting home-made snow plow was built some time ago from an old flat car. It is not equipped with motors, but is pushed by a motor car. There is a 14-ft. blade in front attached to a swivel at the end of a timber drawbar. By means of a chain operated by a brake staff this blade can be adjusted for height or it can be turned to throw the snow in any direction at either side. Between the trucks is another wing set at an angle of 45 degs., with the track which can be raised or lowered by a pair of ratchet levers. The front wing is unusually sufficient to clear any snow encountered in this district, and at a fair speed it will throw 10 ft. beyond the rail. Both wings are used in heavy drifts; the front is elevated several inches to take the worst and throws the snow in one direction, while the other serves as a scraper and throws it in the other direction. In heavy weather the car is weighted with rails or ties.

OFFICERS' CLUB

One of the novel features of the company's organization



OFFICERS' CLUB AT LUNCH

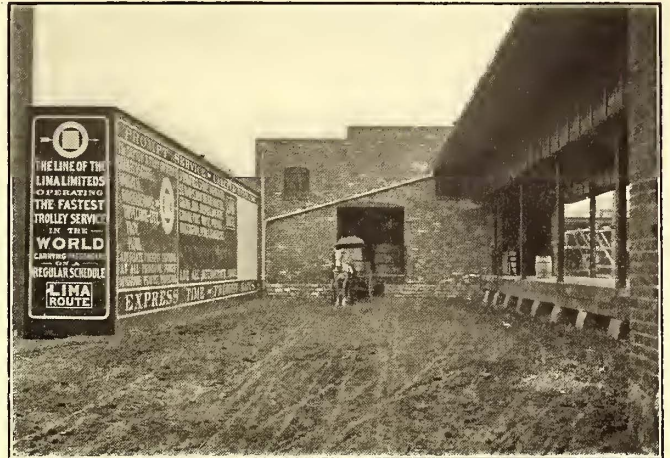
is the officers' club. The various heads of departments meet every noon and have lunch at the company's expense, a room near the headquarters being fitted up for their exclusive use. After participating in the best that the market affords, perfectos are handed out and the officers have a heart to heart talk covering all topics of operation and improving the business. There is a leaved blackboard upon which are posted all manner of instructions and suggestions, each department head having a section on the board. Frequently there are papers on certain subjects. Motormen and con-

ductors are called into the club room at intervals, and explained the workings of new apparatus or regulations. Considerable attention is given to instruction of motormen in the matter of accelerating and current consumption. In the club room is a circuit cut in from the trolley line, with instruments showing the current consumed in a certain section. Motormen who are careless in this matter are shown that they are wasting current as compared with other men making the same runs. At frequent intervals the officers make an inspection of the road, using an old car fitted up for the purpose. Much attention is paid to improving the appearance of the right of way and surroundings of stations. In a number of instances where there are unsightly buildings, quick-growing shrubbery and trees have been planted. Prizes are given to schools making the most attractive improvements, and station agents are similarly encouraged to improve appearance of buildings and yards.

ADVERTISING

The company is liberal in its advertising expenditures, and a special man is employed who devotes his time exclusively to this work. Sign boards all over the district announce the advantages of the "Lima Route" of the "Lima Limiteds." Advertising contracts are carried with nearly forty daily and weekly newspapers. Every special event, opening up a new route of connection, improvement in the freight or passenger service, etc., is heralded not only by display advertisements, but by neatly-worded reading articles, which are live news. A certain amount of cash is paid for this service, but the greater part is traded out in transportation and by carrying papers. The Dayton papers are distributed over a territory by means of connecting lines,

National Cash Register Company in Dayton, form an interesting departure. Whenever a certain number of people can be gotten together and delivered at its plant, this company gives a luncheon, a free entertainment with lantern views of foreign tours and an inspection of the mammoth plant. The Dayton & Troy passes its door, and has run numerous excursions from all points in the district. On national and



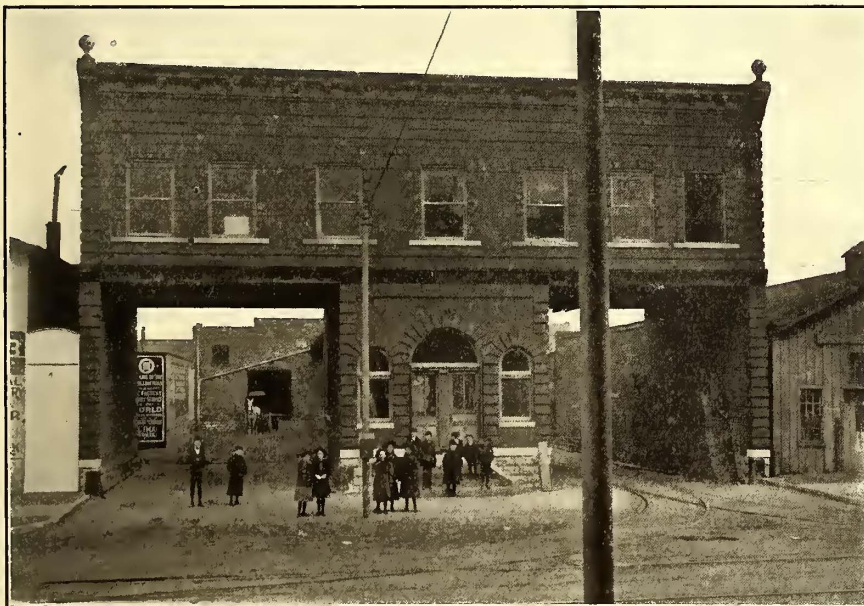
TEAM SIDE, DAYTON FREIGHT STATION

State elections, excursions are run between all points, and election returns are read in all cars and stations. Hunting excursions, holiday, week-end excursions, etc., are a specialty. In handling large fair crowds last year, special excursions were run from all points, and at the fair grounds, partitions were built leading to cars for various points, each car handling people to a certain point and running on limited schedule to that point without other stops. A dispatcher's office was erected at the grounds, and all cars were handled from there; there were no delays or accidents. Unlike many roads in this district, the company does not favor the operation of parks, nor care for parks on its line. The park traffic is usually a short haul only, and interferes with regular traffic at the time when it is heaviest—mornings and evenings. A park which it operated for several years has been abandoned.

INTER-LINE BUSINESS

The company has been a leader in the development of interline and long-distance business, not only in connection with electric roads, but with steam roads as well. Recently, it worked up considerable business among homeseekers, and sold a number of tickets to Oklahoma, Texas and other Southwestern points, tickets being sold through without the use of exchange orders. Through tickets are sold to a large number of distant points, and baggage is also checked through by the use of duplicate checks.

This is one of the few roads which interline all cars with another road. All local passenger cars run from Dayton to Wapakoneta, and limited parlor cars run from Dayton to Lima, part of the way on the Western Ohio Railway. The latter run is 80 miles, which is covered in 2 hours and 30 minutes. This is said to be the fastest regular electric schedule in the country. For some time the company operated a special known as the "Clover Leaf" special, which ran to Delphos on the Ft. Wayne, Van Wert & Lima line,



FREIGHT STATION AND GENERAL OFFICES IN DAYTON

so that they arrive several hours ahead of Cincinnati and Toledo papers, thereby greatly increasing their circulation and prestige. Records are kept of this service, and stamps are issued to the papers at 1 cent a pound.

A passenger and freight solicitor is kept constantly busy working up new business, and some interesting and diplomatic work has been done. Transportation properly placed with hotel men has resulted in advertising cards in all lobbies in the district. The solicitor works up excursions for societies to attend entertainments or meetings in other towns, and where parties are large enough, they are given special cars with fast runs. Special excursions to the plant of the

to connect with Clover Leaf (steam) trains from Toledo and St. Louis. The train made 95 miles in 3 hours, and the return trip at night in 2 hours 35 minutes. This run was abandoned on the opening of the electric connection to Toledo by way of Findlay. As announced in a recent issue, electric service is soon to be extended through to Toledo, and cars will make the 162 miles from Dayton to Toledo in 5½ hours. The chair cars used in this service are owned exclusively by the Dayton & Troy. Excess is charged for chair cars on local trips, but not on interline trips. Under the agreement, each road collects and keeps its own fares, and excess, but the Dayton & Troy receives a car mileage for the use of the car while on another road. With the local cars, each road keeps all the fares it collects and pays its own crews, the distance being practically the same on each road. Local cars connect with cars on the Western Ohio main line for points north, and the limiteds connect with the limiteds on the Fort Wayne, Van Wert & Lima for

a record of time of arrival and departure of all trains and reports these movements to the despatcher. The line is covered by the system of the Postal Telegraph Company, with instruments in each station so that messages may be transmitted by this means, if desired.

FREIGHT BUSINESS

There has been considerable discussion among interurban managers in this district, as to the most desirable methods of handling freight and express, so-called. For several years the business on this road was handled by the Southern Ohio Express Company on a car-mileage basis. The traction company furnished the cars and the motormen, and the rates were practically the same as express rates. Some months ago this arrangement was abrogated, and instead of retaining express rates or rates between express and freight, the company has launched out with a purely freight business in connection with the steam roads. It has induced


Freight vs. Express

No express is handled by the Dayton and Troy System (415 East First Street) and all the merchandise which is unloaded on their platform goes to Piqua, Springfield, Sidney, Wapakoneta, Celina, New Bremen, Minster, St. Marys, Lima, Delphos, Van Wert, Ft. Wayne, Huntington, Wabash, Peru, Logansport, and many other points.

Exclusively at Competitive Freight Rates

If you ship freight it will be worth your while to have our freight man call. Drop a card or call up
THE DAYTON & TROY SYSTEM
415 E. First St.
Dayton, O.
Telephone—Bell 1455. Home 6511

NEW POINTS REACHED VIA



The Dayton and Troy ELECTRIC RAILWAY SYSTEM

Tickets are now on sale to the following stations:

	One Way.	R. T.
Beaver Dam	\$1.70	\$3.05
Bluffton	1.85	3.20
Mt. Cory	2.00	3.55
Rawson	2.05	3.65
Findlay	2.25	4.00

Bowling Green, Maumee, Toledo and Detroit.

All the Way by Electric Lines
Connections are made for the above points at Lima. Car leaving Lima every two hours from 6 a. m. until 10 p. m., for Findlay.
For information inquire of D. & T. Ticket Agent, 7 North Jefferson street.

(Piqua Fast Line.)
SPECIAL RATES.
ONE WAY.

Tippecanoe 30c	Botkins81
Troy50c	Wapakoneta 1.15
Piqua50c	St. Mary's 1.35
Sidney75c	Celina1.55
Anna90c	Lima1.45

ROUND TRIP.

Tippecanoe 55c	Botkins . . . \$1.75
Troy65c	Wapakoneta 2.95
Piqua90c	St. Mary's 2.40
Sidney1.35	Celina2.75
Anna1.60	Lima2.55

30 day limit on all tickets.
Hourly trains in each direction.

WEEK END RATES.

The Dayton & Troy System of Electric Railways are also selling every Saturday
Tickets to the following points on the Western Ohio Railway, good going Saturday and Sunday, returning Monday, at the following low rates:
To Sidney \$1.05 Wapakoneta \$1.60
St. Mary's \$1.35 Lima \$2.00
Celina \$2.10
Note the liberal time allowances.
Make your trip the more enjoyable by going and coming when you choose, not being hampered by the arbitrariness of the steam road schedule.
Baggage checked on all limited trains to Piqua, Sidney, Wapakoneta and Lima only, at a uniform price of 25c per piece. Conductors will furnish on request transfer, carrying passengers to any point on the Piqua local lines.
NOTE—All regular trains of the Dayton & Troy system of electric railways make connection at Troy, O., with the trains of the Springfield and Troy Electric Railway and through tickets may be purchased to Casttown, Addison, Christiansburg, Springfield, etc., at all offices and stations of the D. & T. system.

Thanksgiving Day Rates

DAYTON & TROY, System of Electric Railways

Will offer very low round trip rates to the following points:
Dayton to Springfield and return . . . 75c
Dayton to Sidney and return . . . \$1.20
Dayton to Anna and return . . . 1.45
Dayton to Botkins and return . . . 1.60
Dayton to Wapakoneta and return . . . 1.80
Dayton to Minster and return . . . 2.30
Dayton to Van Wert and return . . . 2.90
Dayton to Celina and return . . . 2.30
Dayton to New Bremen and return . . . 2.20
Dayton to Lima and return . . . 2.20
Dayton to Delphos and return . . . 2.75
Dayton to Ft. Wayne and return . . . 3.20
Dayton to Ft. Wayne and return 4.20

Tickets Good Going November 29 and 30; Good Returning until December 4.

No excess fare on limited trains, provided tickets are purchased before entering the cars.
Elegant Library Chair Cars Dayton to Lima—Velvet seated coaches Lima to Delphos, Van Wert and Ft. Wayne, Ind.
Only one change of cars between Dayton and Ft. Wayne.
You step from one car to the other at Lima.
The finest, cleanest, fastest, best, cheapest.
Trolley Service in the World
Ask the agents of the
D. & T. System,
7 North Jefferson Street.
Phones: Bell 508, Home 2508.

THE Dayton & Troy

System of Electric Ry's.
are now selling one way and round trip tickets from
Dayton to Ft. Wayne, Ind.
VIA THE
D. & T., W. O. & Ft. W., V. W. & L.

UNION STATIONS AT ALL TERMINALS.
Regular hourly service from Dayton and
FIVE—FAST LIMITEDS—FIVE ALL MAKING DIRECT CONNECTIONS AT LIMA.
ADVANTAGES!!!

Fastest Time.
Lowest Rates.
A Clean, Comfortable Ride.
Movable Library Chair Cars, Dayton to Lima.
Velvet Seated Coaches, Lima to Ft. Wayne.
Only One Change of Cars, at Lima.
Baggage Checked Through.

Fare One Way, \$2.75
Round Trip . . \$4.95

NO EXCESS FARE ON LIMITED TRAINS IN EITHER DIRECTION.
Provided Tickets are Purchased Before Entering the Cars.

TYPICAL NEWSPAPER ADVERTISEMENTS, PUBLISHED BY THE DAYTON & TROY ELECTRIC RAILWAY COMPANY

points in Indiana. Business for Springfield and points east, is done with the Springfield, Troy & Piqua, which connects at Troy, and runs a chair limited to connect with the "Lima Limiteds."

This chair car service has been quite a decided success. It is practically as fast as the steam road, and the cars are uniformly on time. Chair seats, tables, magazines, daily papers, wash-room facilities and baggage on every car, without excess fare, are among the drawing cards of the service. Limited cars on this line earn about five cents per car mile more than local cars, and, as nearly as can be ascertained, they cost about 25 per cent less to operate on account of fewer stops, which effect both the life of the equipment and the power consumption.

DESPATCHING

Despatching is by telephone, with steam railroad rules and forms. Despatching orders are issued at terminals, and other orders are issued largely through station agents. There are semaphores at each station, and each station agent keeps

other roads to go into this arrangement, and at present it has working agreements with the Springfield, Troy & Piqua Traction Company, the Western Ohio Railway, the Toledo Bowling Green & Southern, the Fort Wayne, Van Wert & Lima Traction Company, the Dayton & Western Traction Company, and several other roads, whereby freight may be shipped over a wide district covering all of Western Ohio and many points in Indiana. Some of the roads continue to do an express business, but the Dayton & Troy is committed to the purely freight business. The arrangements with other roads is on a pro rata basis, governed by the distance covered. The standard steam classifications are used, and steam rates are met on practically anything. While no attempt has been made to handle coal or ore, the companies are handling bulky articles like ice, machinery, tobacco, whiskey in barrels, and merchandise of every description. The higher classes of freight are of course catered to, and there is a minimum charge of 25 cents for any package, which, of course, brings the average receipts per car higher than those of a steam road, but a strong point is made of

competitive rates with practically express service minus wagon service.

Stations have been fitted up in all towns, with team tracks, side tracks and covered warehouses. Views of some of these stations are presented. At Dayton, a fine terminal station has been erected, and the lower floor is used exclusively for the freight service. The second story is devoted to the general offices of the company, and has ample space and facilities for all departments. In the rear of the freight office is a two-story warehouse. Back of this warehouse is a track connection from a steam railroad, so that freight from steam cars can be unloaded or loaded without wagon transferring. At one side are two tracks with a capacity for six cars, while team platforms are on the other side. The exterior of the building is pressed brick with stone trimmings and the offices are handsomely finished in hardwood. The station is used jointly by the Dayton & Troy and Dayton & Western, which are closely affiliated, although the station is owned by the former. Each company has its own agents. The station serves as the clearing house for business north, east and west, as there are lines leading in these directions in the arrangement. Freight runs are as follows: Dayton to Piqua, 12 m.; Dayton to Troy and Springfield, by way of the Springfield, Troy & Piqua, 2 p. m.; Dayton to Lima, via Western Ohio, 5:45 p. m.; Dayton to Piqua, 6 p. m.; Tippecanoe & Lima, 10 p. m. The run to Tippecanoe is at night, and the car does local work between Tippecanoe and Lima next morning. At Lima, transfers are made to points in northern Ohio and northern Indiana. Thus far all cars are operated singly, and are ordinary express cars with two large double doors on each side. The Springfield, Troy & Piqua has five box-trail cars, which have been used in Dayton, and the Dayton & Troy is building five. They will have box-car framing, hood roof, two end and two side doors. They will have capacity of 60,000 lbs., and will be fitted with automatic air brakes, large flange wheels, long drawbars and knuckle heads to enable them to go around sharp curves. It is the intention to haul one, and possibly two, of these in a train, and to make through shipments over other roads.

The forms used in handling freight follow closely steam freight practice. The agent makes waybills in duplicate in a book. A receipt goes to the consignee, a tissue copy of the bill goes to each line on interline business, and another copy goes with the package. The original remains in the book. Interline waybills show the routes and roads, and there are spaces showing time of receipt and departure to be signed by agents at junction points, with another space for receipt of final destination. All bills of lading as received are stamped with a rubber stamp, as follows: "Accepted, subject to all terms and conditions of the bills of lading of Dayton & Troy Electric Railway, per — agent." This relieves the company of any unusual conditions which are placed in bills of lading by shippers. Local waybills are yellow, and interline, pink. Agents also have damage and adjustment reports (purple), shortage and adjustment reports (light green), over and adjustment reports (light red). They forward to headquarters a daily abstract of waybills forwarded and received; daily station balance debit and credit; a memorandum of waybills, passing through his office, on a brown card, and a daily expense bill. An apportionment book is kept showing the date, number, from, to, consignor, consignee, weight, freight, advances, prepaid, and names of roads with which interline business is done, showing their apportionment, debits and credits. Settlements between roads are made monthly.

As the system has only been in operation a few months,

the management is unable to determine accurately what it costs to operate the freight business or what the average receipts are likely to be, but it is claimed that the proposition is much more satisfactory than the old express arrangements, the gross receipts for last month being 210 per cent greater for that department. The average receipts are about 5 cents per ton mile, and cars frequently earn 50 cents per car mile. The average operating expense for all cars at present is 12½ cents per car mile, the freight cars costing about the same as passengers, so far as can be determined.

The gross earnings of the property have shown an increase of 35 per cent since the institution of freight and interline passenger business.

The operating officers of the company are: Harrie P. Clegg, president and general manager; C. M. Paxton, secretary and traffic manager; W. E. Rolston, general superintendent and chief engineer; R. A. Crume, purchasing agent, and C. H. Murline, auditor.

TWO-MOTOR VS. FOUR-MOTOR TEST MADE BY THE UNITED RAILWAYS AND ELECTRIC COMPANY OF BALTIMORE

Through the courtesy of H. H. Adams, superintendent of shops of the United Railways & Electric Company, of Baltimore, the following data are presented giving a summary of a recent test carried out in Baltimore to determine the relative power consumption of two-motor and four-motor equipments. In each instance the tests extended over two days and were made not so much to establish the theoretical relative economy under ideal conditions, but to determine the relative power consumption of the two types of equipment as operated regularly in Baltimore.

Car No. 710 had a 31-ft. body mounted on double trucks with 33-in. wheels and was equipped with four Westinghouse 101-B motors, giving a total of 160 hp in motors to the car. This car complete weighed 45,000 lbs. light and had a seating capacity for forty-four passengers.

Car No. 730 had the same length body on maximum-traction trucks with 33-in. driving wheels, and was equipped with two Westinghouse 56 motors, giving a total of 110 hp. This car weighed 31,700 lbs. light and had a seating capacity for forty-six passengers.

From the summaries herewith printed it will be observed that under practically the same running conditions as regards line speed, gear ratio, seating capacity, number of stops and passengers carried, the four-motor equipment consumes but 10 per cent more current per car mile than the two-motor equipment. The two-motor car was equipped with hand brakes only, while the four-motor was fitted with air brakes, and it is possible that the current consumed by the two-motor equipment was slightly increased by reason of the motorman running with the hand brakes partly set in order to enable him to make his stops quickly. It is also probable that the two motors on car 730 were working at a disadvantage in that they were not altogether heavy enough for the service. The same motormen were used upon corresponding trips in each test.

	CAR No. 710	Relative Percentage	CAR No. 730	Relative Percentage
Type of equipment.....	4 W. 101-B motors		2 W No. 56 motors	
Horse-power.....	160 hp total	100%	110 hp total	68.7%
Gear ratio.....	18-66 or 1:3.66	100%	18-64 or 1:3.56	97%
Weight.....	45,000 lbs.	100%	31,700 lbs.	70.5%
Average kw.....	28.47	100%	25.65	90.%
Average amperes (assuming voltage 500).....	56.95	100%	50.6	90.%
Kw-hour per car mile.....	3.525	100%	3.17	90.%
Kw-hour per ton mile.....	.1565	100%	.200	128.%
Average passengers carried per round trip.....	145	100%	148	102.%

QUICK WORK IN EQUIPPING CARS AT BALTIMORE

The United Railways & Electric Company is now receiving the last of an order of 200 cars of the Brill semi-convertible type. Of this order, 160 cars are 30 ft. 8 ins. over corner posts with 5 ft. platforms, for city service, and the remaining forty are the same length over posts but with platforms 5 ft. 6 ins. for high speed service. Heretofore, the Baltimore system has been committed to maximum traction trucks as the wide track gage, which is 5 ft. 4½ ins., and the narrow streets did not permit of an ordinary double truck car. However, by very careful designing and the adoption of a straight-sided car, a double-truck car has been developed that operates satisfactorily on the streets in Baltimore, and all the rolling stock on the shipment now being received will have double trucks with eight 33-in. wheels and four motors on each car. Of the electrical equipments, 160 are GE-80 motors rated at 40 hp each and forty are GE-90

the materials were ready in advance for the car men, and all that the latter had to do was to place the parts in position underneath the car. Only the best of materials were used in the air brake parts, all pipe being galvanized iron with brass unions, and each piece of pipe was reamed and blown out with steam jet before being installed.

The force for equipping cars was organized as follows:

Mounting motors, etc., ten men.

Electrical work, twenty men.

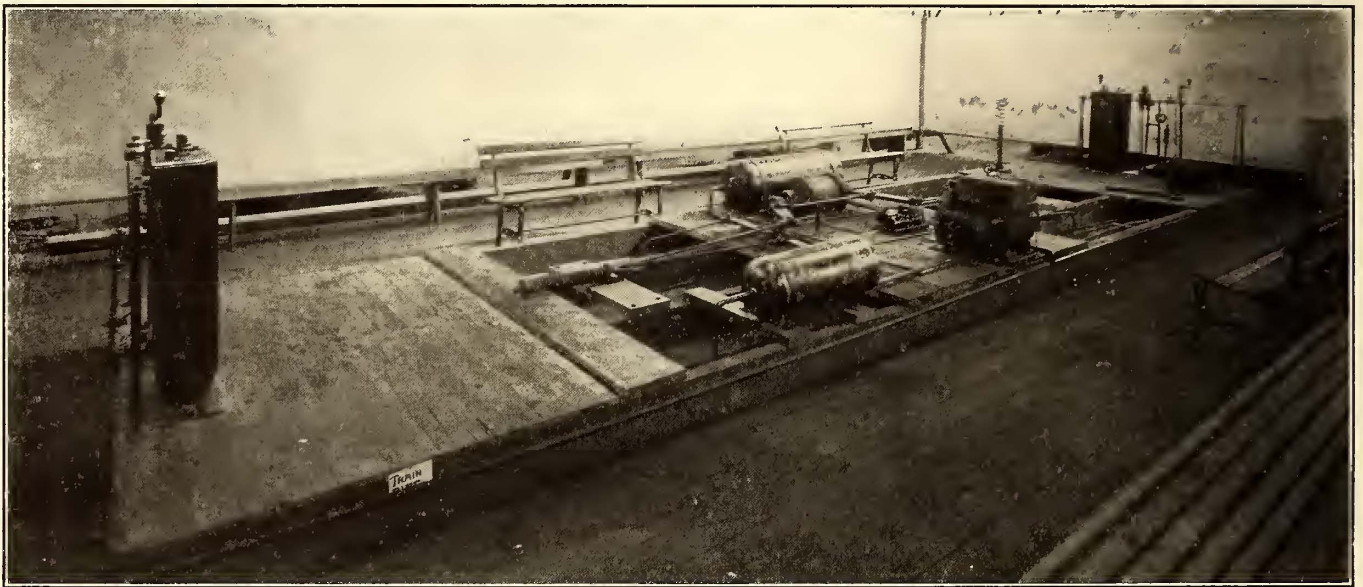
Trucks, sand boxes and brakes, ten men.

Boring and carpenter work, three men.

Air equipment, piping, etc., ten men.

This gives a total of fifty-three men, including two men working upon the bending of pipes, etc., and this force was able to turn out complete five cars per day of ten hours.

As these were the first cars on which air brakes had been used, arrangements were made for thoroughly instructing the motormen in the use of the equipment, and for this purpose



AIR-BRAKE EQUIPMENT MOUNTED ON PLATFORM FOR INSTRUCTING EMPLOYEES AT SHOPS OF THE UNITED RAILWAYS & ELECTRIC COMPANY, OF BALTIMORE

motors rated at 55 hp each. The controllers are of a comparatively new type designated as K 28 F, with a new device embodying two contactors in series with the controller placed underneath the car so that the heaviest portion of the current is broken below the car, instead of in the controller case.

The forty cars for high-speed service are fitted with rolled-steel wheels, and are equipped with air brakes.

In equipping these cars at the shops of the railway company it is believed that a new record has been established for quick work. The bodies as received from the manufacturers had practically none of the auxiliary equipment, and the work of installing air brakes, wiring trucks, motors, etc., was done at the Carroll Park Shops of the railway company. After this work was once under way the cars were turned out at the rate of five per day complete. H. H. Adams, superintendent of rolling stock, states this was accomplished by carefully systematizing the work and perfecting an organization for this one purpose. In the beginning one car was equipped complete, and all the parts were then taken down and used as templates and patterns for making up the parts used on all the rest of the cars. For instance, on the air brake equipments all the pipes were bent to shape, accurately fitted and assembled so far as possible before being placed on the cars, two men being engaged on this work, so that all

Mr. Adams rigged up a platform in one corner of the shops to represent the bottom of a car turned upside down. On this platform were installed a complete air brake and control apparatus, so that all the details could be readily explained to the car crews. All the parts of the apparatus were labelled with their proper names as a means of familiarizing the men with the air brake terms.

D. C. CATENARY AT NEW ORLEANS

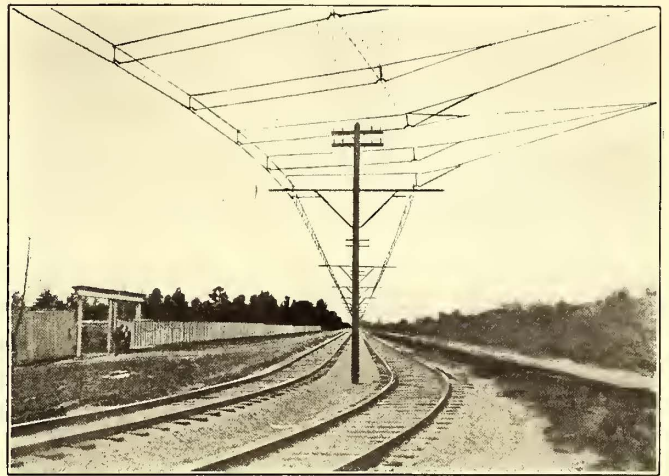
The New Orleans Railway Company last year built an extension to the new City Park race track, and took the occasion to install catenary construction as a sort of experiment, with the idea of determining just what can be expected from the catenary in ordinary service. The extension is operated entirely by direct current, so the experiment is being made not so much with reference to the question of insulation, as to determine what the mechanical and operating results will be, and particularly to find out whether the number of overhead troubles can be reduced by this method of construction. The line has been up for only a short time, but the results, so far, have been thoroughly satisfactory, and seem to indicate that the troubles caused by trolley wheels leaving the wire and breaking down the overhead work can be virtually eliminated.

The line was built from the company's own plans in accordance with the ideas of A. L. Black, electrical engineer for the company. The catenary is supported on creosoted wooden poles spaced 100 ft. apart. It is believed a considerably greater spacing would be entirely safe with catenary suspension, and if the poles are placed every 150 ft. or 175

double pull-offs attached to both the messenger wire and the trolley wire. The pull-offs from the two wires in each case meet in a common pull-off insulator, from which they are carried to the guy pole by a single guy wire. At the beginning of curves, the construction is further strengthened by means of an iron rod reaching from the bracket brace on



DIRECT-CURRENT CATENARY AT NEW ORLEANS



VIEW SHOWING CONSTRUCTION OF DIRECT-CURRENT CATENARY ON CURVES

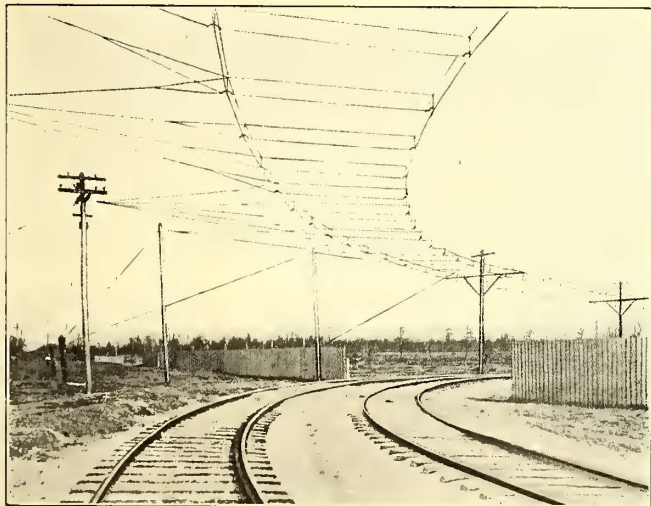
ft. apart, it is believed catenary suspension can be constructed at but little additional cost over the cost of ordinary trolley construction, inasmuch as the saving in poles, brackets and overhead material will very nearly counterbalance the additional cost of the catenary.

The messenger wire from which is suspended the trolley, is a 1/2-in. galvanized steel strand wire, which is supported by 10-ft. steel tube brackets attached to the poles by regulation wall sockets. The messenger wire is attached to the pole brackets by means of a Locke insulator, which is held in place on the brackets by a special iron casting.

the pole out to the trolley wire to which it is attached by a standard clip. The photographs will serve to illustrate the appearance of the construction.

SLEET CUTTER

J. L. Sullivan, master mechanic of the St. Francis County Railway Company, of Farmington, Mo., sends the following description and sketch of a device for removing sleet from the trolley wire. The device is a small casting shaped something like the section of the rim of a trolley wheel, and is designed to be attached to the harp so that it will cover the upper part of the wheel, and the trolley wire, instead of engaging the regular groove of the wheel, bears against this auxiliary rim. The groove of the attachment is fitted with



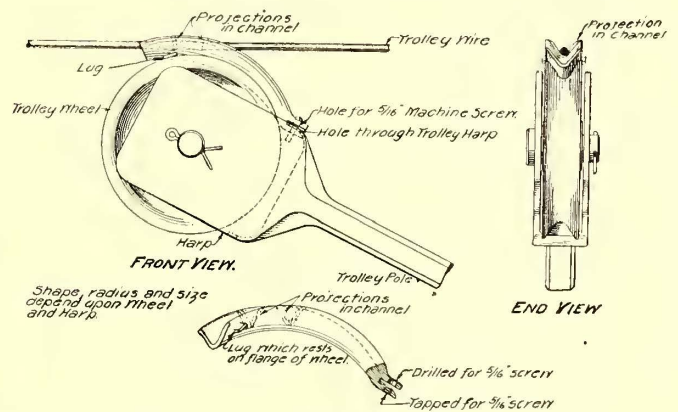
VIEW SHOWING CONSTRUCTION OF DIRECT-CURRENT CATENARY ON CURVES

The trolley is 0000 grooved wire, and it is suspended from the messenger wire by spreaders of 1/2-in. pipe in varying lengths, depending on the catenary curve. These spreaders are attached to the messenger wire by three-prong clamps, and to the trolley wire by 4-in. mechanical clips, the spreaders being provided at both ends with screw threads to screw into the clamp and clip, respectively. The overhead material was supplied by the Ohio Brass Company.

At curves, the construction is held in place by single and

projections which scrape against the wire and break up the ice or sleet. The device is made of composition of about the same hardness as the trolley wheel, and is attached to the harp by means of a 5-16-in. screw.

As a result of the franchise granted to the Chicago & Milwaukee Electric Railway Company for entrance into Milwaukee, it is said the company will four-track its line so as to give limited service between Chicago and Milwaukee.



DETAILS OF SLEET-CUTTING DEVICE

NOTES FROM HOUSTON, TEXAS

Houston is a progressive, growing, go-ahead city with a population of 60,000, and by reason of its railroad and water connections is rapidly becoming one of the foremost cities in the Southwest. The Houston Electric Company, which operates all the street railway lines in the city of Houston, has passed through some troublous times, including a boycott and strike during the latter part of 1904. But under the management of Stone & Webster, of Boston, who now control the company, the property has been greatly improved, additional lines have been built, and the enterprise bids fair to have an entirely satisfactory and successful future.

The street railway system comprises 42 miles of track. Owing to the saturated condition of the soil it is difficult to obtain a good foundation for track work, and most of the track recently laid is built with a layer of planking underneath the ties in a manner which will be described in detail in a later issue of the *STREET RAILWAY JOURNAL*.

The road is distinctly a city system, as only two of the lines extend into the suburbs, and these are but four or five miles long. The company has recently adopted as its standard type of car a car body measuring 44 ft. 8 ins., built by the St. Louis Car Company, and mounted on Brill No. 27-G trucks with two GE-67 motors to the car, both motors being mounted on the rear truck. The cars are fitted with the Detroit divided platform, and are equipped with Christensen air brakes. They are provided with the United States combined arc and incandescent headlight. There are practically no grades on the system, and the speeds are not high, and for this service this type of car has been found thoroughly satisfactory.

In mounting the car body on the trucks, the center of the body is set about 13 ins. forward of the center line of the trucks. The purpose of this is to throw the dead weight of the car forward, inasmuch as the cars are operated only from one end, and the live load is usually thrown largely on the rear truck due to the natural reluctance of passengers to move forward in the car.

The company is using a chilled-iron wheel made by the Dickson Car Wheel Company, of Houston, and is getting an average of 35,000 miles to 40,000 miles from these wheels. The standard wheel weighs 450 lbs., is 33 ins. in diameter, with $2\frac{1}{4}$ -in. tread, and $\frac{7}{8}$ -in. flange. The axle is cold rolled steel, 4 ins. in diameter. It is the practice to press wheels on axles with 30 tons to 35 tons pressure. The company is now using split gears of the Nuttall make.

The trucks are all fitted with soft gray iron brake-shoes without chill, made in a local foundry. The brake rigging is the standard rigging furnished by the truck manufacturers with this type of truck. The braking leverage is arranged to equalize on all eight wheels, but it is the practice to set the shoes on the rear truck a little closer to the wheels so the driving wheels receive considerably more of the braking effort.

Babbitt linings are used in all armature motor and axle bearings. The company is still using a high grade grease for bearing lubrication, but is watching with interest for the development of a feeding device that will permit of oil lubrication. On axle bearings it is the practice to pour the babbitt lining to size without boring. Armature bearings, however, are bored out on a lathe to an exact fit.

The company repairs and winds its armatures in its own shops, and makes part of its own coils. The master mechanic is of the opinion that it does not pay a small company to attempt to make all of its own armature coils. It

is difficult to say just where the line can be drawn in this regard, but the road must be large enough to warrant the organization of a coil department equipped with modern machinery. Where a small road has several types of motors in use, it will take a considerable force in the armature department to keep sufficient of the different types of coils on hand, and the number of damaged armatures varies so largely, depending upon weather conditions, that at times the coil department will have little to do while at other times extra men will have to be added to the force to keep up with the demand. To secure any economy in making its own coils, therefore, the company must be large enough to keep a well organized force of winders busy all the time.

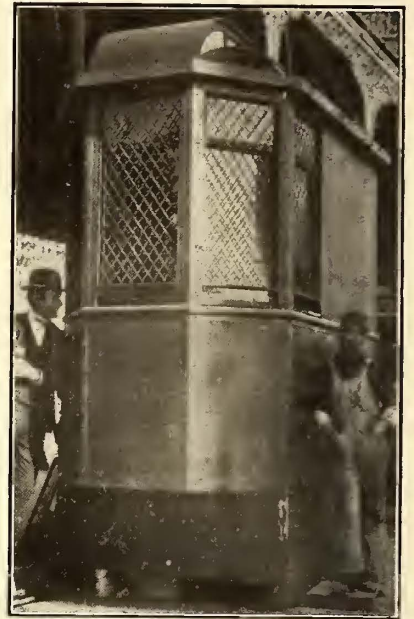
The power station of the company contains one 650-kw General Electric 550-600 volt railway generator direct connected to a Hamilton-Corliss cross-compound engine. This machinery was installed in 1904, and is now used to carry the load for the greater part of the day. In addition to this unit there is also some older generating equipment comprising one 250-kw General Electric generator, one 225-kw Westinghouse generator, two Edison 80-kw machines and two Thomson-Houston 80-kw multi-polar machines, all belted to a jack-shaft driven by two Allis cross-compound condensing engines. The station output ranges during the day from

600 kw to 800 kw, and this load is well taken care of by the 650-kw unit. At night the load drops to about 300 kw, and it is the custom to then shut down the main unit and supply current from the older apparatus. The station is showing excellent economy in cost per unit of output, and this arrangement of having one unit of sufficient size to carry the day load, including the morning and evening peaks, with a relay of smaller units for the night load, appears to be an excellent plan.

The station is burning Texas oil exclusively, as fuel under the boilers, and it has been found a clean, convenient and economical substitute for coal. A feature of the station is the small amount of lost heat radiated from the front of the boilers into the boiler room. In fact, during a recent cold snap it was found necessary to keep a fire going in a small stove in the boiler room in order to provide warmth for the boiler-room attendants, although the boilers were working at overload pressure.

The company is now building a complete new storage house and shop plant, and as soon as the plans are perfected they will be published in the *STREET RAILWAY JOURNAL*.

The following is the personnel of the local operating organization acting for Stone & Webster, of Boston: Manager, David Daly; superintendent, W. H. Tucker; engineer of power station, John F. Usener; electrical engineer, F. D. Martinez; master mechanic, V. W. Berry.



STREET BOOTH FOR STARTER AND INSPECTOR, HOUSTON

CONTACTORS WITH A SERIES PARALLEL CONTEROLLR

The United Railways & Electric Company, of Baltimore, has recently installed on a number of its long four-motor cars, the K-28-D controller, in which two contactors in series are used to break the main circuit. This controller has recently been brought out by the General Electric Company, and is intended to obviate the objections to the use of the ordinary series parallel controller with four-motor equipments. The troubles resulting when the main circuit is broken inside of the controller casing, were discussed at the Philadelphia meeting of the American Street and Interurban Railway Engineering Association, and several editorials have been published in this paper on temporary expedients, such as the manipulation of the circuit breaker, by which these troubles can be reduced.

Fig. 1 illustrates the wiring diagram of the K-28-D controller system. The two contactors for breaking the circuit are used in conjunction with two small contacts in the controller casing and just below the controller cylinder. These contacts are illustrated in Fig. 2, and are used for completing the circuit through the operating coils of the contactors.

A pivot arm, operated by a projection on the fibre disc at the bottom of the cylinder, brings the two fingers into contact with a cross-connecting strip. A magnetic blow-out is used for promptly extinguishing the arc occasioned at the

slightly in advance of the main fingers, thereby taking most of the burning.

The K-28 controller is perfectly able to handle the ordinary arcing occasioned in opening the circuit, but in case a motor becomes damaged and the arcing at the fingers is greatly increased, the contactors insure a prompt extinguish-

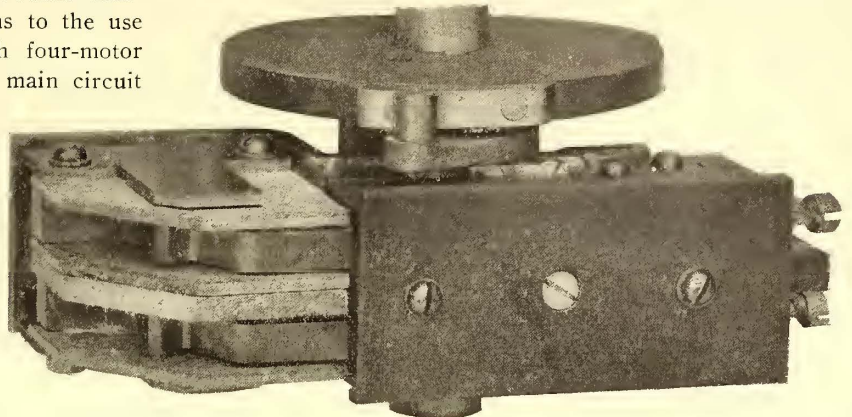


FIG. 2.—FINGERS AT BASE OF CONTROLLER FOR OPERATING CONTACTORS

ing of the arc. As the contactors are placed in the main circuit between the trolley finger and any grounded portion of the controller after the controller has been turned to its off position. The two contactors, operating with the resistance tubes which are placed in series with the operating coils, are mounted in an iron box

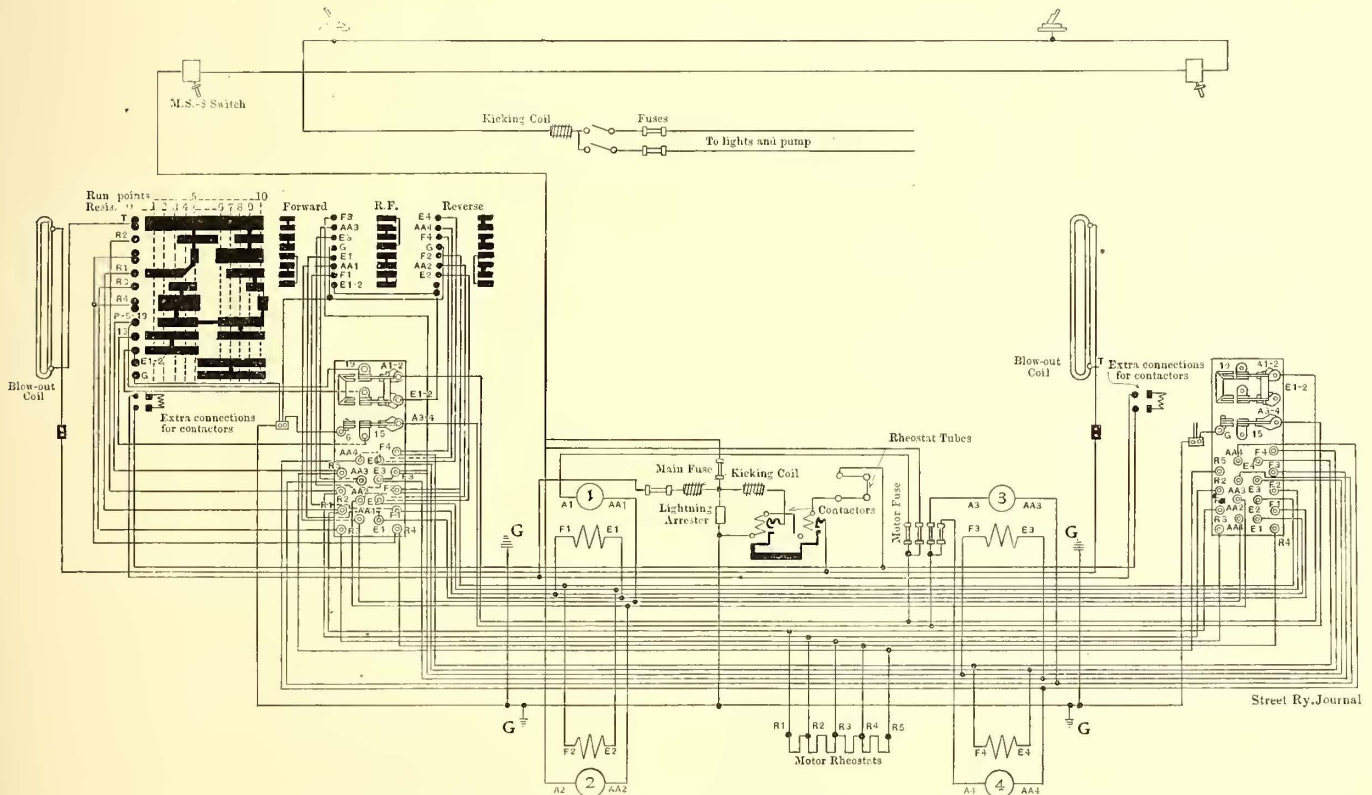


FIG. 1.—WIRING DIAGRAM OF K-28 CONTROLLER SYSTEM EMBRACING TWO CONTACTORS AS USED ON FOUR-MOTOR EQUIPMENTS IN BALTIMORE

fingers of this switch when opening the circuit. The projection in the fibre disc is so located that the contactor circuit is completed after the main fingers have made contact with the cylinder segments, and it is intended that in turning off the two contactors shall open the circuit

which is located in a convenient position under the car.

The Worcester & Northern Railway Company has been granted a charter for an electric railway from Holden to Princeton, Mass.

PROPOSED INTERURBANS IN MICHIGAN

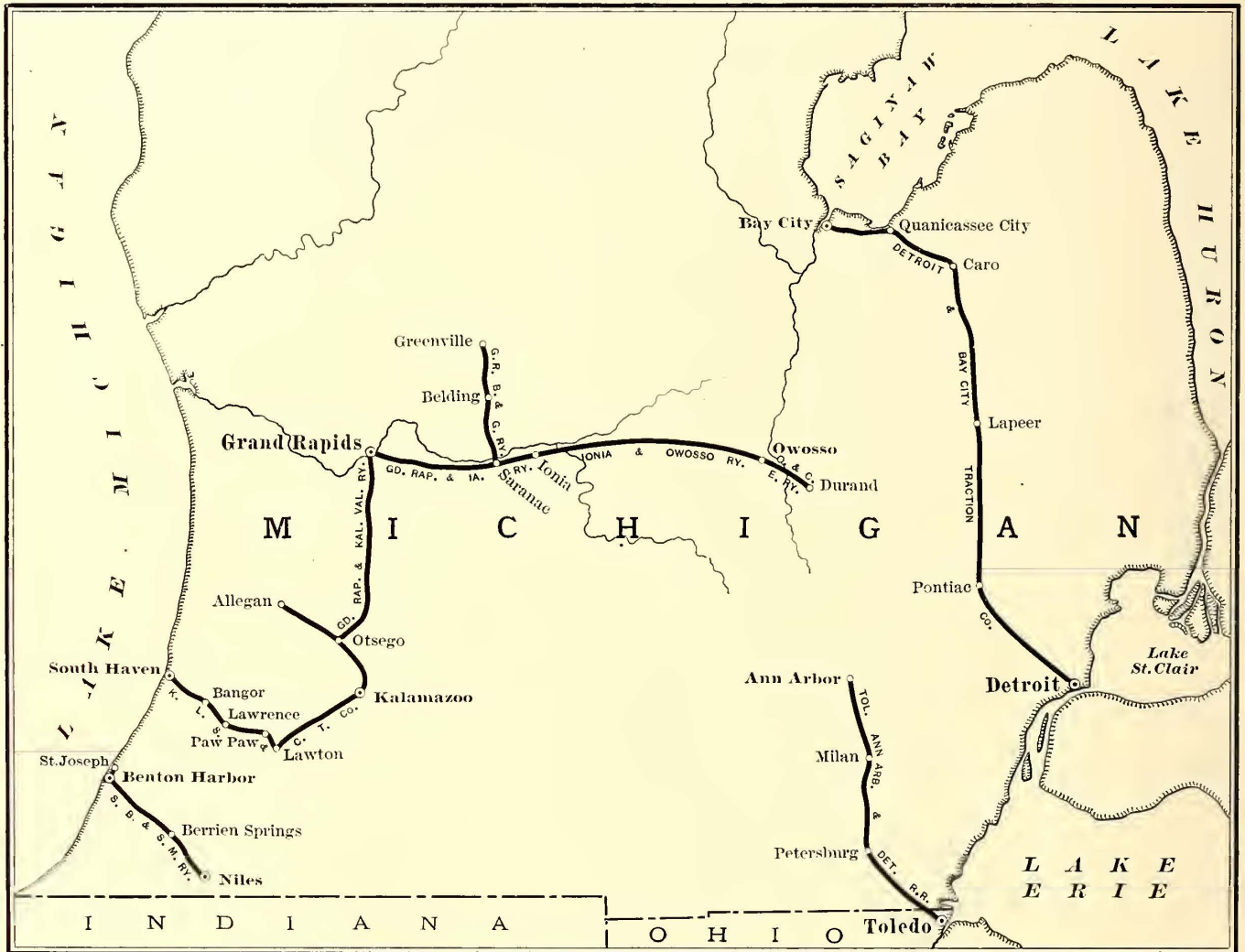
While it was at Detroit that the first interurban railway development in Michigan occurred, other cities throughout the State were slow to profit by her experience. Excellent city and suburban lines were built, but here development seemed for a time to rest. Recently, however, a number of important lines have been built, and the prospects for new construction during the coming year are better than ever before. In fact, the plans in hand for building new lines exceed in number and are more pretentious than ever, as the accompanying map shows. A summary of these projects follows:

The Detroit-Bay City Traction Company has commenced

The same company is also planning to extend its line, which is completed to Pine Lake, north to Owosso, and some of the right of way and other details have been completed for that road.

West from Lansing to Grand Ledge, a line is projected by the Platt Power & Heating Company, of Lansing. The company has secured a number of water power rights along Grand River, and as soon as the stations are established it proposes to construct the road.

The Kalamazoo, Lake Shore & Chicago Traction Company has purchased of the Michigan Central that stretch of track between Kalamazoo and Mattawan, which the steam road abandoned when it straightened its main line. The traction expects to have its cars running early in the year to South



MAP SHOWING SOME LONG ELECTRIC INTERURBAN LINES PROPOSED IN LOWER MICHIGAN

Street Ry. Journal

work on its line, which it is believed will add an important feeder to the growth of Detroit. Grading has been commenced between Bay City and Quanicasse City, and the right of way through to Detroit is said to have been all secured.

The Grand Rapids & Ionia, the Grand Rapids, Belding & Greenville and the Ionia & Owosso lines are part of the interurban system which ex-Governors John T. Rich and A. T. Bliss and their associates plan to construct. The Lansing-Jackson line is to be a part of the Mills-Elliott-Moore system, for which it is proposed to make Lansing the center. The roadbed for the lines has been constructed to Mason, with the exception of a few short stretches, and all of the right of way has been secured. The company has the material and expects to renew construction of the line early the coming spring.

Haven, with steam motive power, and later with electric power. It is understood that it is this system with which the Mills-Elliott-Moore syndicate expects to connect its Jackson-Kalamazoo line for traffic through to Chicago.

The St. Joe River Traction Company proposes to construct a line from St. Joseph to Dowagiac, and has made application for crossings over the Pere Marquette, near St. Joseph, and over the Big Four at Eau Claire.

The line from Benton Harbor to Niles is one that the South Bend & Southern Michigan Railway proposes to build as the beginning of a line through to South Bend.

Recently there have been articles filed by a company known as the Kalamazoo-South Bend Traction Company, but nothing is known as to its plans.

The Detroit, Ann Arbor & Toledo line is one that John

O. Zabel, of Petersburg, is promoting, and it is said that some work has been done on that line.

The line from Owosso to Durand is planned as an extension of the present interurban line between Owosso and Corunna, and the company has secured some right of way and franchises for it.

DISCUSSION ON AXLES AT THE NEW ENGLAND STREET RAILWAY CLUB

The second meeting of the New England Street Railway Club this year was held in Boston at the American House, on the evening of March 1, President E. E. Potter, of New Bedford, being in the chair. After the usual dinner a short business meeting was held, and it was announced that the club's annual meeting and banquet would be held in Boston on March 22, the banquet being assigned at the Hotel Somerset. The speaker of the evening at the American House was E. T. Millar, general car foreman of the Boston & Maine Railroad. His subject was "Axles."

At the outset of his address, Mr. Millar emphasized the importance of the axle question as regards design, quality of material and methods of manufacture. Axles as used on steam and electric roads are practically known as two classes—the Muley or buttonless journal, and the M. C. B. type, or button journal. The M. C. B. standard axle has journals $3\frac{3}{4}$ in. by 7 in., with a $5\frac{1}{8}$ in. wheel fit. The Muley axle has several serious disadvantages. It is sometimes called the "end thrust" axle, referring not only to a piece of metal which comes in contact with the end of the axle, but to an axle which has a piece of metal which slides down into a groove cut in the end of the axle. With these types of bearing, inspection is difficult, for the piece of metal must be removed in order to see just what the condition of the bearing is. The number of spare parts to be carried in stock is unduly increased, lubrication is not apt to be well applied, and end play is often excessive on account of the wear of the metal, which takes the end thrust with the M. C. B. bearing. As the end wear occurs the journal also wears down in thickness, and eventually has to be renewed.

Axle specifications are necessary for safety and economy, and there is no more important part of a car than the axle, for the reasons that breakages are very dangerous, and overheating causes delays in the handling of traffic. It is generally admitted that steel made in open-hearth furnaces is much superior to that made by the Bessemer converter process, for the former seems to withstand shocks better. The M. C. B. steel-axle specifications call for .40 per cent; manganese, not over .50 per cent; silicon, .05 per cent, sulphur .04 per cent, and phosphorus, not over .05 per cent. Mr. Millar emphasized the fact that the last named is the dangerous element, and recommended a tensile strength of 80,000 lbs. per sq. in., elastic limit, 40,000 lbs. Axles should be free from flaws, and journals turned smooth and cold-rolled before being placed in operation.

The cars on the Boston & Maine's electric line at Concord, N. H., weigh about 20 tons light when ready for service, and are equipped with $3\frac{1}{4}$ -in. by 6-in. journals. When the journals are worn down to 3 ins., they are scrapped. A taper of 1-32 in. between the front and back end of an axle means truing up as though the axle were new. In milling key seats for gears, fillets should be used at the ends so as to avoid sharp corners.

Mr. Millar stated that he had always maintained that the condition of the track on the electric line at Concord should receive as much credit in the elimination of broken axles as

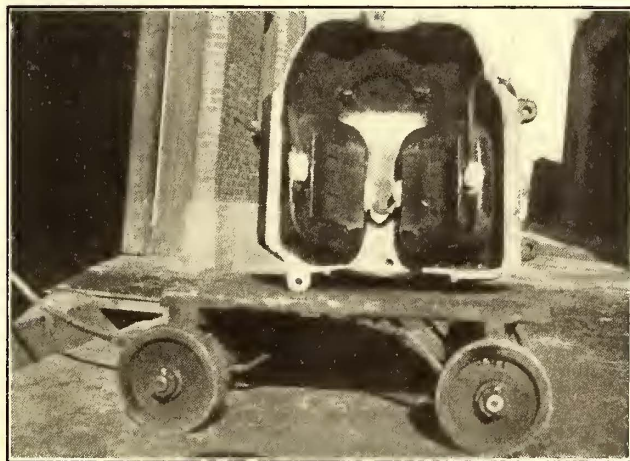
the design, material and workmanship of the axles themselves. When the public, who patronize this line, feel that the company has given them as good a car and as easy riding one as could be expected, there is little doubt that the track man is largely responsible for the smoothing down of rough places.

In the brief discussion which followed the presentation of the address, it was stated that one great trouble of the axle question was that companies are not willing to pay the cost of specifying much better axles than are commonly used at present. Axles can be obtained of over 200,000 lbs. tensile strength, with 22 per cent or 23 per cent elongation in test pieces, instead of 18 per cent. Automobile axles represent a very high development in point of strength. The axles of electric cars are subject to strains of the order of those encountered in locomotive-driving axles, rather than in the axles of trail cars. Less than .03 per cent phosphorus can now be obtained in commercial products. The treatment of the steel is the most important subject of all. Chrome-nickel steel is growing in favor in Europe, and will doubtless be successfully used in this country before a great while. The meeting closed with a rising vote of thanks to the speaker.

PROTECTING RAILWAY MOTOR FIELD TERMINALS

An effective and original method to prevent the burning out of fields, due to flashing at the terminals on account of the accumulation of carbon and copper dust, is being followed with success by the Colorado Springs & Interurban Railway Company, of Colorado Springs, Colo. This method originated about a year ago with B. M. Lathrop, superintendent of the company, and since its adoption has prevented the loss of a single field by lightning or otherwise.

It consists first of making a mixture in equal parts of



PROTECTING THE LOWER FIELD TERMINALS OF A GE NO. 67 MOTOR

shredded asbestos, shellac and plaster of paris, which, when properly introduced and kneaded, forms a pulp about equal in consistency to putty. The terminal posts and cables are then thoroughly cleaned and fastened, and the mixture applied so that it completely covers from view the entire connection.

The shreds of the asbestos then serve to bind and hold the mixture together in drying after application. After being applied and subjected to the air for about twenty-four hours, this mixture hardens by reason of the presence of the plaster of paris and shellac, and with the asbestos forms a very tough and solid material. It can be removed, if necessary, only by being broken up by severe hammering.

CORRESPONDENCE

LARGE ELECTRIC AND STEAM LOCOMOTIVES

THE BALTIMORE & OHIO RAILROAD COMPANY

Baltimore, Md., March 3, 1906.

EDITORS STREET RAILWAY JOURNAL:

Having observed the remarks under the caption "Two Papers on Heavy Electric Traction," in your publication of Feb. 24, I take pleasure in reviewing, for the information of your readers, the following items relating to the paper presented before the New York Railroad Club.

The report was based on observations and results obtained from actual practical performance covering a sufficient period to warrant the conclusions reached, and the opinions expressed were fully justified and strictly unbiased. A comparison was made between electric locomotives completed by the designers and builders in September, 1903, and a steam locomotive, the construction of which was finished eight months later.

While the electric locomotives were operated in helper service over the extremely short maximum distance of 3.4 miles, about $1\frac{3}{8}$ miles of which is a continuous tunnel, with $\frac{5}{8}$ miles made up of six short tunnels and masonry bridges, there still remained 1.4 miles in the open; the steam locomotive was run in helper service for a maximum distance of 16.5 miles, and in through freight service for a distance of 43.5 miles. On the mountain division, where the steam locomotive was in service, the conditions with respect to snow, sleet, dampness, slippery rail and wind were much more severe than on the better protected line traversed by the electric locomotives.

The work done by the electric locomotives, composed of two sections, consisted of hauling trains averaging 1100 tons for 3.4 miles over a ruling gradient of 1.5 per cent, with curvature of from 5 degs. to 11 degs. The work done by the steam locomotive consisted of pushing an average of 1950 tons of train for 14 miles, over a ruling gradient of 1 per cent, with curvature of from 1 deg. 30' to 7 degs. The comparative conditions and distances, therefore, show most favorably for the economical operation of the electric locomotive motors, and the tunnel conditions were not such as to be prohibitive to a high power-plant efficiency.

In compiling the specifications for a modern electric locomotive, the first, second, fourth, fifth, sixth, seventh, eighth, tenth and eleventh requirements can all be met by certain types of modern steam locomotives. The third requirement is necessary in electric but not in steam locomotives, for the reason that the former cannot be economically constructed nor operated in as large single units as steam locomotives, and in order to produce the hauling capacity it is necessary that the sections shall be constructed in a manner that will prevent delay and expense for coupling up and operating. The ninth, twelfth and fourteenth requirements are not applicable to steam locomotives, but from practical experience they are most essential for electric locomotive operation. The thirteenth specification is a proposition that has been brought out by some electric locomotive advocates as a strong reason for the adoption of electric traction for the handling of traffic over mountainous lines.

The additional essential requirements that can be met in the steam, but which were omitted from the electric locomotives, are as follows:

(1) A minimum capital and maintenance cost per unit of tractive power.

(2) A self-contained machine generating the power necessary to develop its hauling capacity.

(3) The smallest number of bearings and parts per unit of power developed.

As to the specification for the elimination of armatures from locomotive driver-wheel axles, and the transmission of power to driver wheels not less than 60 ins. initial diameter, without the use of gearing, this was accomplished in quite a simple and satisfactory manner, in connection with electric locomotives weighing 196,000 lbs. that were constructed ten years ago, and which have been in service ever since that time. Such a method of power transmission was also provided on two types of electric locomotives, illustrated and described in your issue of Feb. 24, 1906.

The cost of \$6.10 per 100 miles run for running and shop repairs made for one year, per electric locomotive consisting of one section, must be approximately doubled to compare it with the cost of \$5.14 per 100 miles run, which was the cost for the combined running and shop repairs for the steam locomotive on account of work performed during the same period. The charge of 9 cents per mile was an estimated figure covering a future ten years' performance of the steam locomotive, and cannot be applied as comparative with the one to two years old electric locomotive present costs.

As regards power house performance, so long as the current required is supplied in sufficient quantity and charged at a cost per kw-hour approximating the performance of up-to-date power plants using coal for fuel, there can be no severe criticism.

In justice to the expressions as given in the report, as well as to both the electric and steam locomotive performance in question, I have thought that the above information should be given to avoid any misapprehension in connection with the factors involved.

J. E. MUHLFELD,

General Superintendent of Motive Power.

NEWTON & NORTHWESTERN ELECTRIFICATION IN IOWA

The owners of the Newton & Northwestern Railway Company, who have recently devised plans to electrify a portion of the main line and construct extensions from a point near Boxholm to Fort Dodge and from Kelley to Des Moines, Ia., as noted heretofore in these columns, have organized another company, to be known as the Fort Dodge, Des Moines & Southern Railway Company, which will have charge of the construction of the two extensions, the electrification of the necessary parts of the main line, and the operation of the completed line between Des Moines and Fort Dodge and another extension from Kelley to Ames, and possibly to Nevada, Ia. Articles of incorporation of this company were filed in Iowa Feb. 27, 1906. Boone is made the principal place of business of the new company. The company organizes with a capitalization of \$10,000, which will be used to carry on the preliminary surveys, and which will be increased from time to time as the necessity arises. The articles state that the business of the company shall be the acquisition by construction, purchase or lease of a railway or railways, connecting the city of Boone with the city of Des Moines, the city of Fort Dodge and the city of Ames, all in Iowa, and extending the same and the construction, purchasing or leasing of other railway lines in Iowa and operating said railways by steam, electricity or other practical motive power. The board of directors is composed of the following: W. H. Benn, C. E. Rice, W. Chamberlain and C. O. Elbert, addresses not given. These parties are also the incorporators. The engineers will be placed in the field this week to locate the proposed line from Kelley to Des Moines. The contract for the construction of the extension from Boxholm or Lanyon to Fort Dodge will be awarded within the next ten days, and work will then be started on that section.

TESTING LIGHTNING ARRESTERS

BY W. P. JACKSON,

Master Mechanic, Columbus, London & Springfield Railway

The subject of testing lightning arresters is of particular interest at this season of the year, and I submit below a method, which I believe to be of considerable value, inasmuch as, during one operation consuming about five minutes, it will indicate the existence of open circuits in either trolley or ground taps, measure the length of spark gap, and also indicate the existence of a defective blow-out coil, or a high-resistance graphite rod.

For testing car arresters, a resistance taking 4 amps. to 5 amps. on 550 volts is mounted in a suitable location in the car house. Attached thereto by a sufficient length of No. 14 insulated wire, is a hook fastened on the end of a light wooden pole, 8 ft. to 10 ft. in length. This, with a test gage of metal 1-40 in. thick x 1/2 in. wide x 3 ins. long, provided with an insulated handle, and a connection of 4 ft. of No. 14 insulated wire, constitutes the necessary apparatus.

When testing the arrester on a car, the trolley is first pulled down, and all paths for the current, such as lights, heaters, pump and headlight circuits, are cut off. The main motor switch or circuit breaker is left in. The circuit hook is then placed over the trolley wheel, the arrester box opened, and the gage is inserted in the spark gap and then withdrawn. If the gage goes in with a snug fit, the gap is of proper length. If, when the gage is taken out, it draws a fat arc, which is promptly extinguished, the inspector can safely assume that the trolley and ground connections, resistance rod and blow-out coil are in good condition. If no arc occurs, it indicates an open circuit in the trolley or ground taps. To determine which is at fault, the gage is re-inserted and one end of the connecting wire is touched to the rail or other convenient ground. If a spark is obtained, it is safe to assume that the ground tap is open-circuited. If no spark occurs, the open circuit should be looked for in trolley taps, or in the arrester itself.

If, when the gage is withdrawn, the arc is very weak, or a mere spark, the existence of a high-resistance graphite rod is indicated. A defective blow-out coil is readily detected by the failure of arc to rupture after the gage is withdrawn.

The same method of testing will serve for line arresters by mounting the resistance on the line car or speeder. In this case, the trolley taps should be opened, and resistance inserted in series with the arrester.

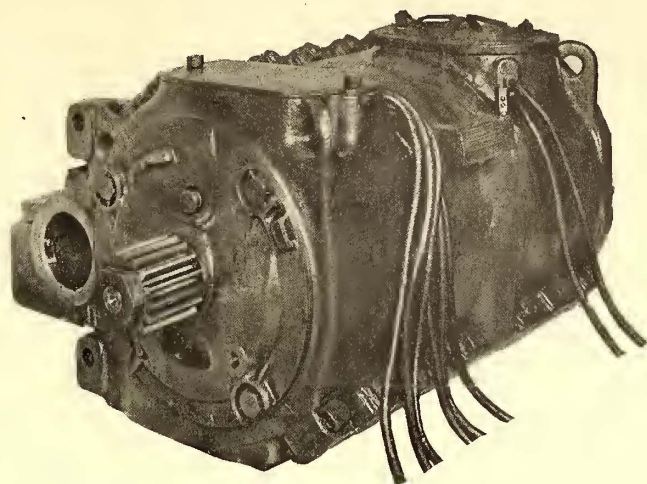
SINGLE-PHASE EXTENSION AT MILWAUKEE

A short account was published last week of the two proposed interurban extensions to the system of the Milwaukee Electric Railway & Light Company, upon the single-phase system. One of these is to be 20 miles in length, the other 16 miles in length. Both lines will be operated at a potential of 3300 volts, and, in addition, the motors are designed to run on the existing 7 miles of 550-volt direct trolley line between West Allis and Milwaukee.

Each of the ten cars, comprising the initial equipment for these roads, will be furnished with four General Electric 75-hp motors, of the type known as the GEA-605. This motor was described in the STREET RAILWAY JOURNAL for May 6, 1905, at which time a diagrammatic outline of the motor was published. A photograph of the motor is reproduced herewith.

These equipments will in general be operated as single cars, but occasionally will be run in two-car trains. For train control the Sprague-General Electric multiple-unit sys-

tem will be used, adapted for operation on alternating current. The transformer for use on these cars is of the oil-cooled type, and is wound for 3300 volts on the primary, with five different secondary taps for controlling the speed



SINGLE-PHASE MOTOR FOR MILWAUKEE INTERURBAN LINES

of the motor. The speed regulation is so devised that the running speed will be the same on both the alternating and direct-current portions of the line.

Distribution of the various transformer sub-stations will be at 3300 volts. At the stations, the current will be fed to the trolley line at 3300 volts. The catenary construction will be used. It is proposed to have these extensions in operation during the fall of 1906.

THE HANDLING OF TRANSFERS IN CONNECTION WITH THE CANADIAN FARE SYSTEM

In response to various inquiries received from a number of railways in the United States, Robert J. Clark, of the Toronto Railway Company, has added to his paper on "Collecting and Handling Fares," published in the STREET RAILWAY JOURNAL of Jan. 23, the following details regarding the company's methods of handling transfers.

Toronto Railway Co.

Transfer Ticket Report.

DATE _____

ROUTE _____

RUN NO. _____ MOTOR OR TRAILER _____

TICKET NO. _____ ENDING TRIP _____

TICKET NO. _____ COMMENCING TRIP _____

NO. ISSUED _____ NO. CANCELLED _____

TRIP NO. _____	U	TIME. _____	Collected.
	D	_____	

TOTAL _____

RELIEVED BY COND. NO. _____

BADGE NO. _____ CAR NO. _____

NO. UNUSED RETURNED TO OFFICE _____

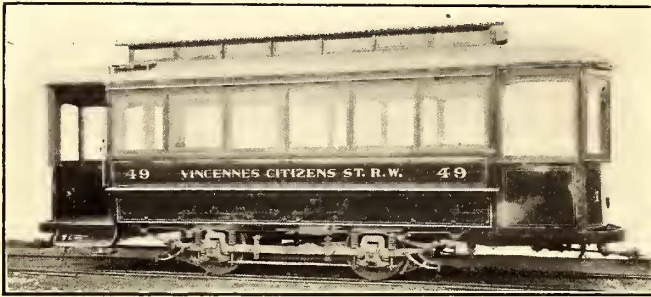
FACE OF ENVELOPE CONTAINING TRANSFERS

Owing to the collection of fares by the box system, the transfers have no monetary value, and consequently are not registered when collected. They are collected by hand by the conductor and placed in envelopes designed for that purpose, as shown in the accompanying cut. On this he records the date, his badge number, the run number, the progressive number of the pad of transfers at starting trip, and the progressive number at conclusion of trip, the difference giving the number of tickets issued. At the end of the trip, he places the transfers collected in this envelope, indicates the number on the outside, seals the envelope and deposits the same in the nearest office as he passes on the next trip. These envelopes are then sorted at the office. A thorough check is made on one route per day, for which the controller's department checks up the number of transfer tickets issued to each individual conductor, the number

issued by him to the public, and the number collected during the trip, strict scrutiny being made to see that the time indicated on the transfer ticket agrees with the time indicated for that particular trip on the envelope. When this is completed the issued or collected transfers are mutilated and placed in large bags and sold as scrap paper. The unissued tickets are retained to be issued as transfer extras on the same day in a later month should occasion require.

NEW EQUIPMENT FOR THE VINCENNES STREET RAILWAY

The car illustrated in the accompanying cut, is the standard type in use on the lines of the Vincennes Citizens' Street Railway Company. Several lots of these cars have



SINGLE-TRUCK CAR FOR VINCENNES CITIZENS' STREET RAILWAY

been furnished by the American Car Company, which is the builder of the present order. Vincennes, which is in the southwestern part of the State on the Wabash River, has now a population of over 10,000, and is of considerable importance as it is the junction of several steam railroad systems. The railway company operates about 10 miles of lines with upwards of twenty-five cars, and reaches Lin-



LONGITUDINAL SEATING AND SEMI-ACCELERATOR DOOR OF VINCENNES CAR

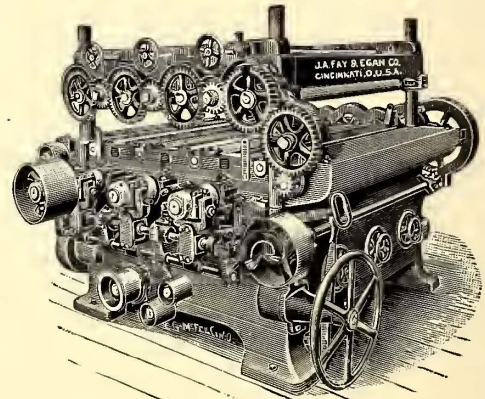
coln Park and the Fair Grounds, a short distance from the city, both of which are controlled by the company.

The cars are 18 ft. long over the bodies, and 27 ft. over the vestibules. The platforms, which are 4 ft. 6 ins. long, are enclosed at diagonally opposite corners of the car. The entrances are without doors or gates. Semi-accelerator doors are used on the body ends and in conjunction with the platform entrances at one side, aid considerably in facilitating egress and ingress. The width of the cars over the sills, including the panels are 6 ft. 3 ins., and over the posts at

the belt, 7 ft. 6 ins.; the sweep of the posts is 8 ins., and the distance between the centers of the posts, 2 ft. 11 ins.; the height from the floor to the ceiling, 8 ft. 7¼ ins.; from the track to the under side of the sill, 2 ft. 2⅝ ins., and from the under side of the sills over the trolley board, 9 ft. 1⅝ ins.; from the track to the platform step, 14 ins., and from the step to the platform, 12 ins. The woodwork of the interiors consists of cherry, and the ceilings are of carline finish, all stained the same color. The longitudinally placed slat seats are also of cherry. The trucks are of the No. 21-E type with 7 ft. wheel base, 33-in. wheels and 4-in. axles. Two 25-hp motors are used per car. The weight of a car and truck without the motors, is 13,000 lbs.

TRIPLE-DRUM SANDER FOR RAILWAY SHOPS

The J. A. Fay & Egan Company, of Cincinnati, Ohio, recently brought out its No. 4 triple-drum sander, called "The Conqueror." It is stated that for car shops having fine sanding to do, this machine will be found very valuable, as the quality of its work is always first-class and uniform under the most trying conditions. It works material from 30 ins. to 80 ins. wide and 8 ins. thick. The three steel drums carry sandpaper of varying grade from coarse to fine, and have



TRIPLE-DRUM SANDING MACHINE

a vibratory motion that eliminates all lines and snake marks. These drums can be entirely removed without trouble, and any ordinary workman can recover them, and give the paper the proper tension in a very short time. There are eight feed rolls, four above and four below the platen, driven by a train of heavy-expansion gearing. The three pressure rolls are placed one over each drum. The feed is governed by a double belt-tightener, operated by a hand lever.

The Pittsburg Railway Company is to install twenty emergency straight air brake equipments for motor cars with CP-21 air compressors, and ten emergency straight air brake equipments for trail cars, furnished by the General Electric Company. The cars upon which these equipments will be mounted are to be run singly and in two-car trains, consisting of one motor car and one trailer. The type of air brake equipment above mentioned, sometimes called "semi-automatic," is essentially a straight air brake system, having in addition an emergency valve on each car, which, in case the train breaks apart, disconnects the brake cylinder from the train line, and connects it directly to the main reservoir, thus applying the brakes on all cars, just as in the automatic system. In ordinary service, the operation is exactly the same as with a standard straight air brake system.

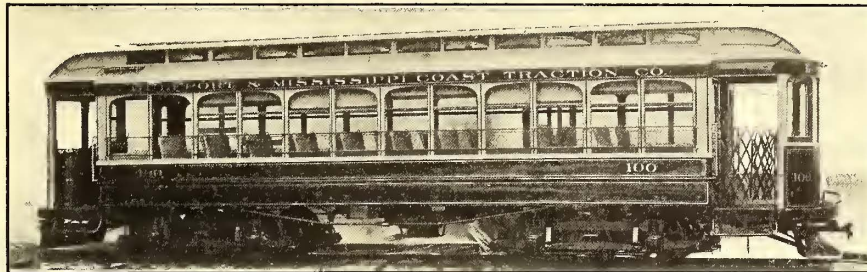
CARS FOR THE GULFPORT-BILOXI LINE

Ten cars of the grooveless-post semi-convertible type, like the one illustrated, have just been finished by the J. G. Brill Company, and shipped to Gulfport for use on the 28 mile line between Biloxi, Gulfport and Pass Christian, which will be in operation about May 1. The State of Mississippi has a coast line on the Gulf of Mexico, seventy miles long with excellent harbors, and skirted by a division of the Louisville & Nashville Railroad. The line of the Gulfport & Mississippi Coast Traction Company parallels the steam line, and is expected to obtain practically all the passenger traffic between these points and towns along the route, on account of the fine cars, more frequent service and fast schedule. In the STREET RAILWAY JOURNAL of Aug. 5, 1905, was described a shipment of semi-convertible cars from the John Stephenson Company to the Biloxi Electric Railway & Power Company. The systems at Biloxi and at Gulfport are controlled by the same interests as the new interurban line, the former having a trackage of seven miles and the latter three miles. A new power plant and car shed are being constructed at Gulfport, and a 1500-kw plant with two direct-connected turbines is being installed.

The illustration of the car exterior shows how admirably the car builder's semi-convertible window system is adapted to the twin-window arrangement. The arrangement gives a massive appearance to the exterior, which is in keeping with interurban service. The same curved lines will also be noticed in the ventilator sashes and the transoms. There are two compartments with a total seating capacity of forty-

tervals along the lower ventilator rails. The car builder's folding gates close the platform entrances, and the platform gongs, signal bells, draw-bars, bumpers and other specialties are of the same make. Small pilots are attached to the platforms with angle irons and round iron bars, in such a manner as to keep them from projecting beyond the end of the draw-bars. The air brakes are fitted with connections, as it is intended to run the cars in trains.

The general dimensions are as follows: Length over the



ONE OF THE NEW CARS FOR THE GULFPORT & MISSISSIPPI COAST TRACTION COMPANY

end panels, 33 ft. 4 ins., and over the vestibules, 42 ft. 9 ins.; width over the sills, including the panels, 8 ft. 2½ ins., and over the posts at the belt, 8 ft. 6 ins.; sweep of the posts, 1¾ ins.; distance from the center to the center of the side posts, 2 ft. 8 ins. The side sills are 4 ins. x 7¾ ins., and the end sills, 5¼ ins. x 6⅞ ins. There are 12-ins. x ¾-in. sill plates on the inside of the sills. The thickness of the corner posts is 3⅝ ins., and of the side posts, 3¼ ins.; the length of the seats, 38 ins., and the width of the aisles, 22 ins. The cars are mounted on No. 27-E-1½ trucks, which have 6-ft. wheel base, 33-in. wheels and 5 in. axles.

POWER FOR THE SIMPLON TUNNEL

It is announced that the hydraulic power of the Videria and Rhone Rivers is to be used in operating a turbine station, which will furnish current for the coming electric trains in the Simplon tunnel between Switzerland and Italy. The operating current sent from the sub-stations will be 2300 volts, three-phase. The dam now under construction is about 500 ft. long, and is arranged for a 30-ft. head. In the two turbine halls there will be eight pairs of 3000 hp, each running at 200 r. p. m., with their shafts continued to the 25-cycle, three-phase, 500-kw generators in the center hall. For transmission to the sub-stations, the potential is raised to 33,000 volts by oil transformers.

ANOTHER SINGLE-PHASE RAILWAY IN SWITZERLAND

The Maschinenfabrik Oerlikon, of Oerlikon-Zurich, Switzerland, has received a contract for equipping with single-phase apparatus, the Valle Maggia Railway, connecting Locarno and Bignasco, Switzerland. This line is 27.5 km (22 miles) long, is of 1 m. (39.37 ins.) gage and built for trains weighing up to 55 tons. The operating current, 5000 volts, will probably be generated in a 700-kw hydro-electric station 16 km (12.8 miles) from one of the terminals. Each car will be equipped with four 40-hp single-phase motors, and will carry the Huber side-contact collectors, previously described in these columns. This line is the second single-phase line in Switzerland, and its electrification, according to this system, is the direct result of the Oerlikon Company's successful experimental work on the Seebach-Wettingen line as described in the STREET RAILWAY JOURNAL of Feb. 24.



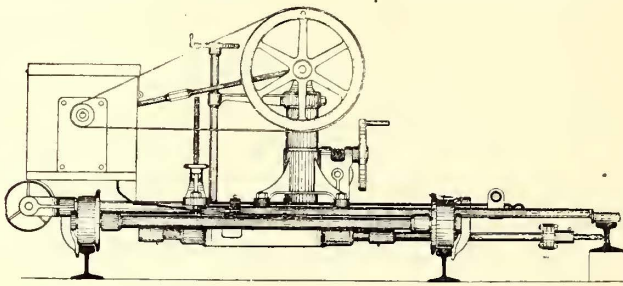
INTERIOR OF GULFPORT-BILOXI CAR, SHOWING DIVISION INTO COMPARTMENTS

eight, twelve of which are in the smoking compartment. The seats, which are of Brill manufacture, have high step-over backs with head-rolls. Wide net window guards are used on account of the low window sill, the top of which is but 25 ins. from the floor.

The interiors are finished in cherry of natural color, with ceilings of decorated birch. The partition, window sashes, doors and moldings are also of cherry. The bronze trim is of generous dimensions, and includes large individual parcel racks. Besides the incandescent lights, which are placed along the center of the dome, lights are distributed at in-

AUXILIARY DEVICE FOR DRILLING CURRENT RAIL

The accompanying view illustrates the new attachment which has been placed upon the Ludlow track-drilling machine for third rail work. This attachment can

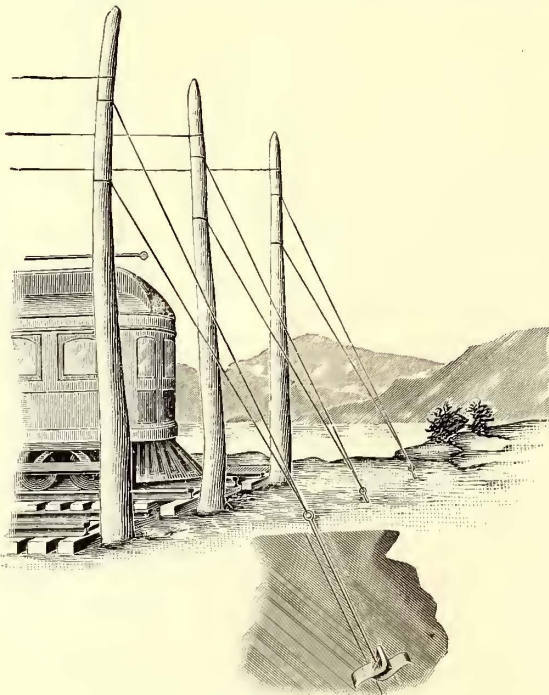


TRACK DRILL FOR THIRD-RAIL WORK

be applied to any of these track drills now in use. All of the parts that connect the machine to the third rail are insulated, and hence the drilling can be done without danger to the operator of the drill. This drill is now manufactured by the Cleveland Armature Works, of Cleveland, Ohio.

A SIMPLE TROLLEY ANCHOR

For over a year, the Western Ohio Railway Company, of Lima, Ohio, has been successfully using a pole-guying device, known as the Wapak anchor, and made by the Wapak Hollow Ware Company, of Wapakoneta, Ohio. The construction of this anchor is apparent from the accompanying



GUY WIRE FASTENED TO ANCHOR

cut, showing its appearance in service. The anchor can be set in less than half an hour by one man, wherever a 4-in. or 7-in. hole can be put down, and the only tool needed is a common post auger with a 5-ft. handle. When once set and adjusted this contrivance needs no further attention, and will easily outlast the pole, as it is made of iron covered with asphaltum to render it rust-proof. When preparing to guy a pole, a hole should be made not less than 4½ ft. deep, and just large enough to let the anchor go

down when folded up. When set, the blades should point right and left—not up and down. The blades should be spread, the earth tamped in between them to hold them apart, and the hole tamped full. When the anchor and the post or pole are connected by wire, it should be stretched tight before any twisting is done.

The blades will, generally, spread of their own weight; and are so curved that they will catch in the bank when the earth is tamped in between them. Under the pressure of tightening, the blades will spread out, entering the bank, and standing at, or near, right angles. By reason of this spreading of the blades the Wapak anchor has two great advantages: First, its holding service is greatly increased, and, second, it is held by the unmoved sub-soil of the bank into which it has been thrust.

These anchors are sold in a number of sizes, suitable for different strains. For the convenience of users of this device, the company carries in stock the Iwan post augurs to be used in connection with the setting of this anchor.

SUB-PRESSES FOR DIE WORK

In almost every railway shop, it is convenient to have a machine for stamping out different metal shapes such as figures, letters, discs, etc. For this class of work George M. Griswold, of New Haven, Conn., constructs a device for die work known as a "sub-press," and which is stated to be decidedly better than the old style of blanking dies. The sub-press is made for the purpose of holding the punches and dies in perfect alignment, and to avoid injuring or shearing the punches while setting them in the power press. The sub-press dies are made on an entirely different principle than the old blanking dies, which usually require two or more operations to produce a finished blank. The sub-press die makes the complete blank with all of the holes, monograms, figures, or whatever is ordered stamped into it, by one stroke of the press. As the stock is clamped firmly while the blank is being cut, each and every piece turns out perfect and exactly like its original.



SUB-PRESS FOR DIE WORK

This device is always ready, and only requires to be placed in the power press. It does away entirely with the trouble of delicate punches, so often spoiled by the old way of setting them. Furthermore, the sub-press is a little machine complete in itself, with punches always set and in perfect alignment. It is claimed that, in the long run, sub-press dies are by far the cheapest, wherever accurate work is essential. An ordinary power press, with an opening of about 10½ ins. between the gate and the bed, will answer for sub-press dies, but the manufacturer advises the use of a power press made especially for sub-press purposes.

While Mr. Griswold makes a large variety of sub-press dies, he does not confine himself to this line, but also is prepared to furnish to order all kinds of special machines and tools which cannot be found in the open market. One of his latest designs is a toggle-joint power press for sub-press dies, to punch out armature discs and other parts that must be made to a high degree of accuracy.

A NEW RECORDING REGISTER

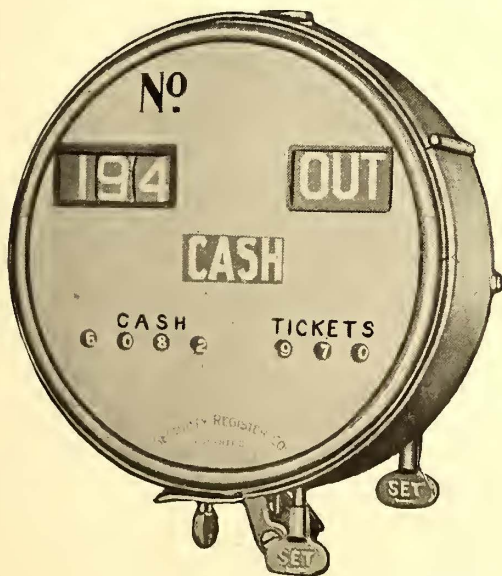
The Security Register Company has been engaged for a number of years on the development of a recording register, but has been unwilling to place any of these registers on the market until they should have been perfected. The company now announces that such a register is ready for the market, and that it has sold a number to different railway companies.

In outside appearance and size, the register resembles the well-known non-recording registers of the company, except that it is about half an inch thicker. It is made in both the single and double types. The record is made on a roll of paper, which in the double registers is 2½ ins. wide, and in the single registers is 1½ ins. wide. Every time a conductor takes or leaves a car and at every change of the direction plate, the reading of the totalizer is printed on this strip of paper. The register also allows an identification of the conductor who is operating the car, and of any inspector who may board the car to inspect the register, and also records the number of the register itself. This latter is to assist the auditing department in checking up the records.

		6	
5	4	4	7 0 6 I 100
5	3	6	7 0 5 I
5	1	9	7 0 3 I
5	0	4	7 0 1 3
4	8	8	6 9 9 5
4	7	1	6 9 7 7 100
4	5	6	6 9 6 I
		6	
		10	
4	5	6	6 9 6 I 100
4	5	6	6 9 6 I
4	4	1	6 9 4 2
4	2	6	6 9 2 5 100
4	1	2	6 9 0 9
		10	

FORM OF RECORD FROM REGISTER

start out to see that the registers are in good condition. With the recording register illustrated, the starter first inserts his identification stamp in a hole in the base of the register. This stamp carries his number, and stamps this number on the record strip. The identification stamp is then

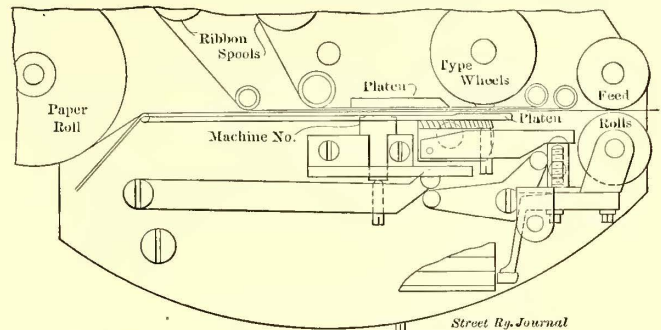


DOUBLE RECORDING REGISTER

withdrawn, and an operating handle is inserted. This records the reading of the totalizer and the register number. If a double register is used, it records both cash and ticket totalizer readings as they are at the time, and also the register number. Until the operating handle is inserted, the register is dead and

no fares can be rung up upon it. After testing the register, the starter reinserts his identification stamp to show that all the fares recorded within his identification-stamp marks on the strip were for testing purposes only, and must not be charged to anyone. He then hands the operating handle to the conductor, who first marks the record with his identification stamp, then inserts the operating handle and is then ready for business. The insertion of both the operating handle and the identification stamp feeds the recording ribbon a short distance, so that the records are not superimposed on each other, and after the operating handle is inserted in the register it must be turned all the way through, and make a record before it can be withdrawn.

After the car leaves the car house, the register is operated exactly like an ordinary register, the conductor keeping his day card as usual. Every time he turns his direction



WORKING DETAILS OF RECORDING REGISTER

plate, these readings are automatically printed on the record strip to which the conductor has no access. When a conductor leaves the car he withdraws the operating handle, and this makes a record of the totalizer. He then inserts his identification stamp, indicating that he has completed his run. He then turns his operating handle over to the next conductor, who proceeds like his predecessor.

A glance at the accompanying reproduction of a typical record from a double machine, will make the method clear. Here, the two small numbers 10 indicate that conductor No. 10 collected on four half trips 456-412 or 44 tickets, and 6961-6909 or 52 cash fares. The car was then taken by conductor No. 6, who in six half trips collected 544-456 or 88 tickets, and 7061-6961 or 100 cash fares. It also shows that the register number was 100.

If desired, inspectors can be required to mark the register record when they inspect a car on the road, and thus make a record of their visits.

The mechanism of the recording device can be seen from the section herewith. A paper strip is carried on the roll at the left hand, and is fed from the feed rolls at the right, and then is rolled up over a reel at the right. The paper tape passes over the recording typewriter ribbon, and has an automatic feed. At the end of the day the inspector at the car house opens the register, stamps the day, hour and car number, and sends the record to the auditing department, where the number of fares registered by each conductor can easily be obtained by subtracting his lowest from his highest number. Each reel will carry enough paper for over 3000 impressions, or sufficient to last anywhere from 30 days to 60 days, according to the number of trips made per day. The last few feet of the recording paper, or enough for three or four days, are of a different color from the rest, so that the inspector can tell when the paper needs replenishing. The recording ribbon will last from eighteen months to two years. The gears and other wearing parts in the register are of the best cut steel.

FINANCIAL INTELLIGENCE

WALL STREET, March 7, 1906.

The Money Market

There has been a material improvement in the monetary situation during the past week. The heavy liquidation in the stock market, which has been in progress practically throughout the entire period, has released considerable amounts of funds heretofore tied up in speculation. This, together with the announcement by the Secretary of the Treasury that he would deposit \$10,000,000 Government funds with the depository banks at the principal centers, caused a more liberal offering of funds by local lenders, which was reflected in lower rates for all classes of accommodation. No announcement has been made as yet as to the exact manner in which the Government money above referred to will be deposited in the banks, but in well informed circles it is believed that the Secretary of the Treasury will distribute the entire amount among the depository banks in the near future. Bankers and other lenders, however, do not look for any decided reduction in rates until the spring demand for money at interior points, which is still urgent, has been satisfied, and money is again moving in this direction. Government finances continue to improve. Foreign exchange has ruled somewhat steadier, owing largely to a sharp falling off in offerings of finance bills and sterling loans. The European markets have ruled easier, money and discounts at London and Paris showing a decidedly easier tendency. The bank statement published on last Saturday made a far better exhibit than had been expected. Loans decreased \$8,463,100, due largely to the shifting of loans from local to foreign bankers. Deposits decreased \$12,753,700. Cash decreased \$3,305,400, but as the reserve required was \$3,118,425 less than in the preceding week, the decrease in the surplus was limited to only \$116,975. The surplus now stands at \$5,008,750, as against \$5,125,725 in the previous week, \$8,389,700 in the corresponding week of 1905, and \$29,943,350 in 1904.

Money on call ranged between 7 and 4 per cent, the average for the week being about 5 per cent. Time money was obtainable at $5\frac{1}{2}$ per cent for sixty days to four months, a decline of $\frac{1}{4}$ per cent, while five and six months maturities were quoted at $5\frac{3}{4}$ per cent, which is also $\frac{1}{4}$ per cent lower than the rate prevailing at the close of last week. Price mercantile paper was quoted at $5\frac{3}{4}$ per cent.

The Stock Market

The month of March in the stock market has been ushered in much after the style of the proverbial lion, but whether it will go out as the lamb is a matter that can only be conjectured. From present indications the balance of the month is likely to witness more or less unsettlement in the market, not that there is anything radically wrong in the situation, but simply because of the present speculative temper. As a matter of fact, there has been little or nothing thus far on which to base any such selling movement and consequent serious decline in values as has taken place during the past week or so; on the contrary, practically all developments of an important nature have been of a character which ordinarily would have inspired unbounded confidence in the future of values and have occasioned general buying of securities. The announcement of the Secretary of the Treasury that he would deposit \$10,000,000 with the banks of this and other cities was certainly reassuring, but instead of having a good influence it seemed to inspire more or less apprehension that monetary conditions were not as they might be, otherwise Secretary Shaw would not have resorted to the measure noted.

The reports received from railways throughout the country showed a most remarkable state of prosperity, and the exceptionally open winter was reflected in especially gratifying increases in net earnings for the month of January and other periods. Increased strength was noted in the copper metal market, and while the iron and steel trade was reported dull by comparison, there was no evidence of any shading of prices. In a word, fundamental conditions were all that could be desired, yet values crumbled under the force of liquidation of long stock, combined with heavy bear pressure, which brought prices to a lower level than on any occasion since last autumn. Great stress was laid upon the possibility of a coal strike this spring, while the affairs of the

larger insurance companies were pointed to as a highly disturbing element. The shares of the anthracite coal companies and those of the copper producing properties were made to stand the brunt of the selling pressure, but stocks of all classes suffered more or less, and while there were frequent rallies, these were invariably of a feeble order and at the close the market was in a feverish and uncertain state.

The stocks of the local traction companies sympathized to a greater or less extent with the downward surge in the general list, but all things considered they acted quite well under the circumstances. This, no doubt, is explainable by the present and prospective large earnings of all these properties, a striking illustration of which was afforded by the report of the Brooklyn Rapid Transit Company for the last fiscal year, showing an increase in gross earnings of \$2,033,351 and in net of \$1,216,344. The announcement that a syndicate has been formed to underwrite a portion of the new Interborough-Metropolitan securities seemed to have a reassuring effect, as there had been some confusion as to what would be done with the vast amount of securities which this company is to issue.

Philadelphia

Trading in the local traction stocks developed larger proportions during the past week, and although prices moved with more or less irregularity the net changes were small considering the weakness prevailing in the general securities market. Interest centered in the shares of the Philadelphia Company, all of which were extremely active. At the opening of the week there was a disposition to sell the common stock, but as all offerings were readily absorbed, the price was not lowered materially. From $52\frac{1}{2}$ at the opening the price ran off to 51 on transactions aggregating about 18,000 shares. Upwards of 1200 shares of the preferred stock changed hands at from $50\frac{1}{4}$ to 50. The receipts issued for stock deposited in accordance with the United Railways purchase plan were active and strong, and at one time were selling about 3 points above the non-assessed stock. Opening at $52\frac{3}{4}$ the price rose to 54, and closed at $53\frac{1}{2}$. Receipts for about 25,000 shares of stock were dealt in. Philadelphia Rapid Transit opened firm at 32, but subsequently there was a decline to $30\frac{1}{2}$, on the transfer of upwards of 8000 shares of stock. Consolidated Traction of New Jersey was quiet but firm, several hundred shares selling at $82\frac{7}{8}$ and $82\frac{1}{2}$. Union Traction brought $63\frac{1}{2}$ and $64\frac{1}{4}$ for about 500 shares. Other transactions included American Railway stock at $52\frac{1}{2}$ and $51\frac{3}{4}$ ex dividend; American Railway warrants at $\frac{1}{4}$ and $1\frac{3}{8}$, Fairmount Park Transportation at 20, Philadelphia Traction at $101\frac{1}{4}$ and $101\frac{1}{8}$, Thirteenth and Fifteenth Passenger at 302, United Traction of Indiana at 31 and 32, and Rochester Railway & Light at 98.

Baltimore

The market for tractions at Baltimore has been fairly active and generally strong, about the only weak feature being United Railway 4s, which declined about 2 points to $92\frac{3}{4}$, on sales of about \$45,000 bonds. United Railway stocks and income bonds, on the other hand, were comparatively strong, the free stock selling at $17\frac{3}{8}$ and $17\frac{1}{2}$ for about 1400 shares, while the deposited stock brought $18\frac{1}{2}$. The free incomes advanced from 73 to 74, and closed at $73\frac{3}{8}$, on dealings of about \$175,000, while the certificates representing deposited incomes sold to the extent of about \$310,000 at from $71\frac{1}{2}$ to $72\frac{1}{8}$. Norfolk Railway & Light 5s lost $\frac{1}{4}$, \$3,000 selling at $100\frac{1}{2}$ and $100\frac{1}{4}$. City & Suburban 5s advanced a fraction to 106 on the purchase of \$7,000. Other sales included Charleston City Railway 5s at $105\frac{3}{4}$ and 106, Citizen's Railway & Light 5s, of Newport News, at $88\frac{1}{2}$ and Knoxville Traction 5s at $108\frac{1}{2}$.

Other Traction Securities

The Chicago market has been absolutely featureless, trading being confined almost exclusively to odd lots. South Side Elevated broke $1\frac{1}{2}$ points to 93, on sales of 280 shares. Metropolitan Elevated common brought 28, and the preferred 68 and $68\frac{1}{2}$. Other sales were: Chicago City at 198, North Chicago at 75, Chicago & Oak Park at $7\frac{1}{4}$, the preferred at $27\frac{1}{4}$, Northwest Elevated at $28\frac{1}{4}$ and the preferred at $68\frac{1}{2}$ and 68. The Boston market was heavy. Boston Elevated lost a point to 154. Boston & Worcester common and preferred declined 1 and 2 points re-

spectively, the former to 31 and the last named to 81, despite the favorable statements of gross earnings for the month of February, showing an increase of 27 per cent over those for the corresponding month last year. Massachusetts Electric common, after selling at 20 at the opening, dropped to 17½, but later rallied a fraction. The preferred declined from 68 to 67. Boston & Suburban sold at 23. West End common sold at 99¾ and 100, and the preferred brought 115. In the New York curb market the Interborough Rapid Transit stocks have been extremely active, and prices held remarkably well considering the extensive liquidation in the general stock market. Interborough Rapid Transit opened at 227½ and broke sharply to 219, but toward the close the price advanced to 229, at which it closed. About 15,000 shares were dealt in. Interborough-Metropolitan common declined from 53 to 51½, but later rallied to 52½, upwards of 24,000 shares changing hands. The new preferred stock sold to the extent of about 8000 shares, at from 91 to 88 and back to 89, while more than \$1,000,000 of the new 4½ per cent bonds were traded in at from 92¼ to 90¼ and back to 90½. Other sales included American Light & Traction at 122 and 121½, the preferred at 101 and 101¾; New Orleans Railway common at 36¾ and 35¾, the preferred at 83½ and 82; North Jersey Street Railway 4s at 78 and interest, and Public Service Corporation 5 per cent notes at 95¼ and interest.

The event of the week in Cleveland was the fluctuations of the Cleveland Electric Railway securities, due to State legislation. For two weeks the stock had been going down hill, owing to the probability of the passage of the Metzger bill. Upon the announcement of the defeat of this measure the stock jumped from 75 to 83. Sales aggregated about 1800 shares. Aurora, Elgin & Chicago preferred sold up from 95½ to 95¾. Elgin, Aurora & Southern sold to the extent of 600 shares, with an advance from 51 to 51½. Northern Ohio Traction & Light sold at 31½. The 4 per cent bonds sold at 74½. Cleveland Electric sagged to 81, with a deal at sixty days delivery at 82½. A small lot of Lake Shore Electric common sold at 15½, a decline of a point. Muncie, Hartford & Ft. Wayne sold at 40¼ for several lots, a decline of 1½. Toledo & Western securities showed some activity at Toledo, several blocks of the bonds selling at 89½ to 90, and the stock at 15. Columbus Railway & Light, in the last two weeks, went to 85, down to 80, back to 85, and then down to 82½. Columbus Railway common is scarce at 103, and the preferred stands at 110, with few offerings. Cincinnati, Newport & Covington common sold at 51½, a fractional decline. The preferred also fell off ½ to 97¼. Cincinnati Street Railway was inactive at 146¼. There was a small sale of Detroit United at par.

Security Quotations

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

	Feb. 28	Mch. 7
American Railways	51¾	51½
Boston Elevated	154½	154
Brooklyn Rapid Transit	80¾	79½
Chicago City	193	—
Chicago Union Traction (common).....	—	—
Chicago Union Traction (preferred).....	11½	12
Cleveland Electric	44	—
Consolidated Traction of New Jersey.....	81½	81
Detroit United	99½	97¾
Interborough Rapid Transit	220	228
Interborough-Metropolitan Co. (common), W. I.....	53	51
Interborough-Metropolitan Co. (preferred), W. I.....	90	88
Interborough-Metropolitan Co. 4½s, W. I.....	92	90½
International Traction (common).....	—	37¼
International Traction (preferred) 4s.....	—	73½
Manhattan Railway	155	156½
Massachusetts Elec Cos. (common).....	18	18½
Massachusetts Electric Cos. (preferred).....	66	67
Metropolitan Elevated, Chicago (common).....	28	28
Metropolitan Elevated, Chicago (preferred).....	68	68
Metropolitan Street	113½	115
Metropolitan Securities	66¾	71¼
New Orleans Railways (common).....	36½	35½
New Orleans Railways (preferred).....	83	80½
New Orleans Railways, 4½s.....	90	89½
North American	98½	98¼
North Jersey Street Railway	27	27½
Philadelphia Company (common).....	51¼	50¾
Philadelphia Rapid Transit	31	30½

	Feb. 28	Mch. 7
Philadelphia Traction	101	101
Public Service Corporation 5 per cent notes.....	94½	94½
Public Service Corporation certificates.....	72	72
South Side Elevated (Chicago)	94	93
Third Avenue	131	132½
Twin City, Minneapolis (common).....	117	116½
Union Traction (Philadelphia).....	63¼	63
West End (common).....	99	99½
West End (preferred).....	113½	114

W. I., when issued.

Iron and Steel

The "Iron Age" says that so far as new business is concerned, in nearly all lines of crude and finished iron and steel, the week has been a very dull one. As an indication of the situation, the statement may be made that the United States Steel Corporation is booking new business at the rate at which deliveries are being made. No business for very distant delivery is being taken, and orders are closely scrutinized to prevent speculative purchases. The volume of business may therefore be designated as normal, in contrast with the extraordinary volume during the winter months. Reports from all the distributing centers show the pig iron trade to be very dull.

OHIO BILL DEFEATED

The Metzger bill, introduced in the Ohio Legislature at the request of Mayor Tom L. Johnson, of Cleveland, was defeated in the House last week by a vote of 56 to 49. The bill was most obnoxious to the street railway interests of the State, and was directed especially at the Cleveland Electric Railway in Mayor Johnson's fight for 3-cent fare or municipal ownership in that city. It provided that street railway franchises should be submitted to a vote of the people instead of depending upon the securing of the majority of foot frontage on a certain street, as at present. It provided that the question of municipal ownership should be submitted to the people to be decided by vote, and it also provided that a property owner on a street could not block the building of a street car line, except a majority of the people on the street enter written protests. This last clause was injected into the measure at the eleventh hour in the hope of saving it.

AFFAIRS IN CHICAGO

Judge Grosscup has granted permission to Henry S. Robbins, attorney for the North and the West Chicago Street Railroad Companies, to file a petition asking a forfeiture of their leases to the Union Traction Company on the ground that it had failed to pay the rentals since September, 1903. Attorney Robbins maintained that the revenues of the Union Traction Company should be applied to the payment of the rentals. He has been given until April 10 to complete taking testimony in the suit for a forfeiture of the leases, because the Union Traction Company, as he alleges in his petition, has not paid the \$3,416,000 of floating indebtedness of the underlying companies, whose payment was assumed at the time the United Traction Company obtained the original leases. The defense is given ten days after April 10 in which to introduce its testimony. The court protested against further delay in the taking of testimony and directed Master in Chancery Bishop to send him the testimony without a report on either the law or the facts. Judge Grosscup indicated his intention to push the settlement of the Union Traction receivership. At the time of the reference of the case to the master he said the court wanted it quickly disposed of and the joint accounts of the companies settled.

In an ordinance submitted to the local transportation committee the Metropolitan Elevated Railroad Company indicates an intention to reach out for suburban business and offer terminal facilities for interurban electric lines. General Counsel Gurley offered an ordinance as a substitute for the one presented to the Council a few days ago, in which he asked for an extension of the Douglas Park branch as well as of the Humboldt Park line. The Douglas Park branch will connect with the Suburban Electric line at Forty-Sixth Avenue, and it is the intention to extend the Humboldt branch to the Desplaines River. The electric line operating in the Fox Lake region is expected to use this branch as a Chicago terminal. It will pass through or near Hermosa, Cragin, Mont Clare, the Westward-Ho golf links, and other villages or frequented places.

PRETENTIOUS COMPOSITE SUBURBAN SYSTEM FOR CHICAGO

Announcement was made in Chicago last week that there is soon to be incorporated in New Jersey a \$50,000,000 corporation which will carry out the long contemplated plan of constructing an elevated and an electric railway to tap the most populous districts in Northern Illinois and Indiana, connecting them with Chicago. The project contemplates the building of an elevated structure above the present Lake Shore & Rock Island tracks, its business terminus being at the depot at Van Buren Street. The tracks are to be elevated as far as Washington Heights, where they will descend to the ground, in the same manner as the Oak Park Elevated Railroad, and run for the remainder of the distance as a suburban trolley.

The proposed corporation is promoted by the Moore brothers, of the Rock Island; Robert Mather, of the Rock Island holding company; President Yoakum, of the Frisco system, and by William S. Reed, who is the president of the three traction companies which will enter into the coalition.

It is proposed to build roads outright through the territory which is to be traversed, but some of the lines which have already been built will be taken over. As a preliminary to the coming arrangement Mr. Reed purchased a number of these lines last fall. Both the Lake Shore and Rock Island roads will have stock in the new company, and Mr. Reed will turn in the following properties:

Chicago Electric Traction Company, running from Sixty-Third Street and South Park Avenue to Harvey, a distance of 32 miles.

Chicago Southern Traction Company, running from Harvey to Kankakee, with a branch from Blue Island to Hammond, and having a total length of 38 miles.

Chicago, Blue Island & Joliet Traction Company, running from Blue Island to Joliet, a distance of 25 miles.

This will give a total straightaway trackage of 95 miles without the necessity of building any new lines, but it is proposed to make traffic arrangements with the Chicago, Kankakee, Lafayette & Southeastern, which connects Kankakee with Lafayette, and from that point with many of the Indiana suburban lines; with the Chicago & Indiana air line roads, running from Hammond to South Bend, and with the McKinley syndicate, whose lines parallel the Chicago & Alton to St. Louis and terminate at Joliet.

The elevated portion of the structure will be equipped with depots, beginning at Twenty-Second Street, at every five blocks south of that, as far as Sixty-Third Street, below which the present Lake Shore and Rock Island stations will be utilized.

The Lake Shore and Rock Island Railroads will surrender their entire suburban business, which will be carried by the new company. The new service will also make a most important point of Blue Island, where most of the roads will center and from which cars will run over the surface lines to the elevated structure at Washington Heights.

The elevated structure will hold four tracks, two for through service and two for local traffic. The tracks to be elevated will be 10 miles in extent. In addition to affording terminal facilities for the present immense interurban electric service, it is supposed that the lines hereafter reaching Chicago will avail themselves of the same terminal facilities.

The financial portion of the project contemplates an issue of \$35,000,000 capital stock in common shares, \$5,000,000 non-cumulative preferred shares, and \$10,000,000 in thirty-year gold bonds bearing 5 per cent interest. On this capitalization it is figured that the annual receipts will be a little short of \$4,000,000, with operating expenses of \$2,493,275, including \$500,000 interest on bonds. The properties included in the deal, as to cash values, are listed as a track mileage of 193 miles, 40 miles of which is elevated steel structure, \$20,000,000; Chicago & Southern Traction Company, including the Chicago Electric Traction Company, \$4,000,000; Blue Island & Joliet Railway Company, \$1,000,000; Blue Island & Hammond Railway, \$1,000,000—or a total cost of \$26,000,000. The estimated cost of construction is \$6,235,466.

Attorney Charles F. Davies, general counsel for the company, says that the object of the company is ultimately to operate an electric railway between Chicago and Indianapolis, and in view of this plan is gradually extending its lines toward Chicago and the Indiana city. A line is now being operated between Sixty-Third Street and South Park Avenue and Harvey over the old storage battery line.

At the offices of William S. Reed it was admitted that plans similar to those reported were under consideration, but it was stated they were not far enough advanced to give out definite information.

HEARING ON FREIGHT BILL IN NEW JERSEY

The hearing held at Trenton on Monday by the Senate committee on railroads and canals on the Waklee repealer of the law of 1896, which prohibits the transportation of freight and express in New Jersey by electric railway, seems to indicate the likelihood of the passage of the measure. The bill is a compromise, and has been accepted as partial relief by the farming interests, who have for several years been vainly petitioning for the repeal of the entire act of 1896, to the end that the companies might have unrestricted freight rights. The only opposition to the bill is that of the steam railroads, which contend that the electric railway companies, to carry freight, should organize under the general railway laws and not use the public highways. Judge Gilbert Collins, who opposed the report of the bill as the representative of the Erie and the Lehigh Valley Railroads, said that no step should be taken that would jeopardize so enormous an amount of capital as is invested in steam railroads and effect so large a number of employees. Prof. Voorhees, president of the State Board of Agriculture, and D. T. Dens, ex-president of that body, both advanced convincing arguments for the electric railway interests. Prof. Voorhees said that within 50 miles of any New Jersey farm are markets that represent 7,000,000 of the richest people in the world, and that every means should be taken to provide for the expeditious marketing of farm products. This is impossible at the present time. Neither the Pennsylvania Railroad nor the Reading Company has so far opposed the measure.

ANNUAL MEETING OF THE NEW ENGLAND STREET RAILWAY CLUB

The New England Street Railway Club will hold its annual banquet on Thursday evening, March 22, 1906, at the Hotel Somerset, Boston. Among the speakers will be Hon. W. Cary Ely, of Buffalo, president of the American Street & Interurban Railway Association, and Hon. George Tate Blackstock, of Toronto, Canada. The tickets, which cost \$2.50 each, can be purchased of the secretary. Members may purchase tickets for guests until the committee considers that it is being done to such an extent as to exclude members. In addition to the banquet the annual business meeting of the club will be held at 3 p. m. of the same day, at the Hotel Somerset. Balloting for officers will begin at 3:30 p. m. and the polls will close at 5:30 p. m.

THE LOS ANGELES-PACIFIC DEAL

The report is again in circulation (and not controverted) that the Los Angeles-Pacific Railroad Company has disposed of its properties for \$6,000,000. The purchaser is said to be E. H. Harriman, of the Southern Pacific, together with Kuhn, Loeb & Company and the Standard Oil Company. That Henry E. Huntington does not figure in the transfer, in spite of the generally accepted theory that he has long held an option on the property, is conceded. At the Huntington railway headquarters here it is said that such a transfer of the Los Angeles & Pacific would be undoubtedly regarded by Mr. Huntington as a hostile move. For many years Mr. Huntington has been on the most friendly terms with both E. P. Clark, president, and Gen. M. H. Sherman, vice-president, of the railway company, it being known that the two interests have had a working arrangement, by the terms of which neither could enter the field of the other.

It is said that the purchase price of \$6,000,000 will be equally divided between Mr. Clark and Gen. Sherman.

With the absorption of the Clark-Sherman interests by Mr. Harriman and his associates, it is highly probable that the Southern Pacific's Santa Monica steam line will be electrified at an early date. If Huntington has been shut out in the transfer of the Clark-Sherman lines, it is taken to mean that another break is due between the powers in control of what are known as the Huntington-Harriman lines.

Mr. Clark, when sought for an authoritative statement, would neither deny nor affirm the reported sale to the Harriman syndicate. It was admitted, however, that several extensive negotiations have been begun at different times for the company's entire property or the control of it.

E. P. Sherman, son of Gen. M. H. Sherman, has been appointed as general superintendent of the Los Angeles-Pacific Railroad Company, while Mr. C. H. Ellison, lately of the Southern Pacific, has received the appointment of chief engineer.

**ANNUAL MEETING OF THE LOUISVILLE RAILWAY—
IMPROVEMENTS PROPOSED**

Extensions and improvements aggregating more than \$800,000, to which reference has been made before in the STREET RAILWAY JOURNAL, were decided upon at the annual meeting of the Louisville Railway Company, held a few days ago. At the meeting the following directors were elected, the only change being in the selection of Judge Alexander Humphrey, to take the place of the late St. John Boyle as vice-president and general counsel; T. J. Minary, Harry Bishop, J. B. Speed, Attila Cox, Alexander P. Humphrey, Alexander Henry Davis, H. H. Littell, J. W. Gaulbert, Samuel Casseday, John Stites, Charles T. Ballard. The directors elected the following officers: T. J. Minary, president and general manager; Alexander P. Humphrey, vice-president and general counsel; J. B. Speed, chairman executive committee; Samuel G. Boyle, secretary and treasurer.

The report for the fiscal year showed earnings as follows:

Gross earnings	\$2,298,619.13	
Net earnings of Beargrass lines.....	15,288.41	
Income from other sources.....	41,972.79	
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Total receipts for the year.....	\$2,355,820.33	
Operating expenses	\$1,218,212.61	
Taxes for year.....	204,750.00	
Interest on debt	351,504.00	
Dividend on preferred stock.....	125,000.00	\$1,899,456.61
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Net earnings	\$456,363.72	
From which deduct dividend on common stock, paid and accrued	376,706.66	
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Surplus earnings	79,657.06	
Set aside on account of depreciation of cars	\$25,000.00	
Set aside on account of depreciation of machinery	40,000.00	
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Balance carried to profit and loss.....	\$14,657.06	

In his report to the stockholders President Minary said:

"On May 17 there was sold to the highest bidder 200 of the 4½ per cent bonds of the company, at \$1,030.50 and interest, amounting in all to \$207,950, which was expended in improving the property.

"The Eighteenth Street line was extended from Pleasure Ridge to Valley Station, and extension operated on March 16. The line over the Preston Street road to Okalona was completed and put in operation June 1. The Louisville & Southern Indiana Traction Company commenced the operation of its cars from New Albany and Jeffersonville to Third and Market Streets in our city Sept. 13, over the Madison Street route, as per the agreement between the two companies.

"The Market Street line to Fontaine Ferry and Western Park, was double-tracked in April, ready for travel at the opening of the parks for the season. During the past summer an asphalt street was completed by the city over the unfinished portion of the old Shelbyville pike in Crescent Hill, and as the work progressed the single track of T-rails was replaced with a double track of 9-inch section, 100-pound grooved rails. The extension of the Second Street line from the House of Refuge over and along Shipp Avenue, G Street and Floyd Street, to the new shops of the Louisville & Nashville Railroad Company, and to the Central Stock Yards, was completed and put in operation Nov. 1. The Shelby Street line has been extended to Burnett Avenue, over and along Burnett Avenue to Texas Avenue, and on Texas Avenue to Goss Avenue, and the cars started upon the same during the present month.

"The new station on Jefferson and Green Streets, between Third and Fourth Streets, is nearing completion, and will be ready to accommodate the passenger business and for general offices of the company within thirty days, the freight or express cars having been operated from the station since Dec. 20.

"The interurban shops at East and Green Streets, which were built to accommodate the 4-ft. 8½-in. standard gage cars, were completed and occupied in August. The system has been improved during the year by additional large cables for the better distribution of power.

"During the coming year the management expects to make numerous improvements, such as adding new cars to the equipment, storage battery plant, new boiler house and boilers to the power plant, extension of the lines, and many other improvements

of a small nature, at an estimated cost of \$800,000. To provide for this it will be necessary to increase the capital stock of the company."

CAR CONSOLIDATION ABANDONED

The project of merging the principal street car manufacturing companies in a \$56,000,000 combination has been abandoned, according to an official statement made by Kean, Van Cortland & Company, of New York, one of the banking firms which was to have financed the consolidation. The chief difficulty is understood to have been the price asked by at least one of the companies in the proposed consolidation for its property. G. Martin Brill, of the J. G. Brill Company, was to have been the president of the consolidated organization.

BROOKLYN RAPID TRANSIT EARNINGS FOR YEAR

The comparative income statement of Brooklyn Rapid Transit system for the year ended Dec. 31, 1905, compares as follows:

	1905	1904
Gross receipts	\$17,493,011	\$15,459,660
Operating expenses	10,078,923	9,261,916
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Net earnings	\$7,414,088	\$6,197,744
Other sources of income.....	225,501	237,141
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Total income	\$7,639,589	\$6,434,885
Charges and taxes.....	5,388,138	4,961,614
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Surplus for year.....	\$2,251,451	\$1,473,271
Previous surplus	2,127,236	2,657,726
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Total surplus Dec. 31.....	\$4,378,687	\$4,130,997

Of this amount there was appropriated—

For discount of bonds sold.....	1,746,800	1,153,200
In adjustment of various accounts....	12,600	5,652
For additions and betterments.....	288,145	844,909
Balance, surplus	2,331,143	2,127,236

The following is a consolidated general balance sheet as of Dec. 31, 1905, of Brooklyn Rapid Transit Company and constituent companies, with comparison:

Assets—	Dec. 31, '05	Jan. 31, '05
Cost of road and equipment.....	\$105,484,656	\$101,785,741
Adv. account construction leased companies	7,431,135	6,628,455
Construction expenditures constituent companies	4,053,167	1,374,567
Accounts to be adjusted.....		21,206
Guaranty fund (securities and cash) ..	4,005,755	4,005,755
Treasury bonds	1,617,500	2,649,000
Treasury stock	146,228	146,228
Cash on hand	1,342,105	2,903,123
Due from companies and individuals..	514,748	346,585
Construction material and general supplies on hand	900,410	767,684
Real estate mortgages	6,500	
Prepaid accounts	181,058	178,802
Discount on bonds	404,118	1,396,800
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Total	\$126,087,382	\$122,203,948
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Liabilities—		
Capital stock	\$45,950,709	\$45,959,605
Bonded debt	74,888,040	70,655,180
Real estate mortgages	329,640	
Audited vouchers	1,155,606	561,870
Due companies and individuals.....	160,126	81,979
Taxes accrued	484,789	1,333,700
Interest and rentals accrued.....	640,183	525,402
Insurance reserve fund.....	51,428	21,428
Special reservation	10,000	
Contractors' deposits	42,120	
Long Island Traction Trust Fund....	9,611	9,439
Accounts to be adjusted.....	33,985	
Surplus	2,331,143	2,099,426
Loans and bills payable.....		900,000
Sundry accounts		25,867
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Total	\$126,087,382	\$122,203,948

CAR HOUSE DESTROYED IN NEW YORK

The car house of the New York City Railway Company fronting on the North River, between Forty-Second and Forty-Third Streets, was destroyed by fire Sunday night March 4. Forty-two cars and seven sweepers of the Thirty-Fourth Street cross-town line were burned. The damage from the fire was estimated at about \$150,000. The fire was discovered about 7:30 o'clock by one of the car cleaners, and is said to have started in a Forty-Second Street car, which stood on the most westerly track, about 100 ft. back in the barn. Four alarms were sounded.

SINGLE-PHASE FOR CONVERTED INDIAN ROAD

In connection with the Jhelum River hydro-electric power installation in British India, it is announced that a contract has just been awarded to the General Electric Company for the equipment to be installed in the plant and for converting the Cashmir section of the Jhelum Valley Railway, some 180 miles long, into a single-phase line. Included in the apparatus contracted for are twelve 1000-kw generators, to be direct connected to Doble turbines delivering 1765 bhp to the shaft under a head of 400 ft. Other electric apparatus under contract will include twelve 60,000-volt transformers, each of 1000-kw capacity, wire for the transmission lines, etc. The plant is to be located near Ramfur, about 50 miles below Sprinager, where there will be a 6-mile conduit. This is the second large undertaking of the kind entered upon by the government, the first being the Cauvery Falls installation, now in successful operation. The entire hydro-electric installation will be constructed, erected and placed in operation under the supervision of Major A. J. de Lotbiniere, R. E. A. C. Jewett, formerly of the General Electric Company, who was connected with the Cauvery Falls scheme, will serve as installing engineer for the government.

MAHONING VALLEY MERGER EFFECTED

The long talked of merger of the properties of the Pennsylvania & Mahoning Valley Railway, the Youngstown & Sharon Railway and the Sharon & New Castle Railway, and several subsidiary companies, has been effected, under the name of the Mahoning & Shenango Railway & Light Company. The company has control of 175 miles of city and interurban properties in and between Warren, Niles, Struthers, Youngstown and Lowellville, Ohio, and Sharon, Sharpesville and New Castle, Pa. It also controls the electric lighting systems in Youngstown, New Castle, Hubbard, Sharon and Sharpesville. The capital stock of the new company is \$10,000,000. New officers have been elected as follows: E. N. Sanderson, president; Randall Montgomery, first vice-president; M. S. McCaskey, second vice-president; Alexander Webb, Jr., treasurer, and Leighton Calkins, secretary. Directors are as follows: E. N. Sanderson, of New York; M. A. Verner, of Pittsburg; James Parmelee, of Cleveland; A. T. Bannard, of New York; J. B. Dennis, of New York; Leighton Calkins, of New York; George W. Johnson, of New Castle, Pa.; Simon Perkins, of Sharon, Pa.

NEW YORK MERGER DECLARED OPERATIVE

The Merger of the Interborough Rapid Transit Company, Metropolitan Street Railway Company and Metropolitan Securities Company took place March 1, when Secretary Francis, of the Morton Trust Company, announced that sufficient shares of stock of the three companies had been deposited under the merger plan. Chairman Edward J. Berwind called a meeting of the organization committee, consisting of Andrew Freedman, John D. Crimmins, Thomas P. Fowler, Gardiner M. Lane and Cornelius Vanderbilt. After the merger agreement was declared in operation it was decided that all of the stockholders should be given a chance to deposit under the plan, and that stock of the Interborough and Metropolitan would be received up to Friday, March 16.

A meeting of the temporary organization of the new Interborough-Metropolitan Company was called by Vice-President Walter G. Oakman, of the Interborough Rapid Transit Company. The temporary organization is in the hands of Gen. James Jourdan, John B. McDonald, Morton F. Plant and Peter A. B. Widener. On the return of August Belmont, who is now at Palm Beach, the temporary organization of the new company will be superseded by the permanent organization.

The listing committee of the New York Stock Exchange held

a meeting late in the afternoon of the same day, and authorized the listing of the certificates of deposit of the Metropolitan Street Railway Company and the Metropolitan Securities Company in the unlisted department, so that these certificates of deposit can be dealt in and used as collateral for loans in the same manner as the deposited stock. The temporary board of directors of the Interborough-Metropolitan Company adopted the necessary resolutions to make the plan operative.

The new Interborough-Metropolitan Company intends to adopt a broad policy, judging by the statements of President Vreeland, of the Metropolitan system, and Vice-President Bryan, of the Interborough Rapid Transit Company. Many plans were informally discussed by the operating officials of the two systems, and the prediction was made by several of the financiers that in less than six months the public would be greatly pleased at the improved facilities which would be extended by the new company. President Vreeland said:

"While there have been no definite plans made for changes or improvements in the transit facilities, pending the merger, from twelve years' experience with city transit, having to consider the general movement of traffic irrespective of whether it was carried on the surface, elevated or subway, I am convinced that many changes can be made in the operation of the systems that will be of great advantage to the public."

The common stock of the new company, amounting to \$100,000,000, will be deposited under a voting trust agreement. The voting trustees will be August Belmont, Walter G. Oakman, Thomas F. Ryan, Cornelius Vanderbilt and Peter A. B. Widener.

The Interborough-Metropolitan Company on March 2 filed with the Secretary of State a certificate of increase of capital from \$15,000 to \$155,000,000. When the company was incorporated the capitalization was fixed at \$5,000 preferred and \$10,000 common stock. The certificate just filed increases the amount of the preferred stock to \$55,000,000 and the amount of the common to \$100,000,000. The certificate was signed by Walter G. Oakman, who was chairman, and Edward Cornell, who was secretary of the meeting of stockholders which was held on March 1 in New York.

RECENT IMPORTANT ORDERS FOR AIR BRAKES

The Westinghouse Traction Brake Company announces that since the first of the year it has received many large orders for air brake equipments for electrically operated railways. Among these are contracts for seventeen equipments for electric locomotives now being built by the General Electric Company and the American Locomotive Works for express service on the New York Central & Hudson River Railroad, electrical division. This style of equipment will be known as type ET, and is said to include a number of new features that have not yet been secured, either with the automatic air brake alone, or with the combined automatic and straight air brake equipment. Among these special features may be mentioned the following:

First. The locomotive brakes can be used in conjunction with the train brakes or not, as desired.

Second. The locomotive brakes can be released at any time without releasing the train brakes.

Third. With this equipment any given pressure in the brake cylinder on locomotive is automatically maintained indefinitely, irrespective of leakage or length of piston stroke, the only limitation being the capacity of the motor compressor employed to produce the air.

Fourth. Should locomotive wheels become locked, the brakes of the locomotive can be immediately released without releasing train brakes and can be reapplied with any degree of brake pressure.

Fifth. This new equipment materially reduces the number of parts used with the standard locomotive equipment, dispensing with triple valve, auxiliary reservoir, etc.

The Westinghouse Company is also building 125 AMR air brake equipments with D-2-EG compressors, for new steel cars to be operated on the suburban branches of the New York Central & Hudson River Railroad, electrical division.

Among other important recent orders for Westinghouse brakes are the following:

Fifty-eight equipments embodying the graduated release and quick recharge of auxiliary reservoir features, for the West Jersey & Seashore Railway Company. This is the division of the West Jersey & Seashore which is at the present time being electrified.

Forty AMR equipments, embodying electropneumatic features,

with D-2-EG compressors, for the Philadelphia Rapid Transit Company. This AMR equipment with the electropneumatic feature is the latest type of automatic equipment designed for electric train service. With this equipment the following important results can be secured: Graduated release on all cars; quick re-charge of auxiliary reservoirs; quick serial service application; no overcharging of brake pipe; prompt response of triple valves after full release, and independent operation of all compressors on a train.

Seven AMR equipments, embodying electropneumatic features, with D-2 compressors, for the Philadelphia & Westchester Traction Company, and the Philadelphia & Garrettford Street Railway Company.

One hundred SM-3 equipments with D-1 compressors, for the United Railways & Electric Company, of Baltimore. These equipments are in addition to the 160 similar equipments ordered in July, 1905, by the same company.

Twenty-six SM-1 equipments, for the Pacific Electric Railway Company, Los Angeles, Cal.

Fifteen SM-1 equipments for the Indianapolis Traction & Terminal Company.

Ten SM-3 equipments, with D-1 compressors, for the Lake Shore Electric Railway Company, Fremont, Ohio.

Six SM-3 equipments, with D-1-EG compressors, for the Lynchburg Traction & Light Company.

Fourteen SM-1 equipments, with D-2-EG compressors, for the Lima & Toledo Traction Company.

Thirty-five SM-1 equipments, with D-1 compressors, for the Indianapolis Traction & Terminal Company.

Ten SM-1 equipments, with D-1 compressors, for the Indiana Union Traction Company.

Thirty SM-3 equipments for the Metropolitan Street Railway Company, Kansas City, Mo.

Eight SME equipments, with XD-2-EG motor compressors, for the Pittsburg & Butler Street Railway Company, a single-phase road to go into operation this coming spring.

Twelve SM-3 equipments for the Syracuse Rapid Transit Company.

Five SM-1 equipments, with D-1 compressors, for the Nahant-Lynn Railway Company.

Eight AMT equipments, with D-1-EG compressors, for the Norwich & Westerley Railway Company.

STREET RAILWAY PATENTS

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

UNITED STATES PATENTS ISSUED FEB. 27, 1906

813,416. Railway; Lewis Ginger, Colorado Springs, Col. App. filed Nov. 17, 1905. For ascending steep grades an elevator is provided for the reception of an ordinary motor car whose wheel engages friction wheels on the elevator, to there run the elevator by the car propelling means.

813,476. Brake Hanger; Owen Wittmer, Columbus, Ohio. App. filed Nov. 11, 1905. A bolster-guide column, the inner and outer faces of which are provided with vertical grooves, and a brake hanger provided with a pair of spaced flanges arranged to enter the grooves.

813,427. Railroad Motor Car; Clarence H. Howard, St. Louis, Mo. App. filed Dec. 1, 1905. Relates to the frame and floor of that class of railroad motor car, which is propelled by gasoline or other suitable motor, mounted thereon and combined with weed-burning apparatus.

813,475. Car Fender; Albert B. Wilson, New York, N. Y. App. filed Aug. 29, 1905. Relates to means for the control of the fender by the motorman.

813,498. Car Fender; Martha E. John, Portsmouth, Va. App. filed June 15, 1905. A chamber normally closed by spring-controlled doors, arranged at an incline to the base of the fender, and a cushioning device movably mounted in the chamber.

813,506. Switch; George E. Lynch, Columbus, Ohio. App. filed Aug. 30, 1905. A switch for rack-rail systems providing continuity of the rack at the switch, and consisting of a pivoted section of rack adapted to bridge over the rail of the main line or siding, depending upon the position of the switch.

813,511. Brake-Operating Mechanism for Cars; John O. Neikirk, Chicago, Ill. App. filed Aug. 5, 1905. The operating wheel for the brake is mounted on a hinged head, adapted to swing into and out of operative relation with the brake staff.

813,515. Trolley Supporting Device; Alex. Palmros, Columbus, Ohio. App. filed April 11, 1900. Adapted for mine locomotives in which the trolley is horizontally spring-pressed against the conductor.

813,619. Acoustic Signaling Apparatus for Railways; Enrico Coen-Cagli, Naples, Italy. App. filed Oct. 24, 1902. In order to warn the driver that he is approaching a signal, there is provided a detonating apparatus, acted upon by the passage of a train, an anvil, an explosion chamber above the anvil for the expansion of the gases, and an oscillating plate, closing at each explosion an electric circuit in order to signal the explosion at the station.

813,632. Car Fender; Frank J. Fairchild, Detroit, Mich. App. filed June 21, 1905. Means for adjusting the fender a suitable distance above the track rails.

813,638. Electrically-Operated Controlling Mechanism; George H. Fretts, Springfield, Mass. App. filed May 13, 1905. For street railway switches, a solenoid and its core combined with a latch carried by the core and arranged to be attracted by the core on the energization of the solenoid.

813,691. Brake and Track-Sanding Mechanism; Murry A. De France, Newark, Ohio. App. filed Sept. 7, 1905. The application of emergency brakes simultaneously operates the track-sanding mechanism in a novel manner.

813,776. Fender; Andrew Chovan and Michael Gex, Allegheny, Pa. App. filed Aug. 21, 1905. The fender has its upper and lower ends mounted in longitudinally-slotted supports, and means provided for reciprocating the fender.

813,840. Insulated Rail Joint; McLeod W. Thomson, Altoona, Pa. App. filed April 10, 1902. The fish-plates have depending wings, which converge toward one another beneath the base of the rail and serve to hold an insulating wooden block which serves to strengthen the construction.

813,882. Electric Switch and Signal Apparatus; Lawrence Griffith, Yonkers, N. Y. App. filed Nov. 5, 1904. An interlocking signal system so arranged that the various indicators cannot respond to a signal as long as electric energy is supplied to the signal "motion-plates."

813,898. Automatic Block-Signal system for Electric Railways; Gray W. Johnston and Alex. H. Ackerman, New York, N. Y. App. filed April 25, 1905. Provides an overlap system by spaced contact plates along the road, which successively receive energy from the power circuit. Avoids the use of local batteries or track potentials, or other factors of variable or uncertain value.

813,938. Car Fender; Charles Bauer, New York, N. Y. App. filed Oct. 12, 1905. Details of construction.

813,996. Means for Electrically Connecting Railway Rails and the Like; John M. Atkinson, Chicago, Ill. App. filed March 15, 1904. The fish-plate has a V-shaped recess for the reception of the base of the rail, and a soft copper strip is embedded in the walls of said recess to contact with the rail.

813,998. Insulated Rail Joint; Bandroft G. Braine, New York, N. Y. App. filed Oct. 31, 1903. A bolt provided with a head at one end, and a screw-thread at the opposite end, an intermediate sleeve of insulation hugging the bolt and washers at the ends of the sleeve having recesses at the sides toward the sleeve.

NEW PUBLICATIONS

Advance Edition of "The Elements of Electrical Engineering, Vol. I. Direct-Current Machines, Electric Distribution and Lighting." By Prof. W. S. Franklin and Prof. William Esty, of Lehigh University. New York: The Macmillan Company; 368 pages; Illustrated. Complete edition to be ready in July; about 550 pages. Price \$4.50.

This book is one of a series which is being prepared by the professors of physics and electrical engineering of Lehigh University primarily for class work in that institution, and for this purpose a limited number of advance copies were issued. The complete volume, which will be placed on the market by the publishers at an early date, will cover the entire subject given in the sub-caption, and will include chapters on storage batteries, electrical distribution and wiring, etc., which are not contained in the advance edition. The authors describe the theory, construction and operation of direct-current generators and motors in a lucid and complete manner, and their work can be recommended as an excellent treatise for class work or for any one who wishes to acquire a knowledge of the principles of these machines.

PERSONAL MENTION

MR. CHARLES H. TURNER, ex-president of the St. Louis & Suburban Railroad, died a few days ago at the Waldorf-Astoria. He was a member of the financial firm of Rowland, Knapp & Company, of New York.

MR. NORMAN McD. CRAWFORD, formerly general manager of the Hartford Street Railway Company, who has been appointed by the municipal ownership committee of the National Civic Federation to investigate municipal ownership of street railways abroad, is to sail March 10, on the "Coronia."

MR. HORACE E. ANDREWS, president of the Cleveland Electric Railway Company, will sail March 10 for a two months' automobile trip through Europe. Mr. Andrews will pay some attention to the street and interurban railway situation in Europe and will inspect the subway in London built by the late Mr. Chas. T. Yerkes.

MR. MARTIN STEIN, assistant auditor of the Western Ohio Railway, was killed in a collision between a freight car and a limited car on that road a few days ago. The deceased was twenty-six years of age, and had worked up from a minor clerical position. He was being considered for appointment to the position of auditor to succeed Mr. J. H. Merrill, whose resignation took effect March 1.

MR. ALBERT BENHAM, assistant superintendent of the Cincinnati Traction Company since 1901, has been transferred to Columbus, to assume the duties of general superintendent of the Appleyard properties, which were sold recently to the Schoepf-Morgan syndicate. Before going to Cincinnati, Mr. Benham was division superintendent of the Pittsburg Railways Company. He will have supervision of about 175 miles of interurban lines.

MR. E. J. RAUCH, formerly general superintendent of the Canton-Akron Railway Company, of Canton, Ohio, has been appointed superintendent of the Columbus, Buckeye Lake & Newark Traction Company and the Columbus, Newark & Zanesville Traction Company, succeeding Mr. A. M. Frazee, who goes to Cloquette, Minn., to superintendent the construction of a large power plant, which will furnish light and power to Duluth and Superior. Mr. Frazee will remain in Newark, Ohio, until June.

MR. H. H. CARPENTER, heretofore general passenger agent of the Western Ohio Railway, has been appointed auditor and purchasing agent of the company, succeeding Mr. John H. Merrill, who, as stated in a recent issue of this paper, has become secretary of the newly-formed Central Electric Railway Association, with headquarters at Indianapolis. Mr. Charles F. Price, who has been advertising representative of the company, has succeeded Mr. Carpenter as general passenger agent. Mr. C. H. Collins, heretofore general freight agent of the Appleyard lines, is now general freight agent of the Western Ohio.

MR. CHARLES H. COX has resigned as general manager of the Lincoln Traction Company, of Lincoln, Neb., to become general manager of the Citizens' Street Railway Company, which was organized a year ago for the purpose of building city lines in Lincoln and interurban roads to connect the city with neighboring towns. Material for track and overhead construction has been ordered, also the cars and motors, and the expectation is that a part of the system will be ready for operation in the fall. Before going to Lincoln Mr. Cox was manager of the Middleboro, Wareham & Buzzard's Bay Street Railway Company, of Middleboro, Mass.

MR. CHAS. H. KILGORE, of Cincinnati, died at his home in that city last week. He was frequently referred to as the father of the street railway and telephone systems in Cincinnati. He built and operated many of the original horse lines in the city, entering the business in 1869. It was under his guidance that the street car lines were first equipped with cable, then electrified, and finally merged into the present system. He was largely interested in the Cincinnati Street Railway Company, the Toledo, Bowling Green & Southern Traction Company and a number of banks, and left a fortune estimated at \$5,000,000. For a number of years he had lead a retired life, devoting his time largely to charities.

MR. JOHN F. WALLACE, formerly chief engineer of the Panama Canal Commission, will, in a few weeks, take an important position in the Westinghouse Companies. This step was rumored when Mr. Wallace left the Commission, but the news was very indefinite then, as, indeed, it is to-day. It is understood that a new Westinghouse company is being organized, of which

Mr. Wallace will be the president, but the official announcement on the subject is not expected before the end of the present month. Mr. Wallace, before serving on the Canal Commission, was chief engineer of the Illinois Central Railroad, and has always enjoyed a high reputation in engineering circles for his technical ability and attainments.

MR. F. B. HUNTINGTON, vice-president and secretary of the Fond du Lac Street Railway & Light Company, Fond du Lac & Oshkosh Street Railway Company and Eastern Wisconsin Street Railway & Light Company, of Fond du Lac, Wis., has resigned from these companies to become comptroller of the Chicago Terminal & Transfer Company. Mr. Huntington came to Fond du Lac June 1, 1903, accepting a position with the Fond du Lac Street Railway Company as secretary. Soon thereafter he was elected secretary of the Eastern Wisconsin Street Railway & Light Company, and later was elected secretary of the Fond du Lac & Oshkosh Railway Company. Upon the death of F. B. Hoskins, recently, Mr. Huntington was elected secretary and vice-president of all three companies. Before becoming connected with the Fond du Lac Company Mr. Huntington was claim adjuster of the Wisconsin Central Railroad. The company with which Mr. Huntington has become associated has a belt line completely surrounding Chicago, owns the Grand Central Station and terminals of many of the other roads entering Chicago, its lines connecting with every railroad entering Chicago, and with all steamboat and transfer lines.

MR. FRANKLIN BROOKS, vice-president of Eugene Munsell & Company, of New York, died at his home in Elizabeth, N. J., on Monday, March 5. Mr. Brooks was born in San Francisco fifty-one years ago, and came East with his parents when a child. He began the study of mica under his father in North Carolina, where the elder Brooks was interested in mining, and soon became widely known as an expert. He associated himself with his cousin, Eugene Munsell, in the firm of Munsell & Brooks, and dealt in mica. Later Mr. Munsell, Mr. Brooks and others purchased the Munsell & Thompson Manufacturing Company, and consolidated it with Munsell & Brooks as Munsell, Rollo & Company. This company was later dissolved and the firm of Eugene Munsell & Company was formed. Mr. Brooks, besides his interest in Munsell & Company, was vice-president of the Mica Insulator Company and a director in two mica mining companies operating in North Carolina. The firm is also interested in the output of mica mines in India, and a few years ago Mr. Brooks visited these properties while on a trip around the world. Previous to his death, Mr. Brooks had been ill for several months with rheumatism, and had lately gone to Summerville, S. C., for treatment. He is survived by a widow, a son and two daughters.

MR. FRANCIS FREDERIC BODLER, master mechanic of the United Railways of San Francisco, Cal., was born in Germania, Pa., May 12, 1875. He received his early education in



F. F. BODLER

the public schools of that town and later attended the Mansfield State Normal School, from which he graduated in 1894 to enter Lafayette College at Easton, Pa. Here he took the course in electrical engineering, employing his time during vacations working as general repair man in a smithy in his native town. Graduating in electrical engineering in the spring of 1898, he was offered and accepted a position on Oct. 10 of the same year, as general repair man of the New Jersey Street Railway Company, and was steadily advanced through the company's testing and armature winding departments to the position of chief clerk and assistant master mechanic. On Sept. 1, 1901, he was offered and accepted the position of master mechanic of the Jersey City, Hoboken & Paterson Street Railway, and on Jan. 1, 1902, he became master mechanic of the North Jersey Street Railway Company's system, with headquarters at Newark, N. J. In August, 1902, he was appointed master mechanic of the United Railways of San Francisco, Cal., which position he still holds. Mr. Bodler is a member of the American Street and Interurban Railway Engineering Association, and has been instrumental to a large extent in building up and maintaining the efficient street railway service which the city of San Francisco now possesses.