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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, 8300 *copies are printed. Total circulation for* 1906 *to date,* 402,000 *copies, an average of* 8204 *copies per week.*

Fastening the Car Body to the Trucks

As the trucks and motors of the average interurban car weigh approximately as much as the body, it appears that it would be of advantage to tie the trucks and the body together in such a manner that the trucks would have to be lifted before the body could turn over sideways. As usually mounted, the center pins and the shoulders of the center bearings are all that hold the trucks and body together. When the centrifugal force in rounding curves is great enough to throw the body alone over, there is danger of the center pins breaking. If, however, the body were held down solidly to the trucks the weight of the trucks would no doubt hold the body in place in many cases and thus serious accidents would be avoided. Even in case of derailment the heavy trucks would tend to hold the body right side up.

Safety plates are sometimes placed on the car side bearings in such a manner that they extend under the chafing irons of the truck bolster, but often they are not of sufficient strength to be of any service in emergencies. Even if these plates did hold, the stress of the car body would be transmitted through the truck bolster, and as this rests on the elliptic springs the car body would tip quite a distance before the stresses would tend to lift the truck. It might be a better method to have the pull of the car body fall directly on the transom bars, or, perhaps, the center bearing could be designed so as to take the pull before the body had tipped very much.

Comparison of Brake-Shoe Wear and Oil Consumption

With the present indefinite methods for measuring the wear of brake-shoes as well as the consumption of oil in journal and armature bearings, it is impossible to compare with any degree of accuracy the results obtained on different roads. The wear of brake-shoes is usually given in car-miles. The term means very little, as is shown by the wide range of mileage obtained on different roads. For one thing, it does not take into consideration the number of stops made with the shoe. There may be an average of ten stops per mile on one road and less than one on another. The weight of the car is likewise ignored. A term that would be very much more definite in its meaning would be "ton-stops per pound of wear" of the brake-shoe. The ton-stops could be obtained by multiplying the weight in tons on the wheel by the number of stops made. The adoption of the term would of course require a knowledge of the number of stops made by the car. These could be obtained with quite a degree of accuracy by averaging for a few days the number per mile of each class of cars on the road, or probably an inexpensive instrument could be devised to record them. However, the term "ton-stops per pound of wear" is still indefinite, as the speed at which the car is running when the brakes are applied is not taken into consideration. The wear of any shoe is of course approximately proportional to the energy lost by the car when it is stopped, and this is proportional to the square of the speed. At some future time the brake-shoe question may be regarded of such importance that effort will be made to obtain the wear of brake-shoes in terms of energy absorbed. For the present, however, we certainly need a better standard of comparison than is in use, and the sooner one is adopted the quicker we can compare with some degree of definiteness the wearing qualities of different brake-shoes. Then the su-

perintendent of every system will not feel compelled to give every shoe on the market a long test before adopting a standard, but can get a good idea of the shoe he requires by noting the wear of the different shoes on other roads. The consumption of oil is also commonly given in a term with little meaning. The greater the weight on a bearing the greater, of course, is the quantity of its lubrication. A better term than that used at present would be the "ton-miles" which would be obtained by multiplying the weight in tons on the journal by the distance in miles. The desirability of such a term was pointed out in a communication which appeared recently in this periodical.

Disfiguring the Interior of Cars

The appearance of the interior of many cars looks as if the designer never expected that registers, fire extinguishers, emergency tools and other miscellaneous apparatus were ultimately to be placed in the car. At any rate, no provision is often made for them, so that these different devices and apparatus when once in place frequently destroy the general effect of inlay mahogany finish, gracefully curved lines in the ceiling, expensive leaded art glass and smaller details of architecture which have cost considerable money.

The register probably does more to disfigure the car than any other piece of apparatus. Frequently no provision at all is made for hanging it. In other cases the base must be dropped two or three inches below the top of the door opening in order to get it above the door. Again, on account of the presence of moldings the register has to be hung two or three inches out from the woodwork. No matter what the color of the interior finish may be, the registers are almost invariably painted black. In the design of a car provision should certainly be made for the register. Ample space should be left above the door so that it can be hung properly, and moreover this space should be left clear of moldings so that the register can be fitted up close against the woodwork. In many cases it might be possible to build the bulkhead with a recess in it so that the register would not extend out so far from the woodwork. And probably if the case of the register were painted or stained to approximate the color of the interior finish of the car it would not stand out so prominently.

While designing the car a little thought regarding the location of the fire extinguisher would sometimes result in a better appearing interior. This extinguisher usually has a polished brass barrel and almost invariably is supported on a red cast-iron bracket in one corner of the car. These colors do not harmonize with inlay mahogany, weathered oak and most other finishes used in the interior of cars. The glass-covered case for the emergency tools also very often detracts considerably from the appearance of the interior. With a little forethought this case could be built into the finish as a part of the car in such a manner that it would not look out of place.

After the car has been put into service the management sometimes adds to its disfigurement by screwing notices or framed signs indiscriminately to the bulkheads. When such signs are used, they are frequently made of a size not adapted to fit in any available place, and the finish and color of the frames often do not accord with the general decorative scheme.

Of course if it were not possible to avoid these incongruities which grate on the nerves of those passengers with a sense of the fitness of things there would be a reasonable excuse for their continuance. But as a very little additional time taken in designing the car would improve so much the general effect of the interior, there seems to be no plausible excuse why they should not be avoided.

Direct-Current Steam Turbines

Until one considers the question with a little care, it appears rather surprising that the great majority of the applications of the steam turbine to heavy power service have been made in alternating-current plants. There would certainly seem to be a large field for direct-current turbo units at the present time, particularly among the smaller railway power plants where the load-factor is poor and the water supply costly. A number of turbo generators of the direct-current type are now in service, and if the natural difficulties pertaining to a decidedly new machine can be overcome—and we believe that they can—there ought to be an extended use of such machines in work where the direct current holds sway.

The one troublesome point about any high-speed direct-current machine is the commutator. It is no easy matter to collect anywhere from 1000 to 4000 amps. at 600 volts with carbon brushes and without serious vibration or even flashing at speeds of 4500 or 5000 ft. per minute peripheral velocity. For this reason opinions vary as to the performance of the turbo-generator in actual service, and there is no doubt that there is still much to be learned about the design of such machines. In a certain sense the machine is in an experimental stage as yet, and its manufacturers have done wisely to refrain from extensive efforts to introduce it indiscriminately, preferring to test its behavior under a wide variety of circumstances, with the object of perfecting all details before exploiting the apparatus. It is almost inevitable that the first few purchasers of new types of machinery should sometimes encounter unforeseen operating troubles, which in due course of time are pretty sure to be overcome by the manufacturers. It is well to remember that the design of commutators and fields is now one of the best understood features of dynamo work, and within the last few years the sparking problem has been brought under very close control. We see no reason why the direct-current turbo-generator should not be produced in perfectly satisfactory form in the light of present designing skill. It may be necessary in some cases to employ the inter-pole method of field winding to introduce certain reactances to absorb sudden and tremendous magnetic fluctuations as the load shifts instantaneously from zero to 100 per cent overloads, or even to utilize the magnetic blow-out principle in severe cases of flashing. The smaller turbo-generators placed in service in train lighting and railway power stations apparently have given a good account of themselves, though little has thus far been made public on the subject. It is certainly too early for sweeping conclusions, but there is no question about the field of application. The problem is, to our minds, more an electrical question than one of mechanics. The use of steel bands on the commutators of such machines holds the bars in place even under the heavy centrifugal strains of rotation. As far as the turbine end is concerned, the same advantage of economy at light loads and compactness should hold as well with d. c. as

with a. c. machines. It is well to remember that many operating steam engineers are entirely unused to high-speed machinery, and that considerable care must be taken in operating a turbine in parallel with old engines, which may not be able to hold up their loads, as severe drains come upon the power house. We believe that as far as there is any uncertainty in the d. c. turbine situation, the status of affairs will have cleared up pretty well within the next year or so, giving the railway world a standard machine which promises great usefulness.

A Substitute for the Rotary Converter

In last week's issue we gave an outline of the principles of a new form of rectifier for alternating current now being built for use on a locomotive on the Paris-Lyons-Mediterranean Railway, of France, and a more extended description of a somewhat similar piece of apparatus called a permutator, which has been in use for a considerable length of time abroad for the conversion of alternating into direct currents. Neither has yet been employed in this country, so far as we are aware, although for certain purposes they possess striking advantages. But little has yet been made public in regard to the rectifier first mentioned, but the permutator may be described as a synchronous converter, of which the brushes rotate in step with the rotary magnetic field. Physically it resembles more than anything else an induction motor, of which the armature is permanently clamped, and from which armature leads are brought to a stationary commutator about which the brushes rotate. Inasmuch as there is no need of providing for the rotation of the secondary winding, it can have a core common with the primary, forming thus what is practically a rotary field static transformer. Inside this structure is a simple revolving armature, merely big enough to spin the brushes. This is wound like an ordinary rotary converter, and starting as an inductor motor under the influence of the primary field, runs synchronously when up to speed as a self-excited motor. The permutator then acts like any synchronous commutating machine, and is reported to give very excellent results. The fact that the rotating part of the machine, being merely brushes and driving motor, is very light makes it possible to put the permutator into action with great rapidity and with very small expenditure of energy. A few seconds suffice to bring the brushes to speed, and then the main secondary winding goes into action and the machine delivers direct current up to its full capacity. Like an ordinary rotary, it may go in on the wrong polarity and then has to be put right in the usual way.

A most valuable feature is the fact that the transformation ratio may be made anything that seems desirable, since the secondary winding and the primary are independent, something after the fashion of an auto-transformer, instead of being connected, as in the case of the ordinary rotary. Hence the primary can be wound for any voltage which can be conveniently insulated in a static transformer, and the secondary winding can deliver any direct-current voltage that the commutator design will permit. In fact there is no good reason why the main windings of such a machine could not be oil-insulated like any other transformer, so that the line voltage used in the electrical distribution could be turned directly into the primary without any intermediary whatever. In this respect the permutator has the advantage even over a motor-generator. The secondary voltage of the permutator, however, is determined by the transformation ratio for which the machine is wound and hence must fluctuate with the primary voltage. It can easily be regulated, on the other hand, by the means generally available for regulating the secondary voltage of a transformer. Since the power factor of the permutator can be made very high, as in the case of the static transformer in general, the conditions of commutation can be kept fairly favorable and permanent, and the efficiency can also be kept high, especially at partial loads. The energy required by the rotating parts is not stated, but it is obviously much less than in the case of the massive armature of the ordinary rotary. The vital question regarding the permutator is of course the commutation as in every device for commutating an alternating current. We should think that the conditions of the magnetic circuit were not altogether favorable for sparkless commutation, but on the other hand, they are at least as good as in a series a. c. motor, the commutation, of which we are assured on all sides, is quite unexceptionable..

Of course commutator design in such a machine requires a good bit of skill, since, while in theory the transformation ratio may be anything, as a matter of fact, the requirements as to voltage per conductor in the commutator and the feasible current density in the brush contacts are decided inconveniences in design. The former, in particular, imposes limitations on the magnetic circuit that may be at times very burdensome. Frequency, perhaps, is rather less a stumbling block in the permutator than in other commutating devices. Altogether the machine is certainly most interesting and promising. It can undoubtedly be built much lighter for a given output than any form of machine now in use, and by this is especially fitted for electric railway locomotives which use a. c. on the line and d. c. in the motors. In efficiency it should surpass even the rotary, and other conditions being equal should also be materially cheaper. Just why American engineers have not taken an acute interest in the permutator it is difficult to say. Perhaps the revolving brush feature is mainly responsible for this neglect. This portion of the machine presents, of course, an apparent inconvenience since it cannot be worked over without shutting down. By stroboscopic methods it is possible, however, to inspect the action of the brushes while in motion and it certainly is far from impossible to provide means for the adjustment of the brushes with respect to the commutator. We fancy that the brush difficulty would be far less formidable in practice than it seems at the first glance, although it is a very wide departure from anything already familiar on this side of the water. Both the permutator and other forms of rectifier which dispense with a heavy revolving shaft deserve to be studied in this country, since if they give the results claimed for them they will work something very like a revolution in the customary methods of obtaining d. c. from a. c. If good, they will prove valuable; if bad and subject to very serious drawbacks, the fact should be ascertained at once. Fortunately, the Paris-Lyons-Mediterranean locomotive on which the latest form of rectifier is to be tried will soon be put in commission, and further particulars will soon be available as to its operation and exact construction.

SOME OPERATING FEATURES OF THE KINGSTON CONSOLIDATED RAILROAD COMPANY

The city of Kingston, N. Y., is a prosperous community of about 30,000 population, situated on the west bank of the Hudson River, 88 miles north of New York and 53 miles south of Albany. Among the chief industries are cement works, lime kilns, brick yards, foundries and cigar manufacturing. Most of the cement, lime, brick and great quantities of bluestone from the nearby Catskill Mountain quarries are shipped by water, but the city also has direct connection with the West Shore and Ontario & Western Railroads, and reaches the New York Central by ferry to Rhinecliff, on the opposite shore of the Hudson River.

Kingston is well known to thousands of Catskill vacationists, for in that city connections are made with the Wallkill Valley and Ulster & Delaware Railroads, which between them traverse the greater portion of this charming mountain region. In recent years, Kingston itself has become an important summer resort, as it is pleasantly situated in a water and mountain district yet offers most of the conveniences of a large city. The country is rich in historical associations of pre-national times, thus presenting opportunities for many interesting excursions. Even "the house visited by George Washington" is not lacking.

The street railway system is owned by the Kingston Consolidated Railroad Company, which gives a ten-minute service over the 10 miles it operates. One is rather astonished to learn that a town of this size should have had two competing railways. Yet this was the case for several years, even though the new line was not profitable before constructing an expensive subway to cross the West Shore Railroad. However, in 1901, the newcomer bought the older line under the present name, and since then the traction service has been conducted on a business basis. After the consolidation some of the track was taken up, but this was done so judiciously with regard to the future growth of the city that no new construction has been required since.

Unlike so many other public service corporations, especially in larger cities, this company enjoys the friendship of the public to an unusual degree. The cultivation of this sentiment has proved profitable not only from the traffic standpoint but also in the settlement of damage claims. Fortunately, the latter are rare despite single-track operation and the numerous grades of a hill city.

PARK BUSINESS AND PLEASURE RIDING

The endeavor of this company to serve the public faithfully also finds expression in its manner of fostering park traffic. Much has been written pro and con on the wisdom of a railway going into the park business, but it is difficult to see why a proper appreciation of the public's pleasure needs should not be converted into a favorable factor of a railway's income. Kingston Point Park operated by this company is a good example of a place where Nature's work has been improved to make it highly attractive for pleasure seekers without the glare and blare that has become characteristic of so many modern parks. For a long time the Point was simply a scrubby rock-covered peninsula projecting into the Hudson River. A few years ago, however, the Ulster & Delaware Railroad extended its line to the end of the peninsula, where a transfer station and dock was built for passengers from and to the Hudson River Day Line boats. The Kingston company, realizing the possibilities for traffic inherent in this location, soon began to lay out what has since become one of the prettiest parks on the Hudson River. Even those who love Nature unadorned will find satisfaction here, as part of the land was left in its original wildness for the sake of contrast.

A peculiar feature in connection with this resort is that a

A VIEW OF A PORTION OF KINGSTON POINT PARK AND THE BOATING LAGOON. PART OF THE CONCERT STAND IS SHOWN AT THE LEFT

large portion of the visitors come via the numerous excursion boats plying up and down the Hudson. Nevertheless, these outsiders have the same privileges granted to them as those who come via trolley and steam railroad. It is not unusual for people to travel three or four hours by rail or water to spend some time at the Point.

For the convenience of patrons a casino has been erected on the dock. The lower floor of this building is used for the sale of light refreshments and the upper floor has benches and tables for picnic parties bringing their own supplies. Further back in the grounds is a large hall for social and business gatherings. There are also numerous summer houses, rustic shelters, benches and tables throughout the grounds, besides an artistic music stand near the lagoon. The customary amusement features are few in number, since visitors find their chief pleasure in strolling through the park, boating among the islands in the lagoon or in listening to the band music. A merry-go-round, Ferris wheel, photograph gallery and a few slot machines comprise what may be termed the "artificial" attractions. No alcoholic drinks are sold on the grounds, nor are excursions carrying them in stock allowed to land. Hence undesirable elements are excluded and the cost of police is small.

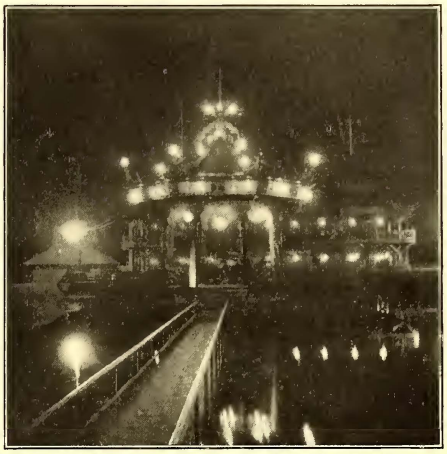
An idea of the financial scope of the business at this park can be obtained from the following table, which gives the results of the seasons of 1902 to 1906, inclusive. The park opens in May and closes in October, but the business during these months is very small.

CLASSIFICATION OF RECEIPTS AT KINGSTON POINT PARK

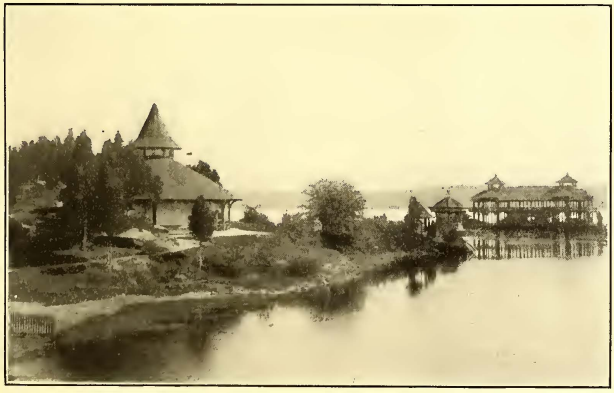
	1902	1903	1904	1905	1906	Total
Gate receipts	$967.64	$1,510.48	$849.81	$841.35	$1,045.50	$5,214.78
Pavilion	1,109.97	934.58	962.99	1,015.03	1,448.83	5,471.40
Photograph	92.62	100.00	100.00	90.00	100.00	482.62
Merry-go-round	1,389.50	1,523.50	1,219.25	1,389.85	1,798.25	7,320.35
Boats	1,083.51	1,093.80	727.05	653.70	896.25	4,454.31
Landings	236.00	309.00	202.50	93.40	72.00	912.90
Slot machines	10.09	40.43	29.54	169.68	18.80	268.54
Laughing gallery	.....	.....	112.81	.....	.....	112.81
Ferris wheel	.....	.....	.....	79.33	193.10	272.43
	$4,889.33	$5,511.79	$4,213.95	$4,332.34	$5,572.73	$24,510.14

One thing that will be noted from the foregoing table is the drop in receipts during 1904 and 1905. This was due to a corresponding decrease in the river passenger traffic, which suffered heavily for the two years following the great "Slocum" disaster in New York harbor. This shows that an occurrence of such character often makes its effects felt in the most unexpected quarters. Fortunately, the uniformly good record of the Hudson River boats now has brought the excursion business up to its former importance.

Visitors to the Point from other towns often take the electric car for a trip to Kingston and Rondout. After leaving the park the trolley lines lead along Rondout Creek until they turn sharply to climb the hills to Kingston. Half way between Rondout and Kingston is the City Hall, from whose high tower one can enjoy an extensive view of the Catskill and Shawangunk Mountains, of New York, the Berkshire Hills, of Connecticut and Massachusetts, and a large part of the Hudson Valley. Among the historical buildings are the Dutch Reformed Church, first built in 1659, and the Senate House, erected in 1676 by Colonel Wessel Ten Broeck, where more than a century later the State constitution was adopted, Kingston then being the capital of New York State. The trolley route follows that taken by the British soldiers when they landed at the Point in October, 1777, and marched to Kingston to destroy it by fire. The city is now the county seat of Ulster County and contains quite a number of interesting public and educational structures.



A NIGHT VIEW IN KINGSTON POINT PARK



THE BOAT LANDING AND HANDSOME PAVILION AT THE END OF KINGSTON POINT PENINSULA

RELATIONS WITH EMPLOYEES

If "charity should begin at home," cordial relations with the public ought to find their inception at the car house, that is, such feelings must first be cultivated with the employees who are the company's intermediaries with its patrons. Careful selection and training has resulted in securing for the Kingston company a class of car men of good physique and intelligence. An evidence of the way the management looks after its men is afforded by the fact that it has made arrangements to furnish ice free during the summer to all of its employees from the crop which it will harvest this winter on the lagoon in Kingston Point Park.

About a year ago the company started for its car men a benefit association which has since proved very successful.

All matters pertaining to dues levied and benefits allowed are determined by a majority of the three trustees. These trustees hold office for one year but may be removed any time during their term by a three-fourths vote of the membership. New trustees elected must receive more than one-half of the entire votes of the association, each member in good standing being entitled to one vote. The trustees' decisions with regard to assessments and benefits are final. They can allow whatever benefits their judgment dictates, but their power is limited by statute as follows: Dues in no case are to be more than 50 cents per month and benefits paid must not exceed $10 per week. At the time the association was started the company contributed a nest egg and announced its willingness to make up any deficits. Thus far, however, the organization has been entirely self-supporting.

SINGLE-TRUCK CLOSED CAR USED IN KINGSTON, N. Y.

SNOW-PLOW IN SERVICE

FARES AND TICKETS

The uniform cash fare is 5 cents, but fare tickets are sold at the rate of twenty-one for one dollar. The company encourages the sale of these tickets throughout the city, as it increases riding and brings the cash in advance. Ticket sales amount to about 3.4 per cent of the total receipts from passengers. There are six transfer points, and, as cars are operated on a ten-minute schedule most of the day, the transfers are usually punched for a fifteen-minute period. Complimentary transportation is issued in the form of small books containing tickets of the type illustrated on the next page.

Conductors place all cash, tickets and transfers in plain canvas bags. These are securely closed with a simple metal clasp and then dropped through the top of an old safe which has been remodeled for that purpose. As there are two divisions on the line—Colonial and Kingston—the bags of one division are distinguished by the imprint of a red star.

Since the Kingston system is single track, precise instructions are given on the card reproduced herewith to all crews with regard to turn-outs, lay-overs, leaving times, etc. This schedule provides for six cars on the Kingston City division and seven cars on the Colonial division.

SHOP DETAILS

In the past the Kingston company did practically no shop work beyond car painting and minor repairs. It has recently purchased some machine tools, however, and now is not obliged to send work to outside machine shops. The new tools consist of the following: A boring mill, manufactured by the Betts Machine Company, with a capacity for wheels up to 44 ins. diameter; a 150-ton wheel press from the Schaffer Manufacturing Company; a 12-ft. engine lathe fur-

Kingston City Division.

Car No.

1 Passes on all switches up, turns in from Kingston passing on all switches down.

2 Passes on all switches up and down, leaves Point on 20 minute time.

3 Passes on all switches up, turns in from Kingston passing on all switches down.

4 Skips Hill up and down, leaves Point on 20 minute time.

5 Skips ferry up, turns in from Kingston, skipping Center down.

6 Skips Hill up, leaves Kingston on 20 minute time.

20 minute switches are Center and Ferry.

When on 20 minute time a Colonial car will always be passed at the Power House switch.

When on 20 minute time car leaves Kingston on the **Even Hours, 20's** and **40's** and the Point on the **10's, 30's** and **50's**.

Colonial Division.

Car No.

1 Passes on all switches up, turns in from Marius Street through Palmer House, passing on all switches down.

2 Passes on all switches up and down, leaving Point on 20 minute time.

3 Passes on all switches up, turns in from Marius Street through Palmer House, passing on all switches down.

4 Passes on all switches up, skips Bongartz down, leaves Point on 20 minute time.

5 Skips Bongartz Switch up, turn in from Marius Street through Palmer House, skipping Cedar down.

6 Skips Lindsley up. Leaves Marius St. on 20 minute time.

7 Skips Bongartz up. Lays ten minutes at Marius Street. Leaves on 20 minute time.

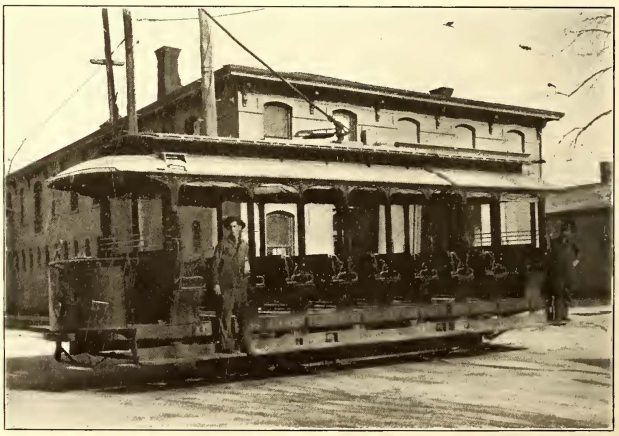
20 minute switches are North Front Street, Cedar Street, and Lindsley Switches.

When on 20 minute time, cars lay 10 minutes at Marius Street.

When on 20 minute time (when the Kingston City is running through) a Kingston City Car will always be passed at Power House Switch.

When on 20 minute time cars leave Marius Street on the **05's, 25's** and **45's**, and the Point on the **Even Hour, 20's** and **40's**.

INSTRUCTION CARD FOR CAR CREWS



TYPICAL SUMMER CAR USED IN KINGSTON

nished by J. J. McCabe, of New York, and a "Yankee" tool grinder made by the Wilmarth & Morman Company, of Grand Rapids, Mich. All of these tools are operated through belting driven by a 10-hp motor.

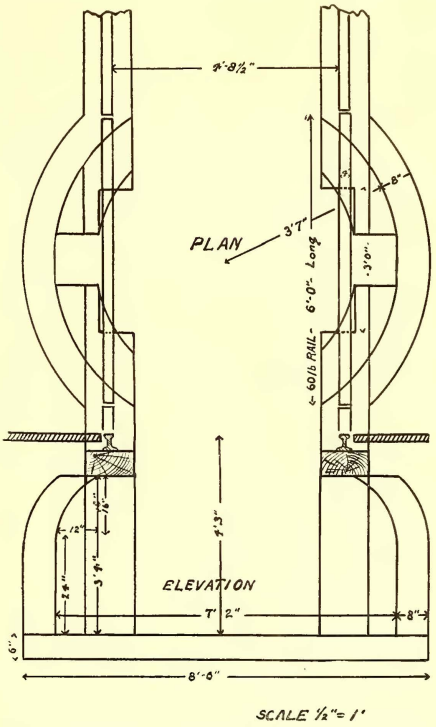
The company has determined also to do armature rewinding. As there are at least twelve cars in operation every day, it has been found that armature repairs are required frequently enough to keep one winder busy all the time. While the difference in cost between the old and the new methods is not considerable, injured armatures are now returned to service more quickly and the absolute assurance exists that only the best repair materials are used throughout. The advantages of home work would disappear, of course, if the management were not in position to keep strict supervision over the labor and the material.

KINGSTON FARE AND COMPLIMENTARY TICKETS

REDUCED FAC-SIMILE OF TICKET ADVERTISING POSTER

The master mechanic of the company has devised a neat wheel pit which has proved a great labor saver in changing sets of wheels of single-truck cars. Vertical brick arches extend outward from the pit at the place where the wheels are to be changed. The area enclosed by these arches is covered by the shop flooring except for the removable pieces corresponding to the positions of the journal boxes. When it is desired to change a pair of wheels the car is run over this pit and then jacked up about 4 ins. After this is done, the 6-ft. section of track spanning the diameter of the arch is lifted out of the way, and the axle, wheels and journal boxes are lowered as a unit. The construction dimensions of this pit are shown in the accompanying plan and section.

The pit jack shown in one of the illustrations is a home-made tool assembled by the master mechanic. It is of the differential screw type operated with a ratchet. The jack proper is screwed into a wooden block which rests on a platform furnished with wheels to permit easy transportation of the jack up and down the pit. At the top of the jack is a plate for carrying the semi-circular iron segment which holds an armature scoop. The latter is made of iron but has no sharp edges which could cut into the insulation of the armature coils.



PLAN AND ELEVATION OF WHEEL PIT FOR CHANGING WHEELS AND AXLES FOR SINGLE-TRUCK CARS

ROLLING STOCK AND PAINTING

There are thirty-eight passenger cars, twenty-four of which are nine and ten-bench open cars and fourteen are 16-ft., 18-ft. and 22-ft. closed cars. All of these were built by the Pullman Company. The car equipments are fairly evenly divided between GE-800, GE-1000 and Westinghouse 49 motors. All of the cars are single-truck, and as the service is not severe, split gears have been found to give entire satisfaction.

The only special car is a home-made vehicle used in summer as a 2500-gal. gravity sprinkler, and in winter as a snow-plow, the same truck being used for both purposes. Two 35-hp motors are used on this car. The snow-plow is illustrated in two accompanying illustrations, one of which shows it in active service and the other in the shop freshly painted and fitted up ready for the coming winter. The plow itself is of sheet steel ½ in. thick. Rotary brooms have not been found necessary, as the plow is kept on the line with the first indication of snow.

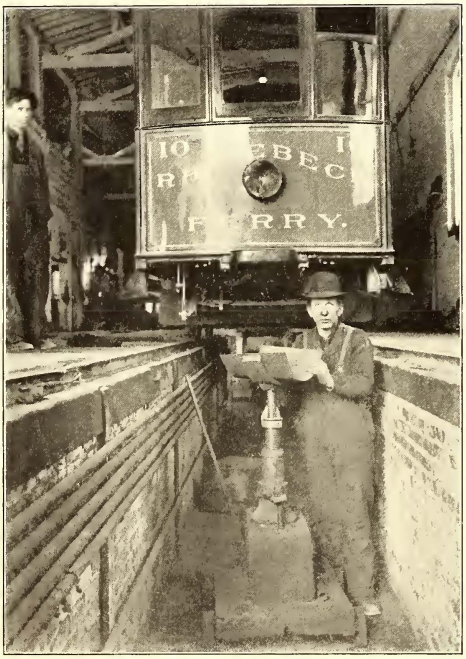
The company believes in the monetary value of keeping

up rolling stock in first-class condition. Cars are repainted every year, the summer cars being looked after in winter and vice versa. The paint shop accommodates four cars at a time. The average cost for the last four years has been as follows:

Year Ending June 30.	Total Cost.	Cost Per Car.
1903	$1,515.57	$40.00
1904	1,547.35	40.08
1905	1,623.12	42.71
1906	1,703.77	44.83

GENERAL DATA

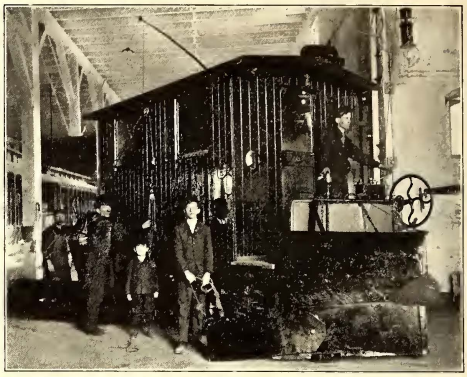
Thus far the year 1906 has proved one of the most profitable in the history of this company. The number of car-miles for the nine months ending Sept. 30, 1905, was 428,316, compared with 395,533 car-miles for the same period this



HOME-MADE ARMATURE LIFT

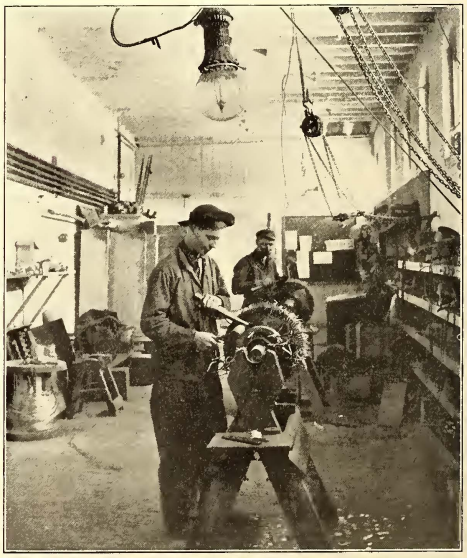
year, but the number of passengers carried increased in greater proportion, namely, from 1,991,018 to 2,224,808, making about 5 passengers per car-mile in 1905, and 5.2 passengers per car-mile in 1906. Outside of the regular passenger receipts, which last year amounted to $122,500, the company receives several hundred dollars annually from chartered cars, carrying mail, advertising and the sale of power. The park figures have already been given. The advertising is let out to a single party, the concessionaire paying a fixed sum and securing most of the advertising from local merchants, rather than the great national advertisers. The total receipts for the first nine months of 1906 were $109,170, as against $97,044 for the corresponding period of 1905.

On the whole, the operating expenses for nine months were the same as for the corresponding period of 1905, increasing only from $57,937 to $58,555. Comparing this with the greater increase in the gross earnings, it will be found that while in 1905 the operating expense was almost 59.7 per cent of the earnings, it dropped to 53.6 per cent in 1906. The influence of weather conditions appears from the fact that for nine months in 1905 the cost of removing snow and ice was $439.38, while in 1906 it dropped to $106.65—practically



THE SNOW-PLOW READY FOR ANOTHER WINTER

one-fourth. A similar pleasing reduction was made in the figures covering damages and the legal expenses in connection with them from $3,665.52 to $663.90. The latter figure is certainly remarkably low in view of the mileage operated, the numerous hills, six grade crossings and the crowded park



IN THE ARMATURE-WINDING ROOM

traffic of the summer months with open cars. During the entire year 1905 there was but one fatal accident.

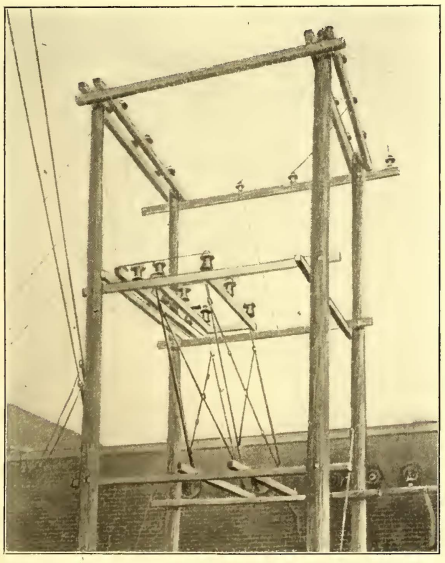
The Kingston Consolidated Railroad is owned very largely by local capitalists whose personal interest in the operation

of the line has enabled the management to keep the system up to a high notch of efficiency. The general manager and first vice-president of this company is C. Gordon Reel, who has held this position since 1902, shortly after the Kingston lines were consolidated. Mr. Reel is very much interested in the employees' benefit association, and acts voluntarily as its treasurer. The other officers of the company are: President, Charles M. Preston, New York; second vice-president, A. M. Day, Danbury, Conn.; treasurer, Abraham Hasbrouck; secretary, Augustus J. Phillips, Kingston, N. Y.; superintendent, G. B. te Bow, Kingston; master mechanic, C. J. McNelis; chief engineer, M. J. Sullivan. The directors are Messrs. Preston, Day, Reel, Phillips and Hasbrouck, together with August Belmont, New York; Howard Chipp, Kingston; Hewitt Boice, Kingston, and George Hutton, Kingston.

AN OPEN AIR SECTIONALIZING SWITCH FOR HIGH-TENSION LINES

An open air high-tension switch, which is comparatively inexpensive to install, has been designed by M. J. Kehoe, engineer of the Fort Wayne & Wabash Valley Traction Company. Several of the switches have been in use on the high-tension lines of the company for some months, serving to sectionalize the lines in the event of trouble.

The switch has the advantage over the forms of high-tension switches, in that the insulation of the line is maintained. In fact the wires are carried through it, and the terminals are supported on standard line insulators. The

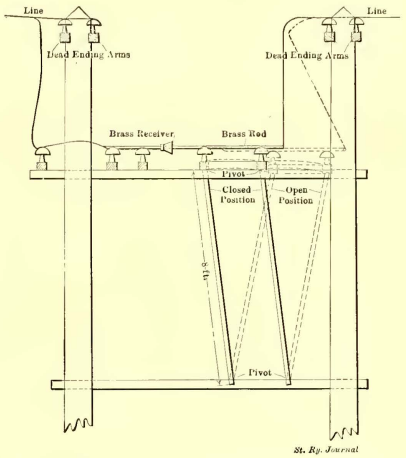


HIGH-TENSION SECTIONALIZING SWITCH IN SERVICE

accompanying illustration shows the switch installed at the sub-station at Roanoke, a few miles southwest of Fort Wayne, Ind. Four poles support heavy cross-arms at the top, and below these is bolted the framework carrying the switch proper.

The high-tension wires of one side of the line are lead over top cross-arms and down to three fixed brass bell-mouths, supported on line insulators. The wires of the other side of the line terminate in three brass rods, mounted on insulators, which are themselves carried on a wood frame. This frame is supported on four long arms, pivoted at their lower ends so that the frame may be thrown backward or forward. When thrown forward the terminal of the brass rods enter the fixed bell-mouths and the circuit is closed. Throwing the frame to the rear causes the rods to recede a foot or more from the bell-mouth and the circuit is opened.

When a 13,500-volt circuit is broken, the length of each



CONSTRUCTION DETAILS OF HIGH-TENSION SECTIONALIZING SWITCH

of the three arcs is not more than 6 ins. The small arc is largely due to the fact that the inertia of the rotary converter on one side of the line keeps the voltage up approximately to that of the generating machine during the period that the circuit is being broken.

The switch is primarily a line-sectionalizing switch and is not intended to take the place of oil switches in power houses or sub-stations. One point where it can be used to advantage is at a junction where two or more high-tension lines diverge after having been carried on one pole line for several miles. When trouble occurs on one of the lines beyond the junction, it is frequently necessary to cut the current off at the power house from all of the paralleling lines before repairs can be made, because of the fact that inductive effects in the paralleling lines may result in a dangerously high potential in the one-line cut-out. Open air switches of the type described when placed in each of the lines at the junction point, however, will remove the necessity of cutting out any of the lines other than the one being repaired.

The fact that the switch is comparatively inexpensive to install makes possible its use at frequent intervals in a high-tension line, so in case linemen find trouble on the line they can cut off the current at the nearest switch and make repairs without delay. When so installed danger of misunderstandings as to whether or not switches are thrown off in the power house is avoided. The lineman making the repairs can often see for himself that the switch is open. The switch was manufactured for Mr. Kehoe by the Ohio Brass Company.

TESTS OF THE WARD-LEONARD-OERLIKON ELECTRIC LOCOMOTIVE

The Oerlikon Machine Works, of Switzerland, have recently made public the results of certain tests conducted on the Ward-Leonard-Oerlikon electric locomotive, of which several accounts have been published in the Street Railway Journal. The Oerlikon Company builds all classes of electric locomotives, and recommends this type under two conditions, viz: (1) When the profile is irregular so that recuperation can be secured either in one or both directions of running, and (2) when it is desirable to economize power and when there are frequent stops.

Up to July, 1906, this locomotive had been in regular service for two years on a section of the Swiss Government Railway between Wettingen and Affoltern. The ton kilometers hauled during that time were 631,209, equivalent to 434,000-ton miles. The single-phase voltage used was 15,000. During the two years in which the locomotive has been in operation no repairs of any kind have been required. The only change made in the equipment has been that the machine was originally built for 50 cycles. After some of the runs had been made it was decided to change the frequency to 15 cycles. The only alteration required in the locomotive was to rewind the stator of the induction motor. This fact shows the flexibility of this type of machine to different conditions of service, such as the character of current available.

The locomotive on which the tests were made weighs from 44 to 46.5 metric tons and is capable of a tractive effort of from 600 kg to 4000 kg (1320 lbs. to 8800 lbs.) at speeds of from 70 km to 36 km (44 to 22½ miles) per hour. Twenty-five cycle current is considered by the manufacturers as "standard" for this type of machine, but, as stated, frequencies of 50 cycles and 15 cycles have been used satisfactorily.

The voltage of the single-phase current may also be regulated by local conditions. With 6000 volts on the trolley wire the current is taken directly to the motor-generator group, and the weight of the locomotive complete is 44 metric tons. When the trolley wire potential is above 6000 a transformer is used. The weight of the locomotive is then increased to 46.5 metric tons.

The weights of the two types of locomotives, and prices quoted for them by the manufacturers are approximately as shown in the table at the top of the next column.

The motor-generator group, with the exception of the primary side, is the same in both equipments. It consists, briefly, of a single-phase induction motor whose armature is mounted on the same shaft as the armature of the d. c. generator and of the exciter. The latter machine also serves as a starter as will be described later. The common shaft runs

A—ELECTRICAL EQUIPMENT

	6000 Volts and 25 Cycles		15,000 Volts and 25 Cycles	
	Weight, Kg.	Price, Francs	Weight, Kg.	Price, Francs
Motor-generator, with exciter, controller and rheostats	15,180	40,500	15,180	40,500
Four d. c. motors	8,000	25,700	8,000	25,700
Collector, high-tension switch, ammeters, voltmeters, lightning arresters, lighting apparatus and wiring	560	4,100	560	4,100
Transformer, with blower, compressor, compressor governor, tools, etc.	1,360	4,200	3,960	10,700
Total for electrical equipment	25,100	74,500	27,200	81,000

B—MECHANICAL EQUIPMENT

Two trucks, with wheels, 1 meter diameter, locomotive body and cab	19,000	23,000	19,000	23,000
Total	44,100 or 97,020 lbs.	97,500 or $19,500	46,200 or 101,640 lbs.	104,000 or $20,800

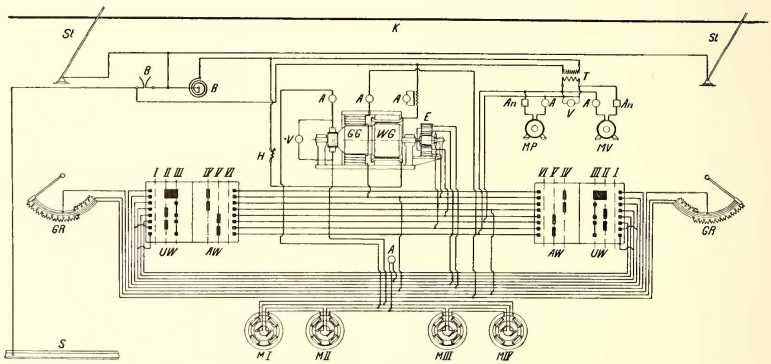


FIG. 1.—DIAGRAM OF CONNECTIONS OF LOCOMOTIVE

K—Trolley wire.
St—Trolley.
B—Lightning arrester.
H—High-tension circuit-breaker.
A—Ammeter.
V—Voltmeter.
WG—Single-phase motor.
GG—D. C. generator.
E—Exciter.
T—Transformer.
An—Switch.
MP—Motor-compressor for air-brakes.
MV—Low-pressure pump for air blast.
GR—Regulating resistance for speed.
AW—First half of controller (for starting).
UW—Second half of controller (for changing connections).
MI, MII, MIII, MIV—D. C. motors on axle.
S—Rail.

at 730 r. p. m. The rated power available at the shaft is 520 hp, and the maximum is 1100 hp. The railway motors are also the same in the two equipments. They are wound for independent excitation and are provided with artificial ventilation and encased to keep out the dust and moisture. They are designed for 900 volts and a maximum speed of 1200 r. p. m. The continuous output available for each motor is 95 hp. Each, however, is capable of working up to a maximum of 200 hp, measured at the rails and including the gearing, which is in the ratio of 1 : 3.5. Fig. 1 shows the diagram of connections.

To start the locomotive, the motor-generator is first put in operation. This is accomplished through step V of the controller by which the secondary of the 10-KVA transformer is connected to a special transformer coil on the exciter, which is in series with its armature, so that the exciter operates as a single-phase series motor and brings the motor-generator up to the normal speed. When this is accomplished the stator winding of the motor of the group is connected to the single-phase line current by means of a high-

tension switch. In the next position, step IV. of the controller, the field coils of the d. c. generator are connected to the poles of the exciter, whose series starting coil has been cut out and which now runs as a shunt dynamo auto-exciter. The exciter then supplies current to the field coils of the generator part of the motor-generator, and also to the field coils of the railway motors. These two circuits include regulating resistances, which are controlled by a lever with a common contact point.

We have now to consider the other two positions of the controller cylinder. These steps change the connections of the exciter; in one position the current passes through the field coils of the railway motors in one direction and in the other position in the reverse direction. As the direction of the current from the generator remains constant, these two positions of the controller give direction to the operation of the locomotive. Variations in speed are made by varying the resistances in the field circuit of the generator and in the field circuits of the motors. Recuperation of energy is secured by means of the rheostats of the field circuits of the motors, through which the voltage at the brushes of the motors can be made greater than the voltage at the poles of the generator. The motor-generator then revolves at a higher speed than would be called for by synchronism, and the single-phase motor of the group pumps back current into the line.

Fig. 2 shows characteristic curves of the locomotive when operating under normal conditions. In this diagram the speed curve is shown as a function of the tractive effort for different drawbar pulls of the locomotive, such, for instance, as would be required by a train on various percentages of grades. The d. c. motors are usually run at a constant voltage of 900, the exciting current being varied to secure changes in speed. Nothing would prevent, of course, obtaining different speeds by varying the voltage applied to the motors, but in this case the draw-bar pull of the locomotive would be limited by the maximum voltage available. For normal operation, therefore, it was considered undesirable to change the voltage of the motors. It is otherwise, however, in accelerating the train, when the most economical results are secured if at first the voltage of the motors is varied and afterward it is kept constant.

Figs. 3 and 4 show acceleration curves for a train weighing 170 tons. In Fig. 3 the acceleration occurs on a level, and in Fig. 4 on a grade of 1 per cent.

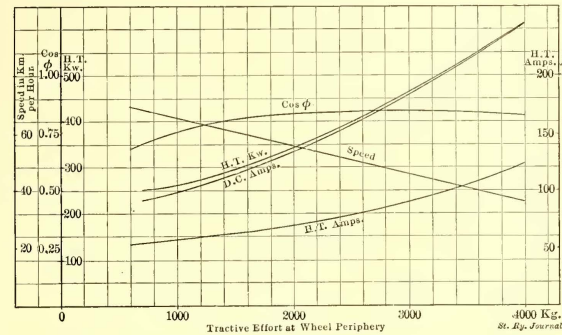


FIG. 2.—CHARACTERISTIC CURVES OF LOCOMOTIVE UNDER NORMAL CONDITIONS, D. C. VOLTAGE CONSTANT AT 900

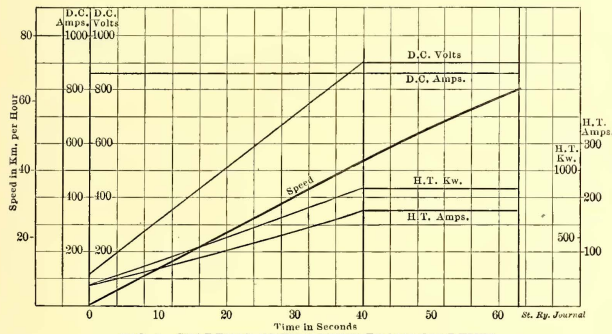


FIG. 3.—STARTING WITH 170-TON TRAIN ON LEVEL

In Fig. 5 are assembled the maximum tractive efforts developed at the commencement of a period of acceleration, with the corresponding electric characteristics. Although in this diagram the field strength of the motors is assumed to be constant and at a maximum, different tractive efforts are developed by varying the voltage at the poles of the d. c. armature of the motor-generator group. It is also possible to obtain from Fig 5 the values of the constant losses of the motor-generator group when running without load, that is, 28 kw, as well as the current absorbed without load, 34.5 amps., for a voltage on the trolley wire of 6000. The amount of power consumed under different loads as well as the power factor of the single-phase motor are shown at different speeds in Fig. 2. In Fig. 5 it is possible to obtain the same values for the locomotive in a stationary position, the generator being differently excited, according to the different degrees of starting desired. Finally, these same values are also shown in

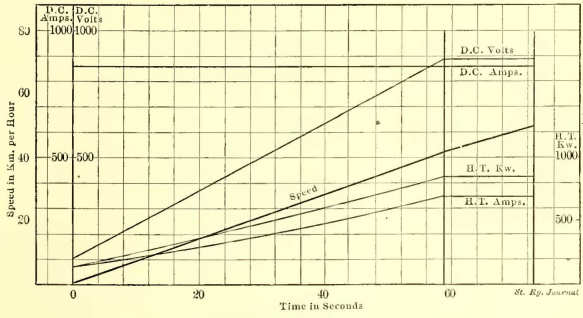


FIG. 4.—STARTING WITH 170-TON TRAIN ON 1 PER CENT GRADE

Figs. 3 and 4 during the period of acceleration of a train of 170 tons on grades of 0 and 1 per cent.

As for the recuperation of energy by electric braking, it can be shown that on a level the energy which can be recuperated in reducing the speed of a 170-ton train from 65 km to

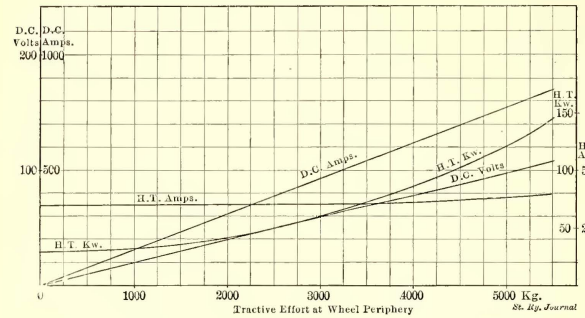


FIG. 5.—MAXIMUM TRACTIVE EFFORT AT COMMENCEMENT OF ACCELERATION

27 km (41 to 17 miles) per hour in 52½ seconds will be about 3 kw-hours, and the power recuperated by keeping the speed of the same train constant at 65 km per hour on a 1 per cent grade is 63 hp.

CAST-IRON WHEELS AND THEIR CHEMICAL COMPOSITION

BY JAMES ANDREWS

In a general way the quality of a cast-iron wheel may be read from its chemical composition, though too great dependence should not be placed upon this method of determination because the temperatures of pouring and annealing have very decided effects upon the results that are obtained. When the iron comes down from the cupola the major portion of the carbon, for example, is in the combined state and then, as it cools after having been poured, the larger portion of it passes from the combined to the graphitic condition. The amount that is so changed depends upon the temperature at which it is poured. Hence even though the total carbon in the iron is known, the varying proportions in the tread and plate cannot be definitely determined without destroying the wheel. The only point that is known to a certainty is that the ratio of combined to graphitic carbon is higher in the chill than in the tread. Uncertain as the data obtained from a chemical analysis may be, it must not be thought that they are of no value, for they point to certain facts that, within limits, serve as a guide.

At this point it may be well to utter a word of caution regarding the making of analyses. Where accurate work is desired the carbon content should always be obtained by the combustion and not by the color test. It is much slower, but it is accurate, while the color test, depending as it does upon the keenness of vision and the judgment of the chemist, is liable to all sorts of error. If, however, a comparison between two wheels is to be made and speed is a prime requisite, the color test may be used, but the two analyses should be made by the same chemist in order to eliminate as far as possible the personal equation from the work. As an example of how a reputable chemist may err when depending upon the color test, a certain one made such a test of a piece of steel and reported it to contain 0.45 per cent carbon. It was known that the steel must have a higher percentage than this, and the chemist was instructed to make a combustion test. This was done and a carbon content of 0.65 per cent reported. This is, of course, an extreme case, but is cited as an awful example and of methods that are to be avoided.

With analyses accurately made, some wheel makers even then consider that to base an opinion on the relative amounts of combined and graphitic carbon in the tread and plate is but to deceive oneself.

Total carbons in two wheels may be approximately the same, yet the graphitic carbon in the tread of one may be ten times as much as in the other. For example, a case in point is that of wheels having totals of 3.56 per cent and 3.42 per cent of total carbon respectively. Analysis showed that the first had 1.50 per cent of graphitic carbon and the second but 0.16 per cent, while the ratios of combined carbon was reversed, one having 2.06 per cent and the other 3.26 per cent. On the basis that these analyses were correct, these variations would indicate that the metal was very cold when the first wheel was poured and very hot for the second one. Setting aside the analysis, for a moment, the probability is that the first wheel, with the high percentage of graphitic carbon, would have the greater tendency to develop seams and cracks at the throat of the flange than would be the case with the second, because iron that is poured cold does not have the same cohesive strength as the same mixture would have when poured.

Wheel makers say that this has been demonstrated time and again, so that when wheels show a tendency to crack in the hub the trouble is done away with by simply raising the pouring temperature, and it seems a fair and natural conclusion that what is true of the hub and plate is also true of the flange and tread. With these facts in mind it is reasonable to expect that the first wheel of those under consideration is the more dangerous of the two.

It is quite true that objection may be raised to these conclusions on the ground of the paucity of the experimental data upon which they are based. Very little, for example, is known of the actual tensile or cohesive strength of the chilled part of a cast-iron wheel. Test specimens from this part of the wheel are difficult and expensive to obtain, and few there be that have been made. Of these few at least one showed the high tensile strength of 36,000 lbs. per sq. in., but there are no data available as to its composition.

It is, of course, useless to make a comparison between the carbon contents of the tread and the plate of a wheel; for, while the totals should be approximately the same, we know, offhand, that there will be a wide variation in the proportions of the combined and graphitic.

With the total carbon the case is different, and here it is profitable to make comparisons between different wheels. If test bars from the wheel mixtures are used for the purposes of the analysis, a comparatively uniform physical condition can be maintained and then uniform chemical conditions will give uniform results. If these conditions vary the results should at least be comparable.

In order to have a basis to work upon the two wheels already referred to will be taken. Their chemical analysis, as reported, is as follows in percentages:

No.	Total Carbon	Graphitic Carbon	Combined Carbon	Phosphorus	Silicon	Sulphur	Manganese
1 Plate	3.70	3.30	.40	.33	.80	.123	.45
1 Tread	3.56	1.50	2.06	.417	.73	.12	.47
2 Plate	3.40	2.69	.71	.37	.65	.14	.42
2 Tread	3.42	.16	3.26	.41	.56	.14	.43

The statement has already been made that, owing to the evident temperatures at which these two wheels were poured, the No. 1 is the more dangerous, yet when viewed solely from the standpoint of total carbon this same wheel (No. 1) should give not only a slightly better chill but also a slightly stronger wheel, a complete reversal having been made by the foundry treatment.

With a practically uniform content of phosphorus and manganese, the discussion of these two wheels may be confined to the comparative effects of the other three elements.

Years of experience seem to have demonstrated that the allowable range of the silicon content lies between 0.60 and 0.70 per cent. Some specifications set the limits from 0.60 to 0.80 per cent, though, even then, it is claimed that the nearer the working is kept to 0.60 per cent the better it will be for the wheel. Good wheels have, however, been made with the silicon content as low as 0.53 per cent, but 0.80 per cent is the top notch of the allowance that can be made in the other direction.

On the silicon basis the No. 1 wheel will be much weaker than No. 2. The chill will be deeper but softer and will not wear as well. And here let it be understood that the statements regarding the comparative hardnesses of chills is inferential only. A statement is made that one chill is harder or softer than another because of variations in the wearing qualities that have appeared. The one that wears the more rapidly is called the softer and is supposed to be so, yet no actual tests for hardness, so far as is known, have ever been made of car wheel chills to ascertain just what their relative conditions in this respect may be. Wheelmakers are, nevertheless, working on the basis that these assumptions are correct.

With the sulphur there is another state of affairs. The lower content in the No. 1 wheel points to a stronger metal than in No. 2, yet the probability is that the chill will be softer and not wear as well, for the presence of sulphur is thought to add to the hardness.

But these two elements cannot be considered independently of each other or of the carbon, manganese and phosphorus. Take No. 1, for example. With the carbon at only 3.70, the silicon at 0.80 is much too high. For such an upper limit as this the total carbon should be at least 4.00 or better more, while the sulphur would be improved at 0.19 or 0.20, since 0.80 per cent of silicon means a soft, weak wheel, while 0.12 in sulphur also stands for softness, while 3.70 of carbon is not sufficient to counteract either or both of them. So that, if this 3.70 carbon had been combined with about 0.67 of silicon and from 0.14 to 0.16 per cent of sulphur a much better wheel would have been produced both in strength and hardness, the foundry treatment of the metal having been the same in both cases.

Again, if this silicon at 0.80, which makes for softness, had been combined with from 0.19 to 0.20 per cent of sulphur, which makes for hardness, a fairly good chill would have been produced; while the raising of the carbon to 4.00 or 4.10 per cent would have given a strength to have counterbalanced these two high percentages of silicon and sulphur, both of which have a tendency to cause weakness. This statement is made in order to show how the probable quality of a wheel may be varied by a variation of its chemical contents, the foundry practice remaining the same.

Turning now to wheel No. 2, the proportions of the total carbon to the silicon and sulphur are much better than in No. 1, yet better results would have been obtained had the silicon been lower. If this had been down to between 0.57 and 0.60, instead of up to 0.65, there would have been more of strength as well as hardness.

In this wheel the carbon is altogether lower than it should be allowed to fall in a wheel, while both silicon and sulphur are above the minima of what can be safely used. Hence, in this wheel it would be well either to reduce the silicon or raise the carbon.

For the reasons that have thus been set forth, namely, the bad relative proportions of carbon, silicon and sulphur, coupled with the very evident fact that the iron was too cold when poured, it can be stated that the No. 1 wheel would be a dangerous one to use. Here, then, is a wheel unsafe for traffic and unsafe in a way that no inspection can detect, and rendered so by the combination of bad composition and careless foundry practice. As for the former, there is some chance to guard against it by a proper mixing and melting, but for the latter there is no protection save the vigilance of the man in charge.

As for wheel No. 2, the relative proportions of the silicon and sulphur to each other are about right, the softening tendency of the one being counterbalanced by the hardening tendency of the other. As for the carbon, it is a trifle low for the percentages of the other two, though this is, in part, overcome by the fact that the wheel was poured very hot, which has added strength and freedom from seams.

In a resumé of this discussion it may be stated that:

Cold pouring produces a liability of seams in the tread and tends to weaken the iron, while the opposite effect is produced by an elevation of the temperature.

A high percentage of silicon produces a soft, weak wheel.

A low percentage of sulphur is liable to cause softness.

A high percentage of carbon adds to strength and, if properly poured, to hardness.

In the application of these principles to street car wheels much tentative work had to be done because of the varying conditions of the service as compared with that of steam roads. For example, certain wheels had been made of the following average composition:

	Per Cent.
Total carbon	3.77
Graphitic carbon	2.74
Combined carbon	1.03
Phosphorus	.353
Silicon	.68
Sulphur	.175
Manganese	.44

The mileage obtained with these wheels was large and satisfactory and the wear low, but when they were put to work in city service and brought into contact with hardened manganese switch points and crossings they developed a decided tendency to chip at the flange. In order to correct this for this special class of service the composition was modified so that it averaged as follows:

	Per Cent.
Total carbon	3.80
Graphitic carbon	2.94
Combined carbon	.86
Phosphorus	.356
Silicon	.65
Sulphur	.174
Manganese	.52

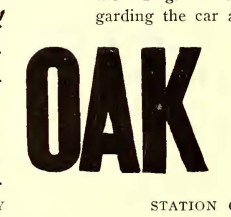
In this change, it will be observed, the total carbon was kept about the same, though slightly increased, and the analysis gives the relative value of the combined and graphitic for the plate, that of the tread being the reverse and varying, as already indicated, with the temperature of pouring. The silicon and sulphur were lessened and the manganese increased. The result of this combination of changes was that the wheel was both strengthened and hardened at the flange, and the trouble with chipped flanges done away with to a great extent. There was, however, a slight reduction in

the mileage. In order to meet this failing the composition was again changed and made as follows:

	Per Cent.
Total carbon	3.86
Graphitic carbon	2.94
Combined carbon	.92
Phosphorus	.358
Silicon	.70
Sulphur	.178
Manganese	.48

In this change there was a reduction of the manganese and an increase of the sulphur, by which an additional hardness would have been obtained had it not been for the slight increase of silicon by which a softening tendency was introduced, while the increase of carbon was made in order to check any weakening that might be produced by the other modifications. With this change the capability of obtaining the original mileage was restored, while the capacity to resist chipping was retained.

It has not been the intention to show here that a chemical composition is the panacea to be used in order to obtain the best of wheels, for that idea was disclaimed at the outset, but merely to indicate a few of the possible influences of that composition upon the quality of the wheel that is produced. Foundry practice is an all-important item that must be taken into consideration, and changes in that may scatter to the winds the best made fromulæ of the chemist and metallurgist. For that reason it would be exceedingly inadvisable for a railroad company to issue specifications bearing upon the chemical composition of the wheels that they are to purchase, for that can best be left to the manufacturer. At the same time it would be money well spent to investigate the quality of the wheels that fail, in order to reach an intelligent conclusion as to the actual causes of such failure. At the same time the manufacturers might well turn their attention to a determination as to whether there is really a difference in the hardness of chills or not; and, if so, whether it is the harder or the softer chill that is possessed of the best wearing qualities. We have jumped to the conclusion that the harder the chill the better the wearing quality, and we mix our metals and fix our chemical composition and arrange our pouring temperatures with that idea in view, and this despite the fact that the hard-chilled wheel wears away more rapidly and gives a shorter mileage than the softer steel wheel; that on skidding it wears flat more quickly; and that it cuts away more rapidly under the brake-shoe and emery wheel. This is offered as a suggestion, to which is added the query as to whether the subject is not of sufficient importance to investigate and find out whether we have been guessing rightly or wrongly. Certainly it does seem worth trying.

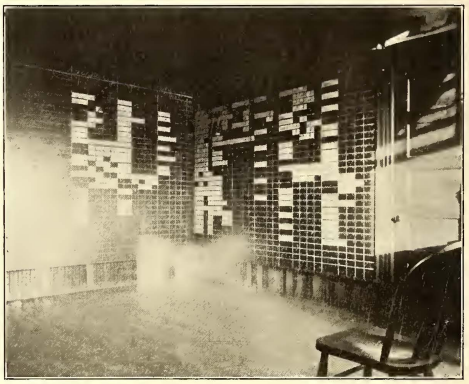


CAR RECORD, DETROIT UNITED RAILWAY

The sixth annual ball of the International Railway Employees Association was held at Convention Hall, Buffalo, on the evening of Tuesday, Nov. 27, 1906, and was a very successful affair.

A CAR LOCATION RECORD SYSTEM

The track department of the Detroit United Railways employs almost 200 work cars of various types. As the railway system embraces about 600 miles of track, with numerous stations and sidings where work cars were kept, a systematic record of their location was found necessary. To accomplish this, John Kerwin, superintendent of tracks, has put into use a novel system by which the location of any car may be found at once. A large blackboard covering two sides of an office is ruled off into large and small rectangles. Each rectangle is provided with two small hooks on which cards bearing the names of sidings and also of car numbers may be hung. The cards are made of manila board about ⅛-in. thick. Those for sidings measure 2 ins. x 7 ins. and are hung in the large rectangles, while those bearing the numbers of all the cars located on the sidings are about half as long as the station cards and are hung in the smaller spaces opposite. A small card bearing a number is hung over the car card to indicate the day of the month that the car was placed on the siding. To assist in identifying cars, general data regarding the car are printed on the back of the car cards, such as the style of car, of the truck, the dimensions, weight of the car, etc.



BOARD FOR HOLDING CAR LOCATION CARDS

STATION CARD, DETROIT UNITED RAILWAY

To be of value the car cards must be changed daily to correspond with the movements of the cars. It has been found that a daily car report showing the movements facilitates this work.

The Worcester Polytechnic Institute has placed an order with the Cincinnati Car Company for the body of the car which is to be used for tests in connection with its new electrical engineering laboratory. The car will be built along the lines of the modern interurban, except that it will not have seats, leaving room for the various pieces of apparatus with which tests are to be made.

THE COMING OPENING OF THE ELECTRIFIED DIVISION OF THE ERIE RAILROAD BETWEEN ROCHESTER AND MT. MORRIS, N. Y.

Last summer, Westinghouse, Church, Kerr & Company were retained by the Erie Rairoad Company to install a complete equipment to cover the passenger service of that portion of the main line of the Rochester division lying between Rochester and Avon and the branch between Avon and Mt Morris, a total distance of about 34 miles of single track, besides sidings. In the issues of the STREET RAILWAY JOURNAL for July 14 and Aug. 25, details were published of the rolling stock and overhead construction, respectively, but it is now possible to give further data. When the work is done, the Erie Railroad will have the distinction of being the first steam railroad in this country to operate a single-phase railway by the multiple-unit system, as the New York, New Haven & Hartford Railroad will employ locomotives.

All the power will be supplied from a single sub-station at Avon, N. Y., about 18 miles from Rochester and 15 miles from Mt. Morris. This station will receive current at 60,000 volts from the Niagara, Lockport & Ontario Power Company, at Niagara Falls. This company's transmission line, which extends to Syracuse, and is being constructed in duplicate, crosses the Erie Railroad at Mortimer, about 5 miles south of Rochester, and from that point the Power Company is building a branch about 14 miles long to supply the Avon sub-station.

The sub-station is now practically completed and the electrical apparatus which it is to contain is being shipped by the Westinghouse Electric & Manufacturing Company. The machinery consists of three 750-kw transformers of the oil-insulated, water-cooled type, transforming the 60,000-volt three-phase current to a 11,000-volt single-phase current, which is to be fed directly to the catenary trolley wires. The usual accessory apparatus is also supplied, such as bus-bars, oil switches, choke coils and lightning arrester apparatus, together with the necessary pumps and piping for properly handling the insulating oil and cooling water into the transformers.

The trolley and messenger wires are supported by the bracket-type of overhead pole construction. The poles are of heavy chestnut, averaging 8 ins. in diameter at the top. The brackets consist of steel T-bars 10 ft. long, supported near the outer ends by two truss rods reaching to the top of the pole, to which they are fastened by a pole clamp designed expressly for this heavy work. Upon the outer end of each bracket is mounted a heavy triple petticoat porcelain insulator, supported upon a malleable iron pin bolted to the bracket. The insulator, in turn supports the messenger cable.

Difficult problems were encountered at Avon and Rochester in supporting these trolley wires over the tracks through the railroad yards, and a new style of overhead span wire construction was designed to overcome the difficulty of carrying such heavy trolley construction through a railroad yard where it is impossible to place poles between tracks. In other places it was found necessary to resort to steel bridges to accomplish this end, but the system of "Tripartite" steel poles and double spans adopted is believed to be fully as effective a type of construction as the former, as it meets all the conditions, is far cheaper and much quicker to erect. The bonding of the 80-lb. rails used on the electrified track is now nearly completed.

The six 54-ft. cars described in the STREET RAILWAY JOURNAL of July 14, are now at the Buffalo shops of the Erie Railroad where the equipment is being applied. Each car carries four 100-hp motors, one on each axle, besides a transformer and the Westinghouse electro-pneumatic system of multiple-unit train control. The trolleys are of the pneumatically-operated pantagraph type. The cars will be ordinarily quartered at Avon in a new car and repair house, to be built of fireproof brick and reinforced concrete with Kalomein windows and frames and rolling steel doors at each end. A suitable concrete pit is also being constructed at one side of the Rochester yard where the cars can be inspected while lying over at the terminal station.

The schedule now under contemplation provides for an hourly service between Rochester and Mt. Morris in both directions.

The Erie Railroad Company has also authorized Westinghouse, Church, Kerr & Company to proceed at once with estimates for the complete electrification of the entire Rochester division between Rochester and Corning, and work upon this is now being actively carried on. It is confidently expected that the coming month of January will witness the completion of the first single-phase system on a steam railroad.

POWER PLANS OF THE CLEVELAND & SOUTHWESTERN

During the last three months the Roberts & Abbott Company has had a corps of engineers investigating most thoroughly the power situation of the Cleveland & Southwestern Traction Company. This company now has 135 miles of operating track, is building 44 more, and the stockholders largely own the Ohio Central Traction Company, making a total of 209 miles to be supplied.

This investigation has been carried on entirely from the standpoint of power-house extension with a view to determining: first, the necessity of such power house; second, its economic location.

In carrying out this investigation various locations for various kinds of power houses were considered, as follows: (1) location of additional power house at site of present power house; (2) location of new power house in the coal fields, both near and far from the present system of railway; (3) the building of a power house to use fuel oil and locating the power house on the pipe lines of the Standard Oil Company; (4) building a gas engine power house for natural gas, to be located on the pipe lines of the natural gas companies along the line of the electric railway; (5) building a gas engine power house to be located at the gas wells and transmit the power to the railway company's system, and (6) building a gas engine power house to be fed by producer gas, the station to be located at any convenient railroad shipping point near the electric railway system.

The first cost, total operating expense, the cost per kilowatt-hour, and the interest and depreciation on each of the above types of power house at each of the locations as outlined have been made up into charts so that the financial status of each of the various methods can be determined at a glance. In addition the cost and operating expense of the various locations and types of construction have been itemized and brought together in combination charts, so that all of the plans can be readily compared, thus demonstrating what, for this particular railway system, should be the future power-house policy.

The Ft. Wayne & Wabash Valley Traction Company, on Dec. 1, issued a new form of interchangeable mileage book, different in a large measure from all other forms in use by steam or traction lines. The new book is for 1000 miles, sells at a rate of 1½ cents a mile and is valid when presented by bearer or a party of two or more.

CONTRACTS FOR THE USE OF TERMINALS—I

With the increase of interurban electric railway companies the question of an equitable contract for the use of terminal facilities becomes an important one. Very few interurban lines own their own terminals, but enter the streets of the principal terminal city or cities over the tracks of the local city railway company. The terms under which this right is secured are extremely varied as to their character. In some cases the interurban crew continues on the car and the fare is divided in a certain ratio. In other cases a city crew takes the car and a payment is made to the interurban company for the use of the car on a mileage basis. To illustrate this wide difference in the terms of terminal contracts the following examples may be quoted, all based on a local fare of 5 cents:

Class I. Interurban company furnishes car and pays crew; city company supplies track and power. Payment made on basis of fares.

Case 1. City company receives 5 cents per passenger carried on the interurban cars, but honors transfers without charge.

Case 2. Same as Case 1, but does not honor transfers.

Case 3. Same as Case 2, but city company receives only 4 cents per passenger.

Case 4. Same as Case 2, but city company receives only 3 cents per passenger.

Case 5. Same as Case 2, but city company receives only 2½ cents per passenger.

Note—In practically all instances, under cases 3 to 5, it is provided that these agreements apply to through passengers only. As a rule, after the interurban cars pass the city line they are not allowed to carry local passengers, or if they do the entire fare goes to the city company. The full 5 cents goes to the city company also, under these circumstances, when a passenger leaves an outbound car before reaching the city limits and before paying another fare.

Case 6. The city company receives 2½ cents for local passengers carried on the interurban cars and 1 cent for through passengers; also 4 cents per car-mile for power and the use of the track. This meets the point covered in the previous note.

Class II. City company furnishes track and power and pays crew. Interurban company furnishes use of car. Payment made on basis of fare.

Case 1. The city company keeps the entire 5 cents and gives transfers.

Case 2. Same as Case 1, except that the interurban company receives 1 cent per passenger.

Class III. Same as Class I, except payment made on car-mile basis.

Case 1. The interurban company keeps 100 per cent of the fares but pays city company per car-mile the average gross receipts per car-mile earned by the local cars of the city company on that route. This figure is determined monthly. Through passengers are given free transfers, but transfers to local passengers have to be redeemed by the interurban company at 2½ cents each.

Class IV. Same as Class II, except payment made on car-mile basis.

Case 1. The interurban company receives 2 cents per car-mile for the use of its car and its maintenance.

Case 2. The interurban company receives 1 cent per car-mile for the use of its car and its maintenance.

This tremendous variation in terms does not necessarily signify that any of the contracts cited above is unfair to either the city or interurban railway company. For example, it is easy to conceive of a case with a very short haul on the city system where the city company would be glad to give the interurban company 2½ cents for traffic which would not otherwise exist. On the other hand, it is not difficult to imagine an instance where the advantages to be derived from carrying passengers directly to a very desirable terminal would be so great that it would be good policy for the interurban company to turn over all of its local fares to the city company for the terminal privileges. The object of this article is not to discuss the proper payments to be made for different services, because these vary so greatly with the conditions, but to throw some light if possible upon the best form of contract covering a service of this kind. To this end, attention will first be directed to seeing whether the experience of steam railroads offers any enlightenment on this subject. A certain degree of comparison between steam and street road conditions may be found in this matter of terminal charges. There are not only many steam railroad agreements covering the use by one company of another company's terminal, but also, owing to the necessity of through billing of freight, agreements have been made between trunk lines and feeders, covering the division of charges on business brought by the latter to the former under conditions corresponding in some measure with those by which the interurban electric company brings business to the city company.

Steam railroad terminal agreements vary as widely in their nature as leases for property. Beginning with the simple landlord and tenant arrangement, such as is illustrated by the Chicago & Terminal Railroad Company, the contracts run by the various changes and degrees through to the practically partnership agreement such as is illustrated by the case of the Savannah Union Station. In the first case mentioned the property is owned absolutely by one corporation, the landlord, and is used by other corporations, the tenants, who pay fixed annual rentals based upon presumptive traffic. In the latter case the property is owned jointly by the railroads using it, through ownership of the stock of the Union Station Company, and the expense is divided, according to the amount of use, upon a wheelage basis. Where the privilege of the terminal includes also the use for a considerable distance of tracks extending into the terminal, the contract usually provides for two classes of charges by the lessee company, one of these as a trackage charge, and the other as a terminal charge. The trackage charge may be based on revenue or on wheelage. The latter or trackage charge is the one under which the New Haven Road uses the Grand Central Station in New York City, and the former by which it uses the tracks leading to that station. Here the terminal charge proper is a certain percentage of the fixed and variable expense of the terminal, and the New Haven proportion is based upon the cost of the station, varies in extent with its use of the terminal, and is adjustable from time to time as this use changes. In addition it pays the New York Central Railroad for the use of the latter's tracks to the Forty-Second Street terminal a certain proportion of its revenue earned by the trains while on this track.

Another example of a contract based upon the interest on the investment or partnership basis is that between the Chicago & Eastern Illinois and the Cleveland, Cincinnati, Chicago & St. Louis Railroad. The former company uses the latter's tracks between Pana and East St. Louis. These tracks were reconstructed and strengthened some time ago, and the terms of the lease read that the lessee company shall pay the lessor "on the basis of interest on the valuation of that part of the old road used, plus the cost of the new road, each company to bear the expenses of maintenance on the usual wheelage basis." Still another example of partnership basis is the contract between the Lake Shore Railroad and the New York Central Railroad for use of the Buffalo terminal, where each company pays a proportion of the net expenditure for fixed charges, maintenance and operation, determined by the number of cars of the Lake Shore and of the Central

accommodated at the station. An arbitrary scale is applied to equalize the cars employed in local and in through traffic.

On the other hand, examples of charges on the car basis or ton basis are frequent. Two which differ slightly might be cited. The New York, Ontario & Western Railroad uses the tracks of the West Shore from Cornwall to Weehawken, as well as the West Shore terminal at Weehawken. For this service it pays a fixed sum per train of standard size with an addition thereto for increased size of train; it pays for the use of the Weehawken terminal agreed sums per ton of freight and per passenger accommodated. The Michigan Central Company has a like use of tracks from the Niagara River bridges into Buffalo, for which it pays an agreed sum per freight car and an agreed proportion of passenger revenue. For its accommodations at the freight and passenger stations at Buffalo the payment for passenger accommodation is based on the passenger car and not on the passenger. The freight payment, like the West Shore and Ontario & Western contract, is based on the ton.

Steam railroad contracts of this kind are at times further complicated by so-called switching charges, or switching arbitraries. The tendency at the present time in the making of new contracts, however, is to value the property to be used jointly, fix a definite rate of interest to be paid proportionately by each company, and then have repairs, maintenance, up-keep, depreciation and sinking funds taken care of by a cost charge based on units of equipment moved.

ARBITRARY OR CONSTRUCTION MILEAGE

The second class of steam railroad contracts mentioned as being related to electric railway terminal contracts embraces those relating to a division of through freight charges, and occurs in cases where a short feeder line delivers car-load freight to a trunk line. If this division of charges was made on a purely mileage basis the proportion due the feeder line would be a very small percentage of the whole, and as the operating expenses of the feeder lines are usually high per car-mile compared with those of the trunk line, and as a premium is very necessary to induce the construction of these feeder lines, the custom has arisen of granting such lines an arbitrary or constructive mileage. Another reason for this practice is that the shipper from a point on the short railroad must have the same rates to his market as the shipper from an equal distance located directly on the trunk line. If he has not an equality of rate he will have to do one of two things; either go out of business entirely, or move his shipments to an originating point on the trunk line. Admitting, then, that the rate must be equal or nearly equal, and assuming that the short line is 10 or 20 miles long, the complete haul is 200 or 300 miles and the freight is $20, to divide this sum on a basis of actual mileage would be annihilation to the little company. The latter is consequently granted a minimum constructive mileage, say 50 miles, and the charges are pro-rated upon this basis.

STATUTES ON THE JOINT USE OF TRACKS

Returning now to the street railway situation, the laws in certain States provide for the adjudication of trackage privileges by some authority; in other States the consent of the existing company must first be obtained, while in still others the municipal or State authorities have the power to grant running rights over another road up to a certain maximum distance.

Thus, according to the Massachusetts State law, the board of aldermen, or selectmen, of any city, after notice and a hearing may, if they decide that public necessity and convenience so require, authorize any street railway company to enter upon and use the tracks of any other street railway company which it may meet or cross. Such authority does not take effect, however, until approved by the State Board of Railroad Commissioners, after a hearing to all parties in interest. If the street railway companies are located in more than one city or town and the owners thereof cannot agree as to the public necessity for such joint use, the matter is decided by the State Board of Railroad Commissioners. If the companies cannot agree as to the compensation for joint use, that is also fixed by the Board of Railroad Commissioners, which board also has the right to "fix the manner and stated periods of such use, or the mode of connection of the tracks."

Section 29 of the Ohio State Code provides that authority to construct or extend a street railway within or beyond a municipal corporation can be granted only by the municipal council by ordinance, but in establishing a new route no authority shall be given by the municipality to occupy the tracks of any existing street railway for more than one-eighth of the entire distance between the termini of the newly established route.

Section 102 of the New York State Railroad Law provides that—

> No street surface railroad corporation shall construct, extend or operate its road or tracks in that portion of any street, avenue, road or highway in which a street railroad is or shall be lawfully constructed, except for necessary crossing * * * without first obtaining the consent of the corporation owning and maintaining the same, except that any street surface railroad company may use the tracks of another street railway company for a distance not exceeding 1000 ft. * * * It shall have the right to lay its tracks * * * wherever the court, upon an application for commissioners, shall be satisfied that such use is actually necessary to connect main portions of a line to be constructed or operated as an independent railroad, or to connect said railroad with a ferry or with another existing railroad, and that the public convenience requires the same, in which event the right to use shall only be given for a compensation to an extent and in a manner to be ascertained by commissioners to be appointed by the courts, as is provided in the condemnation law, or by the board of railroad commissioners in cases where the corporations interested shall unite in a request for such board to act. Such commissioners, in determining the compensation to be paid for the use by one corporation of the tracks of another, shall consider and allow for the use of the tracks for all injury and damage to the corporation whose tracks may be so used. * * *

In the District of Columbia the street railway charters provide for joint trackage arrangements when the routes coincide, upon agreement between the companies, and for an appeal to the Supreme Court of the District of Columbia upon disagreement.

In San Francisco, the board of supervisors have the power to regulate street railroads, tracks, and cars; to compel the owners of two or more of such roads using the same street for any distance not exceeding ten blocks to use the same tracks, and to divide equitably the cost of construction and expense of maintenance thereof between the owners.

In the next issue the provisions of city and interurban contracts will be taken up.

The Columbus, Delaware & Marion has completed a handsome pavilion at Glenmary Park that is intended for use the year around. It is 120 ft. by 100 ft. in dimensions and contains a dancing floor with a walk 20 ft. wide on three sides. On the fourth side a well-equipped stage for amateur theatricals has been arranged. Basket ball and other games have also been provided for. A kitchen furnishes all the necessities and parties may have caterers from the city furnish any service desired. The building is well heated and the cars may be run into a shed connecting with it, so that stormy weather will not hinder a visit at any time.

CORRESPONDENCE

THE WEAR OF STEEL RAILS

Editors Street Railway Journal:

In the discussion of Mr. Job's paper on "Steel Rails" before the New York Railroad Club, it seemed that the interest of the members was not fully up to the importance of the subject and that much more might have been said regarding this matter, both from the standpoint of the data already available and also from those which should be acquired. In one particular at least, the importance of the feature of cropping the ingot down to sound material cannot be too strongly insisted upon. It is the possible failure to do this that may account for a goodly number of the broken rails to which attention was called by one of the speakers. Where rails are breaking by the thousand on a single system there is no use in raising the cry that "it is one of those things that no fellow can find out," for it is not the case and there is no doubt some very good reason for it if the requisite time and the ability are only put upon the work of its determination.

Take the matter of cropping the ingot to sound steel, for example. "Sound steel," in the true meaning of the term, does not signify that the ingot shall be cropped merely to the bottom of the piping so that the metal shall appear sound, but that it shall be cut down to the bottom of the segregation that usually starts where the piping leaves off; and that the metal of the ingot that is used shall not only appear but be sound. Failure to do this will cause the segregation to be rolled out into the web and produce a brittleness that is more than apt to cause a crack that will run back into the rail. Examples of this are often found, and it is not so long ago that a large street railway system found that certain of its heavy girder rails were cracked in the web. When the plates were removed these cracks extended back from 6 ins. to 6 ft., while the opening at the end of the rail was often 2 ins. or 3 ins. A chemical examination of these rails showed a segregation in the webs of every one of them, with the natural inference that they were brittle. The same phenomenon has been repeatedly observed in the T-rails of steam railroads. Certainly this emphasizes the necessity of cropping to sound metal.

If the opinion of the author of the paper to the effect that there is not much in the idea that a "flow of metal" does not take place in the head of the rail, it would seem to be rather difficult to account for some of the phenomena that we meet in the rails that have failed. Where rails splinter and the edges of the head chip off, it might perhaps be difficult to prove a true flow, though it would seem to be still more difficult to prove the converse, namely, that no flow did take place. Take, however, the case of a rail that has been subjected to an exceedingly heavy traffic, where the edge of the rail in the head is simply rolled over. It frequently happens that the metal of the head that is so formed is hard and solid, and as far as the eye can see, in a cross-section, it is integral with the main body and shows no sign of crack or flaw, though it is quite possible that these might appear if examined under the microscope. Whether this is so or not, to all intents and purposes it is a case of "flow," and there must be an unbroken metallic connection between the bead and the head or the former would not be held so firmly in position. Further than this the metal of the head exhibits the symptoms of having been subjected to a flow, in that it is noticeably harder than the uninjured or unaffected metal of the head. In this it resembles wire. Here, after the cold drawing, it is necessary to heat and anneal, else fractures and defective material would result. So in the case of the bead on the side of the head of the rail, it rolls out or flows to a certain point and here the distortion to which it has been subjected has caused such a change of structure that it becomes brittle and can be rolled or made to flow no further. Then the edges splinter off and we have a piece of metal quite unyielding and which would not have the physical characteristics of a test piece cut from the undistorted metal of the head, especially in the matter of bending or elongation under a tensile stress.

Again, in the matter of rail corrugations, in regard to which so much guessing has recently been done in your columns. If the surface of the rail is struck with a hammer and indented, there is a flow of metal. So if there are high and low spots on the head, producing the so-called corrugations, there must be a flow of metal in some way except where actual abrasion produces this serious variation, and we might go on to enumerate other cases of apparent flow, and where distortion can hardly be explained on any other basis, such as the hammering down of rail ends at joints. With these facts in mind, and with the added one that "flow" seems to be the easiest and most natural explanation that we have, it is a pity that some definite reason was not given why we should eliminate the possibility of flow from the causes of rail failures, and why a higher carbon content and a higher limit of elasticity of metal should be advocated, when this increase is the very thing above all others that will tend to decrease flow. That is, it will raise the resistance so that the point at which permanent set takes place is above the point of stress, for there can be no flow until the limit of elasticity has been passed and the power of the metal to recover its normal dimensions above the stress has been removed, has been destroyed.

Aside from these items in which the rate of rail failure depends upon the combination of chemical composition, treatment of the metal in the course of heating and rolling, and the loads and stress to which it will be subjected in service, a point was brought out in the discussion that is sadly neglected in practice, and that is the proper handling of the rails prior to placing in the track. Carelessness in unloading is the cause of a large percentage of rail failures by cracking. When rails were of light sections and only 30 ft. long, they could be handled more easily and their very flexibility tended to make the men more careful. The old tram-rail of the horse car was so flexible that it could easily whip itself into crookedness if it were not handled gently and men found it to be more readily carried if they broke step than where they kept step in moving about. But now, the case is different. The girder rails of 100 lbs. or more to the yard are exceedingly rigid, and any bending at all imposes so great a fiber stress upon the metal that a permanent kink is readily obtained. The great weight of these rails, especially where attempts are made to use them in 60 ft. lengths, is a temptation to rough handling. This is especially true in unloading operations. They are raised over the side of the car and frequently dropped to the ground from heights of from 6 ft. to 8 ft., especially where they are being distributed for laying. Striking as they may at the center or the ends, there is hardly a chance that they will not receive a kink as the result of the fall. The removal of this kink does not help the metal and we have a point, especially prepared by that ever-active demon, carelessness, at which we may look for a crack. Hardly better than this is the practice of lifting long rails at the center where the excessive overhang at each end may well produce a stress in

excess of the limit of elasticity and cause a bend that ultimately makes for failure.

Finally, it seems that under the present conditions of railroad operation, too much care cannot be taken to ascertain not only what is best in chemical composition and manipulation of rails, but also to the causes that contribute most markedly to both the length and brevity of rail life.

GEORGE L. FOWLER.

A LOW-VOLTAGE SHOP CIRCUIT

Detroit, Mich, Nov. 23, 1906.

Editors STREET RAILWAY JOURNAL:

There are several other solutions to the problem of obtaining a low-voltage shop circuit by tapping the transformers, besides that described and illustrated in Fig. 2 on page 949 of your issue of Nov. 10. The connections shown in Fig. 1 on that page will give a neutral point which may be either stable or unstable, depending upon the way in which other connections are made. If the high-tension sides of the transformers are connected delta, the neutral will be stable.

If a certain voltage is impressed on two transformers connected in series on both high and low-tension sides, they will not necessarily divide the voltage equally. For instance, if two 1100 to 110-volt transformers have their primaries connected in series across a 2200-volt line (Fig. 1), and their secondaries also in series, they will give 220 volts across the two secondaries, but there may or may not be 110 volts across each secondary. Now if one of the transformers is short-

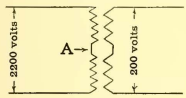


FIG. 1

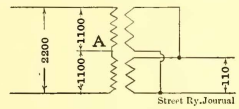


FIG. 2

circuited, its voltage will drop to zero, and the other transformer will take the full voltage. That is, there will still be 220 volts on the secondary circuit, and the point *A* is an unstable neutral.

If, however, the secondaries are connected in multiple (Fig. 2) the secondary voltage will be 110, each transformer will have 1100 volts across its primary, and the point *A* will be a stable neutral of the primary system. If one transformer is short circuited now, it will short circuit the system.

When transformers are connected star, primary and secondary, on a three-phase system, the same sort of thing happens, as the line voltage between any two wires is the vector sum of the voltages of the two transformers connecting into these wires. In this case the transformer voltages are not necessarily equal, even though the line voltages are exactly equal. However, if the high-tension windings are connected delta and the low-tension star, the transformer voltages are fixed and the potential of the low-tension neutral is fixed with respect to the rest of the low-tension system. Hence the neutral is stable. F. O. Blackwell points out this fact on page 150 of Vol. I. of "High Tension Power Transmission." If an unstable high-tension neutral is grounded, a ground on one line wire will short circuit one transformer and run up the voltage on the other two, but will not short circuit the system.

The following are some of the conditions under which the neutral point of the low-tension windings of three single-phase sub-station transformers, connected star on the low-tension side, will be stable.

(1) When the high-tension windings are connected delta.

(2) When the high-tension windings of both power house and sub-station transformers are connected star and neutral grounded if either of the following conditions hold:

(a) If the low-tension sides of the power house transformers are connected delta.

(b) If the low-tension sides of the power house transformers are connected star, and if the neutral of the transformers is connected to the neutral of the generator.

Fig. 3 shows the condition given under 2a. In this case the voltage on each of the step-up transformers is fixed, on account of the connections on the low-tension side. This makes the high-tension neutral stable, and grounding this neutral fixes the potential of the high-tension lines with respect to the earth. At the sub-station the transformer voltages will be fixed because each transformer is connected between its

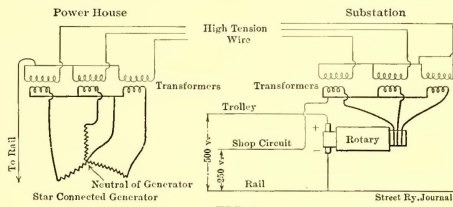


FIG. 3

high-tension line and ground, and so gets the voltage of the corresponding power-house transformer modified by line and rail drop. This fixes the potential of the low-tension neutral with respect to the rest of the low-tension system and so makes the neutral stable.

In case 2b (see Fig. 4) the step-up transformer voltages are fixed by the generator, since each transformer is directly across one of the generator windings. This makes the high-tension neutral stable, and by grounding this neutral and also the sub-station high-tension neutral, the sub-station transformer voltages are fixed as before; and so the low-tension neutral is made stable.

Of course the neutral of a star-connected generator is stable, so when rotaries run directly from such generators the low-voltage trolley can be connected to the generator neutral.

The shop circuit voltage under each of the conditions men-

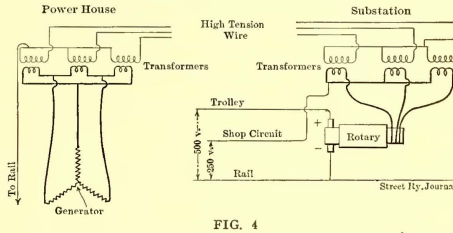


FIG. 4

tioned would have a slight fluctuation, as the neutral is kept stable magnetically, but this variation would probably not be more than a few per cent from half of the d. c. rotary voltage. That is, the regulation of the shop circuit would depend not only upon all of those things which determine the regulation of the main d. c. voltage, but also upon the resistance of the ground circuit between the power house and the sub-station. The arrangement shown in Fig. 2 on page 949 of the previous letter would probably give somewhat better results than any of those mentioned above, because the stability of the neutral is determined by the low-tension windings of the sub-station transformer alone.

F. K. BRAINARD.

ROLLING LIFT BRIDGES

Chicago, U. S. A., Nov. 26, 1906.

Editors Street Railway Journal:

Our attention has been called to the issue of the Street Railway Journal for Sept. 15, 1906, where, under the heading of "Bridges for Electric Railways," and the sub-heading "Movable Bridges," page 400, the author, C. C. Schneider, says:

Lift bridges are generally used for small spans where the local conditions are not favorable to a swing bridge.

Bascule bridges have proved very unsatisfactory for spans up to 200 ft.

This statement is an error, for the reason that more than ninety swing bridges have already been removed, discarded, scrapped and replaced by modern Scherzer rolling lift bridges for the principal electric railways and railroads in the United States, England, Ireland, Holland, Russia, India, Egypt, Argentina and other countries throughout the world. The Scherzer rolling lift bridges constructed include the largest, the longest clear span, the widest, the most rapidly operated and the most important movable bridges in the world. They have been so successful and satisfactory that they have invariably led to repeated orders from the same railroad companies.

Swing bridges, like horse cars, are going out of use. It is now generally recognized that swing bridges are an expensive anomaly in the science of engineering. They are fundamentally wrong in principle, compelling the spanning of two inadequate channels where only one adequate channel is required. They occupy and obstruct the middle and best part of the navigable channel, delaying vessels and consequently delaying railroad, street railway and highway traffic. They encroach upon and obstruct valuable land, water and dock space. They must always be built narrow so as not to completely block the navigable channel. The swing bridge has been found to be a poor asset. It must be discarded and removed at great expense as soon as a growth of traffic requires additional tracks, because two swing bridges cannot be built along side of each other. Swing bridges must be built a long distance apart so as not to strike each other when revolving. The rails on a swing bridge are loose, shifting and dangerous. The swing bridge does not block the roadway when open. Frequent disastrous accidents result from these deficiencies of the swing bridge. All these deficiencies are obviated by the modern Scherzer rolling lift bridges, which are also more economical in cost of construction, maintenance and operation.

The Scherzer Rolling Lift Bridge Company,
By Theo. Kandeler, Consulting Engineer.

FLANGES FOR INTERURBAN CARS

New York, Nov. 20, 1906.

Editors Street Railway Journal:

The table of wheel dimensions on the interurban roads of Ohio, Indiana and Southern Michigan, published in your issue of Oct. 13, discloses one curious condition. This is that the same shape of flange seems to be used, regardless of whether steel or chilled iron wheels are employed. Such practice is a useless waste of metal, except as affording a greater amount of wear for sharp flanges, a doubtful advantage, because excessive sharpness of flanges merely means excessive waste of the metal of the tread in trimming. Extra metal is not needed in the steel tire for strength, because the flange of a steel-tired wheel can be safely counted upon as being four or five times the strength of one of cast iron.

Another striking point shown in the table is the narrowness of the treads used. The reason is, of course, the necessity of running over city tracks, but the effect cannot but be disastrous upon the frog points. With the thick flanges used and the necessary clearance between the wheel and the rail the flangeway and guard rail distances must be fully up to that of the steam roads, or at least 1¾ in., so that the overhang of a 2½-in. wheel tread must be very slight and the danger of a drop and a pound on the frog point correspondingly great. Evidently this part of interurban car development has not yet reached its final point, for care must be taken of the rail as well as the wheel A suggestion in this connection would be to widen the tread to a point suitable for T-rail construction, keep the flange thickness and height down to street requirements, use a steel wheel for strength and reduce its flange dimensions to accord with the requirements of safety if it can be learned what that may be.

Steam Railroad Engineer.

THE EVERYBODY BUSY PRINCIPLE

Nov. 25, 1906.

Editors Street Railway Journal:

In his letter in your issue of Nov. 10, Shopman misquotes my letter in your issue of Sept. 8 when he refers to me as saying that everybody can be busy when the manager is around. I did not say that. I said that a great many managers will claim that everybody is busy when they are around. This remark was made to me at the time I was engaged by the company with which I am now connected. These conditions did not exist for long after I was given charge. I also said that one who is experienced in shop methods could see a good many things that escape the observation of some managers. The best master mechanics always show the manager the worst side of their shop, because, as a rule, when the manager makes his tour of inspection he is not looking for the bright side. If his visits are few, everything must be satisfactory, but when his visits are often, there must be something wrong, and any master mechanic that has the welfare of the company at heart will conduct his department as though it was his own. He will not allow anything to occur that he would like to conceal from the manager. I am glad to note by the latter part of the Shopman's article that he is industrious. If all men felt as he writes, I am sure that the electric railways would be better off.

Master Mechanic.

The commercial bodies of Los Angeles have appointed a joint commission to investigate the subject of street car wrecks in that city and in Southern California, their causes and proper remedial measures. The commission's chairman is J. G. McKinney. The other members of the commission are C. M. Staub, Eugene Germain, J. H. Polk, Robert M. Garvin, Fielding J. Stilson, C. D. Willard and Rev. Burt Estes Howard. To gather statistics here and in other American cities on the number of accidents, the killed and the injured, for purposes of comparison, is the first task to which the newly-organized commission has set itself. Its exact plans, however, are not divulged. Said Chairman McKinney recently: "We are going into this matter as thoroughly as possible, and, when we get through, I believe we shall be able to point out exactly where the trouble lies, and then the fault can be rectified. We expect to have officers of the various local electric railway companies before us for examination and to ask them to give us information to assist us."

PRACTICAL VIEWS ON BRAKE RIGGING

BY FRANKLIN M. NICHOLL

There are few questions before the operating department of greater importance to-day than that of proper brake efficiency of cars, when considered with the cost of maintenance of the entire braking apparatus. Much has been said and written on the subject of brakes in general, but it is the intention of the writer to discuss the most common forms of brake rigging, and only so far as they are applied to double-truck equipments. The conditions involved are so numerous and of such extent that widely varying effects are produced, which render costs for comparative purposes of little value.

Beginning with that part of the truck brake rigging nearest the source of power there are two common forms of brake yoke in common use, viz: the radial bar, which is placed at one end of the truck, and the straight bar, which is placed near the truck bolster and operates over the motor. To these brake yokes are attached the main or pull rods leading from the floating levers at the center of the car. These two forms are connected with the upper ends of the vertical truck levers, and are used with brakes placed either between the wheels or on the outside of the wheels at the ends of the truck.

There are advantages and disadvantages in each form of bar. The radial bar type affords more room for the repair of the motor in the shop, and with short wheel-base trucks it allows the motor to be raised for inspection or for sandpapering of the commutator, while the motor is in operation. On the other hand, the roller arrangement of the radial bar will inevitably work over to one side, thereby applying more pressure to one set of wheels than the other, and locking and binding the brakes on curves. The writer knows of cases where the radial bar, which must radiate with the truck, has caused very serious difficulties and even expensive accidents.

There can be no question but that the proper place from which to pull the brake yoke is at a point as near as possible to the point of radius of the truck. This can best be accomplished with the straight bar type and by the lengthening of the wheel base of the truck. The chief objection—that connected with the opening of the motor lid—can be overcome. Where the operating conditions require the use of very large motors upon a comparatively short wheel-base truck, and where the wheel-base cannot be lengthened or the bolster narrowed, the question of the opening of the motor lid should be one of secondary consideration, because the possession of an effective brake and one which will be absolutely safe under any and all conditions is of as much importance as the motor.

There is another objection to the straight type of bar in that the main brake rod, which extends from the center of the car and passes over the top of the motor, will sometimes come in contact with the motor under heavy passenger loads. But this trouble can be almost entirely eliminated by making the brake rod and clevice heavier at this point, and thereby prevent the sagging of the brake yoke and the main rod over the motor. Release springs of the proper capacity should be provided to draw back into normal position the brake yoke levers after an application of the brakes, and, in the case of a straight yoke, to draw it well back against the bolster so as to allow of the opening of the motor lid when the car is not in operation or the brakes are not applied.

As to truck levers, various forms, ratios and systems are used. Nearly every truck builder has a different method to meet his particular ideas and design of truck. Some builders even go as far as to use the levers for the additional purpose of supporting the brake shoes, with detrimental results to the use of the lever as a lever. Without question the live and dead lever system of brake levers is the most practical and satisfactory, since it is the simplest form of construction, most effective, and provides easy and quick adjustment in taking up the wear of the brake shoes. This system can be used with either the inside or outside-hung brake, but with large motors and short wheel base it is better adapted to having the brake shoes hung outside the wheels.

The proportioning of the arms of a truck brake lever is governed entirely by the clearance limitations of the truck and equipment. This ratio is generally figured by the truck builders; the most common, however, are 3 to 1 and 4 to 1. The former ratio is preferable with outside-hung brakes, which provides more space for the operation of the levers and, with either the inside or outside-hung brake, enables the brake shoe to be placed nearer its correct position on the wheel. With the use of hand brakes the amount of leverage should be increased, and in connection with inside-hung brakes the wheel-base of the truck should be arranged to give ample space for the operation of the increased leverage. It is important, with inside-hung brakes, to keep the brake levers well back and away from the brake heads, as the accumulation of mud and ice between them would cause excessive pressure to be applied at the top of the shoe.

The proper vertical position of the brake shoe on a wheel, to obtain an even-wearing shoe with maximum effectiveness, is at a point on a horizontal line drawn through the center of the axle. This line should pass through the horizontal center of the brake shoe or head. With the shoe thus placed it stands to reason that with the proper amount of wearing or bearing surface of the brake hangers and the proper length of hangers there would be little or no chattering of the shoe and hangers, since the rotative action of the wheel, in either direction, would have equal effect upon the wearing of the shoe.

As to the great question of inside as against outside-hung brakes, the writer recommends the former for the following reasons:

First—All trucks are designed to carry excess weights and strains in the center of the truck, and as the strain of the brakes is the greatest they should be applied at or near that center.

Second—Greater brake efficiency is obtained by direct application of the pressure at right angles to vertical levers, and in line with horizontal wheel centers. This feature is most practicable with inside-hung brakes.

Third—Chattering of the brakes is reduced to a minimum and tilting of the track entirely eliminated.

Fourth—Ease of brake adjustment is secured, due to the wear of the shoes at the most effective point.

Fifth—Brake beams become unnecessary and each shoe is independent of the others.

Sixth—The truck has a better appearance and less space is required for the radiation of the truck.

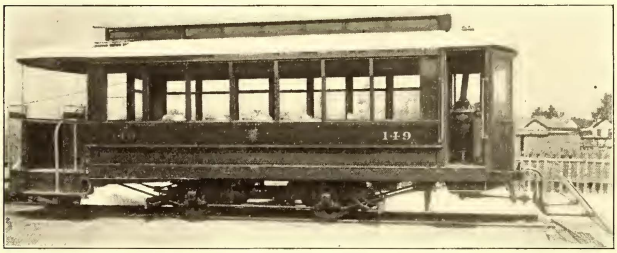
Seventh—The construction of the rigging is simple, so that it will require less attention and repairs.

Eighth—The riding of the car is more comfortable.

The Toledo Railways & Light Company will shortly have a sight-seeing car that will be operated much as the "touring car" is in Cleveland. It will make special trips over the city for the purpose of giving visitors and strangers an opportunity of seeing the principal points about Toledo at a nominal fare.

INTERESTING CAR FOR TOPEKA, KANSAS

The four closed cars shipped last month by the American Car Company to the Topeka Railway Company contain some interesting features. The "Detroit" platform provides the only means of exit and entrance for passengers, the front platform being used exclusively as a motorman's compartment. It will be seen from the illustration that the side sills are extended to the crown piece at the front end of car to form the platform support, which is contrary to the usual custom of having a dropped platform at the front end and supported by the usual knees. The screen doors on the "Detroit" platform are especially interesting; they are operated by rods (shown in the cut) which connect directly with the motorman's compartment. These screen doors effectually solve the problem of preventing passengers from boarding or leaving the car before it is brought to a standstill. A screen guard is placed on top of the dasher opposite the entrance, extending about one-third of the way around platform. The bumper shield will also be noticed at this end of the car. The door leading to the passenger compartment is of the "Accelerator" type. The window system provides for both upper and lower sash to drop. The trucks are of the No. 21-E type with a wheel base of 8 ft. The following are the chief dimensions: Length over the end panels, 20 ft. 8 ins.; over the vestibule sheathing, 30 ft. 8 ins.; width of the car at the sills,, 7 ft. 9 ins.; width over the posts above the belt rail, 8 ft. 2 ins. The side sills measure 3¾ ins. x 6¾ ins., with ⅝-in. x 8-in. plate; end sills, 3¾ ins. x 6¾ ins., and the center sills, 3½ ins. x 4½ ins.



TOPEKA CLOSED CAR, WITH DETROIT PLATFORM

CARS FOR THE NORTHERN TEXAS TRACTION COMPANY AND JOHNSTOWN, PA.

The St. Louis Car Company has recently completed an order for ten cars for the Northern Texas Traction Company, which operates all of the city lines in Fort Worth, Texas, and in addition an interurban line, running 30 miles east to Dallas. The new cars are of the semi-convertible type, both the upper and lower sash dropping into pockets inside the inside lining. The bodies are 22 ft. long, and the interiors are finished in cherry. The same car builder also has added ten closed cars to the equipment of the Johnstown Passenger Railway Company, which operates the city lines in Johnstown, Pa. The new cars have 20-ft. bodies. They are intended for single-end operation only, and are provided with a closed vestibule on the front end and an open dash at the rear. The seating is of the longitudinal cane type.

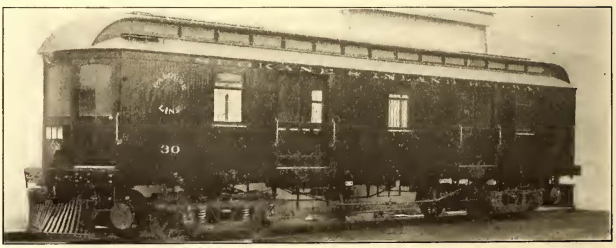
BIG EXPRESS CARS FOR THE PALOUSE LINE

The only cars remaining to be shipped on the order for the Spokane & Inland Railway, the passenger cars of which were described in issue of Nov. 10, are the 50-ft. express cars, and these at the present writing are in the yards of the J. G. Brill Company ready to go forward. In appearance the cars

INTERIOR OF EXPRESS AND FREIGHT CAR

were made to harmonize as much as possible with those for passenger service.

Looking at the interior view, the sliding door in the motorman's compartment is shown as slid back, exposing to view the swing door to the left and the front of this compartment. A similar door is located at diagonally opposite corners to the rear of the car, the arrangement being the same at both ends. This additional means of entrance, besides being of great convenience to the motorman in enabling him to throw his switches without getting down on the track, serves as an added convenience in the handling of long materials. The emergency cord will be noticed in connection with the air-braking system, and on the opposite side the means employed by the conductor for signaling to the motorman. There is also a speaking tube connecting the two platforms.



FREIGHT AND EXPRESS CAR FOR THE SPOKANE & INLAND RAILWAY

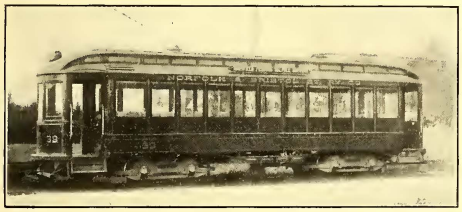
The air cylinders, instead of being placed under the center of the car in the usual manner, are swung in cradles, one at each end, back of the pilot.

The chief dimensions are: Length over the bumpers, 50 ft.; width over the sheathing, 8 ft. 6 ins. The framing consists of side sills 5⅞ ins. x 8⅞ ins., plated with ⅝-in. x 8-in.

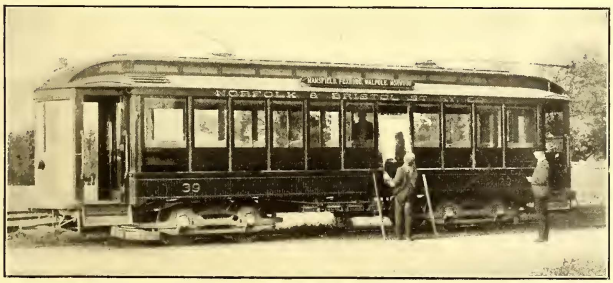
steel; the end sills measure 8⅞ ins. x 14 ins. The needle beams are composed of 8-in. I-beams, double trussed.

A NEW TYPE OF SEMI-CONVERTIBLE CAR FOR A MASSACHUSETTS ROAD

The Laconia Car Company, of Boston, has recently built for the Norfolk & Bristol Street Railway Company, of South Walpole, Mass., several cars which are a radical departure from the ordinary type of semi-convertible car. When closed for winter service, they differ very little from the ordinary closed cars, but when open present more the appearance of the regular open cars than the ordinary convertible car. They are changed from closed to open by removing the window frame, which has, in addition to the glass, a steel panel at the bottom, and when these window frames are removed, the side of the car is completely open from the letter board to within 12 ins. of the floor. The window frames are removed in the summer by taking out the iron sash retainers, held in place by cap screws, fastened through the window posts. Screens are used which are held in position by these same iron sash retainers. Each window is fitted with pantasote curtains, which run in grooves in posts, having special pinch-handle fixtures of the Curtain Supply Company make. The dimensions of the car are as follows: Length over corner posts, 30 ft. 2 ins.; length over dashers, 39 ft. 10¼ ins.; length over bumpers, 40 ft. 10¼ ins.; length inside, 29 ft. 6½ ins.; width over sills, 8 ft. 2 ins.; width over eaves, 8 ft. 4⅞ ins.; height, bottom of sill to top of running board, 8 ft. 11¼ ins.; height from rail to top of running board, 11 ft. 9¼ ins. The cars are finished in red birch, with twenty-two Wheeler reversible seats upholstered in rattan, and are equipped with Christensen air brakes, General Electric No. 1000 motors, Consolidated heaters, Eureka sand boxes, Pfingst fenders and Wilson trolley catchers, and are mounted on Laconia No. 8-B-3 high-speed double trucks, having patented swing bolsters and fitted with Laconia 33-in. wheels.



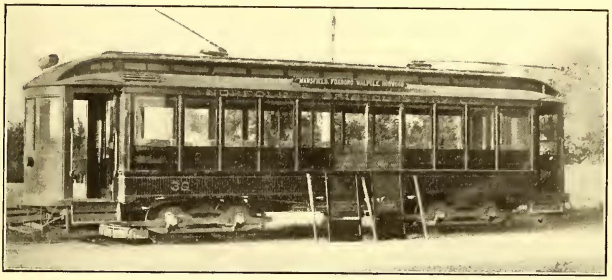
CAR AS USED FOR WINTER SERVICE



REMOVING ONE OF THE WINDOW FRAMES

ST. LOUIS CAR COMPANY AS AUTOMOBILE BUILDER

The St. Louis Car Company is now building the American Mors car in a plant in St. Louis, employing about 300 men. The machine is practically a duplicate of the French automobile of the same name, the main deviation from the French model being the widening of the wheel tread to adapt the machine to the rougher roads in this country. Three models are being built for the 1907 trade—14 to 18 hp, 24 to 32 hp and 40 to 52 hp. The frame of all of the models is of pressed steel, thoroughly braced by four cross-members and gusset plates at the corners.



TWO WINDOW FRAMES REMOVED TO PLACE SCREENS IN

The 24-32-hp car, which will probably be built in the greatest numbers, has a wheel base of 106 ins. The engine is of the four-cylinder vertical type, the cylinders being 4¼ ins. diameter and the stroke 5⅝ ins. Ignition is accomplished by two independent means, a make-and-break and a jump spark system. Splash lubrication is employed.

The sliding change-speed gears permit four forward and one reverse speeds. All of the shafts in the gear case are mounted on annular ball bearings. The gear case itself is of aluminum, split horizontally. A universal joint is placed in the countershaft on each side of the differential gear, and the outer sections carrying the sprockets run on ball bearings. Roller chains of 2½-in. pitch and ¾ in. wide, drive the sprockets on the rear wheels.

The machines are built with lomousine, demi-limousine, and touring car bodies. Runabouts are also constructed.

Unlike many other automobile manufacturers the St. Louis Car Company builds the chassis and body complete. The bodies are built in a shop devoted to this purpose alone. All of the trimmings entering into the construction of the car as well as the canopy top are made by the company.

At a special meeting of the stockholders of the Sao Paulo (Brazil) Tramway Light & Power Company, Ltd., held a few days ago, the propositions to increase the capital stock of the company from $7,500,000 to $8,500,000 and to increase the directorate from nine to ten members were ratified.

SOLDERED RAIL BONDS WITH PERFORATED TERMINALS

Railroad engineers have for a number of years recognized the desirability of using a soldered rail-bond, but have experienced serious difficulty in properly soldering the bond to the rail, and in the tendency of the bond to peel off, caused by the difference in the coefficient of expansion of the steel and copper.

In experimenting with soldered bonds, Walter G. Clark, of the Clark Electric & Manufacturing Company, of New York, found that if the terminals were made sufficiently thin the

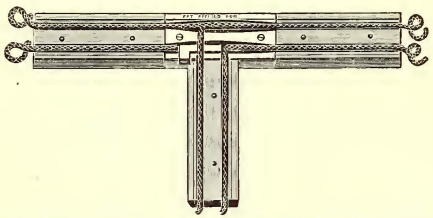
SOLDERED RAIL-BOND WITH PERFORATED TERMINAL

copper would expand and contract without any tendency to peel. He also found that if the bond terminal was provided with openings for the admission of solder and the escape of gas, the solder flowed well between the rail and bond terminal and thoroughly united the bond to the rail, overcoming the difficulties heretofore experienced.

A bond with these features was finally perfected by Mr. Clark and is now made by his company. Some of the distinguishing points will be noted from the accompanying illustration. It may be said also that the terminals are increased in area and reduced in thickness to a point where expansion and contraction do not pull them loose from the rail.

A NEAT SPLICE PROTECTOR

To provide a ready means of complying with the requirements of the National Electric Code and afford neater and safer molding work than has heretofore been possible an



COMPLETED BRANCH, SHOWING APPLICATION OF THE SPLICE PROTECTOR, BUT WITH THE CAP REMOVED

ingenious splice protector for use wherever it is desired to make a branch or tap in a molding line has been devised by Jordan Brothers, of New York. This protector affords a solid, substantial soldered and insulated splice and provides a fire and waterproof porcelain protection at the point where the insulation resistance of the rubber covering on the wire is impaired by the unavoidable splice. As it is held in position by the capping of the molding and is practically invisible, no whittling of molding or capping is necessary. There are no exposed wires at the point where the splice is made and no chance of capping nails being driven through the splice. Its use makes all work uniform, as one branch is an exact copy of others. The splice protector is made for two or three-wire branches or any combination thereof. A completed branch or tap with capping removed is shown in the accompanying illustration.

A NEW WHEEL GAGE

J. E. Osmer, master mechanic of the Northwestern Elevated Railroad, Chicago, employs a wheel gage of special design to determine when wheels are worn to the point where they should be discarded or turned. The gage, which is about 5 ins. long and 3½ ins. high, consists of two pieces of metal, one sliding on the other. With the sliding portion

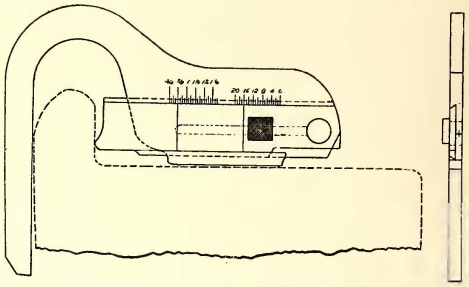


FIG. 1.—THICKNESS OF WORN FLANGE DETERMINED BY READING THE LEFT GRADUATIONS FROM LEFT TO RIGHT BY 1/32 IN., AND DEPTH OF CUT BY READING RIGHT GRADUATIONS FROM RIGHT TO LEFT BY 1/32 IN.

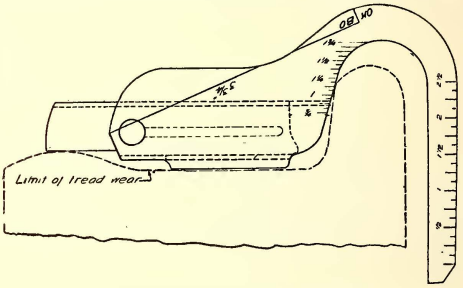


FIG. 2.—MEASURING VERTICAL WEAR AND HEIGHT OF FLANGE BY 1/16 IN., AND LIMIT OF TREAD WEAR

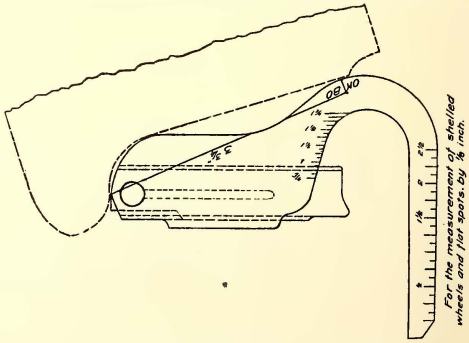


FIG. 3.—DETERMINING CONDITION OF A WHEEL HAVING A BROKEN RIM

the thickness of a worn flange may be determined and read direct from a scale. A second scale shows the amount necessary to be turned off the tread of the wheel to true up the flange. When placed in another position on the tread of the wheel the gage shows the height of the flange and also the limit of wear for the tread. Another scale on the gage is used to measure the depth of flat spots. The gage has been patented by Mr. Osmer and is now sold by the Eureka Gage Company, of Chicago.

FINANCIAL INTELLIGENCE

WALL STREET, Dec. 4, 1906.

The Money Market

There has been no material change in the monetary situation during the past week. The demand for money from local sources has not been large, owing to the inactivity in the securities markets but the heavy losses in cash sustained by the New York City banks on their operations with the Sub-Treasury, and the delay in redepositing the funds disbursed for interest and dividends on Dec. 1, have served to keep rates for practically all classes of accommodations at a high level. During the week ending Dec. 1, the local institutions sustained a loss of nearly $3,000,000 on the interior movement, thus reducing the surplus reserve to a comparatively low figure. Since then the banks have lost nearly $6,000,000 more as a result of the heavy transfers to San Francisco in connection with the fruit crop movement, belated payments by the insurance companies of losses sustained by the earthquake, and the requirements of railroads resulting from the same cause. Other important factors have been the unusually light government disbursements and the large customs collections, which are always heavy around the holiday season. Money on call at the Stock Exchange during the week ranged between 4 per cent and 32 per cent, the average rate for the week being about 8 per cent. In the time loan department business has been practically at a standstill, the banks and other lenders being unwilling to enter into contracts for fixed periods. The inquiry, however, has been extremely light, borrowers not being disposed to pay the high rates asked by lenders. Sixty-day money loaned at 6 per cent, plus a commission, bringing the total charge to the borrower up to 8 per cent. Ninety-day funds were obtainable at 7¼ per cent, four months at 7 per cent, and five and six months at 6½ per cent. Commercial paper was quiet, although a somewhat better demand was reported from out-of-town purchases. Rates remained unchanged at 6 and 6½ per cent for the best names. A feature of the week has been a drop of about ½ cent in the price of sterling exchange to 4.85.05. Rumors of gold imports were in circulation at the close, but the belief is quite general that a movement of the yellow metal from Europe to this side is an impossibility at the present rates for money and sterling exchange. The European money markets have improved, especially at London, where conditions are much easier than for some time past, owing to the re-establishment of the Bank of England's reserve account to a level that compares favorably with the corresponding periods of former years. As a result of this improvement London's open market discounts have worked easier, but it is not expected that the governors of the Bank of England will make any change in the official discount rate until after the first of the year. Money is reported in active demand in Germany. At the close of the week there was nothing in the situation to warrant the belief that money rates will rule decidedly lower until after the year. Government finances are improving, the surplus for the seven months ending Nov. 30 last amounting to $14,776,000, as against a deficit of almost as large an amount in the corresponding period of last year. Secretary Shaw has decided to relieve the situation by anticipating the payment of all government interest up to May 1, 1907, thus releasing about $12,000,000. Payments will be made on Dec. 15. Government collections for customs, etc., are likely to continue heavy until after the holidays, while the Jan. 1 interest and dividend payments must also be taken into consideration.

The bank statement published on last Saturday showed a surplus of $1,449,125, which compares with a surplus of $2,565,375 in 1905, $8,539,075 in 1904, $6,305,300 in 1903, $9,973,750 in 1902, $6,607,675 in 1901 and $10,865,675 in 1900.

The Stock Market

The past week was lacking in any important developments calculated to add to or detract from the market value of securities. Speculation was of normal volume and was dominated by the monetary possibilities and other factors which, on the surface, were of a somewhat adverse character. It can hardly be said that good news passed without recognition, but at the same time it must be admitted that such a favorable influence as the Union Pacific report failed to stimulate speculative activity in the leading shares. The bank return on Saturday was decidedly adverse, and it indicated that money will rule pretty firm during the first half of the month. Interest centered, however, in the President's message to Congress, which was made public on Tuesday. Prior to its publication there had been apprehension that the Executive would take a radical position on certain matters, but the text of the document showed it to be very much more moderate than had been anticipated. While it may be termed a reform document, its recommendations regarding labor, control of coal lands, corporate legislation and an income tax are not of the kind to challenge public opposition, while the declaration against public ownership of railroads cannot fail to exercise a beneficial influence among conservative investors. There is no reason, therefore, why the market should anticipate any bad news from Washington during the short session. With this apprehension removed, the price movements will depend upon ordinary developments. These all make for optimism, as earnings are of a volume to encourage a better feeling. As an offset to the large increase in gross returns, there must be taken into account the increased operating cost due to higher wages and the advance in prices for all materials used in railway construction and improvement. So far as prices are concerned, the market has shown remarkable stability.

The so-called Hill stocks have been prominent, and there has been considerable talk of further important developments in connection with Northern Pacific and Burlington. The industrial shares have followed the lead of United States Steel and Amalgamated Copper. In the case of the first named, there is talk of an increase in the dividend on the common stock at the directors' meeting next month, while the phenomenal demand for copper metal is a strong point in favor of Amalgamated and all other copper shares. At the close of the week New York Central was a conspicuously strong feature, the stock rising sharply on the increase in the dividend rate to a 6 per cent annual basis. The Lake Shore also increased its dividend rate from 8 per cent to 12 per cent, while the Michigan Central was put on a 6 per cent basis, as against 5 per cent heretofore.

The local traction shares are held in abeyance pending developments which will indicate the practical policy of the new administration regarding public utilities. So far as known, the companies will be given a "square deal," and if this is assured the different companies will make rapid progress in the line of new work to reach and provide facilities for the development of the new suburban properties being opened on Long Island and in upper Manhattan. Taking the market as a whole, it appears to be in a position where the price movement will depend more upon the rates for money than upon any possibility of adverse developments in the general situation. While prices are fairly high, these only reflect the greatly added value growing out of the enormous expenditures for additions and improvements during the past five years. With a culmination of the speculative mining craze the public will return to the old standard issues, the value of which does not rest upon promoters' promises, but rather upon the growth and development of the country.

Philadelphia

The dealings in the Philadelphia traction issues were considerably less active during the week and prices continued to show heaviness. The noteworthy feature was the weakness in Philadelphia Rapid Transit, which declined 1½ points to 21½, but subsequently there was a recovery to 22¾, on the withdrawal of Mr. Earle's resignation as a director of the company. About 8000 shares of the stock changed hands. Otherwise the trading was dull and without significant price changes. American Railways sold at 52 and 51¼ for odd lots. Philadelphia Traction ran off from 97 to 96½, and Union Traction, after selling at 63, declined to 62½. Other sales included Philadelphia Company common at 48½ and 48, Philadelphia Company preferred at 48, United Companies of New Jersey at 254½, and Fairmount Park Transportation at 14½.

Baltimore

The feature of the Baltimore traction issues was the increased activity in United Railway issues. The 4 per cent bonds brought

89 for upwards of $40,000, and about $110,000 of the incomes brought 69¾ and 69½. The refunding 5s opened at 88¾ and advanced to 89½, but later declined to 86½, ex-coupons. The first coupon on the refunding 5 per cent bonds was paid on Dec. 1, and the December coupons on the United Railway income bonds were exchanged for the new funding 5s, as provided for under the plan. The free stock sold at 15⅛ for 100 shares, and 500 shares of the deposited stock brought 15¼. Other transactions included Lexington Street Railway 5s at 102⅝, Washington City & Suburban 5s at 104, Norfolk & Portsmouth Traction stock at 27, and Macon Railway & Light 5s at 98.

Other Traction Securities

Trading in the Chicago market was somewhat more active than heretofore, and prices generally displayed an advancing tendency. The most striking feature of the trading was an advance of 7 points in North Chicago stock, from 35 to 42, on purchases of odd lots. West Chicago sold at 31. Chicago Union Traction changed hands at 5, while the preferred advanced from 16⅛ to 17⅜. Metropolitan Elevated common was substantially higher, with sales at 26½ to 27¼ and the preferred sold at 71 and 72½. Trading in the Boston market was rather quiet, but prices generally ruled firm. Boston & Worcester common advanced from 26 to 26⅞ on the exchange of about 700 shares. Massachusetts Electric common rose from 19 to 19⅞, but lost fractionally at the close, while the preferred advanced from 69½ to 70¼ and held all of the gain. Boston Elevated sold in small amounts at 151 and 152, West End common at 94 to 93½ and the preferred at 110.

Considerable traction stock has changed hands on the Stock Exchange at Cleveland within the past week, yet there has been no particular flurry. The announcement that the Forest City Railway Company had declared a dividend created some interest, but did not affect the stock, which was bid at 92 and offered at 95. Delay in announcing a decision of the injunction suit in the United States Supreme Court did not affect Cleveland Electric stock, which has shown some weakness within the last few days. The highest point reached in November was 68¾ and the low- e ‘ 62¼.

Security Quotations

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

	Nov. 28	Dec. 5
American Railways	52	51
Boston Elevated	151	—
Brooklyn Rapid Transit	79	79¾
Chicago City	150	150
Chicago Union Traction (common)	4⅛	4¾
Chicago Union Traction (preferred)	16¾	16½
Cleveland Electric	—	63½
Consolidated Traction of New Jersey	77½	77
Detroit United	84½	81¾
Interborough-Metropolitan	36⅝	37
Interborough-Metropolitan (preferred)	75½	76⅛
International Traction (common)	—	—
International Traction (preferred), 4s	—	—
Manhattan Railway	143¾	143⅛
Massachusetts Electric Cos. (common)	19	—
Massachusetts Electric Cos. (preferred)	69	—
Metropolitan Elevated, Chicago (common)	26	26½
Metropolitan Elevated, Chicago (preferred)	66	70¼
Metropolitan Street	106	106
North American	89¼	91
North Jersey Street Railway	—	30
Philadelphia Company (common)	48	48¼
Philadelphia Rapid Transit	22	22½
Philadelphia Traction	97¾	96¾
Public Service Corporation certificates	65	65
Public Service Corporation 5 per cent notes	95¼	95
South Side Elevated (Chicago)	—	90
Third Avenue	121	123
Twin City, Minneapolis (common)	109	109
Union Traction (Philadelphia)	63	62½

Metals

According to the "Iron Age" the iron and steel markets are firm and quite active, and a number of further advances have been recorded. The scarcity of pig iron is more pronounced than ever, and threatens to cause the closing down of important mills. Despite the congested conditions of the rail mills a fair volume of business is being booked. The American Bridge Company took 50,000 tons of work in November, and has since added 5000 tons for the Philadelphia Rapid Transit. An extension for the Brooklyn Heights Company will call for from 5000 to 7000 tons.

Copper metal continues active and strong. Lake, 22½ and 22¾c.; electrolyte, 22⅛ and 22⅜c.; castings, 22 and 22½c.

NOVEMBER ELEVATED TRAFFIC IN CHICAGO

Two of the Chicago elevated railroads, the Metropolitan and the Northwestern, made new high traffic records in November. The daily average number of fares collected by the Metropolitan during the month was 152,471. This is nearly 10,000 a day larger than its former best average, made in October, this year, and is more than 20,000 larger than the average for November, 1905. The road is now handling 113 trains a day in and out of its own downtown terminal station. The Northwestern "L" collected an average of 93,238 fares a day during the last month, or nearly 5000 a day more than the October figures this year, and 9600, or 11.5 per cent more than its average in November last year. The South Side "L" carried an average of 94,281 passengers daily during the month, an increase of 2.3 per cent over its traffic in November last year. The road's Englewood extension is operating in good shape, but the additional business from that source does only a little more than counterbalance the losses occasioned by substitution of the electric for the cable service on the South Side surface lines.

The following figures show the daily average number of passengers carried by the three roads during November and comparisons with other months:

	1906	1905	Increase	Per Cent
METROPOLITAN				
January	129,720	116,013	13,707	11.81
February	135,570	121,177	14,393	11.09
March	138,169	124,853	13,316	10.70
April	137,447	124,996	12,481	10.00
May	136,735	125,164	11,571	9.24
June	138,974	124,579	9,395	7.54
July	123,370	113,578	8,792	8.69
August	123,512	116,395	7,117	6.11
September	126,975	124,427	2,548	2.05
October	142,671	131,990	10,681	8.09
November	152,471	132,276	20,195	15.26
SOUTH SIDE				
January	92,406	84,569	7,837	9.15
February	95,077	88,173	6,900	7.83
March	95,466	91,384	4,082	4.47
April	95,756	91,901	3,855	4.19
May	97,159	39,971	7,188	7.98
June	101,770	93,941	7,829	8.32
July	92,976	85,272	7,704	9.03
August	88,539	85,288	3,251	3.81
September	89,749	90,476	*727	0.80
October	93,577	92,824	753	0.81
November	94,281	92,156	2,125	2.30
NORTHWESTERN				
January	81,191	73,728	7,463	10.12
February	83,572	78,773	4,799	6.09
March	85,154	90,500	4,654	5.78
April	84,244	79,779	4,465	5.59
May	81,748	77,863	3,885	4.90
June	80,165	75,837	4,328	5.70
July	73,308	67,488	5,820	8.62
August	73,176	68,938	4,238	6 14
September	77,508	74,307	3,201	4.38
October	88,344	80,642	7,702	6.55
November	93,238	83,597	9,641	11.53

* Decrease.

John J. Eagan has filed a petition with the Board of Supervisors of San Francisco for a twenty-five-year franchise for an electric railway over the route of the Geary Street cable system, with a branch line along Point Lobos and Cliff Avenues to a point near the Sutro baths and museum. Mr. Eagan promises that "cars shall be propelled without the use of overhead trolley wires," and further states that his is not a conduit system.

PRESIDENT WINTER OF B. R. T. MAKES STATEMENT OF BROOKLYN PROBLEMS AND WHAT HAS BEEN DONE TO SOLVE THEM

At a meeting last week in Brooklyn of the Municipal Club, held at the Crescent Club, President Winter, of the Brooklyn Rapid Transit Company, made a comprehensive statement of the problems with which the Brooklyn Rapid Transit Company is confronted and of the efforts made by the present management to improve the service and the physical property. It is one of the most forceful presentations of the problems confronting a street railway company ever made, and contains much that is of interest because of the method of treatment adopted, plainly to state the conditions governing the conduct of the company's affairs. Appended is an abstract of Mr. Winter's remarks:

"Probably no place in the world of equal importance has a more fractious child under the name of traction facilities than Brooklyn. As is sometimes the case with black members of the flock, the iniquities of this unhappy offspring, if I may be permitted to suggest, are not all of its own gathering. Some were inherited, some acquired, some only apparent because inherent to the situation, and some, let me confess, well deserving the condemnation bestowed upon them.

"However this may be, in whatever proportion the complaints of an unquestionably suffering public should be divided between remote and immediate causes, whether in this case or that, the fault lies with the company, the public or some apparently incurable condition, the crying need and possibility of improvement is too plainly in sight to be ignored. This is fully recognized by the Brooklyn Rapid Transit Company, and for four years it has been earnestly striving to bring the property in all its parts as nearly as possible to a standard of efficiency equal to the requirements, and this means up to that of any other traction property in the country.

"In pushing forward the work pursuant to that policy, difficulties of every degree have been encountered. Many yet confront us, some of them steadily increasing with the growth of business. Some have in part, only, been overcome, and some, I am glad to say, are numbered with the past.

"It is my purpose to take advantage of this occasion by dwelling upon the ground that has been covered during the past four years. I am well aware it is that which is yet undone and when and how it is to be disposed of, that concerns us all at this time. But I trust a very brief resume will not be without interest and possibly be accepted as the best assurance I can offer as to the future policy of the company. Money talks. And you will better understand the situation, perhaps, when I say that within the period mentioned there had been expended on Brooklyn Rapid Transit properties for

New cars	$10,000,000
Generating power houses	4,400,000
Underground conduits	1,600,000
Sub-stations	1,600,000
Shops, car houses, yards and additions to elevated structure	5,200,000
Elimination of grade crossings	250,000
New paving, miscellaneous additions and improvements	1,750,000

Making an aggregate investment of new money in the properties of upward of $24,000,000.

"Every dollar of this has come from outside sources, save the amount of discount on bonds sold, which must be taken from the earnings of the company.

"If, from the boiling caldron of our transit woes, there could be extracted the essence of the mass, I fancy it would consist of the two following propositions: All Brooklyn roads lead to the bridge, and the very well known but sometimes disregarded axiom in physics, that you can't make two material substances occupy one space at the same time. A certain amount of room is not only convenient for transportation, but absolutely necessary, and when the channel is full, the limit is reached.

"It is also a question if the recognition of the fundamental causes of much of our troubles in Brooklyn and the exercise of consistent efforts to secure remedies do not too often give place, in the heat of annoying occurrences, to angry and futile protests against agencies which are subject to conditions for which they are not responsible, and are powerless within themselves to correct. Still these evils can, in a great measure, be corrected, and the first step in that direction must be a recognition of the fact that we are trying to handle a twentieth century business with nineteenth century accommodations. Brooklyn was not laid out in the expectation that nine-tenths of the interborough travel of a city of 1,500,000 people would demand passage across the river at one point. It is no reflection on the foresight of the engineers of the New York and Brooklyn Bridge that there are now moved over the structure, in one hour of the rush period, 50 per cent more people than were carried in an average day of the first full year of its operation. Nor that the cars are switched and passengers handled through terminals arranged to supply the comparatively provincial requirements of that year, the capacity of which was long since so far outgrown as to make the spectacle of the Brooklyn Bridge in rush hours a scene without parallel at any point of traffic congestion in the world. Picture in your mind New York and Brooklyn as they were when the existing Manhattan terminal was completed, in 1883. Recall the horse cars still in general use, single truckers hobbling along through the streets at the rate of 4 or 5 miles an hour. The elevated was still a novelty, the subway yet unthought of. New York had a population of less than 1,400,000, Brooklyn scarcely more than half that number (720,000).

"Of the 450,000,000 carried by the Transit Company in the last year 150,000,000 crossed the bridge, against 8,529,840 in the year 1884, the first full year of its operation, and 17,177,053 in the year following. In 1890 the tide had swelled to 37,676,411 and in 1897, 45,542,627, so it will be seen with what astonishing strides this traffic has pushed forward during the last nine years, an advance of 230 per cent.

"Now, when we naturally rebel against the bridge crush with its daily horrors, and wildly hurl our impotent maledictions upon whomsoever they may alight, let us remember that with all this growth and change and improvement, with this almost incredible increase in the volume of public travel, the Brooklyn Bridge with its terminal stands the one undisturbed monument of the past.

"The point of all this is not to impart information to the members of this club concerning the existence of an overtaxed and utterly inadequate bridge terminal, nor to paint the daily vicissitudes of interborough travel; who here does not know them from experience, but merely by the use of these striking comparisons to fix your attention on one of the vital defects of your transit system and impress upon you the hopelessness of material relief in that quarter until it is cured.

"So we come back to the two propositions I have referred to: The geography of Brooklyn is determined. The physical law won't give way. The carrier is daily trying to come as near to putting two things in one place as due consideration for safety will allow. The limit under present conditions is reached."

SUBURBAN LINES PLANNED AT BALTIMORE

Plans are being made by the United Railways & Electric Company for several new suburban lines next summer. In addition to the new line to Roland Park, out the St. Paul Street-Merryman's Lane Boulevard, surveys have been made for four more. The new work will be done by the Maryland Electric Railways Company, which was organized for the purpose of providing car houses and feeders to be leased to the United. The new lines planned are: St. Paul Street and Waverly Avenue, out the new St. Paul Street-Merryman's Lane Boulevard to Roland Park. From Orangeville to Highlandtown, on Eighth Street. From Towson to Timonium, out the York Road. From Lakeside to Cockeysville, over private right of way, and connect at Timonium with the line from Towson. From the terminus of the present Wilkens Avenue line to Halethrope and Elkridge.

The franchise for the latter line is owned by the Baltimore, Halethorpe & Elkridge Electric Railway Company. Work on the new boulevard line has already been started.

Work on the line from Towson to Timonium will probably begin in a short time. This line will be about 2 miles long, and will be an extension of the present road to Towson. It is proposed to connect with the line to be built from Lakeside to Cockeysville. Surveys for the latter have been in progress for some time past. The United now operates a line from Roland Park to Lakeside.

The new line from Orangeville to Highlandtown, on Eighth Street, will give this section a north and south road, and will connect with the lines running through Highlandtown to the excursion resorts. Of the new suburban lines the one from Lakeside to Cockeysville is about 7 miles long. If all these lines are built and are double tracked, as now proposed, it will mean that 32 miles of track will be added to the United's system, which on Jan. 1 last totaled about 386 miles.

SUPPOSED TRANSFER FRAUDS IN COLUMBUS—CONVICTION IN BROOKLYN CASE

For some reason certain persons in this city have been collecting transfers from the local road and a few days ago detectives secured 35,000 of them and turned them over to Vice-President E. K. Stewart. An advertisement for transfers was inserted in one of the local papers, the statement being made that as soon as 1,000,000 were secured, they would be sold to secure funds with which to purchase a wheel chair for a crippled boy. Investigations are being made and if it is found that the transfers are being collected for fraudulent purposes, prosecutions will follow.

In this connection it is of interest that twenty-eight conductors of the Broadway division of the Brooklyn Rapid Transit Company were recently discharged from the company as a result of their being connected with a scheme to defraud the company, in which an ex-employee acted as intermediary. The man who acted as go-between has been convicted and sentenced to a term in the penitentiary.

PASSENGER TRAFFIC RECORD IN NEW YORK NOV. 26

The Interborough Rapid Transit Company carried on its elevated lines and the subway a total of 1,486,777 passengers November 26, the largest number for any day ever carried by the system or by the separate companies. The number carried by the elevated and by the subway, as compared with the traffic on the corresponding day in 1905 is as follows:

	1906.	1905.	Increase. No.	Increase. %
Elevated	917,143	828,908	88,235	10.64
Subway	569,634	486,310	83,324	17.13
Total	1,486,777	1,315,218	171,559	13.05

The total increase in revenue for the day was $8,534.

Although the number of passengers carried by the New York City Railway Company, operating the surface lines, is not given, it is stated that the increase was in the same proportion as for the other lines. Consequently the total number of passengers carried in Manhattan on November 26 is the largest on record.

Owing to the holiday shopping crowds and to other reasons, officials of the Interborough-Metropolitan Company believe the city's elevated and subway lines will soon carry in a single day 1,500,000 passengers.

RERORT OF THE WORCESTER COMPANY

The Worcester Consolidated Street Railway Company, the operating company of which the Worcester Railways & Investment Company, now owned by the New Haven, is the holding company, earned net for dividends in the fiscal year ended Sept. 30, 1906, $266,094, equal to 7½ per cent on the $3,550,000 capital stock. These are the largest earnings shown by the company during the past six years. The income account for the last two years compares as follows:

	1906.	1905.
Gross earnings	$1,523,964	$1,379,015
Operating expenses	909,674	821,679
Net earnings	$614,290	$557,336
Fixed charges	348,196	361,312
Balance	$266,094	$196,024
Dividends, 5½ per cent.	195,250	195,250
Surplus	$70,844	$774

OHIO INTERURBAN RAILWAY MANAGERS AND RAILROAD COMMISSIONERS CONFER

At an informal conference between the executive heads of Ohio interurban railway systems and the Ohio Railroad Commission, at Columbus, Ohio, Tuesday afternoon, Dec. 4, many subjects relative to the operation of the Ohio interurban systems and their compliance with the Ohio railway law were discussed. The Commission sought information regarding the operation of the roads, and the officials present asked many questions relative to their obligations under the new law.

One of the most important questions under consideration pertained to the precaution taken by electric roads at steam road crossings. The officials of all the roads said they had stringent rules requiring a full stop on approaching a steam road crossing. Some of the rules require this stop to be made 100 ft. away from the crossing, while others allow cars to run up to within 20 ft. of the crossing.

During this discussion, L. C. Bradley, general superintendent of the Scioto Valley Traction Company, entered an emphatic complaint against the attitude of steam roads relative to these crossings. F. W. Adams, of the Toledo, Fostoria & Findlay Electric Railway, also complained of this attitude of the steam roads. He said that his road carried an average of 2000 passengers a day, which is more than is carried by any of the steam roads that his line crosses, yet the steam roads have little regard for the safety of his passengers, and his company is compelled to take all of the precaution.

O. P. Gothlin, member of the Commission, said there was no law compelling steam roads to recognize an electric line crossing, but he suggested that such a law be enacted. It developed in the discussion that most of the interurban roads of the State, in order to secure crossing rights, had entered contracts with the steam roads, that the latter's lines should at all times be kept clear, and relieving them of all responsibility.

The Commission asked numerous questions regarding the rules governing the operation of the cars of the various companies, and it developed that practically all of the interurban roads in the State operated as far as possible under steam road rules. Norman McD. Crawford, vice-president in charge of operation of the Indiana, Columbus & Eastern Traction Company, said that his company was at present preparing a standard code of rules which it expected to put into effect on all of the lines of the Schoepf syndicate. F. D. Carpenter, of the Western Ohio Railway, said that his company expected to operate under the general code of rules adopted by the American Railway Association. The Commission was asked if it expected to formulate a code of rules for the operation of the electric lines, and the members said they did not, but that they would endorse any code of rules that met the requirements of the law as to safety for passengers and efficiency of service.

Mr. Adams, of the Toledo, Fostoria & Findlay, asked if the Commission had any instructions to give relative to the issuance of free transportation. In answer to this, Commissioner Hughes read section 8 of the Ohio railway law, which tells to whom free transportation may be given by the railroads of the State. The question was raised whether the law prevented the issuance of passes to any persons, as this section does not state that free transportation is not to be given to anyone else not designated in the section, but the Commission held that this was covered in another section, which prevents the granting of any discriminatory rates or favors to any person or persons.

Commissioner Gothlin read the law requiring station buildings at all regular stops, and asked the interurban officials what they expected to do in this regard. General Manager George Wysall, of the Columbus, Delaware & Marion Electric Railway, said that if this section was applied to the interurbans of the State a great many stops that are now made would have to be eliminated. He said that shelter houses were being put up by his company at nearly all of their stops, but he did not think that the interurbans, on account of the nature of the service they furnish, should be held to that law. The Commission has withheld its ruling on that point.

J. B. Foraker, Jr., vice-president of the Indiana, Columbus & Eastern, said his company proposed to erect suitable stations in all of the cities and towns through which its lines pass. In cities the size of Columbus, he said, the company expected to erect combination stations and office buildings that would cost practically $1,000,000 each.

Traction officials attending the meeting were: J. B. Foraker, Jr., Norman McD. Crawford, A. F. Schoepf, W. S. Whitney and A. W. Jordan, of the Indiana, Columbus & Eastern; Charles F. Smith, Cleveland, Painesville & Eastern; L. C. Bradley, Scioto Valley Traction Company; George Wysall, Columbus, Delaware & Marion; F. W. Adams, Toledo, Findlay & Fostoria; F. J. Stout and F. W. Coen, Lake Shore Electric; C. W. Kamp, Tiffin, Fostoria & Eastern; R. J. Wells, Dayton & Union Traction Company; F. D. Carpenter and C. C. Collins, Western Ohio Railway; C. M. Paxton, Dayton & Troy Electric; Fred. J. Green, Springfield, Troy & Piqua, and L. P. Stephens, Columbus, New Albany & Johnstown.

TRAFFIC REGULATION ATTEMPTED IN CHICAGO BY POLICE—OTHER MATTERS

Through the agency of Dr. Maurice Doty, city transportation superintendent, a corps of police has been pressed into service to deal with the handling of vehicle traffic. Nov. 30 this plan was tried for the first time, and the forty mounted men upon whom the work fell found themselves confronted with a serious problem. Drivers who have known little restraint were inclined to be refractory, and only did as they were told when threatened with arrest. Details of policemen were also stationed on the busiest of the down-town platforms of the elevated railroads during the rush hours the evening of the same day to prevent overcrowding of the cars. This action was taken by Chief of Police Collins only after receiving positive assurance from Corporation Counsel Lewis that the city was authorized to take such repressive measures against the companies. The result was that hundreds of persons were late in reaching their homes, being compelled by the policemen to wait on the wind-swept platforms until the heaviest part of the rush hours was past and the cars afforded more room.

A down-town subway, which in reality will be an underground street of the same width and uses as the surface streets at present, may be provided for in the traction settlement ordinance. Alderman Milton J. Foreman contended for such a provision in the pending ordinance at the meeting of the local transportation committee last week, and his views were favorably received. Alderman Foreman suggested that the subway could be used for various municipal purposes if made the width of the street. But half of the subway, he said, would be needed by the street car system. The other half could be used for sidewalks, conduits, gas and water mains, and any purpose the city might desire. Mayor Dunne thought the suggestion a good one, and in the final draft of the ordinance this provision may be inserted.

The reading of the amended ordinance submitted by the traction companies has been completed. Walter L. Fisher, the city's traction lawyer, will redraft the ordinance in accordance with the committee's instructions, leaving blank the amounts to be inserted for compensation and values of the present tangible properties. It is proposed to settle on all other provisions of the ordinance before taking up the financial end. It is on this that the widest difference of opinion is likely to develop..

While none of the lawyers would discuss the result of the conference held in New York the fore part of the week with the financiers who are back of the rehabilitation scheme, it was reported that an agreement had been tacitly reached on the license question, and that a draft of that provision will be submitted to the committee this week. The agreement is said to be satisfactory to both Mr. Fisher and the traction interests. This clause will be taken up at the next meeting of the committee, which will be called by Chairman Werno for some day next week, and thrashed out.

Officials of the Union Elevated Loop have obtained a long petition to be presented to the City Council local transportation committee in support of their ordinance providing for extensions on the platforms along the tracks. The document is declared to contain the signatures of owners or tenants representing 60 per cent of all the abutting property on both sides of Fifth and Wabash Avenues and Van Buren and Lake Streets along the route of the loop road. The ordinance providing for the platform extensions has been pending before the local transportation committee nearly eighteen months. It is expected it will come up in a short time, and the petition is to be presented with the hope that it will influence a favorable report on the measure.

The extensions provided in the measure would be about 40 ft. long at each end of the platforms now in use. By their erection it is announced that two trains could load and unload at a time, thus greatly facilitating the movement of trains on the loop. It includes a ratification of a contract by which the city would receive 25 per cent of the gross receipts of the Union Loop, after the deduction of $250,000 to pay interest on the bonded indebtedness. This would be an increase of 10 per cent in compensation.

NEW HAVEN FINALLY GETS RHODE ISLAND SECURITIES

The purchase of the Rhode Island Securities Company by the Consolidated Railway Company, the holding company for the New York, New Haven & Hartford Company's electric railway properties, was practically completed Monday, says the "Wall Street Journal," and steps have just been taken which put the practical operation of the Connecticut Railway & Lighting Company also in the control of the New Haven Railroad.

These two purchases establish the position of the New Haven as one of the greatest trolley-controlling companies in the country. It will have a trolley service more than 1300 miles in length, with a gross business of more than $16,000,000 per annum.

This purchase puts the electric lines of both Rhode Island and Connecticut into the hands of the New Haven Railroad, and in addition the trolley lines in that part of Massachusetts through which the New Haven operates are also in friendly hands.

The Rhode Island Securities Company is capitalized for $20,000,000 stock, of which $12,000,000 has been issued, and $5,000,000 bonds. Of the $12,000,000 stock $10,000,000 was given to the United Gas Improvement Company at the time of the formation of the holding company.

CONTRACT LET FOR ELECTRICAL EQUIPMENT OF TEXAS ROAD

J. F. Strickland, president of the Texas Traction Company, has awarded to the General Electric Company the contract for the electrical equipment of the company's interurban railroad now in course of construction between Dallas and Sherman. The contract covers among other things Curtis steam turbines for the generating station, which will be located at McKinney, complete machinery for five sub-stations, to be located at different points along the line, complete equipment for fifteen cars, and rotary converters and transformers. Each of the fifteen cars will be equipped with four 75-hp. motors, and arranged for operation in a train. Mr. Strickland is reported to have said that the road will probably be ready for operation by Jan. 1, 1908.

BOARD OF ESTIMATE WILL APPROVE SUBWAYS

Albert B. Boardman, counsel to the Rapid Transit Commission, made the announcement at the meeting Friday, Nov. 30, that in his opinion, the Commission would receive no bids for the construction and operation of future subways under the present provisions of the Elsberg law. Mr. Boardman made this statement in explaining to the Commission the necessity of advertising as quickly as possible for bids for the subway routes which have already been laid out.

"If we start in advertising for bids for these routes," said Mr. Boardman, "we will be in a position to know whether or not the city will receive bids under the present terms and conditions of the rapid transit law. If we do not receive bids we will then have ample time to go to the Legislature and have the Elsberg bill amended. The failure of the city to receive bids will be one of the best arguments we can make before the Legislature to demonstrate the necessity of a modification of the present law."

It was decided to give the Rapid Transit Subway Construction Company, which is building the Brooklyn subway, an extension of two months to complete the work. Under the terms of the contract a penalty was to be enforced for the non-completion of the contract after Sept. 11 last. Counsel to the Commission advised the non-enforcement of the penalty provision because the action of the Commission in changing the original plans to a four-track subway undoubtedly delayed the work.

Bridge Commissioner Stevenson's invitation to the Commission to join in with the Board of Estimate in studying the transportation situation in regard to the Blackwell's Island and Manhattan Bridges was accepted and the Commission will later decide upon a day to make an inspection trip in special cars.

Controller Metz brought up the question of granting a franchise to the Behr Monorail Company in Brooklyn. Mr. Metz said that he doubted, in spite of the promises made by the company, that they could secure consents for the building of the road through Atlantic Avenue to South Ferry. A lengthy discussion ensued between Mr. Metz and Chairman Orr. Mr. Orr said that the company had guaranteed to have all the consents and that the city would practically be put to no expense, because the company agreed to undertake the burden of complying with all the legal formalities.

BROOKLYN LOOP PLANS

Reports were made at the meeting of the Board of Rapid Transit Commissioners last week, that the Brooklyn loop plan, which purposes to tunnel under William Street in Manhattan and run under the East River to connect there with subway, was getting into condition rapidly, although many difficult engineering problems have to be confronted. This subway is known as route No. 9. Regarding advertising for bids for subway construction, Controller Metz thought it would be well to advertise for construction and operation as well. His suggestion received favorable action.

The Bridge Commissioner asked the board to make a trip of inspection of transportation conditions in Brooklyn. This invitation was accepted, and it was left to Mr. Stevenson to fix the date.

On the recommendation of Controller Metz, it was decided to write to the Interborough Company and ask it to run more express trains on Sunday.

Bridge Commissioner Stevenson has also asked the members of the Board of Estimate and Apportionment to make a trip through Brooklyn and Queens to investigate the transit problem there in connection with the facilities the city ought to have after the completion of the new Blackwell's Island Bridge and the new Manhattan Bridge, No. 3. The Blackwell's Island Bridge will be completed in December, 1908, and the Manhattan Bridge the following year. One of the objects of the intended tour is to avoid the trouble that has arisen over the Williamsburg Bridge in regard to elevated road crossings, bridge cars and terminal facilities, as well as subway loops.

ALTERATIONS AT DUDLEY STREET TERMINAL

In order to meet the changed conditions anticipated by the extension of its elevated structure to Forest Hills, the Boston Elevated Railway Company has planned a number of important alterations at the present Dudley Street terminal station. The proposed changes have been approved in a preliminary way by the Railroad Commission, subject to the approval of Mayor Fitzgerald, of Boston, in respect to their architectural appearance and obstruction to light and air.

The proposed alterations provide for a separation of loading and unloading traffic which is not feasible with the present arrangement of its terminal. Dudley Street will probably become a way station upon the opening of the Forest Hills extension, though the plans for the future allow certain trains to be looped through the terminal as at present, in case it is deemed best not to send them all through to Forest Hills. All southbound trains are to stop and discharge passengers for Dudley Street and its connecting surface cars at a new platform, 350 ft. long, which is to be built on the west side of the terminal over Washington Street. Passengers for Forest Hills by the elevated will also be received here as they come up from the street or from the present surface cars which discharge at the elevated level after ascending inclines from the street. Northbound trains will enter the terminal as at present, receiving inward-bound passengers from the loop surface cars and from the street as at present. Two new loading platforms for surface cars are to be built on the inside of the present surface car loops at the elevated level. All the platforms are to be connected, either by the present sub-passages or by two bridges which are to be built, one at each end of the terminal, to connect with the new Washington Street platform. It is also probable that a new piece of third track will be built over Washington Street, to facilitate the entrance of fresh trains from the Guild Street car house without interruption of the service. The present interlocking tower, just outside the terminal, will probably remain as it is, but the completion of the new Washington Street platform will cover a short piece of second track which has at times been used for storage or emergency inspections.

ST. LOUIS CAR COMPANY INCREASES CAPITAL—SOME OF ITS WORK

The St. Louis Car Company increased its capital stock Nov. 28 from $2,500,000 to $3,000,000, and has merged the Kobusch Automobile Company, which holds the American rights to the French "Mors" machine. President Kobusch says that the company has contracts for $6,500,000 of equipment, and is making contracts for the delivery of new steam railroad and street cars in 1908. Finished equipment, valued at $1,600,000, is now ready for delivery. The increase of the capital was deemed advisable on account of the company's large contracts, the demand for steam railroad equipment and the requirements of the electric interurban and street railway lines.

The St. Louis Car Company is now completing the Kobusch-Wagenhals motor car, and will deliver it to the Missouri Pacific & Iron Mountain system in a few days. This car is intended for use on branch lines of steam railroads, and will be used by the Missouri Pacific & Iron Mountain system in interurban service. It has been described in the Street Railway Journal.

The company is building sixty-one all-steel cars for the New York Central for service out of New York. Both the underframe and the superstructure are of steel. Six of the cars are completed, except for the interior painting and finishing. All the cars will be delivered in New York by March 1.

The company is fulfilling contracts for 250 cars for San Francisco, 250 cars for Los Angeles, 150 cars for Boston and several hundred cars for different South American cities. Many of these cars are now ready to be shipped.

The company is completing an extension to its plant of a brick structure measuring 225 ft. x 255 ft., to be used as an erecting shop. The completion of this building will add considerably to the capacity of the plant, as it will provide floor space for seventy-five cars. A portion of it will be utilized for mounting motors and for other electrical work.

The company also has recently completed a sill mill, which measures 60 ft. x 310 ft. A standard-gage track runs the full length of the structure through the center. The mill is being equipped with about twenty tools, all provided with individual motor drive. These machines will be so located that the rough material received at one end of the mill will pass through the machines successively, and will be in a finished state when the opposite end of the mill is reached. All of the heavier material of the bottom framings of the cars will be finished in this mill.

TRANSFER OF OSKALOOSA PROPERTIES

Final transfer of the property and holdings of the Oskaloosa Traction & Light Company, controlling the street railway, electric light and heating facilities, has been made to the Oskaloosa & Buxton Electric Railway Company. The organization of the two companies remains intact and the properties will be operated independently of each other, although under one ownership. Immediately following the transfer of the property new directors for the Oskaloosa Traction & Light Company were elected as follows: W. H. Kalbach, W. R. Lacey, Wesley Garner, C. E. Lofland, W. I. Neagle, W. W. Williams, George Kalbach, Frank B. Shafer and Sam Baldauf. The election of officers resulted in the selection of W. H. Kalbach, president; W. R. Lacey, vice-president, and Wesley Garner, secretary and treasurer.

Contemporary with the sale of the property a car was operated over the line of the Oskaloosa & Buxton Interurban Electric Railway. The construction of this line has been carried out by the Engineering Construction & Securities Company, of Chicago, of which S. A. Kimberly is president, C. A. Ross, vice-president; C. B. Judd, treasurer, and H. T. Bonfield, secretary. Ground was broken for the grading of the line July 23.

FRANCHISES AND RIGHTS OF IMPORTANT LINE TAKEN OVER

Announcement has just been made that Allan W. Paige and associates have bought the franchise and rights of way of the Troy, Rensselaer & Pittsfield Electric Railway Company for $58,000. The line, which is as yet only on paper, covers a stretch of 52 miles. The franchise and rights of way were bought, it is understood, for the Connecticut Railway & Lighting interests. After the transfer of the charter and rights of way had been made, Allan W. Page was elected president of the company; W. H. Sterling, of Brooklyn, vice-president; Alexander McKeogh, of New York, secretary, and H. L. Merritt, of Montclair, N. J., treasurer.

A STEAM RAILROAD DECISION WHICH AFFECTS INDIRECTLY THE ELECTRIC ROADS

The State Railroad Commission of Ohio has decided that because a railroad issues commutation rates on one part of the system, it is not bound by law or precedent to sell the same class tickets on any other portion. Charles U. Shryock had brought charges against the Baltimore & Ohio, which formerly sold commutation tickets between Zanesville and Fraziers. Because the sales had dropped off the tickets between these points were discontinued, although tickets were sold between Zanesville and other points. Mr. Shryock charged discrimination. The Commission, in its decision, said that a railroad company had the right to make rates within the legal limits between certain points, providing that all people buying such tickets were treated alike and that such tickets be sold to all people applying for them. Discrimination lies in the act of refusing to sell to one or more persons when others secure the advantage. But the company also has the right to withdraw such rates when it sees fit. The Commission, however, intimated that railroad companies should exercise care in the issue of such rates. This decision would seem to sustain the steam roads in making rates between certain points in competition with the electric roads. The Hocking Valley Railroad Company and some others sell what they call twin tickets between points where they come in competition and in no other places. Of course, the reason is plain, and whether discrimination could be made out by a passenger living out of this district is a question.

TALKING TO THE ROANOKE PUBLIC THROUGH THE NEWSPAPERS

The Roanoke Railway & Electric Company has adopted the policy of reaching the public through advertisements carried in the daily press, and in accordance with this plan has recently begun a series of talks, the first of which was printed in the local papers at Norfolk, Nov. 27. It has seemed advisable to reprint this first talk in its entirety, as it deals with the reasons why the policy was adopted, and so it is appended:

ELECTRIC TALKS—NO. 1

Until within a very recent period the so-called "public utility" companies of this country pursued a policy of secrecy toward the public. To-day they realize that such an attitude is a mistake. They find that a far better business policy is to tell the public all about it—to conduct their business openly and to take the people into their confidence.

The Roanoke Railway & Electric Company is among the first concerns of the kind in the United States to welcome this new policy of publicity. The Roanoke Railway & Electric Company, together with its predecessor, has been doing business in Roanoke for eighteen years. It has seen Roanoke grow from a modest little town to a city of 30,000 people—the third largest city in the Commonwealth of Virginia. More than that, it has helped materially to stimulate that growth. We are going to tell you some of the ways in which it has done that. We are going to tell you what this company has done for the people and for the city of Roanoke. And we are going to tell you what we are planning to do—and to do as rapidly as possible—to benefit the city and its people. But the main thing to-day is this:

We are here to stay—to stay as long as Roanoke exists as a city. We believe this city is only at the threshhold of its career as one of the great and prosperous communities of its section. We see great possibilities for its development just ahead. We are on the ground to foster that development, and to grow with it.

We want to give the people of Roanoke—

The best electric traction service.
The best electric lighting service.
The best electric power service

commensurate with the demands of a city of its size and progressiveness to be found anywhere. To do this we want the co-operation of the people of Roanoke. To every business man and householder in Roanoke we have a plain business proposal to make. We want careful consideration of that proposal. We ask for fair and square treatment on that proposal—and we guarantee a "square deal" on our part.

ELECTRICITY TALKS

Note.—Each day you will find here something new on the street railway and electric lighting situation and its relations to the people of Roanoke. This will interest you. Watch for it—read it—ponder it. Our constant endeavor is to serve the best interests of the public.

ROANOKE RAILWAY & ELECTRIC COMPANY,
By J. W. Hancock, General Manager.

INCREASE IN PITTSBURG RAILWAY SERVICE—PLAN TO RUN TRAINS

The car service on the Pittsburg Railway Company's system has been increased fully 12 per cent over last year. Since the removal of the tracks of the Pennsylvania Railroad Company from Liberty Street, one of the main thoroughfares, and the placing of the tracks of the company in the center of the street, the movement of cars in the congested downtown district has been greatly facilitated and at present the traffic is being handled with more despatch and in a more satisfactory manner than ever before in the history of the company.

On Dec. 3 the company contemplated trying an express service from Penn Avenue and Sixth Street via Liberty Avenue to the East End district, using a train of four cars with multiple control and issuing transfers from these express trains to a number of cross-town lines. The proposed schedule called for 10-minute headway during the day, and 5-minute headway during the heavy traffic of the morning and evening. It is hoped in this way to relieve the local cars on other divisions and open up a way of better handling the morning and evening rush-hour business.

MANHATTAN RAILWAY STOCKS SOLD

The $4,800,000 new stock of the Manhattan (Elevated) Railway, of New York, offered at auction on Wednesday by Adrian H. Muller & Son, was all sold at prices ranging from $141 to $143 per $100 share, and averaging, it is stated, about 141⅜. Redmond & Company and J. & W. Seligman & Company purchased jointly $3,000,000 stock at an average of about 141¼; D. Lapsley & Company, $650,000 at 141, and the balance was sold to various persons in smaller blocks of not less than 500 shares. The stock, it is understood, was underwritten by a syndicate headed by Kuhn, Loeb & Company at 140, less 2½ per cent and 1 per cent additional for any stock they might be obliged to take. As Kuhn, Loeb & Company purchased only 500 shares of the stock, the company will receive, apparently, as the proceeds of the sale, about $138⅞ per share, or $6,666,000 in all. The amount due the Interborough Rapid Transit for expenditures under the lease from April 1, 1903, to Sept. 30, 1906, was $3,452,183, leaving available about $3,200,000 for future disbursements. A large part of the stock sold to Redmond & Company and Seligman & Company has been resold by them to investors.

CALIFORNIA TRACTION COMPANY

W. J. Barnett, who recently returned to Sacramento, Cal., from a trip to the East, in the interest of the California Traction Company, which is building from Stockton to Sacramento via Lodi, says that the company had purchased all of its right of way between Stockton and Lodi and arranged for its steel rails when the projectors decided that circumstances unforeseen had arisen that rendered it advisable to abandon the right of way first chosen and adopt another. The new route will be situated 1 mile east of the first location, beginning at Stockton and continuing to Sacramento. It will be 100 ft. wide, whereas the first was only 40 ft. This enlargement may imply that the right of way may be intended to accommodate more than one road. The change of route will be expensive, but the company feels that it is better to stand the extra cost than to fight to a finish the various antagonists that have appeared to block the progress of the road. The Southern Pacific is said to have tossed a few obstacles athwart the path of the road, and there was hostility shown by a few of the land owners along the M Street road near Sacramento. It is said, furthermore, that the matter of finding an entrance to Sacramento with the least possible chance of antagonism from roads already here, was one of the motives that impelled the change of route.

The Utah Light & Railway Company, of Salt Lake City, Utah, has placed an order for 60 miles of 80-lb. steel rails for the improvement of its system in that city. The company will, it is said, expend about $2,000,000 during the next two years on improvements and extensions. R. S. Campbell is secretary and general manager.

REPORT OF NATIONAL CIVIC FEDERATION ON MUNICIPAL OWNERSHIP EXPECTED IN JANUARY

The Public Ownership Commission of the National Civic Federation, after investigating public ownership both in Europe and America, has been quoted in the public press to be opposed to municipal ownership on the grounds that it is unscientific, wasteful and morally undesirable. This report was subsequently denied, with the statement that it may have originated from the fact that certain individuals who are members of the commission, and who were originally in favor of municipal ownership, have modified their opinions. The commission was originally appointed to collect statistics upon the subject rather than to formulate conclusions, and expects to submit its report to the Federation before the middle of January.

STREET RAILWAY PATENTS

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

UNITED STATES PATENTS ISSUED NOV. 20, 1906

836,105. Load Brake Apparatus; Clyde C. Farmer, Chicago, Ill. App. filed Feb. 17, 1904. Means whereby the load brake mechanism cannot be brought into operation unless both ends of the car are loaded, and whereby the entire load brake device will be cut out automatically when the train pipe pressure reaches a certain predetermined point.

836,120. Means for Controlling the Movements of a Vehicle on a Line of Way or Railway; Frank E. Kinsman, Plainfield, N. J. App. filed March 6, 1905. An automatic train stop in which means are provided for resetting the automatic controlling means either after the vehicle has been stopped or after the engineer or motorman has decided that he can safely proceed.

836,124. LOAD-BRAKE APPARATUS; Harry R. Mason and Clyde C. Farmer, Chicago, Ill. App. filed Feb. 17, 1904. Provides, in combination with other details, an automatic cut-out device controlling the communication between the train pipe and the load-brake mechanism, such cut-out being constructed so as to operate at a certain pre-determined limit of pressure to close communication between the train pipe and the load-brake mechanism and to open an escape of pressure to permit the air to exhaust to the atmosphere from the load-brake apparatus, leaving the said apparatus in proper set position.

836,135. Railway Switch; Louis R. Parsons, Raritan, Ill. App. filed March 19, 1906. The switch point has a switch connection with a rotary member mounted beside the track and rods extending in each direction and connected to Y-shaped levers, the arms of which are engaged by suitable devices on the train.

836,153. Signaling System for Electric Railways; Louis H. Thullen, Edgewood Park, Pa. App. filed June 9, 1906. Relates to block signal systems having insulated block sections which are separately energized by local batteries and in which the rails are also used as a return connection for the alternating-current power circuit. Has separate relays, one of which is responsive only to direct current and the other of which is responsive only to alternating current.

836,160. Fluid Pressure Brake; Henry H. Westinghouse, Pittsburg, Pa. App. filed Feb. 19, 1904. Means whereby the brake cylinder pressure may be graded down when it is found that the brakes have been applied with greater pressure than necessary.

836,243. Electrically Operated Railway Signal and Gate; James G. O. Combs and Isaac D. Combs, Harold, Mo. App. filed April 20, 1906. Depressible tappets are positioned on the usual ties adjacent to the rail so as to be depressed by a passing train, thereby closing circuits to special motors which are arranged to operate the gates of the crossing.

836,362. Braking Mechanism; Noel Bouchard, Longue Pointe, Quebec, Can. App. filed April 6, 1906. By means of a friction clutch a system of gearing is actuated by the momentum of the car wheels to apply the brakes.

836,394. Railway Track; Edmond Molloy, Philadelphia, Pa. App. filed March 20, 1905. A bisected rail comprising double-headed members serrated on their webs and assembled into interlocking relation.

836,401. Railroad Tie; Edwin De W. Peugh, Hurdland, Mo. App. filed April 10, 1906. The top of the tie is grooved to receive the rails, and on one side thereof an integral lug engages the rail, while on the other side the rail is engaged by a removable clamping member.

836,649. Electric Switch Throwing Device; James A. Posey, Midlothian, Tex. App. filed Aug. 2, 1906. The trolley wheel closes a circuit to a switch-throwing motor which is adapted to run in either direction.

PERSONAL MENTION

MR. JAMES T. HARMER has been appointed comptroller of the New England Investment & Security Company, with office in Boston, Mass. Mr. Harmer has been connected with New York, New Haven & Hartford Railroad in the accounting department for some time.

MR. W. B. MOORMAN, of Natchez, Miss., has been appointed to succeed Mr. F. J. Duffy as manager of the Beaumont Traction Company. He has been connected with the Southern Light & Traction Company of Natchez, Miss., and will be succeeded in his position there by Mr. Duffy.

MR. L. J. SHLESINGER has resigned as superintendent of motive power of the Indiana Union Traction Company to become manager of a mercantile establishment in Cleveland, Ohio. Mr. R. C. Taylor, formerly of the Brooklyn Rapid Transit Company, has been appointed to succeed Mr. Shlesinger.

MR. WILLIAM E. MALONEY has resigned as superintendent of the Manchester (N. H.) Street Railway, to accept a position elsewhere. He will be succeeded by Mr. William J. Goldthwaite, who has recently occupied a similar capacity with one of Tucker, Anthony & Company's properties at Canton, Ohio.

MR. ROBERT McF. DOBLE, of Colorado Springs, formerly of San Francisco, has been retained as consulting and supervising engineer by Messrs. Curtis & Hine, general managers of the recently organized Central Colorado Power Company, in the development of its large hydro-electric power projects on the Grand River, Colorado.

MR. F. R. PHILLIPS, for several years master mechanic of the Cincinnati, Newport & Covington Light & Traction Company, and who recently held the same office with the Michigan United Railways Company, has accepted the position of demonstrator in car equipment with the Ohio Brass Company. Mr. Phillips' headquarters will be Mansfield, Ohio.

MR. JOHN FREEMAN has been appointed superintendent of the Tuscarawas division of the Northern Ohio Traction & Light Company, of Cleveland, to succeed Mr. W. J. Goldthwait, who goes to Cambridge, Mass., as superintendent of the street car system owned by Tucker, Anthony & Company. Mr. Freeman was formerly inspector on the city lines at Akron.

MR. W. F. WHITNEY, for some time general passenger agent of the Detroit, Toledo & Ironton Railway, has been appointed general passenger and freight agent of the Indiana, Columbus & Eastern. Mr. A. W. Jordon, who has been active general passenger and freight agent, will become assistant in charge of all the lines of the Schoepf syndicate in Ohio. Mr. Jordon has been very successful with the Ohio business, and his continuation in charge of the passenger and freight business is a recognition of his good work.

MR. ARTHUR VAUGHAN ABBOTT succumbed to an attack of pneumonia Sunday, Dec. 2, at St. Luke's Hospital, New York City, after short illness. Mr. Abbott was born in Brooklyn, N. Y., in 1854, being a member of a well-known family of authors and clergymen bearing his name, and graduated from the Polytechnic Institute in 1875. He was connected after graduation with the construction of the East River Bridge and then became associated with the Daft Electric Light Company, participating in a great deal of its early construction of dynamos and motors and electric railways. In 1892 Mr. Abbott took up telephonic work on the staff of the Chicago Telephone Company, for which by June, 1901, when he resigned, he had constructed twelve new office buildings with their equipments and lines. He had in the meantime done considerable electric lighting work. During the past few years Mr. Abbott had been on the engineering staff of Westinghouse, Church, Kerr & Company, in New York City, doing also a great deal of work in the field. He was well known as a writer and author, his principal works being the well known "Electrical Transmission of Energy," which has gone through several editions here and in foreign languages, and a series of six volumes on "Telephony," issued by the McGraw Publishing Company, the bulk of the matter having appeared originally as articles in the "Electrical World." Mr. Abbott was a member of a number of engineering bodies, including the American Institute of Electrical Engineers, American Society of Mechanical Engineers, and the American Society of Civil Engineers.