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JAMES H. MCGRAW, President.

HUGH M. WILSON, 1st Vice-President, A. E. CLIFFORD, 2d Vice-President.

CURTIS E. WHITTLESEY, Secretary and Treasurer.

TELEPHONE CALL: 4700 BRYANT. CABLE ADDRESS: STRYJOURN, NEW YORK.

HENRY W. BLAKE, Editor.

L. E. GOULD, Western Editor.

Associate Editors:

RODNEY HITT, FREDERIC NICHOLAS, WALTER JACKSON.

News Editors:

G. J. MACMURRAY, FRANK J. ARMEIT.

CHICAGO OFFICE.....1570 Old Colony Building
CLEVELAND OFFICE.....1021 Schofield Building
PHILADELPHIA OFFICE.....Real Estate Trust Building
EUROPEAN OFFICE....Hastings House, Norfolk St., Strand, London, Eng.

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Fall and Winter Traffic Promotion

After Labor Day the summer traffic season begins to wane. Vacationists return to their homes and offices, children look forward to the opening of school, and the time devoted to pleasure riding and being out of doors is encroached upon by other occupations and amusements. With the first frost the open cars are taken off and the traffic department rests on its oars. Yet there still remain several weeks of delightful weather when the autumn foliage and cool, bracing air attract all the lovers of outdoors. By catering to those who are not content to shut themselves up until the snow flies a moderate but nevertheless profitable traffic can be promoted. There are as many ways of appealing to devotees of fresh air in the fall as in the hot days of summer. Nutting parties, husking bees, overcoat picnics, moonlight trips on frosty evenings, and later perhaps skating parties and winter sports, can be made to produce more than enough revenue to pay for the advertising which would have to be done to acquaint the patrons of the road with the good times to be had out of doors. Most of the summer railway parks at very small expense could be provided with heated waiting rooms for use on cold days, and probably it would not be difficult to induce the restaurant concessionaire to keep open on Saturdays and Sundays, at least to serve hot coffee and light refreshments. Fall and winter pleasure riding cannot be expected to compare in volume with the summer traffic, but it is well worth trying to promote, as it is just as profitable, if on a smaller scale.

Welding Armature Shafts

A broken armature shaft is usually a troublesome and costly repair job which fortunately seldom has to be made on most roads. In San Francisco, where the cars are operated on steep grades, broken armature shafts are of rather frequent occurrence, due probably to the heavy torque exerted by the motors for long periods. Formerly the cost of removing, welding and replacing an armature shaft was from \$60 to \$70, but the cost of the method of welding without removal of the shaft, described elsewhere in this issue, has been reduced to about \$8.50, or a saving of over \$5,000 on the 100 shafts which already have been repaired by this method. It is of interest to compare the cost of welding in an oil furnace, as practised in San Francisco, with the cost of welding by electric arc. The Philadelphia Rapid Transit Company has been using the electric arc for welding for more than two years with marked success. Armature shafts have been successfully butt welded and also built up with new metal welded on when they have worn down to minimum diameter. The cost of welding or building up a shaft with the electric arc is said to be less than \$3.

including the cost of machining. So far as we know the oxy-acetylene or oxy-hydrogen torch has not been employed for welding armature shafts, but there seems to be no reason why it might not be used in shops owning one of these equipments. The secret of successful welding of steel with steel lies in the composition of the flux and control of the temperature below the critical point of the metal.

The Glasgow Strike

The sudden and complete collapse of the tramway strike in Glasgow, Scotland, three days after the men quit work was one of the incidents of the recent serious labor disturbances in Great Britain. Glasgow's municipal tramway system has long been held up as one of the best examples of municipal ownership of public utilities, but the complete tie-up of the system by a strike of the motormen and conductors proves that municipal ownership is not a panacea for labor troubles. There was another side of the strike, however, which is worthy of comment. The Town Council did not play politics and attempt to end the strike by acceding to unreasonable demands which some months before had been refused. Instead it upheld Mr. Dalrymple, the general manager of the tramways, and insisted that the tramway employees as public servants return to their public duties. With the public, which had been seriously inconvenienced, and the Town Council, which was not seeking political capital, against them, the strikers realized the hopelessness of the struggle and capitulated with a rush to get back their old places. It is pertinent to ask if the fact whether the tramways are owned by the municipality or by private interests should affect the principle laid down in Glasgow that the tramway employees are public servants and therefore are under an obligation to carry on their work loyally and without interruption. This obligation constitutes one of the conditions of employment in railway and every other public utility service no less than in the army, the navy or the police force. Recognition of this principle alike by the employees and by the meddling politicians of some of our American cities would go far toward preventing strikes of street railway employees.

The Philadelphia Announcement

The announcement just issued by the Philadelphia Rapid Transit Company to its conductors and motormen, and published in this issue, is a straight business talk on a subject of vital importance to both. There is too often a feeling among railway companies and their men that questions concerning labor organizations and wages cannot be mentioned above a whisper. But there is no part of the work which is more intimately connected with the efficiency of the service or is more important to the general public. The policy of the Philadelphia Rapid Transit Company in this matter is that it has no objection to labor unions of themselves. It has carried this point so far as to agree to pay the union dues of all of its men and thus relieve the unions from the trouble of collecting assessments, provided such a policy should be desired by a majority of the men. The only return which it asks of them is their efficient service and this, it believes, cannot be secured so long as there are two hostile unions. On the other hand, it is perfectly willing to treat with one union whether known as

the Amalgamated association, the Carmen's union, the Red Ribbon order or the Federated league, and it is willing to insure the membership of all of its new employees in such organization by requiring them to join as a condition of their engagement. All that it asks is that the union, whatever its name, should be the choice of the employees as a whole and that the officials of the order should have sufficient hold over the members to carry out all agreements which they may make. Coupled with this announcement is a proposition on the part of the railway company to establish a co-operative arrangement which will guarantee to the men an increase in their wages corresponding with an increase in the gross amount of business done by the company. The proposals are novel certainly so far as a large company is concerned, and as they have been proposed at a time of industrial peace in Philadelphia they should receive consideration on their merits.

Popularizing Data on Accidents

Electric railway companies have long given attention to methods for reducing accidents by training their employees, but determined efforts to secure the co-operation of the public are comparatively recent. It is interesting that work of this character, although along different lines, is being conducted simultaneously here and abroad. An instance of the European campaign is the data on German street railway accidents, abstracted in this issue and now on exhibition at the Dresden International Exhibition of Hygiene. These statistics, which were emphasized by means of large colored charts, overwhelmingly confirm the contention that the carelessness of the public is responsible for most of the street railway casualties. The actual figures quoted are 94 per cent in the case of passengers and 94.8 per cent in the case of non-passengers. There is good reason to believe that a like compilation made in this country would show even higher percentages, owing to the acknowledged greater recklessness of the average American whether walking or riding. The distribution of accidents by months is somewhat paradoxical, because it shows that accidents to passengers are fewer in winter than at other seasons. This unexpected condition shows that dangerous weather conditions are apt to be more than offset when they are so very bad as to make caution imperative. Perhaps the most striking data in the report are those relating to accidents to children. The vast number of young lives lost proves more forcibly than any extended treatise that city children must have better and safer playgrounds than the streets. In a few American cities some progress has already been made in the construction of public playgrounds, but much remains to be done. Electric railway companies could well encourage the playground movement even to the extent, when feasible, of offering the temporary use for this purpose of their own idle land. The greatest opportunity, however, lies in the instruction of the community as a whole and this has been carried on successfully in a number of places. Experience has shown that it may well be begun in the schools, and one reason for this is that it is more easy to teach a child, even in important matters of this kind, than an adult. An older person finds it very difficult to change a long-acquired habit such as getting on and off the cars while in motion.

HIGH VOLTAGE AND THE FIRE HAZARD

The use of very high voltages is spreading country-wide. The benefits of cheap electricity distributed sometimes through more than one state from a single efficient generating station are so great that he would be rash who would set a limit to the expansion of any system or group of transmission lines acceptably serving the public. Grave responsibilities are joined to the operation of lines carrying currents at the potentials now reached, and the art deserves no small amount of credit for the manner in which human life is safeguarded in modern power-plant and substation construction.

Protection against fire has also received the deep study of designing engineers, particularly in the construction of substations in which currents of very high potential are transformed into those of moderate or low voltage. In accomplishing this the two important features of adequate insulation and assured mechanical strength should receive the fullest amount of consideration. Since it makes practically no difference in the electrical behavior of a line whether the circuit is carried directly into a transformer house or oil-switch building or dead-ended on a suitable structure without, with taps to the controlling apparatus, one finds the latter practice growing in favor everywhere. At the substation no less than on the transmission line, therefore, we see a first-class opportunity to utilize strain insulators, jumpers, disconnecting switches, angle-iron framing and other devices planned to secure flexibility of operation without foregoing the standards of mechanical strength which mean so much in dealing with ultra-dangerous voltages.

If land is cheap where such installations are made, too much emphasis cannot be laid upon the importance of allowing ample room for the operation of the equipment. Old as this plaint may seem, it will be seconded without a dissenting voice by the men who spend from eight to twelve hours per day in responsible charge of the service passed through such buildings. By cramping the apparatus into a small area the cost of the outfit per kilowatt may be cut down to half what it must be where liberal space is set aside for handling the plant, but when lightning gets by the arresters and starts an arc between the transformer terminal and the case, with the nearest wall within arm's length and scarcely room available in which to turn around, the chances of trouble from fire or accident are considerably increased. The cost of wiring is less in a small substation, but such economy is but poorly gained if insufficient space is allowed for the apparatus.

A pretty good specification for a fireproof high-voltage substation can be written along the following lines: Incoming circuits dead-ended on suspension insulators, with disconnecting knife switches and taps which provide for the by-passing of the substation if necessary; lightning arresters in separate wing or building of brick or concrete construction; oil switches, if for extreme voltages, also mounted in separate structure containing no inflammable material; rolling steel doorways with padlocks for all independent structures carrying high-potential wiring; wired-glass windows and skylights, concrete floors, brick or concrete walls and roof of tile or reinforced concrete

slabs; all interior lower-tension wiring in conduit, with remote control of oil switches for incoming and outgoing services; marble or slate busbar compartments with approved insulating barriers; carriage, track and winch for removing transformers; and the allowance of extraordinary space for the clearance of all high-voltage leads. Let an installation be made in this wise and the fire risk will be cut down to an amount that few owners of existing plants of older design realize.

CLASSIFICATION OF CAR FAILURES

The head of the mechanical department of every electric railway company is confronted with the choice of two policies in the maintenance of his equipment. His ultimate purpose, of course, is to keep the total cost of inspection and maintenance as low as possible and he may decide to do this by adopting either a long or a short interval between the times of periodical inspection. But whichever plan be adopted it is perfectly safe to say that on all roads running different types of equipment an arbitrary and universal period of this kind for all cars, based on time or mileage, will not lead to the best results. There is hardly a city electric railway anywhere which does not have to maintain apparatus of greatly varying reliability and there is an evident economic advantage in determining in advance and as closely as possible the safe running limits of each class of equipment. Some instances of the truth of this statement were clearly brought out in a paper analyzing the methods of reducing car failures in Syracuse, read at the Cooperstown convention of the Street Railway Association of the State of New York by J. P. Barnes, electrical engineer Syracuse Rapid Transit Railway Company. Thus he quoted the extension on that system of the lubrication interval of two modern motors from 500 miles to 3000 miles. Other examples of this kind were noted in the April 1 issue of the *ELECTRIC RAILWAY JOURNAL*, which contained an article on the Syracuse shops which are used jointly by the Syracuse Rapid Transit Railway Company and the Oneida Railway Company.

While the Syracuse practice is to be commended as assigning to each class of rolling stock an efficiency factor which really means something, it would be very desirable to supplement these data by a more definite understanding of such terms as "car failure," "car defect," "pull-in" and "run-in." These phrases do not mean the same thing on different properties, and even on the same railway the comparative figures of the several carhouses will be misleading if there is no check against the natural tendency of foremen to suppress reports of minor troubles. Hitherto this uncertainty as to the meaning of terms and the accuracy of records has made the monthly car defect chronicle of little value for comparison between companies. For all that it has proved very valuable in arousing among the division heads on individual systems that spirit of emulation which leads to the highest attainable efficiency in their work.

We believe that a more exact basis for general comparisons will be found, first, when the companies are willing to state the amounts actually spent for inspection and repairs per car per month or per car mile operated; second,

when the records make a sharp distinction between a breakdown which requires a car to be helped back to the car-house and a failure which merely causes inconvenience in operating. Monthly cost records of the kind mentioned are kept by the Third Avenue Railroad, New York, and these are classified according to types of motor equipments, as reproduced in the *ELECTRIC RAILWAY JOURNAL* for May 20. Like practices are followed by some other companies. We cannot, however, recall any street railway whose reports are made out in line with the second suggestion. Would not the situation be clearer if a "pull-in" was defined as a car which must be taken out of service because it cannot proceed by means of its own apparatus, a "run-in" as a car which must be run into the depot because of some equipment trouble which is severe enough to prevent the maintenance of schedule speeds, and a "defect" as any other cause not embraced in the other definitions? Furthermore, following the usage of the Brooklyn Rapid Transit System, all troubles should be broadly divided into "electrical," "mechanical," and "causes beyond the control of the car maintenance department." Thus a pull-in might be due to motors (electrical), brakes (mechanical), broken trolley pole (a defect often due to the line department), etc.

It is not asserted that these definitions would cover the ground fully, but if they were applied and studied in connection with maintenance costs it would be possible to secure a much fairer basis of comparison than is now the case. Certainly, it would be absurd to judge on any other basis the efficiency of two car maintenance departments when one of them utterly ignores in its defect records such items as worn-out register cords, broken glass and other comparatively inexpensive items, while the other conscientiously notes everything even at the risk of getting a bad reputation among other companies.

IMPROVING OLD PLANTS

From the engineering point of view old and relatively inefficient power plants are of lasting interest on account of the opportunities for betterment work which they almost always offer. Rehabilitation is a task beset with many difficulties, particularly where depreciation has been permitted to flourish unchecked for many years. Much discouraging work must be done in attempting to raise the efficiency of a station which would be condemned as obsolete by every standard of modern practice, but there is a brighter side to the problem when it is viewed from the standpoint of the effect of even minor betterments upon the assorted assemblage of apparatus which usually comprises installations of extreme age. There are many cases where the scrapping of a plant and the installation of an entirely new equipment might really be justified, but where, on account of limited funds, such improvements must be postponed indefinitely the best that can be done is to modernize the existing apparatus arrangement, cut down sources of loss so far as possible and frequently readjust auxiliary equipment and relocate machinery for more advantageous operation.

Betterments of the above character are usually made in a piecemeal fashion, but this is no particular disadvantage, because the effect of each improvement may be more readily gaged where the work is carried out in single steps.

They can usually be inaugurated in every department from the coal-handling system to the switchboard wiring. Many of the older stations were built in the days when hand firing was practically universal and when two or three handlings of the fuel by barrows manually operated were required between the storage bins and the furnaces. While local conditions dictate the remedy in each case, the general run of improvements includes such work as the installation of narrow gage tracks for the easier handling of coal in small cars, the change of grades to utilize gravity to better advantage in the delivery of fuel to the boiler room, and the installation of small telfer hoists to increase the speed of fuel delivery and reduce the cost of handling per ton. Auxiliary service has been bettered by the relocation of open heaters to give a substantial head in the delivery of water to boiler feed pumps, thereby saving the pumps from possible failures and breakages, with the delivery of water to the boilers at a higher temperature; the inspection and replacement of auxiliary steam pipe covering; installation of by-passes around heaters, stoppage of live steam leaks, examination of losses in pressure in steam piping which feeds main units and auxiliaries, and in the improvement of draft conditions.

In many old stations which are still in service, particularly in the less settled portions of the country, individual stacks are in use in connection with boiler units or batteries. Increasing loads have been handled in such cases either by installing forced or induced draft fans or by making the stack higher. In one instance the steam output of a plant carrying a railway, lighting and power load was increased enough to yield 400 hp additional capacity in boiler service by lengthening the steel stack serving one boiler battery 50 ft. By raising the height of an open feed-water heater 15 ft. above the pumps the temperature of the water supply to the boiler plant was raised from 180 deg. to 212 deg. Other improvements included the installation of new governors on the engines, which facilitated the operation of belted alternators in parallel, and the efficiency of the station was somewhat increased by the simplifying of the switchboard wiring, the original layout being so complex that rapid handling of units was out of the question in times of emergency.

Many plants of the older type carry a diversified load, but are unable to take full advantage of it on account of the inflexibility of the generating equipment. The railway service demands direct current at 550 volts to 600 volts, and other power business is usually handled by separate machinery which cannot be utilized in car operation without the employment of motor-generator sets or rotary converters. It is important to operate the principal steam-engine or turbine units within their economical range of steam consumption, and where separate engines must be run to handle the railway load the fuel consumption of the plant tends to rise unduly unless the power demand of the railway system is considerable. In not a few cases it pays to install a motor-generator equipment to eliminate the separately driven railway generators and to operate the entire plant as a unit on the steam end, rather than to attempt to secure efficient service from engine and generator units which must be operated in isolated fashion. Just as in the central station system steady and long-sustained

loads are desirable, so is it important in plants serving a diversified territory, including street railway, power and lighting business, to endeavor to obtain high load factors at the individual units, thus raising the load factor of the entire station equipment and improving its operating efficiency.

A NEW TYPE OF ELECTRIC LOCOMOTIVE

Elsewhere in our columns we present a brief account of the electric locomotives designed for use by the Paris-Lyons-Mediterranean Railroad, embodying principles of operation so radically new in practice if not in theory that they are worth serious and careful study. The fundamental peculiarity of the locomotives is that they are driven by continuous-current motors supplied with energy from a "permutator" carried on the locomotive and receiving high-tension alternating current from the working conductor. The plan is akin to that proposed some years ago for the utilization of the Ward-Leonard control by furnishing a locomotive with a motor-generator or synchronous converter supplying power to continuous-current driving motors.

The present machine of M. Auvert, who is chief engineer of the Paris-Lyons-Mediterranean Railroad, differs from this primarily in the substitution of the very ingenious permutator, of which M. Auvert is one of the inventors, for the heavy and somewhat cumbersome motor-generator or synchronous converter. The permutator has already been described in these columns, but it is worth while here briefly to notice it.

The permutator is in effect a synchronous converter in which the magnetic field is rotary in the sense in which it is rotary in an induction motor and in which rotating brushes follow this field around a commutator connected to the secondary winding. It is physically much like an induction motor with the rotor fixed and connected to a commutator and brushes circulating around this commutator synchronously with the field. The current derived from the permutator is not a rectified current, but a current commutated in the same sense as in a direct-current generator, in which, of course, the currents in the armature are alternating. Its efficiency is high, in all probability materially higher than that of the ordinary synchronous converter, inasmuch as the moving parts are light and the work done upon them is correspondingly small. Furthermore, the permutator has a material advantage in that it delivers to the commutator a secondary voltage determined by the ratio of the primary and secondary windings, instead of requiring an independent alternating-current transformer and elaborate regulating apparatus, as does the synchronous converter. The chief question regarding the permutator has been the success of the commutation, and this seems now to be satisfactorily established. The rotating brushes are, of course, mechanically speaking, rather a nuisance, but the gain in weight by the use of the permutator is so considerable as to render this objection comparatively insignificant.

The method of control employed in the present locomotives is highly ingenious, consisting of the control of a differentially wound motor brush-shifter by the conjoint

effect of the current in the main motors and current controlled by the motorman. The brush-shifting control would seem rather audacious on account of the possibility of sparking, but the fact that it has been adopted in two large locomotive units would indicate that the sparking difficulty, as in the case of ordinary commutating single-phase motors, has been brought within reasonable limits. A good idea of the characteristics of the new locomotives in connection with more familiar types may be had by comparing M. Auvert's figures for his new 2000-hp machine with the single-phase locomotive of the same output built for the Lötschberg line by the Oerlikon Company. The new Auvert locomotive will not exceed 96 tons; the Lötschberg locomotive weighs 90 tons. The tractive effort at the wheel treads is 12,800 kg in the former and 13,000 kg in the latter, thus being practically the same at practically the same speed of 42 km per hour.

The maximum speed of the Auvert locomotive is 75 km per hour as against 70 km for the Lötschberg machine and the former has one 2000-hp motor as against two 1000-hp motors in the other case. It will thus be seen that for all practical purposes the two locomotives are similar in weight and output, as indeed they should be, since each must have transformer capacity sufficient for its motors, this capacity being in the one case in the permutator and in the other in the ordinary regulating transformers.

In both locomotives the motors are mounted above the axles and are connected to the driving wheels by connecting rods. In this respect the latest Auvert machine differs from the one originally designed and built for operation with permutators. No explanation is given for this change and it may be that it was dictated by the general preference for side-rod locomotives, which are the characteristic type of the Continental builders at present. At the same time, it is interesting to note that one of the advantages supposed to be possessed by direct-current motors, that of such compactness that motors of large power may be applied directly to the axles, has been abandoned in this case. It may not be amiss to call attention here to the fact that recent improvements in motor design may change the relative advantages of side-rod connection as compared with direct connection. With the modern methods of insulating and ventilating motors the limits of space for the motive power between the axles and under the locomotive floor are not so formidable as they were, and if a determined effort was made to see what could be done in the way of suspension of large motors from the axles we believe that the results would exceed anything heretofore attempted.

The practical question in comparing the new system with the ordinary single-phase plan is whether the advantages of a continuous direct-current motor over a single-phase alternating-current motor in general operating qualities are sufficient to compensate for the somewhat greater complication involved by using a permutator rather than a static transformer with regulating apparatus, and this question is one which cannot be answered except after considerable experience. At all events the new permutator locomotive appears to be an entirely novel machine possessing some very interesting qualities, while not yet sufficiently tried to determine its ultimate value.

New Shops at Rockford, Ill.

These Shops Are an Example of Modern Standard Shop Construction, Special Attention Being Paid to Fireproofing and Ventilating Features.

The Rockford & Interurban Railway Company, Rockford, Ill., has just completed a new fireproof shop building, the design of which is of interest because of the structural features and the operating methods employed. The shop is located on a fourteen-acre tract of land north of the city on the interurban division running to Beloit. This large



Rockford Shops—Skylights and Ventilators in Roof

area will be used partly for a general material yard for the city and interurban system, which has 107 miles of track and operates 103 motor cars. W. C. Sparks is general manager of the property and L. M. Jacques is master mechanic. The accompanying engravings show the general features of design and the interior and exterior appearance of the new shop building.

GENERAL ARRANGEMENT

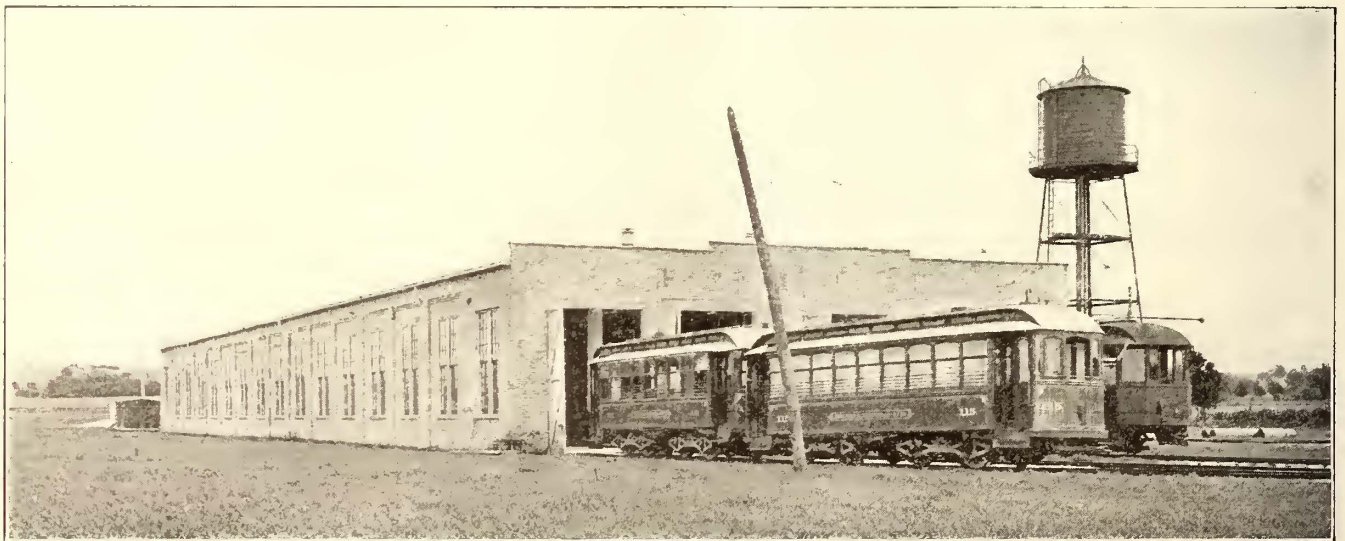
The new shop is a rectangular-shaped structure with a frontage of 75 ft. and a depth of 256 ft. It incloses three

the building, are several utility rooms. Beginning at the front end of the building these rooms are as follows: Office, 24 ft. x 16 ft.; toilet room, 12 ft. x 24 ft.; armature room, 20 ft. x 24 ft.; machine shop, 80 ft. x 24 ft.; carpenter shop, 48 ft. x 24 ft. With the exception of the machine and carpenter shops the subdivisions just mentioned are separated from the main shop by fireproof partition walls. All of the tracks extend through the building, connecting at the front with a ladder track leading to the interurban line and connecting at the rear with storage tracks leading to the material yard.

CONSTRUCTION MATERIALS

All foundation walls and piers are made of concrete composed of a 1:3:5 mixture of Portland cement, sand and gravel. The superstructure consists of a reinforced concrete framework and roof, with brick curtain walls. This structure was designed to carry under test a uniformly distributed live load of 30 lb. per square foot, in addition to three simultaneous concentrated loads on each roof beam adjoining the roof panel under test, the concentrated loads to be 9500 lb. at the center of the panel and 13,500 lb. each, placed at each end of a roof beam and 3 ft. 6 in. distant from a column center. The interior division walls and the exterior curtain walls are built of first-class, hard-burned common brick laid with lime mortar gaged with natural cement and having a header course every sixth course.

The floors throughout the entire building are of concrete 4 in. thick except in the main repair-shop bay and machine shop, where they are 6 in. thick. The concrete used in the floors is composed of one part of cement, three parts of sand and five parts of gravel, and has a top finishing coat 1 in. thick marked off in squares. In the wash room the concrete floor between the rails of each track is sloped to drain openings and the floors of the two track pits also are



Rockford Shops—Front View Showing Water Storage Tank

tracks extending from end to end of the building and spaced with minimum track centers of 14 ft. 6 in. The largest subdivision is a general repair and truck shop, 143 ft. long by 49 ft. 10 in. wide. At the rear of this general repair shop is a paint shop, 32 ft. 6 in. wide and 112 ft. long. A track aisle leading from the general repair shop extends along the interior partition wall of the paint shop. Facing this track, which is continuous throughout the length of

pitched to center drains. The car pits are of concrete construction waterproofed with Hydrex felt in combination with Hydrex compound and guaranteed by the contractor against leakage. All parapet walls are coped with vitrified soft-glazed tile coping laid in Portland cement mortar. The roof is protected by a four-ply tar-and-gravel covering.

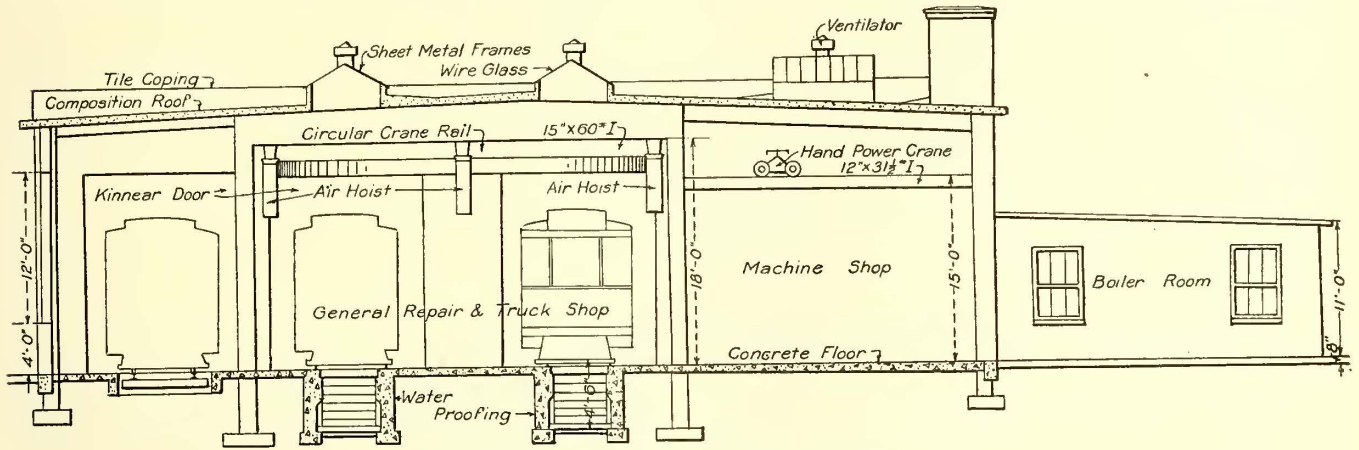
Daylight illumination in the different shop departments is furnished by eighteen skylights, each 6 ft. x 12 ft. These

skylights have metal frames inclosing wire glass and each skylight is surmounted by a Kernschen ventilator designed to withdraw a continuous current of air from the building.

The only combustible materials in the entire shop structure are the wooden window sash, the maple floor in the master mechanic's office and the exterior doors. All interior doors are made of fireproof material. Double-sliding, tin-clad fire doors with automatic release have been installed

REPAIR, TRUCK AND MACHINE SHOPS

The general repair shop and the machine shop are designed to handle the heaviest work which is required by the interurban equipment of this road. Two of the three tracks which extend through the general repair shop have pits extending the full length of the shop. The third track is floored with concrete. The two track pits have heavy concrete side walls in which are recesses inclosing lamps.



Rockford Shops—Cross-Section Through Center

at every opening in the interior partitions, except for the paint shop, where double Kinnear rolling steel doors have been placed at each of the two track openings. The pair of doors on the repair-shop side are hand-operated and those on the paint-shop side are equipped with automatic closing devices.

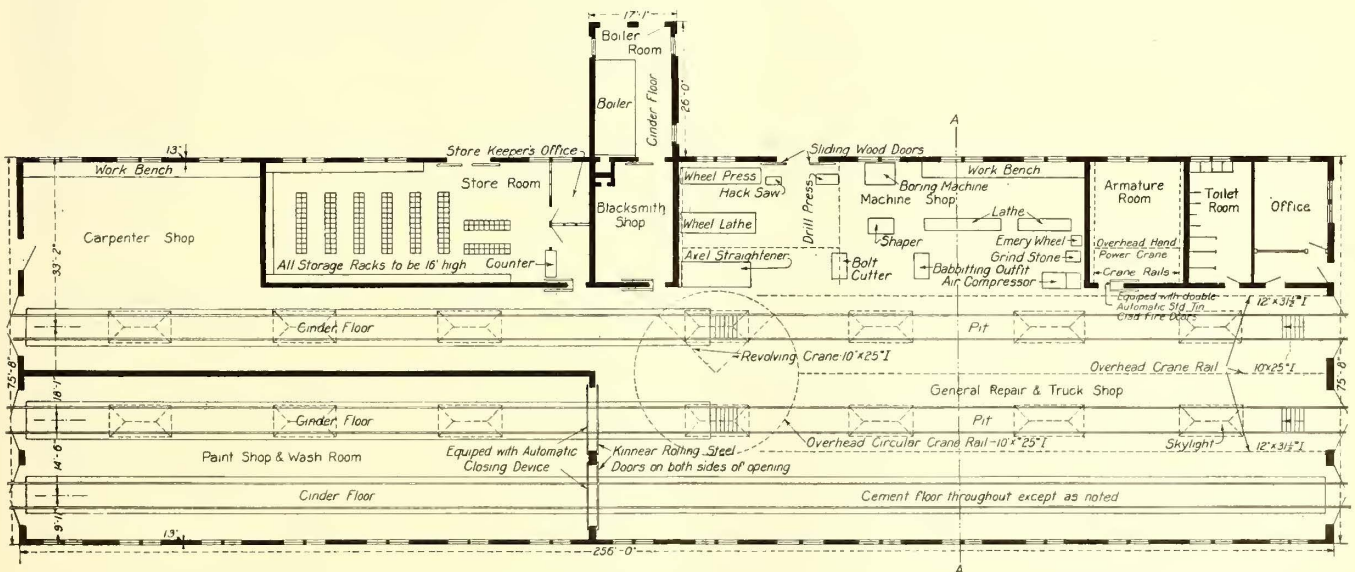
The sliding fire doors in the interior fire walls are made of three thicknesses of flooring laid diagonally and covered with No. 26 galvanized iron nailed in place. This iron is painted with one coat of Dixon graphite paint before being applied. The doors are hung on sloping tracks and are provided with counterweights, chains and fusible plugs.

After the building was completed the interior walls,

Cement steps are provided at both ends of each pit and the floors of each pit are sloped to three drain openings.

As will be noted from the illustrations, the main shop is served adequately by a system of air hoists with I-beam runways. Three runways extend the length of the repair shop and connect at the rear with a circular runway 32 ft. in diameter. The runways support trolleys carrying 14-in. air hoists of Northern Engineering Works manufacture. Each hoist is connected to the shop air supply by an armored hose. Two hoists are provided for each of the three longitudinal runways and two for the circle, in addition to a Triplex chain block, which is also worked on the circle.

The hoists have a lift of 4 ft. and are designed for



Rockford Shops—Plan Showing Air-Hoist Runways

columns, ceilings, etc., except in the office and toilet room, received two coats of white cold-water paint applied with a spray machine. The general paint work was done with the following materials: Asphalt paint, furnished by the Western Roofing & Supply Company; colors in oil, by the Sherwin-Williams Company; varnish, by the Murphy Varnish Company; Monarch whitewash, by George Fletcher & Company.

handling car bodies and truck parts. With these hoists and the arrangement of runways, as shown in the plan view, the usual operations of truck and body repairs can be handled conveniently with very little manual effort. The air-hoist equipment also provides for transferring heavy work from the general repair shop to the crane serving the wheel section of the machine shop, in which are located a wheel lathe, wheel press and boring mill, all driven by an

electric motor. Similarly the armature shop is served by an overhead crane with which materials can be transferred to and from the air-hoist runway in the main shop.

The supply of compressed air for general shop use and for handling water is furnished by an Ingersoll-Rand electric-drive 10-in. x 10-in. air compressor, provided with an



Rockford Shops—Circular Air-Hoist Track

automatic starting and stopping device. Air is stored in a cylindrical tank supported above the compressor.

PAINT, CARPENTER AND BLACKSMITH SHOPS

The paint shop has two through tracks with concrete floors sloped for drainage. The floor space of the paint shop is clear of posts and this section is particularly well lighted by seven groups of large windows and three skylights. It is of sufficient length to hold two large interurban cars on each track. At the present time all of the interurban equipment is being put through the paint shop and the colors of the cars are being standardized, using a light Pullman green with plain gold striping.

The carpenter shop, which is located in the rear of the



Rockford Shops—General Repair Shop

building, has an equipment of modern wood-working tools, all of which are driven from countershafts, which are in turn driven by an electric motor. The carpenter shop is separated from the rest of the shop by fireproof partition walls. A passageway for cars extends between the paint shop and the storeroom.

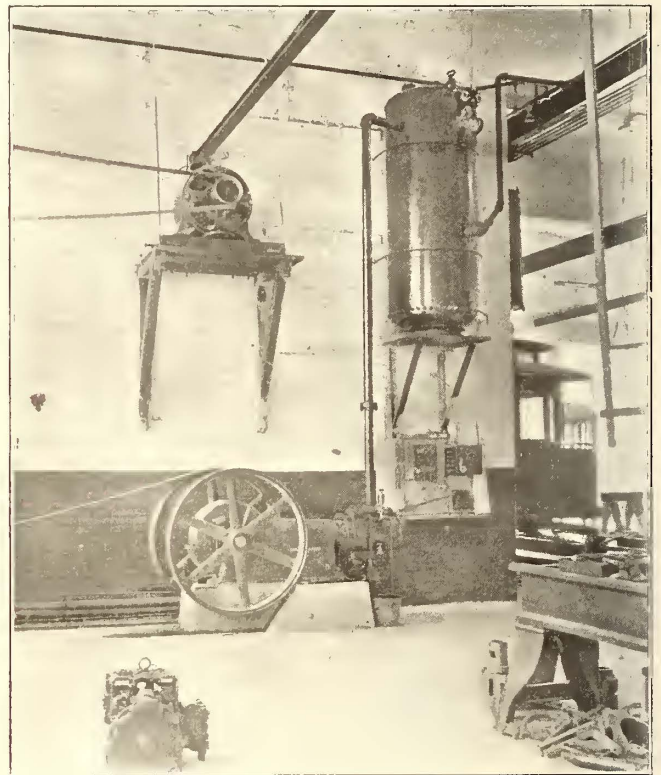
The storeroom has been fitted with wooden furniture and racks 16 ft. high. An office with high partitions and a delivery counter have been set off at the end close to the entrance to the general repair shop. A wide door through the exterior wall provides for receiving heavy materials direct from cars or wagons.

The blacksmith shop adjoins the machine and general repair shops and is entirely separated from these two sections by a fireproof wall having but one opening to the inside of the shop. A monitor skylight with two ventilators provides illumination for the blacksmith shop.

The shop toilet room is equipped with high-grade fittings designed for the convenience of the men. This equipment includes thirty all-steel lockers built by the Lyon Metallic Manufacturing Company.

HEATING AND FIRE PROTECTION

The new shops are heated by hot water provided by a boiler plant inclosed in a separate addition to the shop 17 ft. x 26 ft. in plan. This boiler house has storage space for coal. Its equipment includes a Kewanee low-pressure



Rockford Shops—Air Compressor and Tank

boiler and a centrifugal water circulation pump. The heater pipes throughout the shop generally are supported on the side walls. Radiators are provided in the offices. The heating pipes in the paint shop are supported overhead and each pit is provided with four coils on each side wall. The water supply is obtained from a deep well and water is stored in a 15,000-gal. wooden tank supported on a 50-ft. steel tower. Water is delivered to the tank from the well by an air lift taking its supply from the shop air reservoir. A 4-in. water main extends around the outside of the shop building and connects with four two-way hydrants. Hose connections are also provided in each of the subdivisions of the building. In addition to this fire protection the building is patrolled at night and records of the patrol are made with a Newman Clock Company's outfit.

The structural work of this building was designed by the Witherspoon Englar Company, Chicago.

A company has been formed to build an electric railway in the Crimea from Sevastopol via Yalta to Alushta, a distance of 85 miles.

Electric Locomotive with Permutators in France

This Locomotive Is Equipped with 600-volt Direct-Current Motors Supplied Through Permutators Which Convert the High-Tension Single-Phase Trolley Current.

Some particulars were published on page 1052 of the STREET RAILWAY JOURNAL for Dec. 1, 1906, of the Auvert & Ferrand system of converting alternating currents to direct currents by a machine called a permutator. A permutator is somewhat similar in electrical design to a rotary converter, except that all of the parts are stationary except the brushes, which are revolved about the commutator by an auxiliary synchronous motor so that they keep constantly in step with the magnetic field which revolves around the stationary core. A number of advantages are claimed for this machine over the rotary converter. One is a reduction of bearing friction, and another is greater freedom in design, because no provision has to be made for a heavy rotating element. Mr. Auvert, one of the inventors of the permutator, is chief engineer of the Paris-Lyons-Mediterranean Railroad, one of the principal lines in France, and the machine was designed primarily for use on electric locomotives where the trolley current would be single-phase and the equipment of the locomotive would be direct-current motors. Since the publication of the article mentioned, the Alioth Electric Company of Switzerland has constructed a 150-ton electric locomotive on this principle for the Paris-Lyons-Mediterranean Railway. Recent tests with this locomotive are described in an article by Mr. Auvert in the *Revue Générale des Chemins de Fer et des Tramways*.

The design of the locomotive is shown in the accompanying engravings. It is of the double-unit type, each unit having a bogie truck with wheels 1 m in diameter, and two driving wheels 1.5 m in diameter. On the framework of the locomotive are mounted the following:

One transformer for furnishing the alternating current necessary for the synchronous motors which operate the permutators and for a small auxiliary motor-generator.

One automatic high-tension switch for this transformer.

One main transformer for the permutators.

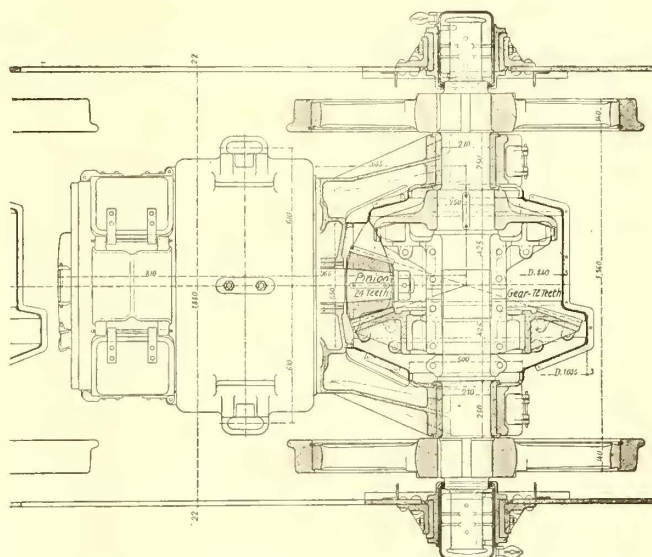
One automatic high-tension switch for this transformer.

One direct-current circuit-breaker.

Two permutators with brushes capable of being revolved in either direction by a synchronous motor.

graph, the two on each half unit being connected in parallel. Each half unit is complete in itself and is identical in equipment with the other. The two units are coupled together at the cab-ends.

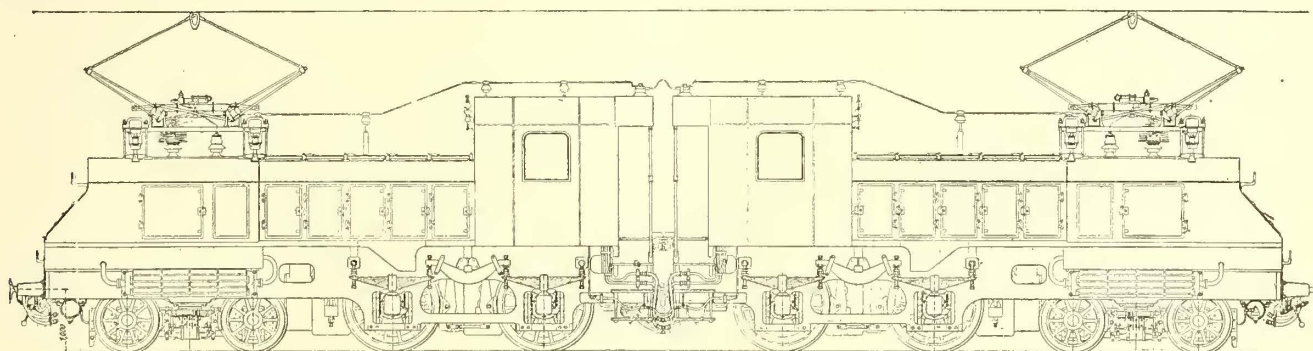
The weight of the two complete half units is 136 metric tons (or 149.6 tons of 2000 lb.) divided 18 metric tons on



P. L. M. Locomotive—Plan of Motor, Showing Method of Gearing to Axle. (All Dimensions Are in Millimeters.)

each driving axle and 16 tons on each bogie truck axle.

Each driving axle is driven by a 300-volt, direct-current, six-pole, series motor having a 1-hour rating of 400 hp at a speed of 650 r.p.m., corresponding to a speed of the locomotive of about 63 km (40 miles) per hour. The two motors of each half-unit are connected in series. The armatures of these motors are not mounted parallel to the driving axle but are at right angles thereto and are connected to the driving axles by bevel gears as shown in one of the draw-



P. L. M. Locomotive—Side View of Double Unit Permutator Locomotive

One air compressor equipped with a single-phase synchronous motor.

One auxiliary motor-generator for starting the synchronous motors of the permutators and providing direct current for the auxiliary equipment.

The apparatus for the control of the collectors, high-tension switches and the speed of the driving motors is located in the cab of each locomotive.

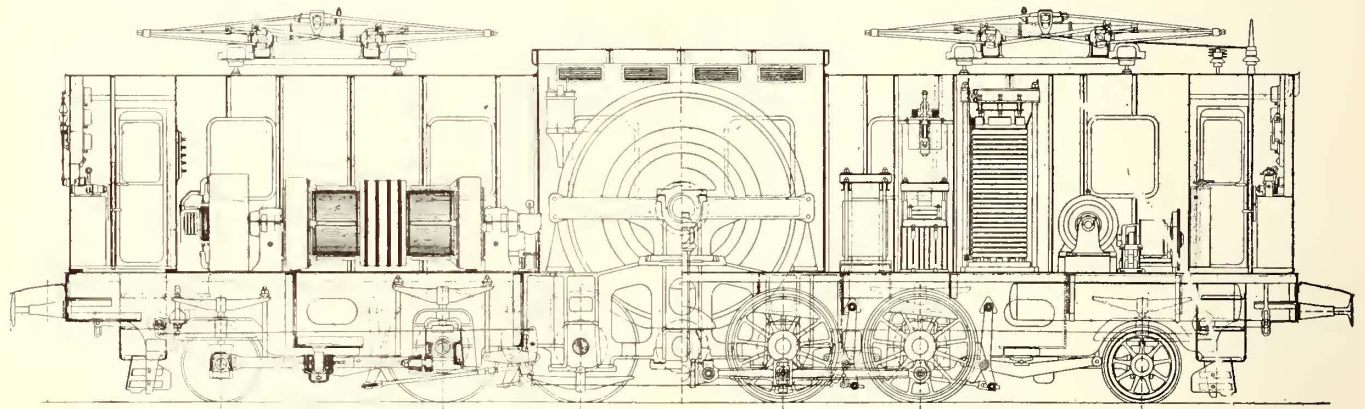
Each half unit is equipped with a Westinghouse panto-

ings. Each motor is supported over its center of gravity by a yoke with spiral springs.

PERMUTATORS

The permutators, of which there are two on each half-locomotive, differ somewhat from those first brought out by the inventors and described in the article previously mentioned. The two direct-current commutators of each permutator are connected in series instead of in parallel, as in the first machines. The terminal leads of the two per-

mutators are also connected in series. The maximum emf on each direct-current commutator is therefore 150 volts, making a total emf for each half-locomotive unit of 600 volts, when the revolving brush holders are in the position of maximum angular displacement. The normal direct current output is 1200 amp, but this can be exceeded for a short time. The angle of brush displacement on the permutators is regulated by means of a pilot motor, the armature of which is actuated by a small current furnished from the auxiliary motor-generator already mentioned. The field circuit of this motor consists of two windings. One is a fine wire coil, receiving current from the motor generator. This current can be varied in amount by the motorman. The second winding on the pilot motor consists of four turns of a conductor of large section, traversed by the current supplied to the driving motors. The mmfs of the two windings are in opposition. If the ampere-turns in the fine wire circuit are greater than those in the coarse wire circuit, the armature of the small motor will turn so as to increase the angle of displacement of the brushes, and thus increase the amount of direct current taken from the commutator of the permutator. As this current increases the field of the pilot motor becomes weaker and the motor will stop, and when the circuit from the main circuit completely neutralizes that from the motor-generator the pilot motor will stop. If the main circuit current should still further increase, the pilot motor would turn in the opposite direction.



P. L. M. Locomotive—New Type with Single Motor and Connecting Rods

Hence the motorman, by regulating the current in the fine wire coil, controls the current in the driving motors. This system of control permits a smooth acceleration, because the tractive effort is kept constant during the whole period of acceleration. It also has the advantage of automatically limiting the load on the driving motors.

The exciting circuits of these pilot motors in the two half-units of each locomotive are in series, so that they move in synchronism and provide multiple-unit operation of the two half-units.

REVERSING

There is a reversing switch on each half-unit. These switches are operated by compressed air and are interconnected so that they can be operated from either cab. They are also interlocked mechanically with the apparatus for varying the angle of displacement on the permutators, so that it is impossible to reverse the locomotive until the brushes are brought back to the position which corresponds to that of minimum voltage and the current in the permutators has been cut off.

MISCELLANEOUS EQUIPMENT

The high-tension switches are operated by distant control by compressed air. Compressed air is also used for raising and lowering the pantographs, although the pressure of the collector shoes on the overhead wire is supplied entirely by springs.

SINGLE-PHASE CURRENT

The single-phase current is supplied at 25 cycles and

11,500 volts by an overhead catenary. The return circuit is by the rails, which are connected every 150 m (500 ft.) to a return circuit wire of 60 mm² (120,000 circ. mils) section carried on the poles.

TESTS

Some tests of this locomotive were recently conducted on a section of track 7.3 km (5 miles) in length between Cannes and Grasse. The maximum grade was 2 per cent. A dynamometer car was used between the locomotive and the trains, which in the three tests run weighed 198 tons, 245 tons and 246 tons, exclusive of the locomotive. These tests showed (1) a rapid and constant rate of acceleration and (2) a ratio between the mechanical power applied at the peripheries of the wheels and the high-tension power, at full speed, of from 78 per cent to 80 per cent.

The report says further that operation of the permutators, when tested at the shops of the manufacturers as regards efficiency and commutation, had proved satisfactory, but that there was some question as to whether they and the synchronous motors would give equally good results when subject to frequent fluctuations in frequency and voltage. No trouble, however, was found. This may in part have been due to the use of very powerful damping devices connected electrically between the armatures of the two synchronous motors, so that if there was any hunting it was synchronous and did not disturb the operation.

It was also found that considerable tractive effort could

be obtained from the locomotive while it stood still, and that the locomotive could exert this effort for some time without any danger to the electrical apparatus. At 11,500 volts and 33.5 amp, corresponding to 385.25 kva and 200 kw, the tractive effort developed was 3875 kg or 8525 lb. At 10,950 volts and 53 amp, corresponding to 580.35 kva and 405 kw, the tractive effort developed while the locomotive was still was 9800 kg or 21,560 lb. The power-factor in the first case was 51 per cent and in the second case was 69 per cent. In both instances the tractive effort noted was excited for two minutes.

NEW LOCOMOTIVE

The results obtained were so conclusive as to the flexibility and high efficiency of permutators for single-phase railway service that Mr. Auvert has designed a new locomotive, embodying the general principles of the present locomotive, but with improvements based upon experience.

This new locomotive is illustrated above. It will have a normal rating on the hourly basis of 2000 hp; a tractive effort at the wheel peripheries of 12,800 kg (28,160 lb.), and a speed at this tractive effort of 42 km (26 miles) per hour. The maximum speed is 75 km (47 miles) per hour.

Each locomotive consists of a single unit supported on four driving axles and two pony axles. Each pony axle is connected to its nearest driving axle by a Zera radial gear. The locomotive will be equipped with only one 2000-hp d.c. motor, which will be connected to the four driving axles by a countershaft and connecting rods. The motor is in the

center of the cab, where it is easily accessible. It is supplied with current from one double permutator and one transformer, which are designed for 15-cycle single-phase current.

The permutator will have four sets of brushes as in the test locomotive, but on account of the low frequency its peripheral speed will not exceed 17 m (56 ft.) per second, which is an important advantage from a practical standpoint. A small auxiliary permutator for automatic starting replaces the motor-generator on the test locomotive. The number of parts on this new locomotive is, therefore, less than one-half of those on the old locomotive, and the length of the body is considerably reduced.

In addition, this plan avoids the necessity of multiple-unit control between the apparatus for changing the direction and maintaining the angle of displacement between the two brushes as in the trial locomotive; hence the accessory equipment is much simplified. This effected a considerable reduction in weight. The total weight of the new locomotive will not exceed 96 metric tons (105 tons of 2000 lb.), of which 72 metric tons will be on the driving wheels and 24 tons on the pony wheels.

ADVERTISING FOR TRAFFIC BY THE LONDON UNDERGROUND RAILWAY

An account was given in the *ELECTRIC RAILWAY JOURNAL* for Dec. 3, 1910, of the large posters and other advertising literature used by the Underground Electric Railways Company, Ltd., of London, to stimulate traffic on its lines. A great deal of attention is given in these posters to their artistic design and coloring. The latter, of course, cannot be reproduced in the photo-engravings. Another

Three recent advertisements are presented herewith. One relates to Burnham Beeches and Stoke Pogis Church, both near London and famous through Gray's "Elegy," and both easily accessible from that city by way of the Underground. A second advertisement called attention to the facilities possessed by the road for those who wished to view the coronation ceremonials, and the third reminds the seeker for recreation of the many country and shore resorts which can be reached by the lines of the company. The originals of the posters reproduced measure 24 in. x 40 in., and are pasted on billboards which are mounted inside or just outside the station entrances.

In connection with the coronation ceremonies the company issued for distribution a number of weeks prior to that event a complete program of the ceremonies, with a map showing the routes of the processions and the special train arrangements that had been made for the different days of the celebration.

LEAFLETS FOR ADVERTISING

Another series of advertising was begun by the company about the first of the year. This consisted of leaflets 5 in. x 8 1/4 in., printed on brown manila paper and issued weekly. The wording is appropriate to the season. Thus that issued on Jan. 4, 1911, during the holiday season, was entitled "The Days of Our Youth." It gave a short sketch of the pantomimes and fairy plays then being given at the different theaters. The leaflet of Feb. 8 reminded the reader that Feb. 7 was Dickens' birthday. It then told of several streets and localities in London which had been made famous by Dickens and the way in which they could be reached by the underground railway. With the coming of spring, country walks were described, and, of course, the occurrence of athletic events and contests was advertised. Notices of such events do not predominate, how-

UNDERGROUND

BURNHAM BEECHES

STONE POGIS CHURCH

A DRIVE IN THE COUNTRY

ON THURSDAYS AND SUNDAYS A BRAKE WILL LEAVE Uxbridge Station at about 3.0 p.m. FOR BURNHAM BEECHES returning by way of The Black Park & Stoke Pogis RETURN FARES 2/- (Box Seats 3/-)

A SPECIAL TRAIN RUNS FROM MANSION HOUSE ON THE DISTRICT RAILWAY IN CONNECTION

	THURSDAYS	SUNDAYS
MANSION HOUSE DEP.	2.7	1.46
Charing Cross	2.6	1.51
Victoria	2.10	1.55
Paris Court	2.19	2.4

SPECIAL CHEAP RETURN TICKETS ON SUNDAYS

UNDERGROUND

RIGHT ON THE SPOT BY **UNDERGROUND**

UNDERGROUND

TOO MUCH OF A GOOD THING

EVERY VARIETY OF PLEASURE RESORT.

PARKS & PLAYGROUNDS
RIVER-SIDE
COUNTRY-SIDE
SEASIDE
PALACES & GARDENS.

Recent Poster Advertisements of London Underground Railway

feature of all of the advertising of the company is that, as a rule, each poster or other publication, in addition, advertises some special service or has been prepared for some special class of passengers. Many of the advertisements, for instance, are intended to appeal particularly to sightseers, of which there are always, of course, a large number in London.

ever, in the advertising publications of the London line as they would be likely to in similar traffic literature in America. Instead the advertisements almost, if not quite, as frequently refer at length to exhibits at the art galleries or at the national museum and even to horticultural displays at the public gardens and similar exhibitions of public interest.

San Francisco Method of Welding Broken Armature Shafts Without Removal

A Cheap and Successful Method Which Can Be Used in Any Shop of Moderate Size.

Until the advent of modern welding systems it was not practicable to repair broken armature shafts. In fact, the only remedy was to substitute a new shaft. This meant that the leads had to be disconnected, the commutator drawn off, the coils removed and, in the case of some armature cores, all the laminations taken off one at a time. Of

This surprising improvement has been obtained by using a fuel oil fire under compressed air of 50 lb. pressure instead of the usual coal fire under the draft of a centrifugal blower. The details of the process were worked out by J. M. Yount, master mechanic of the company, and his assistant, W. Hendry, who is a specialist in ironwork.

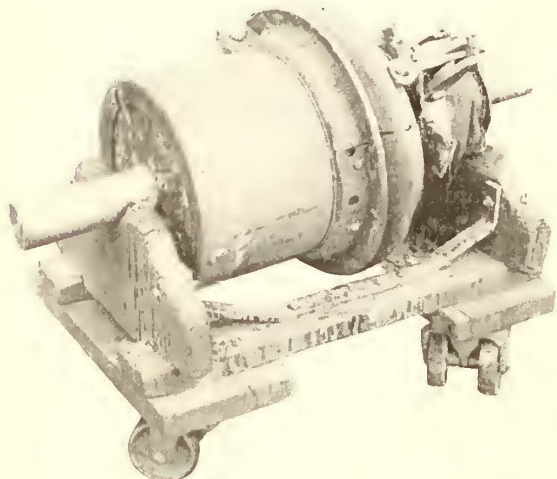


Fig. 1—San Francisco Welding—Ready for Heating

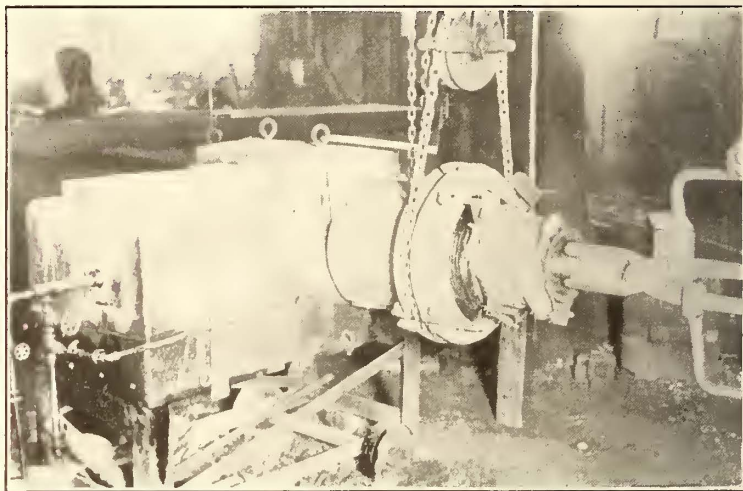


Fig. 2—San Francisco Welding—Complete Armature with Broken End in Oil Furnace

course all of these operations had to be repeated in the reverse order after the new shaft had been installed.

RESULTS OF WELDING SYSTEMS.

The new fuel oil and compressed air method used in the main repair shops of the United Railroads of San Francisco is far superior to the old process in both time and cost. The old plan made the armature useless for three or four days. The new plan, exclusive of turning up the welded shaft in a lathe, requires less than two hours from the time the workmen begin to adjust the protective casing

OPERATING CONDITIONS IN SAN FRANCISCO

In some respects, such as the absence of lightning and snowstorms, electric street railroading in San Francisco is simple when compared with conditions in some Eastern cities. On the other hand, the many steep grades in San Francisco cause other troubles. In particular, these grades minimize the permissible departure from parallelism of the armature shaft and the car axle. The amount of wear that may be allowed in the armature and axle bearings depends on the topography of the line over which the car is oper-

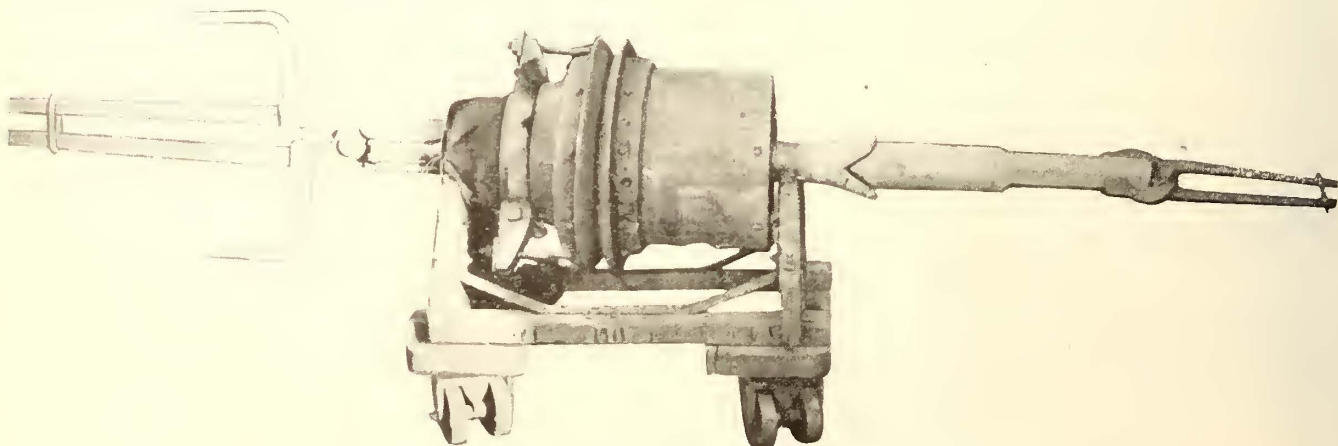


Fig. 3—San Francisco Welding—Type of Weld on Armature Shaft

until the armature is ready for the lathe. The old way cost from \$50 to \$70 per armature. The new way costs \$8.50 and has been uniformly successful in giving a permanently satisfactory weld and without any injury to the armature coils. The time taken to test and bake the armature after the welding is no more than that usually required for an armature which has just been rewound.

ated. The penalty occasionally exacted for excessive bearing wear is a broken armature shaft on a car ascending a steep grade.

PREPARATIONS FOR WELDING

When a broken shaft is to be repaired without removal from the armature the coils are protected from injury by the furnace heat by a sheet-iron hood. The space between

the end of the hood and the ends of the armature coils is filled with a heat-insulating mixture of blue clay and asbestos. When near the fire the armature is further protected by a sheet-iron diaphragm or pair of knife plates inserted between the armature and the firebox. These knife plates resemble a pair of shears with long, slender handles and short, square blades of exaggerated width.

wheel made of slot iron from an old cable road. The hood is held firmly in position and prevented from being jarred ahead on the shaft during the "up-setting" part of the work by eye bolts and a "strong-back" which extends across the front of the commutator, as can be readily noted in Figs. 1, 2, 3 and 5. Thus equipped the armature is slung by a short endless chain and a pulley to the end of the differential hoist on a revolving jib crane. In this way the armature can be conveniently and expeditiously brought by the workmen to the fire, to the cooling water spray and tub, to the horizontal swinging upsetting rammer or under the steam hammer as the progress of the work may require.

THE WELDING PROCESS

The stump of the broken shaft of the disabled armature shown in Fig. 1 is 10 in. long, as the break, in most cases, is under the inside end of the pinion. This stump is introduced into the fire through a small aperture in the sheet-iron side of the blacksmith's high-pressure portable oil furnace. This furnace consists of an air-atomized, air-propelled and air-fed stream of liquid fuel which flames forth from the burner. On encountering the baffle formed by the brick-lined sides of the hollow cubical furnace the blaze fills the fire box with an incandescent mass of vapor. The steel shaft is therefore submerged in conflicting waves of flame which are of great intensity and yet are under such control that in ten minutes a 3/4-in. shaft can be brought to a white heat for most of its length with perfect safety.

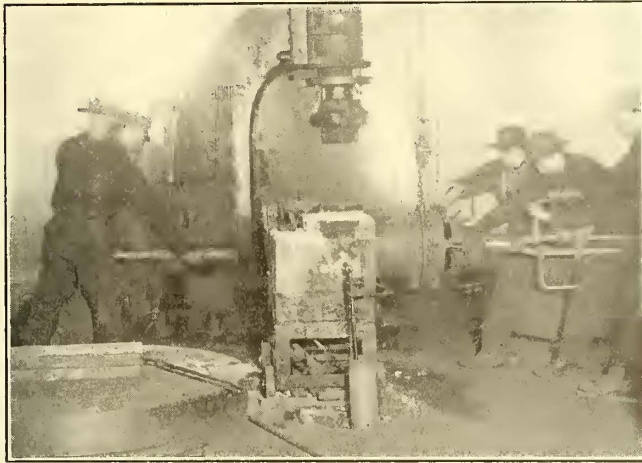


Fig. 4—San Francisco Welding—Driving the Shaft Parts Together at the Final Welding Heat

Semi-circular gaps in their inside edges permit the blades to fit closely around the shaft and prevent the radiation of heat from the furnace.

The armature is still further guarded against burning by a continuous cooling curtain of compressed air which issues from a row of perforations in a U-pipe encircling the shaft. These refrigerating streams of air are released radially over a circular area of about the same size as the cross-section of the hood and in a plane which is parallel to the back of the armature and the side of the furnace. These streams of compressed air become cooler as they expand. They absorb part of the heat radiated from the fire toward the armature coils, alter the direction of another part of it and tend to keep cool that part of the shaft next to the armature core. When the armature leaves the fire a stream of water is played on the shaft, where it emerges

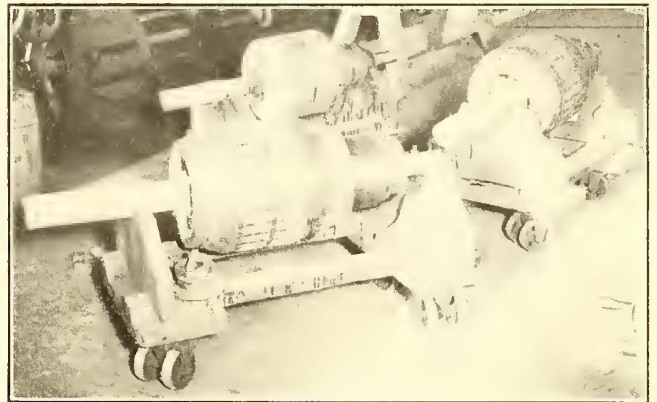


Fig. 6—San Francisco Welding—Armature Shaft Ready for Machining

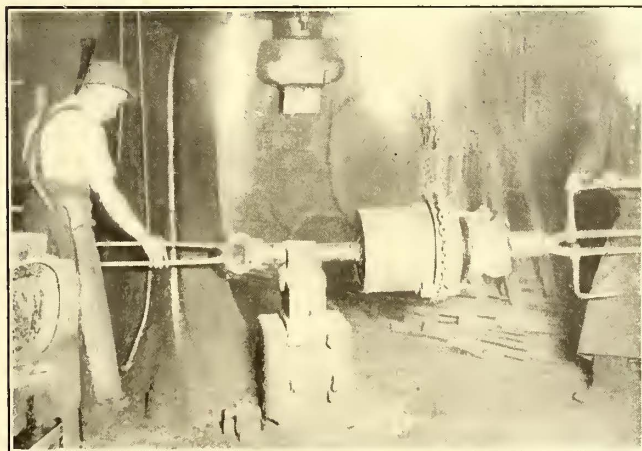


Fig. 5—San Francisco Welding—Completing the Weld in a V-Block Under Steam Hammer

from the hood, to prevent the heat of the red-hot part of the shaft from being conducted to the armature core and injuring the insulation.

For handling heavy armatures easily and rapidly during the several stages of the shaft treatment the protecting hood, as shown in Figs. 2, 4 and 5, is equipped around its center of gravity with a grooved pulley surface or chain

California fuel oil is used in this furnace. According to J. H. Stott, engineer of steam equipment, this oil has an asphaltum base, a specific gravity of 0.951, or 17.25 deg. Beaumé, a calorific value of 18,700 b.t.u. per pound, weighs 333 lb. per barrel and costs to-day 67 cents per barrel delivered. This product is not a crude oil, but a distillate which has passed through the still once. Its viscosity is lower and its calorific value greater than the crude oil.

When fully heated the shaft is transferred from the fire to the water tub. There it is hosed generously "in the neck" next to the hood while being revolved slowly to prevent the heat from passing to the interior of the core. The shaft is also cooled off partially by hosing at the outer end so that when upset the metal will not mushroom up too abruptly at the extreme end. Next the armature is swung opposite a 100-lb. horizontal suspended rammer. While the armature is held steady by the tongs three men vigorously swing the rammer to meet the swinging red-hot armature shaft end-on until it is upset or swelled for nearly all of its length. This upsetting is for the double purpose of providing ample metal for the weld when under the steam hammer and of permitting the lathe man to take a continuous cut across the full width of the bearing when turning up the shaft.

The upset iron is put into the fire again for its second heat. On coming from the second heat the shaft is taken to the hammer and flattened or drawn down to about one-half of its original thickness. It is then returned for the third heat. Upon being brought out from the third heat the armature is up-ended on the ground on the commutator end of the shaft and the red-hot pinion end of the upset shaft is split down the center to form the scarfs for the proposed weld. Both before and after this splitting the hot steel is given the usual generous hosing at the neck to check the movement of heat to the core. A fourth heat is given the shaft to soften the metal so that the smith can set the scarfs, fitting them exactly to receive the wedge end of the axle piece which is to be welded to the shaft. The shaft is then returned to the furnace for its fifth and final welding heat and is prepared for forging under the steam hammer.

It is interesting to a blacksmith of the old school, who is accustomed to heat metal under a pile of coal, to be able to see through the vent hole how this shaft is heated in the oil furnace. Not only can the smith see the shaft as it changes color and decide on the exact moment to remove it, but he can also sprinkle on the welding flux with a spoon just where he wants it to go. Furthermore, he can do some of his welding in the fire and under his eye.

As soon as the shaft stump with its V-shaped opening in one furnace and the axle piece with its wedge-shaped

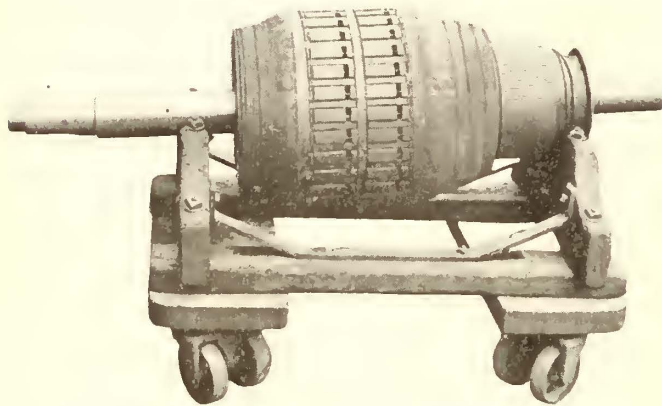


Fig. 7—San Francisco Welding—Completed Shaft

end in another oil fire have reached the proper welding heat and have been sufficiently covered with the welding powder, the axle piece is brought to the furnace, which contains the armature shaft for insertion through an aperture in the opposite wall of the furnace. The wedge enters the V and is firmly driven into place with the rammer shown in Fig. 4. Upon removal from the fire the weld looks, except for color, much as it does in Fig. 3. From this point on, the rest is plain blacksmith work. The shaft is forged, cut off and straightened.

In all five heats are required, as noted—the first for the upsetting, the second for drawing down the end of the shaft, the third for splitting open the shaft end, the fourth for setting and fitting the scarfs and the fifth for the final or welding heat. Sometimes when the scarfs do not forge down to suit the exacting taste of the smith a sixth or wash heat and further forging is given. Five of these welds can be completed in one day of nine hours by one crew when a full day's work on broken armature shafts is presented. This crew consists of a smith and his helpers, who vary in number from two to seven, depending on the nature of the work. These helpers are drawn from the other fires in the shop temporarily and are promptly sent back when their services are no longer required. The largest item of cost is labor and the next one the compressed air used. The item of fuel is almost as trifling as that of welding flux. Up to date more than 100 welds have been made without a failure.

CAUSES OF FAILURE.

The query naturally occurs: To what are these broken armature shafts attributed? Is it bad metal, faulty design or extraordinary conditions? Breaks are not thought to be due to poor steel except in so far as the metal has proved unequal to the extraordinary conditions. The shafts are of the latest design with a taper turn for the pinion similar to that on armatures whose shafts do not break. Still Mr. Yount feels that he has improved the original design by leaving a fillet of metal instead of a sharp angle when cutting down the shaft from the bearing to the taper to receive the pinion. The inside edge of the pinion bore is countersunk to correspond with this fillet. Extraordinary conditions are met as much as possible by limiting the allowable bearing wear on the motors which are operated on heavy grades and by using series instead of multiple speed when ascending grades of 10 per cent to 14 per cent.

TESTING COAL IN LONDON

For the past five years J. W. Towle, resident engineer Underground Electric Railways Company, Ltd., London, has been using the Berthier method of determining the calorific value of the coal used in the Lots Road power station of that company. Every bargeload of coal is tested at the moment at which it arrives at the dock of the company, and the method of testing is so simple that it can be done in about twenty minutes at a cost of between 5 cents and 10 cents. It has been found by the company preferable to any calorimeter test because it gives the company a chance to complain of the coal before it is unloaded, a plan which would not be practicable with the calorimeter test. Although the results secured by the company have rarely been disputed, when such a dispute has occurred independent calorimeter tests have shown that the full value of the coal was practically that shown by the Berthier method. Mr. Towle says that with coals varying largely in their composition the method might be more complicated because different constants would have to be used, but as the company uses only bituminous coal no change in the constant is necessary.

For the convenience of the readers of this paper the following description of the Berthier method from "Engine Room Chemistry," by Augustus H. Gill, is appended:

"Berthier's Method.—This uses as a measure of the heating value the amount of lead which a fuel will reduce from the oxide; that is to say, the heating value is proportional to the amount of lead reduced or oxygen absorbed. One gram of the finely powdered dry coal is carefully weighed out on the horn pan scales and intimately mixed with 60 grams of common litharge (oxide of lead) and 10 grams of ground glass. This mixing can be done with a palette knife on a sheet of glazed paper. This mixture is transferred to a clay crucible of the size of Battersea C, covered with a layer of salt, the crucible covered and heated to redness in the hottest part of the boiler furnace for fifteen to twenty minutes. The crucible is cooled, then broken, the lead button carefully cleansed from the adhering slag and weighed.

"The number of grams of lead obtained, reduced to the basis of that obtained from 1 gram of coal, in case exactly 1 gram of coal was not used, multiplied by 483 gives the number of b.t.u. that will be yielded by 1 lb. of coal. An example will make this clear.

"Weight of coal taken, 1.04 grams.

"Weight of lead button, 31.84 grams.

" $31.84 \div 1.04 = 30.62 \times 483 = 14,750$ b.t.u.

"Two other experiments gave 14,500 b.t.u. and 14,550 b.t.u. The same coal gave in the Mahler-Norton bomb 14,200 b.t.u., or 2.3 per cent lower, which it will be observed is as close as almost any calorimeter gives."

GERMAN ACCIDENT STATISTICS

The German Street and Interurban Railway Association (Verein Deutscher Strassenbahn-und-Kleinbahn-Verwaltungen) has prepared an interesting summary of electric railway accidents in Germany during the years 1905 to 1909, inclusive, for exhibit at the International Exposition

The statistics, as gathered by the association, show that injuries are more frequent to passengers than to pedestrians and other non-passengers, but that a greater proportion of the non-passenger accidents are fatal. Thus the percentage of slight injuries was practically equal for both classes, but 6 per cent of non-passengers' injuries resulted in death as compared with 1 per cent of passengers' injuries.

Fig. 1 shows the fluctuations and the number of passengers carried per accident during the five years from 1905 to 1909, inclusive. It will be noted that there has been a great reduction in the number of minor injuries. On the other hand, the severe accidents and fatalities have increased. A set of similar curves (not reproduced) shows that there have been no important changes in the number and classes of accidents to non-passengers on the basis of mileage operated.

Fig. 2 is a chart which shows by differently sectioned areas the division of responsibility for accidents, the proportion of each class of accident and the results to the person injured. In the case of passengers an overwhelming percentage of accidents was due to negligence in boarding and leaving the cars, although some were also caused by leaning beyond the clearance lines of the windows and platforms. Most of the accidents to non-passengers resulted from either negligence in crossing the track or from side-wipes on devil strips, etc. Of every 100 fatal accidents to passengers ninety-four were due to carelessness of the passenger, four to the railway and two to causes beyond the control of both parties. In the case of non-passengers the responsibility for fatal accidents averages as follows: Non-passengers, 94.8 per cent, railway, 4.5 per cent, and other parties, 0.7 per cent.

Fig. 3 is an analysis of accidents to children caused by trespassing on the tracks. This chart indicates that by far the greatest percentage of fatal accidents occurs to children of less than four years of age. In fact, the deaths in this classification of accidents exceed either the minor

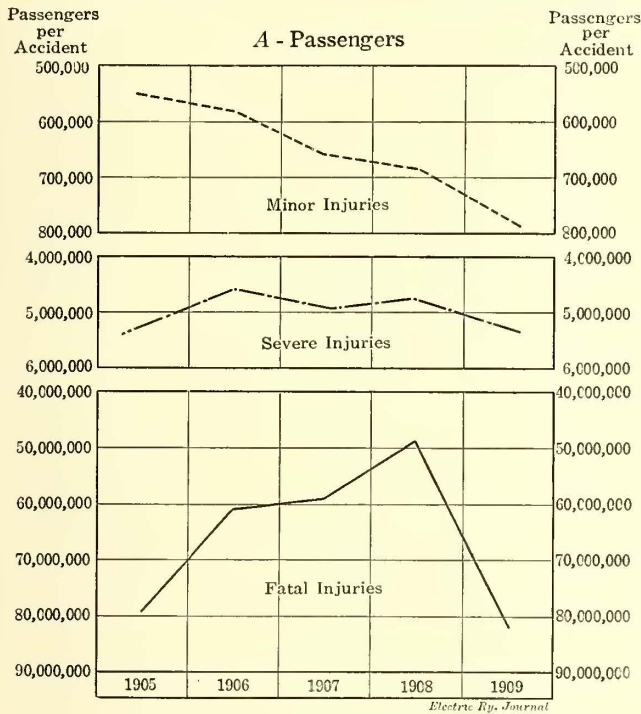


Fig. 1—Accidents per Passenger from 1905 to 1909

of Hygiene, which is being held in Dresden. The following is an abstract of the data presented, together with a selection of the most striking charts, the originals of which were prepared in color. The report states that the total route length of the street railways in Germany amounts to 4000 km (2480 miles), of which 3875 km

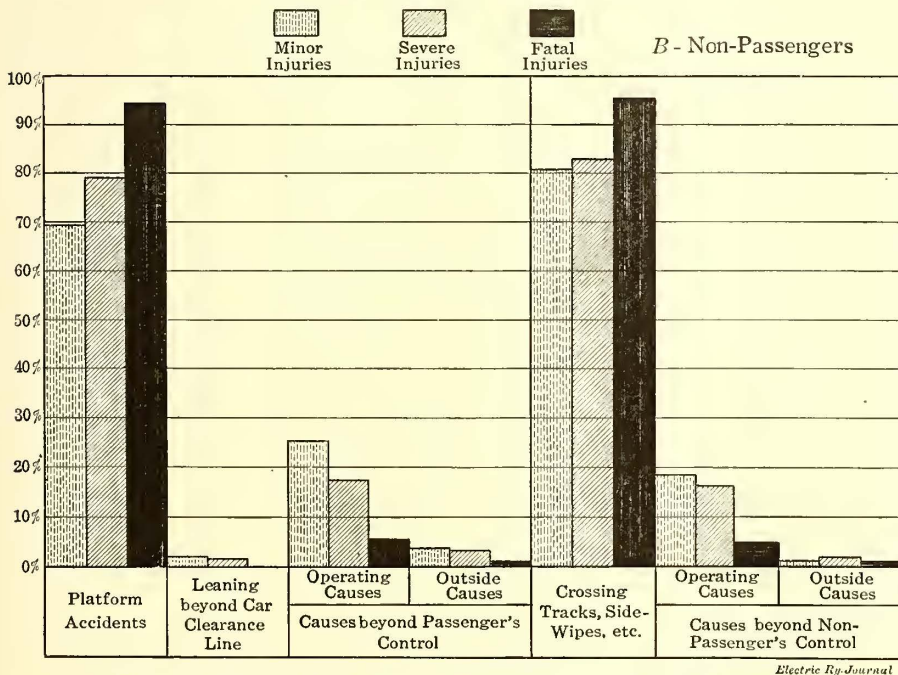


Fig. 2—Causes of Accidents to Passengers and Non-Passengers

(2403 miles) are electrically operated. The members of the association operate 3772 km (2339 miles). The accident statistics cover the operations of lines having a route length of 3658 km (2278 miles), equivalent to 95 per cent of all the electric street railway mileage in Germany.

or severe injuries by 20 per cent or more. These tragic figures are cited to prove the need of giving children some safer playgrounds than the public highways. Similar curves (not reproduced) show that the greatest proportion of platform accidents to adults and of accidents to adult

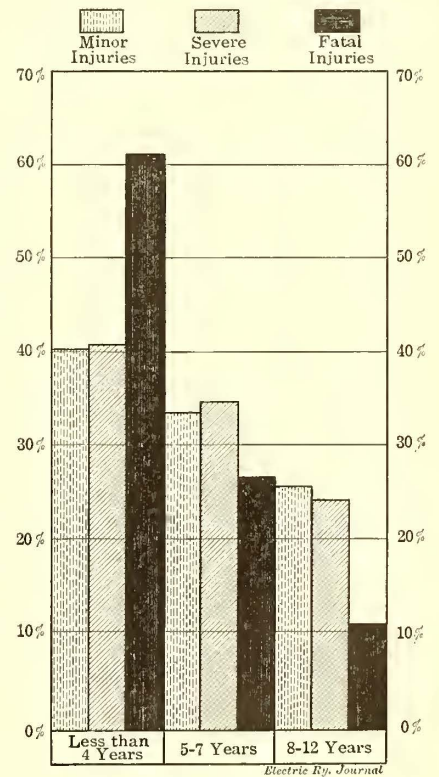


Fig. 3—Accidents to Children

non-passengers occur to people between the ages of twenty-six and forty.

Fig. 4 shows a division of accidents to adult passengers and adult non-passengers arranged according to sex. The comparatively large proportion of boarding and alighting accidents to women may be explained perhaps by the circumstances that in Germany a limited number of street

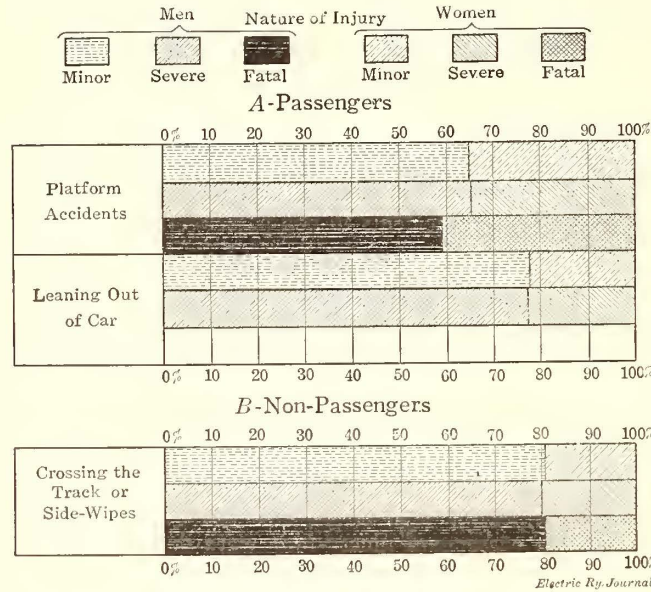


Fig. 4—Accidents to Adults

railway passengers may stand on the platforms, but no one is allowed to stand inside the car. Consequently there is a temptation for a platform passenger, who is standing near the step, to alight before the car stops, and in this women are well known to be less expert than men. In general, however, women are far more cautious than men in avoiding accidents, as is shown by the general comparisons in Fig. 4.

With respect to the distribution of accidents to passengers and non-passengers according to the time of the year, it is a remarkable fact that in both cases the smallest number of accidents occur during the dangerous winter months of December to February. This leads to the conclusion that the presence of ice and snow makes the necessity for caution so apparent to passengers that the number of accidents is actually less than in months with more favorable weather. So far as the non-passengers are concerned the reduction in accidents during the winter months can be ascribed largely to less travel on

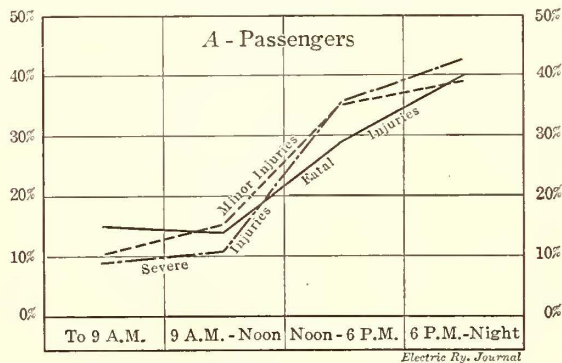


Fig. 5—Time of Accidents to Passengers

the streets. The heavy passenger death rate from September to November is accounted for by fog and rain which causes people to lose their footing in getting on or off the cars.

Figs. 5 and 6 show the proportions of accidents to passengers and non-passengers respectively for different hours of the day. In both classes most of the accidents

occur in the afternoon and evening. It is not clear why this should be so in the case of passengers, but so far as non-passengers are concerned it may result from the greater crowding on the streets in the late hours of the day.

In addition to these accident charts others were presented detailing the nature and percentage of each kind

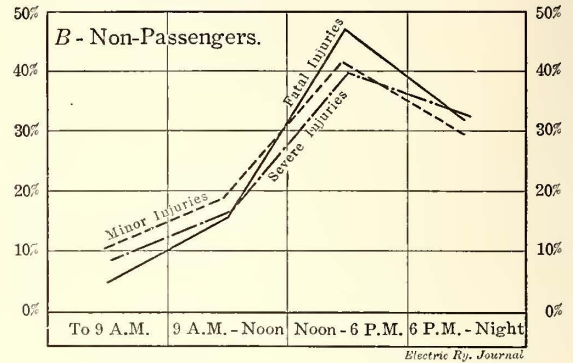


Fig. 6—Time of Accidents to Non-Passengers

of injuries. The charts were accompanied by a description of the efforts made by the street railways of Germany to equip their cars with safety apparatus and to train their employees in accident prevention. It was stated that on an average not more than one-fourth of the accidents to non-passengers could have been avoided or ameliorated by the use of fenders or wheelguards. The report concludes with an appeal to the public to co-operate in the reduction of accidents by the exercise of greater care in boarding and in leaving cars and also in crossing street railway tracks.

HUNGARIAN 1650-VOLT D. C. RAILWAY

On account of increased traffic the management of the Arad-Hegyálja Railway in southern Hungary has recently determined to replace its gasoline-electric cars by a 1650-volt d.c. overhead system. The total length of track operated is 58 km (36 miles). The gage is 1 m (39.37 in.). During the hours of heaviest traffic motor-car trains will be operated on thirty minutes headway. The motor cars will be of the double-truck type and will carry four 50-hp motors each, connected two in series during running. A motor-generator set on each car will furnish low-tension current for the multiple-unit control, lighting and compressor. The 1650-volt overhead line will be of the catenary type and will be equipped with weights to secure automatic tension adjustment. The Ganz Company, of Budapest, expects to have the line ready for operation early in 1912.

The *Elektrotechnische Zeitschrift* began publishing in its issue for July 27 a tabulation by Franz Stein of all electrically operated lines in Europe exclusive of street railways. The table gives the name and location of the line, the date of opening, the gage, maximum grade, shortest radius of curvature, miles of single track, miles of double track, system of current collection, cross-section and voltage of trolley, motor equipment and trucks per car, average and maximum speeds, seating arrangements of cars, weight of mechanical and electrical equipment, weight per seat, method of motor drive, wheel base of trucks, distance between king bolts, length of cars over buffers, length of car body alone, electrical and mechanical details of car construction and equipment, motor capacities, draw-bar pull (of locomotives), names of manufacturers and references to articles describing the individual roads. It is announced that the complete table will be published in pamphlet form by Julius Springer, Berlin.

CO-OPERATIVE PLAN FOR PHILADELPHIA CARMEN

On Aug. 28 the Philadelphia Rapid Transit Company submitted to its motormen and conductors a proposed co-operative wage plan and arbitration scheme which it has prepared with a view of encouraging team work on the part of the men and avoiding future disputes with labor organizations. The details of the plan were printed in a booklet, a copy of which was given to each motorman and conductor in the employ of the company. No action has been taken on the part of the men as individuals or by either of the two organizations having members in the employ of the company. The text of the proposed plan follows:

"The Stotesbury management, as a result of its investigation of the labor conditions under which its motormen and conductors are now working, during which it received the complaints and suggestions of all men desiring to be heard, is convinced that in order to secure the desired co-operation it is essential that there be a greater degree of team work among the motormen and conductors themselves. This, it is believed, can only be secured by eliminating that constant cause of disagreement due to the fact that there are now two rival labor organizations.

"There should now be such a definite understanding between the men and the management as will insure a lasting peace and the general up-building of the property. The plan determined upon should be concurred in by so large a majority of the motormen and conductors as to thereafter establish that unity of action which is necessary to its greatest success.

"That degree of co-operation which finds its expression in an every-day earnest effort to render more efficient service will be most certainly assured when it has been made clear to the motormen and conductors that they are to receive a fair share of the increased earnings due to the added effort on their part.

"Co-operation being the means by which increased wages and comfort of the men as well as increased returns to the company can be most quickly secured, the measure of the fitness of an employée, or official, to continue in the company's employ must necessarily be largely determined by his willingness to co-operate with the management in its effort to improve the service.

"Discipline must be strictly enforced to insure proper service to the public and justice must be meted out without discrimination.

"The standard of the service must be raised, unnecessary requirements which interfere with the comfort of the men or with service to the public must be removed, and the management must use its best endeavors to increase the wages as rapidly as possible within the amount of 22 per cent of the gross passenger earnings, which is the limit of the company's ability to pay.

WAGES

"By virtue of its published promise of April, 1910, the company is obligated to pay the following wage (in cents per hour) to motormen and conductors in accordance with their period of service:

Effective July 1	1st year	2d year	3d year	4th year	5th year	6th year
1910	22	23	23	23	23	23
1911	22	23	23½	23½	23½	23½
1912	22	23	23½	24	24	24
1913	22	23	23½	24	24½	24½
1914	22	23	23½	24	24½	25

"A pension and death benefit plan is also in force by which the company pays to retiring motormen and conductors who are over sixty-five years of age, and who have been in the service twenty-five years or over, a pension of \$20 per month during the remainder of their lives, and in case of the death of a motorman or conductor who has been over two years in the service \$500 is paid to surviving relatives.

"The amount actually paid to the motormen and conductors for the year ended June 30, 1911, and the per cent of gross passenger earnings represented thereby, was as follows:

Timetable cost	\$4,414,987.78	21.42%
Unearned wages at the rate of \$2 per day paid to returning strikers under agreement of April 5, 1910	60,272.64	0.29%
Pensions and death benefits	20,830.00	0.10%
	<u>\$4,496,090.42</u>	<u>21.81%</u>

"The wage scale was increased July 1, 1911, in accordance with the company's promise, so that the rate of wages now being paid is as follows:

First year men	22	cents per hour
Second year men	23	cents per hour
Third year men	23½	cents per hour

"Based upon the increase in gross passenger earnings for the month of July 1911, together with the increased efficiency of operation which it is expected will be secured by co-operation, this management will anticipate the increase in wages promised for July 1, 1912, and make the same effective as of Jan. 1, 1912, viz.:

First year men	22	cents per hour
Second year men	23	cents per hour
Third year men	23½	cents per hour
Fourth year men	24	cents per hour

"Similar advances will be made as rapidly as the use of the 22 per cent of the gross passenger earnings makes possible, but in no case later than the dates contained in the company's published promise of April, 1910.

"Co-operation on the part of motormen and conductors by taking a personal interest in raising blockades, maintaining schedules, careful collection and accounting of fares, avoidance of accidents and observance of the company's rules, together with the introduction of improved operating methods and of a large proportion of cars having almost double the seating capacity of those displaced, will, it is confidently expected, make possible such an increasing wage over that contained in the company's published promise as will result in a maximum wage of 28 cents per hour in the year beginning July 1, 1915.

"The graded scale of wages as set forth in the company's published promise of April, 1910, will be extended as soon as the maximum wage therein provided for has been accomplished.

"The old argument against the graded scale, by which it was contended that the company's interest was to dismiss the older and higher-priced men to make room for the lower-priced new employees, has not to be here considered, as the company cannot reduce its cost by any change in the scale of wages paid, it being distinctly obligated and having actually begun July 1, 1911, to set aside in a separate fund 22 per cent of its gross passenger earnings. All payments to motormen and conductors will be made from this fund, and the sum accumulated therein will be added to that increased wage which was promised in the company's published notice of April, 1910.

"This management is desirous of so improving the wage and working conditions as to promote a feeling of satisfaction in the work, which should not only prevent some of the most capable men being drawn to other lines of work, but it is hoped will serve to largely recruit the force from among the sons of its motormen and conductors.

"The increased wage due to co-operation and improved methods of operation, which so far as the motormen and conductors are concerned will be almost entirely brought about by those now in the service, should be paid to them rather than to the men hereafter employed, whose wages at the time of their entering the service are in any case largely governed by the law of supply and demand. The services of the older men should be given prior recognition for the further reason that they may be then able to set aside such a sum during the remaining years of their service, as will, when taken in connection with the pension and death benefit plan now in force, make possible a more

than ordinary provision in their interest and that of their families against old age and final dissolution.

ORGANIZED LABOR

"Two organizations, i. e., the Amalgamated Association of Street & Electric Railway Employees of America and the United Carmen's Association of America, are each represented by a certain membership among the motormen and conductors of this company. The members of each organization are antagonistic to such an extent as seriously to interfere with the operating efficiency of the company.

"This management has no certain knowledge as to the comparative membership of the motormen and conductors in the aforementioned organizations, nor of that number of the motormen and conductors who are not affiliated with either.

"The question as to whether this management will deal with its motormen and conductors as individuals or as an organized body must now be determined. If with its motormen and conductors as individuals the plan as herein outlined will be effective as soon as the fact has been determined. If with an organization, it can only be with such a one as is willing to enter into an agreement in conformity with the plan of procedure herein outlined, and thereafter in good faith co-operate with this management in its efforts to improve the service.

"This management does not take a position either for or against either of the organizations having membership among its motormen and conductors, but is desirous of securing a lasting peace and the earnest co-operation of its motormen and conductors, and that by the path of least resistance. If, therefore, a large majority of the motormen and conductors (say, two-thirds) desire that this management deal with its motormen and conductors as an organized body, no lasting peace or unity of effort can be expected until this demand has been properly met and fairly disposed of. This management cannot, upon the other hand, so interfere with the personal liberty of any man in its employ as to arbitrarily require him to become a member of a labor organization. It can, however, in all fairness pay from the sum representing 22 per cent of the gross passenger earnings that amount which represents the dues of all motormen and conductors in a labor organization if that be the expressed desire of the large majority.

"The desire of two-thirds of the motormen and conductors expressed by secret ballot, under conditions which insure a fair count, may in all justice be considered as binding the minority to bear their share of such a tax.

"This management has, therefore, decided that upon a proper application being made by either or both of these organizations, a vote will be taken under such regulations as well insure a fair election; this management undertaking, upon a confirmative vote of two-thirds of its motormen and conductors, to enter into an agreement with the organization receiving such vote, which agreement shall conform both in substance and detail with the plan herein outlined.

"In the event of an agreement being entered into with the men as an organization, there would be no necessity for the wearing of union badges nor for the disturbing influence of organizers or collectors of dues, for the reason that the amount representing the dues of every motorman and conductor would then be paid directly by the company to the organization.

"Under these circumstances the frequent contention that men were dismissed because of being affiliated with organized labor would be no longer tenable, as the company would under this arrangement be paying the dues of the new men when hired as well as those now in the service.

COMMITTEE ON CO-OPERATION

"There will be no grievance committee, but in its stead a co-operating committee, which shall be composed of a representative motorman or conductor from each division, the superintendent of each division, together with the super-

intendent of transportation, or his representative, representing the management. The superintendent of transportation, or his representative, will act as chairman of this committee, and, in case of an agreement being entered into with either of the organizations aforementioned, a representative of such national or parent organization will also be a member of this committee and will be responsible to this management for the observance in good faith of the spirit and intent as well as the letter of the agreement.

"The meetings of this committee shall be at a stated hour on a stated day in each month for the discussion of ways and means to improve the character of service rendered to the public and the working conditions and wages of motormen and conductors.

"The order of business shall be as follows:

"1. Suggestion and discussion for the purpose of promoting increased efficiency in operation.

"2. Consideration and discussion to the end that proper discipline be administered.

"3. Suggestion and discussion looking to the comfort and increased wage of motormen and conductors.

"4. Miscellaneous business, included in which would be submittal of report, showing per cent of gross passenger earnings paid to motormen and conductors.

"The general complaint now prevailing upon the part of the representatives of the men to the effect that they are not informed as to the shortcomings of a motorman or conductor until after he has been discharged, whereas if they had known in advance they could very likely have by caution made such discharge unnecessary, is here met by such opportunity, and while it is fully intended that the superintendent of transportation, or his representative, will finally decide as to the retention or discharge of any man, the representatives of the men will under this plan be conversant with the facts leading to this conclusion.

"The representatives of the men upon this committee may, should they question the justice of a decision of the chairman, appeal the matter for final decision to the highest operating official of the company, and in the event of an agreement with either organization, to the highest official of such organization, in which case the highest operating official of the company and the highest official of the organization will meet by appointment and endeavor to arrive at a fair adjustment of the matter. Failing to agree, they shall then select a third person mutually agreed upon whose decision shall be final and binding upon all parties.

"Disagreements over the decisions of the chairman should be most infrequent if, as is expected, both men and management are endeavoring to carry out their undertaking in good faith. This is particularly so because under the plan as herein outlined the interests of both lie in the same direction. As the motormen and conductors will now in any event receive 22 cents out of every dollar collected in payment of fares, it will be to their direct interest to discourage any failure upon the part of conductors to properly account for all fares collected. Dragging the street, running ahead of time or not making every effort to start the cars, in case of blockage of service, all have the effect of reducing the company's gross passenger earnings, and as 22 per cent of this loss now falls directly on the motormen and conductors, their interest is again brought into unity with that of the company."

The annual statistical report of the American Iron & Steel Association, which was issued on July 25, gives the total production of all kinds of rails in the United States during 1910 as 3,636,031 tons, an increase of 20.2 per cent over the quantity rolled in 1909. Of this total 1,884,442 tons were rolled from Bessemer steel ingots, 1,751,359 tons were rolled from open-hearth steel and 230 tons were rolled from iron. Almost 60 per cent of the open-hearth rails rolled weighed over 85 lb. per yard.

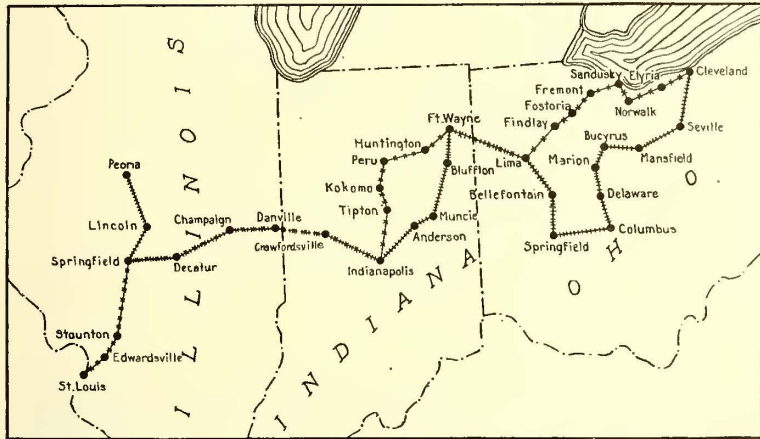
LONG JOURNEY OF ILLINOIS TRACTION OFFICE CAR

The office car of H. E. Chubbuck, vice-president executive of the Illinois Traction System, on Aug. 27 completed an interstate trip of 1624.3 miles and was the first electric car to be run from Missouri across Illinois, Indiana and Ohio to Cleveland. The car made the trip under its own power except for a run of about 50 miles between Danville, Ill., and New Ross, Ind. Between these points it was coupled to the rear of a regular passenger train of the

the McKinley system, and J. A. Kucera, business manager ELECTRIC RAILWAY JOURNAL, made the eastbound trip. Messrs. Peck and Morgan planned the routing of the car.

Among the railway men who accompanied the Illinois Traction car on part of its journey were Charles L. Henry, Indianapolis & Cincinnati Traction Company; A. A. Anderson, Springfield (Ill.) Consolidated Railway; T. F. Grover, G. K. Jefferies, John H. Crall, Mr. Lloyd and M. M. Nash, Terre Haute, Indianapolis & Eastern Traction Company; Douglas Macauley, Montreal, Quebec; F. W. Coen and L. K. Burge, Lake Shore Electric Railway; E. F. Schneider, A. P. Lewis, J. A. Nester and H. Pomeroy, Cleveland, Southwestern & Columbus Railway; John Keyes, Detroit United Railway; R. M. Hemming and F. W. Jennings, Ohio & Southern Traction Company; George Whysall, Columbus, Marion & Bucyrus Railway; J. H. Lahrmer, Columbus, Delaware & Marion Railway; B. J. Jones, Gaylord Thompson, F. J. Moore, H. G. Gilpin and H. F. Dicke, Ohio Electric Railway; A. W. Greenland, Ft. Wayne & Northern Indiana Traction Company; W. H. Forse, F. D. Norveil and E. C. Carpenter, Indiana Union Traction Company.

Car No. 233 of the Illinois Traction System, which made the long trip, is especially well fitted for touring. This car was described in the ELECTRIC RAILWAY JOURNAL for Jan. 29, 1910, page 188. The extreme length of the car over buffer plates is 62 ft.: the width over the car sheathing is 8 ft. 10 in. The extreme width, however, over all projections, including grab handles and sign lamps, is 9 ft. 4 in. The height of the car from top of rail to underside of sill is 3 ft. 5 in. and the height from underside of sill top of roof is 9 ft. 4½ in. The height of the trolley stand over the top of roof is 11 in., making the height of car from top of rail over top of trolley stand 13 ft. 8½ in. The trolley hold-down hook is 15 in. above the top of car, so that height of car over trolley hook is 14 ft. ½ in. The height of the smokestacks from the top of car is 17½ in., making the extreme height of the car over all 14 ft. 3 in. The height from the top of rail to center of coupler is 34 in. The truck centers are 29 ft., and the wheelbase of



Illinois Traction Office Car—Map of Route Showing Lines Traversed Eastbound and Westbound

Cleveland, Cincinnati, Chicago & St. Louis Railroad. This interesting trip was made by the Illinois Traction officials and their guests on the invitation of E. B. Peck, vice-president and comptroller Indianapolis Traction & Terminal Company and Terre Haute, Indianapolis & Eastern Traction Company. The party attended the Cedar Point meeting of the Central Electric Railway Association.

The route of the trip is shown by the accompanying map and table. On the eastbound trip the car was in charge of Mr. Chubbuck and C. F. Handshy, general superintendent Illinois Traction System. Returning it was in charge of George Quackenbush, traffic manager Illinois Traction Sys-

DATA ON INDIANA AND OHIO TRIP OF ILLINOIS TRACTION CAR NO. 233

Aug. Trip	Road	Miles		Time		M.p.h. for trip	Kw-hours		Watt-hours ton-mile
		From St. Louis	Trip	From St. Louis	Trip		Trip	Car-mile	
19	St. Louis to Danville	230.0	8:00	230.0	8:00	27.75	554	2.41	51.9
21	Danville-New Ross	52.1	2:09	282.1	10:09	24.23	Steam		
21	New Ross-Crawfordsville	11.4	—:21	293.5	10:30	32.57	24	2.10	45.3
21	Crawfordsville-Indianapolis	44.6	1:30	338.1	12:00	29.73	90	2.02	43.5
22	Indianapolis-Peru	75.1	2:45	413.2	14:45	27.35	320	2.39	51.4
22	Peru-Ft. Wayne	58.5	2:15	471.7	17:00	26.00			
22	Ft. Wayne-Lima	63.9	2:30	535.6	19:45	25.56	130	2.03	43.7
22	Lima-Findlay	32.8	1:25	568.4	21:10	23.17	80	2.44	52.5
22	Findlay-Fostoria	15.0	—:35	583.4	21:45	25.73	40	2.66	57.3
22	Fostoria-Fremont	21.2	—:46	604.6	22:31	27.68	50	2.36	50.7
22	Fremont-Sandusky	23.0	—:46	627.6	23:17	30.03	60	2.61	56.2
24	Sandusky-Norwalk	27.1	1:12	654.7	24:29	22.58	105	3.88	83.5
24	Norwalk-Rockport	49.4	1:53	704.1	26:22	26.28	160	3.24	69.7
24	Rockport-Kammis	1.8	—:06	705.9	26:30	18.00	8	4.44	95.6
25	Kammis-Bucyrus	103.5	4:44	809.4	31:14	21.92	365	3.52	75.7
25	Bucyrus-Marion	19.5	—:34	828.9	31:48	34.45	50	2.56	55.1
25	Marion-Columbus	48.6	1:55	877.5	33:43	25.36	150	3.08	66.3
25	Columbus-Springfield	45.7	1:50	923.2	35:33	24.96	150	3.28	70.5
25	Springfield-Lima	65.6	2:36	988.8	38:09	25.23	180	2.74	58.9
26	Lima-Ft. Wayne	63.6	2:06	1052.4	40:15	30.29	150	2.36	50.7
26	Ft. Wayne-Bluffton	25.1	—:55	1077.5	41:10	27.41	80	3.18	68.4
26	Bluffton-Ind. Limits	94.4	3:36	1171.9	44:45	26.66	280	2.97	63.9
26	Ind. Limits-Ind. Terminal	3.1	—:17	1175.0	45:02	10.95	15	4.84	104.2
26	Ind. Term.-New Ross	33.0	1:10	1208.0	46:12	28.30	70	2.12	45.7
26	New Ross-Danville	53.0	2:00	1261.0	48:12	26.50	Steam		
27	Danville-Peoria	205.4	7:15	1466.4	55:27	28.33	475	2.33	50.2
Totals				1466.4	55:27		3586		

tem; E. B. Peck, president of the Central Electric Railway Association; Fred Buffe, publicity manager, and E. W. Fowler, chief clerk to vice-president Illinois Traction System. C. E. Morgan, general manager Indianapolis, Crawfordsville & Western Traction Company, the "Ben Hur Route," and L. E. Gould, Western editor ELECTRIC RAILWAY JOURNAL, made the entire journey over the Indiana and Ohio lines. Dr. H. M. Bascom, chief surgeon, and R. W. Morrison, superintendent of the Wichita (Kan.) Railway of

the trucks is 6 ft. 5 in. The overhang on each end of the car from center of king pin to end of buffer face plate is 11 ft. 6 in. The trucks are arranged to swing in the clear without interference on a 33-ft. center radius curve. The car is equipped with four GE-205 interpole motors, rated at 100 hp each, with 600 volts at the motor terminals, and is geared to 60 m.p.h., based on the above rating. The weight of the car without load is 90,000 lb. The interior of car No. 233 is designed for use as a traveling office and is pro-

vided with a forward observation room, a large dining room and office, kitchen and serving room, toilet saloon and a large rear observation platform. Berths of Pullman size are provided for six people. From fourteen to twenty people were served with meals on each day of the trip, the regular porter having one assistant on this trip.



Illinois Traction Office Car—Attached to Rear End of Steam Train

This car is equipped with a number of recording instruments as follows: Sangamo trip and recording wattmeter, Weston ammeter, Weston voltmeter, Warner speedometer, train line and reservoir air gages and a standard ship's chronometer.

The speedometer gives a continuous indication of the speed of the car and also shows trip and total mileages. This instrument was manufactured specially for car use and in appearance is similar to an automobile speedometer, except that it is larger. It is driven from the tread of one of the forward car wheels. A 5-in. steel wheel supported by a tension arm bolted to the upper truck frame is held against the wheel tread by a coil spring. This friction wheel drives a flexible shaft which extends up through the car floor to the speedometer, which is mounted with the other instruments on the mahogany panels forming the motorman's inclosure. The instrument records the speed and total distance moved in either direction which the car may be run.

At each junction point on the journey a record was made of the miles run on the trip from the last junction point, the total elapsed time and kw-hours consumed. These data are given in the table on page 395. The energy con-



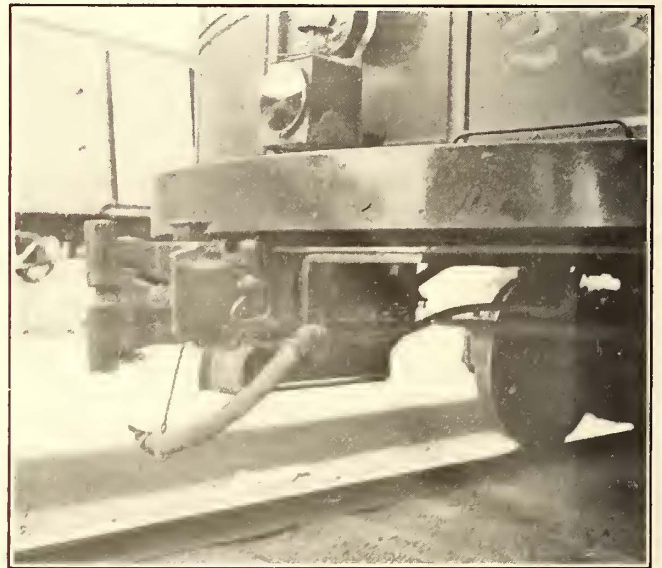
Illinois Traction Office Car—On Siding at New Ross

sumed on each road was read to the nearest 10 kw-hours. The table shows the continuous route of the car from St. Louis, Mo., to Rockport, a suburb of Cleveland, and return via Columbus and Lima, and Indianapolis to Peoria, Ill. This round-trip mileage was 1466.4 miles, in addition to which side trips totaling 157.9 miles were made. The total journey thus was 1623.4 miles. Of this distance 105.1

miles were run on the steam road, making the total distance via electric railways 1519.2 miles. Deducting the side trips from this, there remains 1361.3 miles, the distance traveled on electric railways in making the round trip without side trips. The average speed for the continuous journey was 26.44 m.p.h. The energy consumption on the electric railway mileage was 2.634 kw-hours per car mile. Assuming the weight of the car with load as 93,000 lb., the watt-hours per ton-mile were 56.21.

In connection with the foregoing figures it should be remembered that the time shown for the various trips includes that consumed in waiting for exchange of pilots and obtaining orders at junction points. The maximum speed was reached on a side trip from Indianapolis to Crawfordsville and return over the "Ben Hur Route." On this trip a speed of 72 m.p.h. was reached and maintained for several minutes. The run between Indianapolis and Crawfordsville, 42 miles, was made in 47 minutes, including slowing down for one interlocking and flagging over a railroad crossing.

No difficulty was experienced in handling the car at any point on the route and it was not damaged in any way. Before being set on the steam road siding at Danville the car was subjected to M. C. B. inspection. Previously the



Illinois Traction Office Car—Coupler Blocked to Prevent Side Movement

coupler heads had been anchored in the central position by heavy yokes bolted to the radius bar. The couplers and platforms as well as steps and grab handles on all Illinois Traction cars are designed to pass M. C. B. inspection. The charge for handling the electric car on the steam train for the 50-mile run was \$15 plus full fare for each passenger. The Illinois Traction System is an associate member of the American Railway Association. On the east-bound trip when the train which hauled the electric car from Danville reached New Ross the car was left on the station siding about 75 ft. from the track leading to the "Ben Hur Line." No trolley wire was available so the car was moved about 200 ft. by means of a jumper cable which was held on the trolley base and connected to the trolley feeder cable.

The newly constructed division of the Mount Hood Railway & Power Company between Montaville and Bull Run, Ore., was transferred to the operating department on Aug. 3. The company has filed passenger and freight tariffs covering its entire operating lines with the Oregon Railroad Commission and the Interstate Commerce Commission.

THE EFFICIENCY OF SANDED TRACKS IN SIDINGS FOR CAR RETARDATION

In an article in two recent numbers of the *Deutsche Strassen-und-Kleinbahn-Zeitung*, Dr. Köpcke, Dresden, Germany, discusses the depth of sand required on rails to secure sufficient retardation to stop a car. He considers this plan advisable, with derailing switches, in restricted areas where steep sidings are not practicable.

He states that his earliest experiments showed that 5 cm (2 in.) to 8 cm (3.2 in.) of sand on the rail offered a resistance equivalent to one-twelfth to one-eighth of the wheel pressure or axle loading. To reduce the danger of the sand layer unseating the wheel tread and thus interfering with the guiding quality of the flanges, the derailing tracks of this character have been built with some retaining means for keeping the sand properly spread. On sand-covered straight track the guiding value of the flanges is not entirely lost because the sand is gradually compressed to a thickness of say 15 mm (6 in.). However, to insure permanent effective action, both on curved and tangent track, guard rails should be provided together with some other metal sections for preventing the displacement of the sand.

A cross-section through one-half of a sanded track at Dresden is shown. In this case the running rails had to serve also as retaining sections owing to the fact that this standard-gage track is installed between platforms only 3.1 m (10 ft. 2 in.) apart. This restriction limited the space between the running rail and the "sand" rail to 132 mm (5 in.). Clearance conditions also made it necessary to have the top of the running rail 43 mm (1.7 in.) higher than the "sand" rail.

The determination of a coefficient f for rolling friction in a given sanded track is based on observing the distance s which a car or axle traveling at a known velocity per second v runs before coming to rest. Let the mass of the body be represented by M and its weight (mass \times gravity) by Mg . Its kinetic energy $\frac{Mv^2}{2}$ will be equivalent

to the friction overcome in traveling the sanded distance s . Consequently $\frac{Mv^2}{2}$ equals $Mgfs$ or $s = \frac{v^2}{2gf}$, or $f = \frac{v^2}{2gs}$.

The retardation per second G is expressed as $G = fg$. The conditions during the running time t on the sanded track are like those for a freely falling body, namely, $s = \frac{Gt^2}{2}$

$$= \frac{fgt^2}{2} \text{ and, since } v = fg, s = \frac{vt}{2} \text{ and } v = \frac{2s}{t}$$

The initial velocity, v , is therefore twice as great as the average velocity over the sanded track, so that by substituting this value $\frac{2s}{t}$ in the expression $f = \frac{v^2}{2gs}$, there is

derived the coefficient of friction $f = \frac{2s}{gt^2}$. It will be seen

from this that no special speed measurement is required, nothing more in fact than the running time on the sanded track and its length.

The energy of wheel rotation should be added to the energy of the forward movement of the total mass M . This can be done most conveniently by adding a percentage. The rotative energy of a pair of wheels is assumed to be equivalent to the addition of 400 kg to the weight of the car. The following percentage, therefore, would have to be added to the weight of a two-axle freight car weighing empty 5000 kg:

$$\frac{2 \times 400 \times 100}{5000} = 16 \text{ per cent.}$$

For a loaded car weighing 15,000 kg complete, the increment would be 5.33 per cent, so $1.053 \times 15,000$ kg would be the mass.

The percentage of grade is to be subtracted from or added to the value of f , according to whether the train is ascending or descending the sanded track.

FIRST PROBLEM

When a loaded four-wheel car came to rest at the bottom of a sanded track having a 1 per cent grade, it was noted that the distance traveled by both axles was 91 meters and the running time, 15 seconds. What was the value of f ?

From the previous expression for f we have:

$$f = \frac{2 \times 91}{9.81 \times 15^2} \times 1.053 + 0.01 = 0.09683$$

The entering speed is

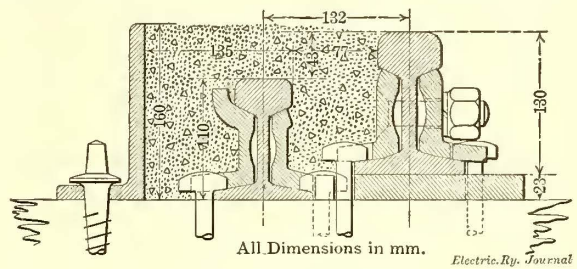
$$v = \frac{2 \times 91}{15} = 12.1 \text{ meter-seconds} = 43.6 \text{ km an hour.}$$

NOTE—9.81 is value of g in meters per second per second.

It is hardly necessary to add that in the case of trains it is necessary to consider the distances traveled by each pair of wheels. It is possible to insert the distance traveled by the center of gravity of the train when the train is uniformly loaded.

SECOND PROBLEM

For incoming trains from Gorlitz the Dresden terminal has a sanded stub terminal 64 meters long. Assuming the total length of a locomotive and tender to be 16 meters and their combined weight 75 tons, while the average weight



Half Cross-Section of Sanded Derailing Track at Dresden-Altstadt, Germany

distribution of a passenger train is 2.5 tons per meter, how great is the resistance of the sanded track when $f = 0.1$?

In the first place, the length of the train is $64 - 16 = 48$ meters; its weight $48 \times 2.5 = 120$ tons; the distance covered by the center of gravity of the train $\frac{64 - 16}{2} = 24$

meters; the distance covered by the center of gravity of the locomotive and tender is $64 - \frac{16}{2} = 56$ meters. Therefore,

the retarding effort is $A = 0.1 (75 \text{ tons} \times 56 \text{ meters} + 120 \text{ tons} \times 24 \text{ meters}) = 708 \text{ ton-meters}$. The train mass velocity v to be thus destroyed (adding 6 per cent to the train mass for the energy of its rotating masses, or [120 tons + 75 tons] 1.06 = 206.7 tons) is

$$v = \sqrt{\frac{2 \times 9.81 \times 708}{206.7}}$$

$$= 8.195 \text{ meter-seconds} = 29.5 \text{ km an hour.}$$

The New Zealand government has made its first move toward exercising the unlimited powers of regulation of tramways that it recently obtained by the passing of an amending tramway act through Parliament. The new law makes it possible for the Minister of Public Works to impose all regulations affecting tramway operation. Very small scope is left to authorities in their future choice of plant equipment, almost every item being placed on the compulsory list. One regulation stipulates that the gap on car lightning arresters shall be $\frac{1}{32}$ in., and minute directions for valves, details of sanding gear, etc., are laid down. The engineer of the Wellington tramways has advised his council that it will cost the system £75,000 to comply with the regulations.

PERFORMANCE OF ILLINOIS TRACTION AUTOMATIC BLOCK SIGNALS

The automatic block signal installation of the Illinois Traction System, as described in the *ELECTRIC RAILWAY JOURNAL* for June 24, 1911, page 1105, has been in operation since April 20 on the Peoria, Bloomington & Champaign division. The signals on the Springfield & Northeastern and the St. Louis, Springfield & Peoria divisions were put in operation late in June. During the month of July a total of ninety-six automatic block signals were in operation on the Illinois Traction System, and these signals operated 99.9813 per cent perfectly. Other data regarding the performance of the signals for June and July appear in the accompanying table. The totals include only the July results.

Referring to the thirty-nine signals on the Peoria, Bloomington & Champaign division, it is noted that on the average each signal moved 106.4 times per day in June and 90.8 times per day in July. This reduction in

ILLINOIS TRACTION SYSTEM SIGNAL DEPARTMENT—MONTHLY REPORT.
Month of June. ————— July, 1911.

Division.	P.B.&C.	P.B.&C.	S.&N.E.	St.L.S.&P.	Total for July.
No. of signals.....	39	39	17	40	96
No. of movements.....	124,530	109,775	21,315	51,104	182,194
No. of failures.....	9	15	4	14	33
No. of trains stopped.....	19	26	12	6	44
Minutes delayed.....	37	54	30	22	106
Movements per failure.....	13,837	7,318	5,329	3,650	5,521
Movements per train stopped.....	6,554	4,222	1,776	8,517	4,141
Movements per min. delayed.....	3,365	2,033	710	2,323	1,718
Per cent perfect.....	99.9927	99.89608	99.9812	99.9726	99.9813

Failures chargeable to:	June	July	August	Total
Signal department.....	1	2		2
Blown fuse.....	1			1
Defective apparatus.....	3	4	1	4
Track department.....		2		2
Power department.....	4	5	1	8
Overhead department.....		1		1
Operating department.....				
Broken wire.....				
Miscellaneous.....				
Creditable failures.....		1		2

- Records for June report:
 1—Signal department; loose wire.
 3—Defective apparatus; relay contacts and lighting.
 4—Power department; defective bonding.
- Remarks for July report:
 9—Defective apparatus; bad motors, relays, etc.
 14—Power department; bonding, power being off.
 2—Signal department; loose collar on signal, old bond wire not removed.
 2—Track department; damaged insulated joint, shunted track while placing ties.
 1—Overhead department; guy wire on 2300-volt line.
 3—Creditable failures; reported down with train in block.
 2—Blown fuses.

the number of signal movements of 15.6 less movements per day in July was due largely to a rearrangement of the train schedules. The Peoria, Bloomington & Peoria division of the Illinois Traction System extends from Peoria eastward through Mackinaw Junction to Bloomington. From Mackinaw Junction the Springfield & Northeastern division extends southward through Lincoln to Springfield, there connecting with the St. Louis, Springfield & Peoria division. The section of the Peoria, Bloomington & Champaign division between Mackinaw and Peoria is an especially busy piece of single track because it handles all the passenger and freight business operating on one line between Peoria, Bloomington and Decatur and on another line between Peoria, Springfield and St. Louis. The headway between trains on the line between Peoria and Mackinaw was so short in June that the signals slowed the handling of trains to a certain extent and thus the plan of operation was changed. Since the first of July all passenger trains which leave Peoria for Bloomington and Springfield at the same time now operate in multiple as far east as Mackinaw Junction, where they are divided to follow the separate roads to destination. This combination of cars into multiple-unit trains for operation over the most heavily traveled piece of single track has reduced the number of train movements and increased the speed of operation and track capacity. While the traffic handled in

July was greater than that in June, the number of signal movements, as earlier stated, was approximately 15 per cent less.

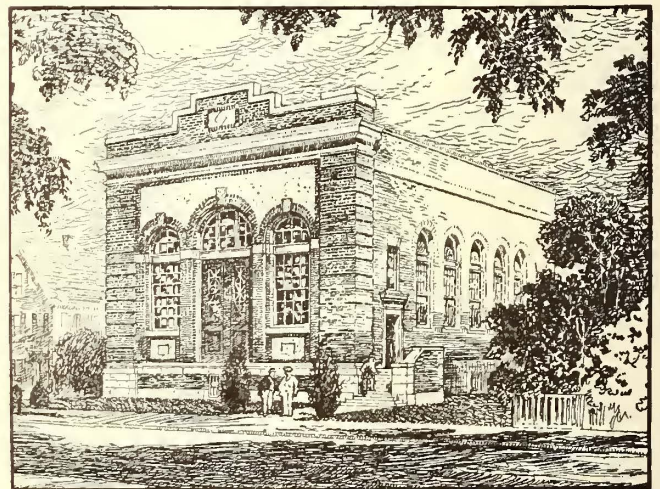
In July the signal department and the department of trolley and transmission lines were consolidated and placed under the charge of John Leisenring, signal engineer. Thus an economy in maintenance of signals is to be expected as compared with the maintenance of automatic signals on a steam road.

For a new installation on a cross-country interurban railroad the performance record is excellent. It will be noted that the power department was responsible for the largest number of signal failures. These are occasioned by the power being off the transmission line and by defective bonding. All such failures, of course, caused the signals to go to the "stop" position, and so provided maximum safety.

It is interesting also to note that when the signals were first installed they acted as most efficient rail-bond detectors, and whenever a bond became loose, thus opening the track circuit, the signals at both ends of the circuit automatically were set to "stop." Although the signal territory has recently been rebonded and the bonds carefully tested, the signal system, which requires a continuous return through each rail, often indicates open circuits at night, even though none was indicated in the daytime. Careful examination showed that the contraction of the rails due to the lower temperature at night caused some of the bonds to open the circuit.

TRANSFORMER SUBSTATION OF BOSTON ELEVATED RAILWAY

Six transformer substations are in process of construction for the Boston Elevated Railway Company. They are in the following suburban districts of the city: Cambridge, Brookline, Malden, Arlington, East Boston and Roslindale. All are of similar architectural style, being constructed of brick, stone and concrete. The dimensions of the several



Brookline Substation, Boston Elevated Railway, from Architect's Sketch

buildings are about 50 ft. in width by 80 ft. in length, with a height of 50 ft. to the top of the ornamental front. The face of the buildings will have an imposing and large doorway for use in taking large parts of machinery in and out. These doorways will be surmounted by latticed windows over which there will be a large arch. The cables will enter the building in all cases by underground conduits.

The accompanying sketch of the Webster Street station in Brookline is from the drawing of Peabody & Stearns, architects. The Stone & Webster Engineering Corporation is the constructing engineer for the building.

HEARING ON TRANSFERS IN NEW YORK

At the hearing in regard to the question of fares upon connecting or intersecting lines of street railway in New York before Commissioners McCarroll, Maltbie and Eustis, of the Public Service Commission, First District, on Aug. 18, 1911, Commissioner McCarroll said: "Having considered the letters that were laid before it, the commission feels that it is ready to announce that the rates arrived at would not be satisfactory to the commission. Of course, we assume that the action submitted to the commission was taken after consideration on the part of the companies. Not that I want to foreclose the situation; the commission will proceed to take the evidence that may be offered to show the ground upon which the rate proposed by the companies was arrived at."

William D. Guthrie, of counsel for the Third Avenue Railroad, asked an adjournment, as the accountants of that company were still at work upon data which the company desired to offer in evidence. He said that the accountants had reported that, while on the Third Avenue Railroad there was a decrease of 10,000,000 transfers the year following the abolition of the universal transfers, there was a large increase in revenue passengers, a large increase in the operating profit and a very large decrease in the operating cost. It involved a great deal of work to separate the totals of each company in order to show the result of the operation of free transfers between the cross-town lines and the long-haul lines.

Commissioner Eustis said that as the evidence of the witnesses of the commission stood the companies did not benefit in a monetary way by the abolition of the free transfers. Commissioner Maltbie thought that the companies must have ready a justification for the rates which they proposed and that an adjournment was unnecessary. In reply Mr. Guthrie said:

"The practical men report that the cost of rendering the service, as they figure it, is a certain figure, and that the present net revenue is a little more than 4 cents with the transfers that are now granted. From that they naturally figure that if a large number of transfers were added to those now granted the cost of rendering the service would be increased, the average return per passenger would be materially reduced, and if the return per passenger was materially reduced the operation would necessarily result in a loss to the company. We expect to demonstrate the result, but it requires an immense mass of proof."

At the hearing on Aug. 22 A. F. Weber, chief statistician of the commission, explained tables prepared by him which showed the results of operation of the street railways in Manhattan for the fiscal years 1907 to 1910, inclusive. In referring to the figures which he presented Mr. Weber said that the number of paid fares on the surface lines in 1910 was only about 2,000,000 more than in 1907. In the same four years the increase of passengers in the subway had been 110,000,000, while the increase on the elevated lines had been 20,000,000.

George W. Linch, receiver of the Second Avenue Railroad, described the routes operated by that company, mentioning the points where transfers are given. The average revenue per passenger on the company's Second Avenue line during the six months ended June 30, 1911, taking transfers into account, was 4.73 cents; on the First Avenue line, 4.84 cents; on the Eighty-sixth Street line, 4.66 cents; on all the lines, 4.74 cents. Excluding all taxes and all interest on capital employed in operation and all allowance for depreciation, but including rents of property employed in operation not owned by the Second Avenue Railroad, the cost per passenger during the six months ended June 30, 1911, on the Second Avenue main line was 3.72 cents; on the First Avenue line, 4.67 cents; on the Eighty-sixth Street line, 4.67 cents. The average on all lines was 4.11 cents. The total number of car miles operated by the company

for the six months ended June 30, 1911, was 1,807,219, and the average revenue per car mile for the whole system, 23.95 cents. The period of six months ended June 30, 1911, showed the best results from the point of operating revenue of all half yearly periods since Mr. Linch had been receiver of the company.

Brainard Tolles, of counsel for the Second Avenue Railroad, explained that both the Metropolitan Street Railway and the Second Avenue Railroad had a franchise on Eighty-sixth Street and Avenue A, east of Second Avenue. Each was running on its own franchise and neither was using the line of the other. The physical ownership of the tracks did not carry with it any obligation to exchange transfers so long as each ran on its own franchise.

At the hearing on Aug. 23 F. T. Wood, assistant to the general manager for the receivers of the Metropolitan Street Railway, explained a comparison of operating statistics of the Metropolitan Street Railway, from July 1, 1910, to Dec. 31, 1910, with the period from July 1, 1907, to Dec. 31, 1907, which had been offered in evidence by Joseph P. Cotton, of counsel for the receivers of the company. The figures for 1907 were not for all the lines, but only for that portion of the system which corresponded to the present system. Mr. Wood took the six months ended Dec. 31, 1907, because that was the last semi-fiscal year period before the unlimited free transfer system was curtailed, and took the last six months of the calendar year 1910 because that was the last corresponding period after the transfer privilege had been curtailed.

On a basis of daily comparison of passengers carried during the two periods, the figures indicated that during the period when the transfer privilege was curtailed the lines involved carried 42,913 more revenue passengers each day and 60,026 fewer transfer passengers than they did each day during the six months ended Dec. 31, 1907. This gain in revenue passengers was also accompanied by a reduction in car mileage operated of 3323 miles a day on the average in the last six months of 1910 as compared with the last six months of 1907. In other words, the loss of transfer passengers was made up by a corresponding gain of revenue passengers. The curtailment of the transfer privilege also lessened the number of transfer abuses.

A table was introduced by Mr. Wood as evidence comparing the revenue passengers and transfer passengers of each of the operating systems in the borough of Manhattan for the six months from July to December, 1907, and the corresponding period of 1910, the purpose being to bring before the commission the question of how far the discontinuance of transfers had affected the lines of the Metropolitan Street Railway and how far it had affected other lines. This table showed revenue passengers, transfer passengers, percentage of increase and decrease, miles operated, percentage of increase and decrease and the average fares per passenger. The tabulation showed that the transfer privilege of the Second Avenue, Central Park, North & East River Railroad and the Twenty-eighth & Twenty-ninth Streets Crosstown Railroad was cut down 90 per cent, the Third Avenue Railroad 47 per cent and the Metropolitan Street Railway about 16 per cent. The average fare per passenger for the period in 1907 was 3.203 cents, while in 1910 it was 3.461 cents. Mr. Wood said that as soon as the privilege of transferring was extended there was a tendency to take advantage of the retransfer feature. Consequently, many people who formerly were free passengers two or three times now took a direct route to their destination instead of going via crosstown lines two or three times, thus tending to turn travel along the most direct route.

The hearing has been adjourned until Sept. 13.

The municipality of Tokio, Japan, has purchased the local tramway system from the Tokio Railway Company. The price paid was \$32,082,000 in gold.

CENSUS DATA ON CROSS TIES PURCHASED

A preliminary statement showing the number of cross ties purchased by steam and electric railroads during the years 1910, 1909, 1908 and 1907 was issued on Aug. 24 by Census Director E. Dana Durand. The report was prepared under the direction of William M. Steuart, chief statistician for manufactures, by J. E. Whelchel, expert special agent. The data have been compiled in co-operation with the Forest Service of the Department of Agriculture, and form one of the series of annual reports containing statistics in regard to the lumber and timber industries.

The steam and electric railroads of the United States purchased 148,231,000 cross ties during the calendar year 1910, paying therefor, at point of purchase, \$75,889,000, as compared with 123,751,000 in 1909, 112,467,000 in 1908 and 153,703,000 in 1907, costing \$60,321,000, \$56,282,000 and \$78,959,000 respectively. The number purchased in 1910 was an increase of 20 per cent over 1909 and 32 per cent over 1908. These percentages indicate that the year 1910 was one of greater activity in railroad projection and construction than any other year since 1907. Of the total purchases of cross ties during 1910 electric railways purchased 8,635,000, or 5.8 per cent. The steady increase in the number of cross ties reported as purchased for new track is noteworthy. The total for this purpose in 1910 was 22,255,000, as against 16,437,000 in 1909, 7,431,000 in 1908 and 23,557,000 in 1907; the total for 1910 exceeding that for 1909 by 35.4 per cent, for 1908 by 199.5 per cent and nearly equaling that for 1907, the largest ever recorded. Largely as a logical result of the greater demand for cross ties during 1910 the average cost per tie at point of purchase advanced to 51 cents, the same figure reached in 1907, as compared with 49 cents in 1909 and 50 cents in 1908.

In 1910, as in preceding years, oak was the principal kind of wood used for cross ties. The number of oak cross ties formed 46.1 per cent of the total for 1910, as compared with 46.2 per cent in 1909, 42.8 per cent in 1908 and 40.2 per cent in 1907.

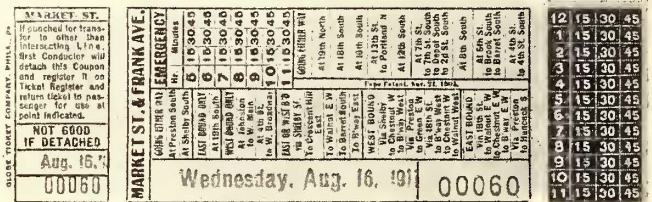
A substantial increase in 1910 over 1909 is shown in the number of Southern pine cross ties reported; the increase in the cut from this species over 1909 being 22.8 per cent, as against an increase of 20 per cent in the total number of cross ties reported from all woods. Douglas fir also showed for 1910 over the preceding year a larger increase, namely, 28.2 per cent, than the increase in the total purchase from all woods. On the other hand, chestnut, cedar and cypress, with increases over 1909 of 17.1 per cent, 7.8 per cent and 17.6 per cent, respectively, were bought in relatively smaller quantities. While the bulk of the cross ties were cut from the six woods mentioned during each of the four years and while combined they contributed 85.5 per cent of the total in 1910, 85.3 per cent in 1909, 86.5 per cent in 1908 and 87.2 per cent in 1907, a remarkable and significant showing in connection with the figures for 1910 is noted with reference to certain woods which hitherto have been utilized as cross-tie material to only a very limited extent. The increase in the number of cross ties over 1909 reported as cut from elm was 451.7 per cent; gum, 328.8 per cent; birch, 323.3 per cent; spruce, 121.5 per cent, and mesquite, 114.9 per cent. A very large percentage of the cross ties cut from these woods was given some preservative treatment, thus increasing their life to or beyond that of untreated cross ties made from the more commonly used or standard cross-tie woods. The growing

scarcity of these last-mentioned woods, however, tends to increase their cost and accounts largely for the introduction of substitutes cut from cheaper species. The drift in this direction is clearly brought out by a comparison of the figures relating to treated cross ties during the past four years. In 1907 the number of cross ties reported as having been given some preservative treatment was 19,856,000; in 1908, 23,776,000; in 1909, 22,033,000, and in 1910, 30,544,000, the number for 1910 showing an increase over that for the preceding year of 8,511,000, or nearly 39 per cent.

THREE-COUPON TRANSFER IN LOUISVILLE

The Louisville Railway Company has recently put in operation a new system of transfers which was devised at the time the number of transfer points was increased. The company now gives transfers at practically every intersection of its lines, the only exceptions being at points where it is possible for passengers to "loop."

The new transfer used has some novel features and is illustrated herewith. It has two coupons. One is the

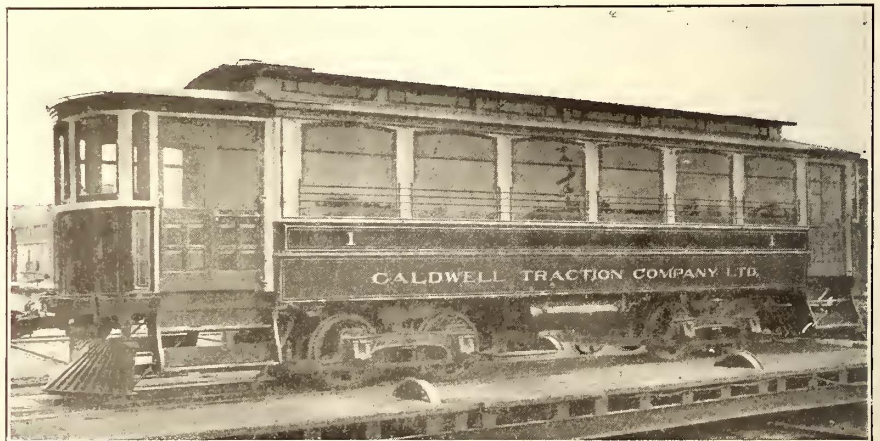


New Transfer at Louisville

usual p. m. coupon. The other is a special coupon designed to prevent the necessity of the issue of a transfer on a transfer. When a passenger has to use two connecting lines the conductor on the car on which he pays his fare issues the transfer illustrated and punches the final destination. The conductor on the second car collects the left-hand coupon and the conductor on the third car collects the transfer. The ticket also has an emergency space.

NEW CARS FOR ELECTRIFIED GASOLINE LINE

The Caldwell Traction Company, Ltd., of Caldwell, Idaho, has been operating a 7-mile line with a gasoline car and recently purchased from the St. Louis Car Company



Car for Caldwell Traction Company

two cars of the type illustrated, which have replaced the gasoline car service. The Caldwell Traction Company enjoys the distinction of being an electric railway which, although small, has no interest-bearing indebtedness. W. R. Sebree is president and owner of the new road.

The new cars are designed for double-end service and

have reversible cross seats. The bodies have six extra large windows on each side, are provided with 6-ft. vestibules having folding doors at the steps and are mounted on St. Louis Car Company's No. 47 improved trucks. M. C. B. type radial couplers and locomotive type pilots are installed. The bottom framing consists of 4-in. x 7 $\frac{3}{4}$ -in. yellow pine sills connected by cross sills of oak. Between the side sills and the subsills are $\frac{3}{8}$ -in. x 11-in. steel plates extending the full length of the body, which is 28 ft. long. The length of the car over all is 41 ft. Westinghouse air brakes, Consolidated electric heaters and four Westinghouse 101 B-2 motors are installed. The inside finish of the cars, including molding, sash and doors, is mahogany in its natural color. The car builder supplied its standard type of window guards, vertical wheel brakes, summer platform gates, sand boxes, seats and trimmings.

750,000-VOLT TESTING TRANSFORMERS.

The increasing demand for high-voltage power transmission apparatus has made it necessary to produce potentials much in excess of the highest rated transmission voltages, both for the purpose of insulation testing and the investigation of high-voltage phenomena. Two 500-kva, 750,000-volt testing transformers have recently been built at the Pittsfield works of the General Electric Company. One of these transformers is for permanent use at the Pittsfield factory, where it will aid particularly in the research and investigation of corona and other phenomena

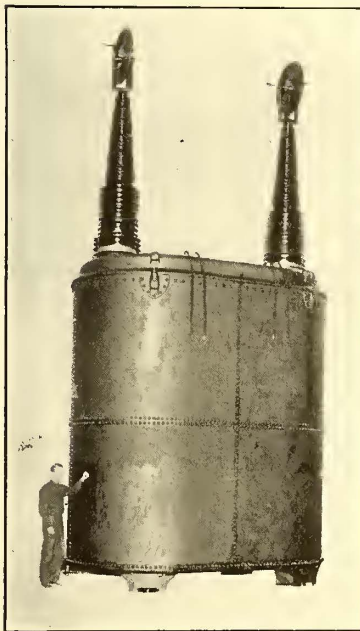
windings consists of a number of pressboard cylinders which divide the space into a number of generous oil ducts, greatly assisting in the circulation of oil and increasing the dielectric strength. The insulation between the two stacks of high-tension coils consists of a number of flat pressboard barriers with oil ducts between. The insulation material used is especially treated to give high insulation resistance and low specific capacity.

The supports for the high-tension coils are unique in that they consist of metal upon which the winding directly rests and to which they are electrically connected. These metal supports act as shields to the terminal coils, protecting them from any discharge which may be induced to ground. While there is a metal shield at both the top and bottom of each stack, the windings are supported only at the bottom, where the metal shield rests upon heavy porcelain insulators attached to the iron framework of the transformer.

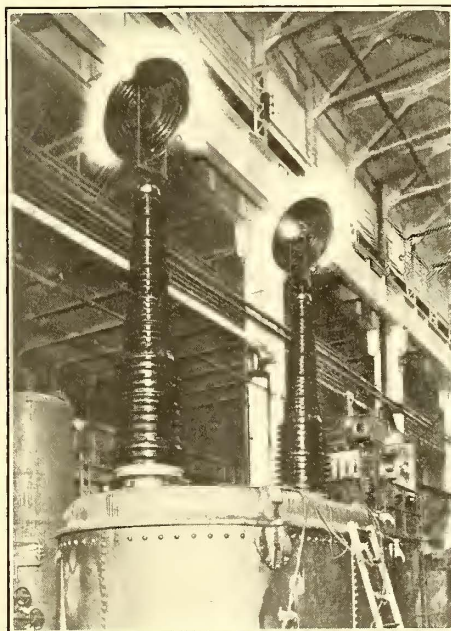
The tanks are constructed of heavy wrought iron with riveted seams and are provided with substantial cast-iron feet. The cover is of cast iron.

Both high-tension and low-tension leads are brought out through the transformer cover. The low-tension leads follow the usual construction of flexible leads passing through porcelain bushings. The high-tension leads are of the sectional filled type which consist of rings of insulating material filled with a semi-viscous compound. To obtain sufficient creeping surface on the outside of the leads collars are assembled between the annular sections.

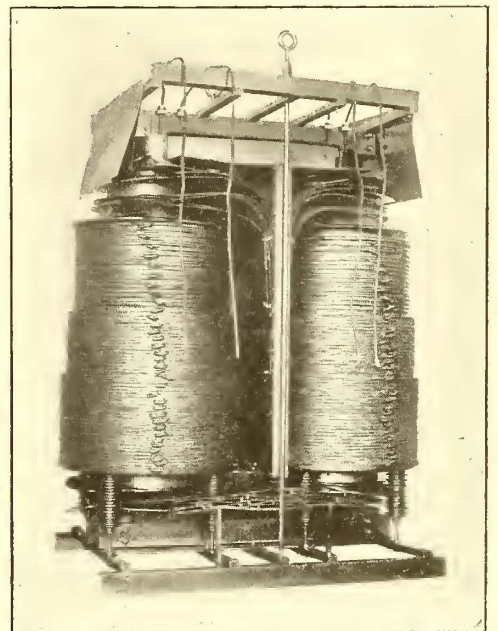
Tests for corona have been taken at night with the



Exterior View of Testing Transformer



600,000-Volt Corona Test of Transformer



Core, Coils and Frame of Testing Transformer

in connection with transformers, oil circuit-breakers, insulators, etc. The full ratings are as follows:

K 60-500-1100/2200-750,000.

K 60-500-500/1000/2000-750,000 (for Pittsfield).

They are oil-insulated and follow an adaptation of the vertical-core type used generally on high-voltage transformers. The low-tension winding consists of long cylindrical coils placed next to the core on each leg. The high-tension winding consists of a number of double-section circular disk coils with conductor wound one turn per layer. The terminal coils, which are at the top of each stack, have smaller outside diameters than the coils lower down so that greater distance is provided between these coils and other parts.

The insulation between high-tension and low-tension

transformer operated at normal voltage by ratio, both high-tension terminals free. While the protective reactances on the top of the high-tension leads showed considerable corona, very little was noted elsewhere on the transformer or leads. One of the accompanying views shows the corona developed during a test of the transformer at 600,000 volts.

The approximate weights and dimensions are as follows:

Dimensions: Floor space, 8 ft. x 13 ft.; height to top of cover, 15 $\frac{1}{2}$ ft.; total height including protective reactances and spark-gap, 28 ft.

Approximate weights: Weight of core, 13,150 lb.; weight of copper, 1100 lb.; weight of tank and cover, 14,000 lb.; total weight, less oil, 28,250 lb.; weight of oil, 7000 gal., 50,400 lb.

ELECTRIC RAILWAY LEGAL DECISIONS

LIABILITY FOR NEGLIGENCE

Illinois.—Setting Down Passenger.

After a car has stopped at a street crossing, a passenger desiring to leave it may assume it will not start till he has had reasonable time to leave it in safety. (*Moore v. Aurora, E. & C. R. Co.*, 92 N. E. Rep., 573.)

Indiana.—Duty to Alighting Passengers.

Where a street car conductor signaled the car to stop and it had slowed in response to the signal as if to stop at a regular stopping place, it was the duty of the conductor to see that before he started the car forward none of the passengers was in a position of peril caused by the conditions thus brought about. Since in such case a passenger may assume that the car will remain standing long enough to enable all that desire to alight to do so safely, the stopping of the car a reasonable time is not sufficient. (*Louisville & Southern Indiana Traction Co. v. Korbe*, 90 N. E. Rep., 483.)

Indiana.—Frightening Horses on Highway—Liability.

Where a person is in imminent peril, one who having knowledge of his condition acts so as to increase it is negligent; and hence where a railroad's servant in charge of an electric car, having seen that a horse on an abutting highway was frightened by it and was liable to do damage, failed to stop his car, although able to do so safely, and increased the horse's fright, thereby causing an accident, the company is liable for his negligence. (*Effinger v. Ft. Wayne & W. V. Traction Co.*, 93 N. E. Rep., 855.)

Kentucky.—Horses on Highway.

Where the servants of a street railway company in charge of a car see that its approach frightens a horse on the street they must use ordinary care not to increase its fright, and if they have reason to believe that the approach of the car frightened the horse it is negligence to move it nearer. (*Owensboro City R. Co. v. Wall*, 133 S. W. Rep., 1145.)

Kentucky.—Master and Servant in Repair Shop.

A car repairer who, after placing a car over a pit to repair it, was called away by the master and on his return fell into the pit, from which, without his knowledge, the car had been removed through the negligence of the master, did not assume the risk of the resulting injury. (*Lexington Ry. Co. v. Cropper*, 133 S. W. Rep., 968.)

Massachusetts.—Injuries to Person Crossing Track—Failure to Look and Listen.

Though there is no absolute rule of law requiring a traveler to look and listen before crossing an electric street railroad track, the circumstances might be such that a failure to look and listen properly will show negligence. (*Ferguson v. Old Colony St. Ry. Co.*, 90 N. E. Rep., 535.)

Michigan.—Persons on Interurban Track—Duty of Motorman.

It is not gross negligence for a motorman of an electric car running on its own right-of-way in the country not to stop his car when he sees a person, who sees him, on the track 400 ft. or 500 ft. away, where by taking a single step that person would be out of danger, and he has the right to assume that that person will step out of the way of danger before the car reaches him. (*Levy v. Houghton County St. Ry. Co.*, 129 N. W. Rep., 683.)

Missouri.—Care Required of Motorman.

An instruction in an action against a street car company for killing a boy on the track, that it was the motorman's duty "to stop said car within the shortest time and space possible with the means at his command upon the first appearance of danger to" decedent, was not erroneous as requiring the exercise of the highest degree of care while the law only required the exercise of ordinary care. (*Kaiser et ux. v. United Rys. Co. of St. Louis*, 135 S. W. Rep., 90.)

Missouri.—Injuries to Children—Care Required—Damages.

Where a motorman of a street car sees a child leaving an alley and starting across the street, it is the motorman's duty to slacken speed and get the car under control, with the brakes ready for instantaneous use, so that, if the child

without exercising the care of a grown person attempts to cross the track, the motorman will be in a condition at least to lessen greatly the chances of collision.

In an action for death of plaintiff's eight-year-old son, who was killed by defendant's street car, a verdict allowing plaintiffs \$4,000 was not excessive under Rev. St. 1899, Sec. 2864, as amended by Laws 1905, p. 135 (Ann. St. 1906, p. 1637), providing that in such an action defendant shall forfeit as a penalty not less than \$2,000 nor more than \$10,000, in the discretion of the jury. (*Childress et ux. v. Southwest Missouri R. Co.*, 126 S. W. Rep., 169-70.)

Missouri.—Negligent Operation—Humanitarian Doctrine.

Under the humanitarian rule the negligence of a party run down by a street car cannot prevent his recovery if the exercise of ordinary care by those in charge of the car causing the injury could have avoided the injury. (*Parrish v. Metropolitan St. Ry. Co.*, 126 S. W. Rep., 767.)

New Hampshire.—Offer to Pay Claim in Damage Suit.

In an action against a street railway company for injuries from a collision, evidence of defendant's voluntary offer to pay plaintiff's claim in full was competent as an admission of liability. (*Altman v. Boston & N. St. Ry. Co.*, 78 Atl. Rep., 616.)

New Jersey.—Street Railroads—Duty of Persons Using.

A person using the public highway must be observant of the presence of cars or vehicles which have the right to use the same street, and, while a pedestrian or driver of a vehicle has a right to pass over or drive over the track of a trolley road, he must exercise care to see that it is safe for him to do so. (*Pfrom v. Public Service Corporation of New Jersey* (two cases), 76 Atl. Rep., 1083.)

New York.—Collision—Negligence—Presumption.

Where a street car motorman dashed into a wagon on the track from the rear, in the face of a lighted lantern hanging from the rear axle, and the motorman gave no explanation of his conduct in exculpation, it would be presumed that he saw the lantern and ran into the wagon regardless thereof. (*Swift & Co. v. New York & Q. C. Ry. Co.*, 120 N. Y. Sup., 203.)

New York.—Limitation of Actions—Injury from Negligence—Complaint.

The complaint against a street surface railroad for personal injury from a hole in the part of a street which, by Railroad Law (Consol. Laws, Chapter 49, Section 178), it is required to keep in a good and safe condition, alleging the injury was due to defendant "suffering" said hole to be and remain, states a cause of action for negligence within the three-year limitation prescribed by Code Civ. Proc., Section 383, though, if the railroad created the hole, it would be liable for the injury as the creator of a nuisance and the six-year limitation of Section 382 would apply. (*Hayes v. Brooklyn Heights R. Co.*, 93 N. E. Rep., 469.)

New York.—Injuries Due to Wrong Signal Given by Non-employee.

Where a passenger was injured owing to the starting of the street car while she was alighting, the carrier was liable, though the signal to start was given by a passenger; the same passenger having previously given starting signals, which was known to the conductor, who at the time of the accident was paying no attention to the passenger but was engaged in counting transfers. (*Blair v. Brooklyn, Q. C. & S. R. Co.*, 126 N. Y. S., 466.)

New York.—Care Required at Street Intersection.

As the ordinary right-of-way of a street surface railroad does not exist at intersecting streets, its right and those of vehicles on the intersecting street being equal, a motorman of a street car must exercise reasonable care to have it under control as it approaches the crossing. (*Huther v. Nassau Electric R. Co.*, 126 N. Y. S., 1105.)

Pennsylvania.—Injury to Passenger from Passing Wagon.

Where an injury to a passenger on a street car is caused by a collision between the side of the car while on its own track and a wagon, not under the control of the street railway company, no presumption of negligence arises in favor of the passenger against the street car company. (*Blew et ux. v. Philadelphia Rapid Transit Co.*, 76 Atlantic Rep., 17.)

Pennsylvania.—Injury to Servant—Proximate Cause.

Where a motorman is injured by a horse running into the front of a street car and crashing through the glass, the company is not liable because of a defective air brake, where the evidence fails to show any connection between the working of the brake and the accident. (*Layton v. Union Traction Co.*, 76 Atlantic Rep., 18.)

Washington.—Snow on Street Car Steps.

That snow and ice had accumulated on the steps of a street car by being brought in on the feet of passengers between the time a passenger boarded it and slipped in getting off is not evidence of negligence. (*Caywood v. Seattle Electric Co.*, 110 Pac. Rep., 420.)

Washington.—Right to Assume That Automobile Will Leave Track.

A motorman may assume that an approaching automobile will be turned off the track until the danger of a collision is imminent. (*Pantages v. Seattle Electric Co.*, 104 Pac. Rep., 629.)

Washington.—Defect in Street—Violation of Franchise Ordinance—Liability for Injuries—Damages.

An ordinance granting to a street railway company a franchise to operate a street railroad may require it to maintain and keep in repair the portion of the street occupied by its tracks and it is liable for injuries to a traveler through its failure to comply with such requirement.

Where a man of sixty-four, in good health, earning with his team \$4 per day, sustained a compound, comminuted fracture of the left ankle and the lower part of the right leg, the bones being crushed into fragments, protruding through the flesh, it appeared that the process of healing was not complete at the trial six months after the injury, that the injury was permanent, and that he would be able only to get around by the use of a stiff shoe, with the aid of a crutch, and that he was confined to his bed about three months, a verdict for \$5,500 was not excessive.—(*Kincaid v. Walla Walla Valley Traction Co.*, 106 Pac. Rep., 918-9.)

CHARTERS, ORDINANCES, FRANCHISES

Delaware.—Paving Streets—Liability.

The charter of a street railroad company (12 Del. Laws, C. 406, Sec. 7) provides that the company shall keep the pavement in good repair within the rails and for 3 ft. on each side thereof. Under a subsequent agreement the street railway company agreed to pave a certain street for 2 ft. on each side of its tracks, and between 1893 and 1895 the city paved the street and was paid by the street railroad company the cost of paving for 2 ft. on each side of its track. In 1904 the city brought suit for the amount due for paving the other 1 ft. on each side of the track. Held, that the action was on an implied assumpsit arising out of defendant's alleged breach of duty imposed by statute, was not on the statute and was governed by limitations in Rev. Code 1852, amended in 1893, p. 888, C. 123, Sec. 6, providing that no action of assumpsit and no action on the case shall be brought after three years from the accruing of the cause of such action. (*Mayor, etc., of City of Wilmington v. Wilmington City Ry. Co.*, 76 Atlan. Rep., 965.)

Indiana.—Maintenance of Fences on Right-of-Way.

In proceedings to condemn land for an electric railway right-of-way, the court instructed that the statute provides that when private ways are maintained over the right-of-way of the plaintiff the owner shall, if said right-of-way is fenced, erect and maintain substantial gates in the line of such fence or fences and keep the same securely fastened and closed when not in use by himself or employees, and that in assessing damages the jury might take into consideration these obligations upon the part of the landowner, but such obligations as an element of damages must be confined to the costs and vigilance required "to maintain" the same. Held, that the instruction was not objectionable because there was no direct evidence as to what it would be worth or how much vigilance would be required to keep the gates closed, as evidence upon such incidental matters as the costs and vigilance necessary to keep the gates closed would not have been proper, and the instruction did not direct the jury that they might consider such items in estimating damages, but they were told merely to take into consideration in determining damages the costs and vigilance required to maintain the same, and the instruc-

tion is not objectionable as introducing uncertain and speculative items into the consideration of the jury. (*Indianapolis & C. Traction Co. v. Wiles et al.*, 91 N. E. Rep., 729.)

Missouri.—Interference with Access to Private Property.

Right of an owner of property abutting on a public highway to have free access to his property over the adjacent highway is as sacred as his right to the property itself, and the use of the highway is a property right of which he cannot be deprived by a railroad company without just compensation, and, though the county court authorizes it to build its tracks across the highway, yet, if in constructing its roadbed thereon in front of his property by making the roadbed and grade of its track above the level or grade of the highway it impairs the usefulness of his property by interfering with access thereto, the company is responsible to him for the loss to the extent of its diminished value. (*Robinson v. Springfield Southwestern Ry. Co.*, 126 S. W. Rep., 994.)

Missouri.—Street Railroads—Regulations—Charter Provisions—Rights of Property Owners.

A street railway company whose franchise requires efficient service can be compelled to render such service by the city if it fails to do so.

A provision of the charter of a street railway company prohibiting the operation and construction of a line on a certain street without the consent of abutting property owners does not give such owners rights greater than those of the general public, or authorize them to interfere with the reasonable maintenance and operation of the line other than as members of the general public.

An ordinance containing an agreement between the city and a street railway company which reserved to the city the right to regulate the re-routing of all car lines was not contrary to public policy, nor unlawful.

If the re-routing of a street car line by a city so as to require a change of cars where none was formerly required will not prevent efficient service on the line and subserves the interest of the general public, property owners abutting thereon cannot enjoin the re-routing because of any depreciation in the value of their property caused thereby. (*Heidegger et al. v. Metropolitan St. Ry. Co. et al.*, 126 S. W. Rep., 990.)

New York.—Interference with Trolley Wires in Streets—Removal of Buildings.

Where plaintiff, a street railway company holding a franchise for the maintenance of its trolley system along the streets of a city, had in its employ competent electrical linemen and inspectors able to raise or lower its wires along the street, so as to permit the removal of a building along the street, and defendant, desiring to move the building, offered to reimburse plaintiff for all the expense incidental to the moving of the wires and for all damages caused thereby, plaintiff was not entitled to restrain such interference with its wires on the theory that the removal would cause irreparable damage for which it had no adequate remedy. (*Western New York & P. Traction Co. v. Stillman*, 124 N. Y. S., 246.)

New York.—Consent of Property Owners—Nature.

The consent of owners of property bounding a street to the construction of a street railway therein, executed in the usual form, is not a mere license to be revoked at will, nor is it revoked by a transfer of the property, and it is sufficient to defeat an equitable action to restrain the maintenance of the railroad by a grantee of the consenting owner, where the road was in operation at the time of his acquisition of title, though the consent had not been recorded. (*Carswell v. Hudson Valley Ry. Co.*, 125 N. Y. S., 25.)

New York.—Construction of Additional Track by Elevated Road.

An elevated road entered upon a street in the city of New York under a franchise giving it the right to build a structure in front of plaintiff's premises sufficient to carry three tracks and thereafter built the structure and laid two tracks thereon. Held, that its subsequent installation of a third track and the increasing size and frequency of its trains did not constitute an additional burden beyond the rights acquired by the user. (*Gerken et al. v. Interborough Rapid Transit Co. et al.*, 125 N. Y. S., 32.)

LONDON LETTER

(From Our Regular Correspondent)

On Aug. 12, 1911, part of the employees of the Corporation Tramways of Glasgow, Scotland, went on strike to enforce their demands for shorter hours and an extended holiday—a working week of fifty-one hours and seven days' holiday with pay. The conditions under which the men worked were a fifty-four hour week with five days' holiday each year, while the wages of qualified conductors were 33s. per week and of motormen 33s. with a bonus of 1s. per week for freedom from accident. The corporation offered to consider the demand six months hence, but a ballot of the men was taken, with the result that 1667 voted to strike immediately and only 171 for delay. The tramway department had available the 700 men who were not on strike, together with some 200 inspectors, timekeepers and men in other grades who had qualified in past times as motormen and conductors. As the city resumed business the number of cars available proved wholly inadequate, and great inconvenience was caused to all classes. Meanwhile additional men were being secured to take the place of the strikers, but the fresh arrivals aroused renewed outbreaks of disorder. A deputation of the strikers endeavored to prevail upon the tramway employees at the power station to join them, but the electricians refused to go out. On Aug. 14 the tramways committee decided to leave the dispute to be dealt with by the general manager. On the same day the men met and passed a resolution in favor of arbitration by the Board of Trade. Contemporaneously the strike weakened, and men continually dribbled back for reinstatement. This was done as far as seemed reasonable, but in many cases new men had been taken on to fill the vacancies. By Aug. 15 the strike had collapsed and the men had returned to work, with the exception of those whose places had been filled.

It has been announced that the date upon which the Wirral Railway must, at the latest, under the act of Parliament, begin the construction of the new terminus at Seacombe occurs about twelve months hence. Upon the notification comes a repetition of the report as to the complete electrification of the company's system, together, of course, with new rolling stock and improved stations. It is estimated that when the plan is put into effect it will be possible to travel between New Brighton and Liverpool in less than twenty minutes.

One of the most important proposals before the London County Council is the consideration of a bill providing, among other things, for a tramway from Farringdon Road, E. C., near the Metropolitan Railway Station, down Farringdon Street to near the Memorial Hall. If this is carried out electric tramway cars will run from all parts of North London to within a few yards of Ludgate Circus. Another projected line is intended to connect Hampstead and Islington, and a third to extend the tramways from Norton Folgate, E., to Liverpool Street station. The council has before it tenders for laying tramways over the bridge now being built over the Metropolitan Railway at King's Cross to connect Pentonville Hill, N., with Gray's Inn Road, W. C.

The long-promised scheme of capital reorganization of the British Electric Traction Company has now been issued. The total amount of capital is unchanged, but the existing preference and ordinary shares are to be exchanged in certain proportions for new first preference, second preference, preferred ordinary and deferred ordinary shares on a par basis. There has thus been no attempt to write off the admitted large depreciation of assets, the contention of the directors being that this depreciation is mainly due to insufficiency of profits and would disappear if earnings were better.

The report of the Dublin United Tramways, Ltd., for the six months ended June 30, 1911, states that the amount available for division is £51,159, out of which it is recommended that dividends be paid for the half year at the rate of 5 per cent per annum, less income tax, on both the preference and ordinary shares; that a sum of £4,000 be set aside toward the renewal of cars and £2,000 toward accident insurance reserve, leaving £9,564 to be carried forward.

By the completion of the new electric tramway from Bacup to Shawforth, built by the Bacup Corporation at a cost of £24,000, a through service between Rochdale and Bacup is possible, running past the famous Healey Dell and affording the final link in a continuous 100-mile radius connecting by electric car Stockport, Manchester, Oldham, Rochdale, Rossendale, Accrington, Blackburn, Darwen, Bolton, Bury, etc. The section between Bacup and Shawforth will be leased by Bacup to Rochdale Corporation for fifty years and then it will be handed over to Bacup.

The Town Council of Edinburgh has appointed a deputation to inspect the trackless trolley system at Leeds.

The Board of Trade inspection of the new extension of the Lenarkshire tramways from Motherwell to New Stevenston recently took place, and the new route has been opened to the public. The new extension is by way of Carfin Road and Jerviston Road to New Stevenston, and the work included the erection of a new bridge over the River Calder at Motherwell, at a cost of £7,000, one-half of which was paid by the Motherwell Town Council.

The report of the Central London Railway shows that the capital expenditure during the half year has been £51,463, of which £38,864 was on the Liverpool Street extension, £7,348 expenses of the issue of preference stock, and £2,617 cost of the high-level subway with the City & South London Railway at Bank Station. The receipts show a decrease of £8,230 and the expenses a decrease of £3,420, making a net decrease on the half year of £4,810. Important changes in the staff entailed compensation to officers who have been retired, and this item figures in the account for £3,316. The decrease of 658,909 in the number of passengers carried is attributed to the large increase in motor-omnibus competition and to the weather. The construction of the Liverpool Street extension is progressing rapidly, and arrangements have been made with the contractors whereby the work will be expedited six months.

Some details of the proposed conversion of the East London Railway to electric traction have been made public. At the half-yearly meeting Lord Claude Hamilton stated that the estimated expenditure was £65,000, and it was hoped that the Great Eastern Railway would incorporate clauses in one of its own bills authorizing the raising of this sum of money. The extra working expenses are put at £3,000 per annum, which the lessee companies are willing to bear. With regard to the interest upon the £65,000, which at 4 per cent amounts to £2,600 per annum, the East London Company will pay this after it has received the minimum rent of £30,000 per annum, and also the extra sum to which it is entitled when the gross receipts exceed £53,000 per annum. The District Railway will supply the current from Lot's Road, and the Metropolitan Company will supply the rolling stock.

The Brighton, Hove and District Railless Traction bill, which has passed the House of Lords, has now also been passed by a House of Commons committee. The bill proposes to empower the Brighton & Hove United Omnibus Company to work its cars between Kemp Town and Rottingdean by the trackless trolley system. J. B. Hamilton, manager of the Leeds Tramways, said the route was well adapted for trackless traction.

The Leicester Tramways Committee announced an extension of the transfer-ticket system, to go into effect on Aug. 28. There will be "inner" and "outer" transfer routes, and all the transfer tickets will be of the 1d. denomination, and issued only at request. On the outer route the general effect will be to enable passengers to travel from one terminus to another, via the nearest junction, or to the end of an overlapping stage on the circuit route, and the "inner" transfer will give transit between the three principal railway stations.

The House of Lords Select Committee, presided over by Lord Newton, has rejected the Greater London Railway bill. The bill originally proposed the construction of a railway from Feltham to Tilbury, running in a semicircle around the northern outskirts of London. Evidence on the proposal was heard for eighteen days by a committee of the House of Commons, which allowed the bill to proceed, after curtailing the length of the line, cutting off the portion from Feltham to Northolt, at the western end, and the portion between Ilford and Tilbury, on the eastern end.

A. C. S.

News of Electric Railways

Opinion on Initiative and Referendum Laws in Columbus

City Solicitor Weinland, of Columbus, Ohio, to whom the Crosser municipal initiative and referendum law was submitted for an opinion in regard to its emergency provisions, holds that even appropriations for salaries of city officials and employees may be subject to delay of sixty days in order to allow the people time to vote upon them in case 15 per cent of the qualified electors sign a petition to that effect. The Crosser law provides for the initiative in regard to grants to public-service corporations, and also in regard to general ordinances. In case 30 per cent of the qualified voters petition the City Council to pass a certain ordinance and favorable action is not taken upon the ordinance without amendment within sixty days, it may then be placed before the people for a vote at the next general election. If a majority of the votes cast upon the question is in the affirmative the proposal becomes a law. Only 15 per cent of the qualified voters are necessary to petition for a referendum vote upon any franchise measure passed by a city council, and one section prohibits the Council from rushing a measure relating to franchises through on a three-fourths vote as an emergency. Such a vote would constitute an emergency in the case of other questions as the law is construed by some, although City Solicitor Weinland does not agree with this construction. His opinion follows:

"This act not only provides for initiative and referendum on all ordinances relating to the grant of franchises and rights to the streets, but in very plain language requires every ordinance and act of the Council in the exercise of the powers granted it by the Legislature to remain inoperative for a period of sixty days, during which time a referendum may be demanded by the petition of 15 per cent of the electors of the city.

"The last section of the act in question pretends to give the Council some little power to put a measure in force immediately, if it finds and declares the same to be an emergency, but even this emergency provision is a farce, since the Council is prohibited from passing as an emergency measure any ordinance involving the expenditure of money.

"Accordingly I regret to be compelled to advise you that action upon all ordinances of Council passed since June 14, 1911, will have to be suspended for a period of sixty days from the date of passage."

Traffic Changes to Be Effected by Cambridge Subway

By the opening to traffic, late this year, of the Cambridge subway and the extension of the elevated structure from the North Station, Boston & Maine Railroad, in Boston, to Lechmere Square, Cambridge, the University City will be brought within the radius of rapid transit development in Boston and its suburbs. Hitherto the surface car lines connecting Cambridge with Boston have been the only street car means of travel. They are confined to three lines—one line from Bowdoin Square, Boston, through Cambridge Street, a congested, narrow street, and across West Boston bridge. A second line is operated from Park Street subway station via Boylston Street, Harvard Bridge and Massachusetts Avenue; this line is by no means a direct one; in fact, it describes three sides of a rectangle. The third route is by way of Lowell Street to East Cambridge and is made slow of operation on account of its passing through a part of the Boston & Maine freight yards, where traffic is constantly subject to delays.

The subway will bring Harvard Square, Cambridge, within eight minutes of Park Street. The subway is rapidly nearing completion. It represents a cost of \$8,000,000. Between Harvard Square and Park Street there are but two stations, in Central and Kendall Squares. This line will carry trains with an equipment similar to that now in use in the Elevated Railway's Washington Street tunnel and on the elevated structures.

The elevated structure will benefit East Cambridge primarily, and from its terminus in Lechmere Square the surface cars which it is designed to carry will radiate in several

directions, embracing Cambridge and Somerville. This elevated line will form a continuation of the present Tremont Street subway. The line will be carried across the Charles River on a new concrete bridge which is being built above the dam that impounds the river in the Charles River basin.

Bids for Borings Along Proposed Rapid Transit Lines in New York

The Public Service Commission began advertising on Aug. 29, 1911, for bids to make borings along the lines of proposed rapid-transit railroads, the bids to be received at the office of the commission until noon on Sept. 12, 1911. Borings are required in advance of the making of plans for new subways and river tunnels. The borings now called for are to be made at the following points:

In Manhattan—Under Seventh Avenue from Fourteenth Street to Fifty-ninth Street; in Fifty-ninth Street from Seventh Avenue to Second Avenue; in Sixtieth Street from Fifth Avenue to Second Avenue; in Broadway from Fourteenth Street to Forty-second Street.

In Brooklyn—In East Ninety-eighth Street and Livonia Avenue; in Nostrand Avenue; in Stuyvesant Avenue and Utica Avenue.

In Manhattan and Brooklyn—Under-river crossings, from Old Slip, Manhattan, under the East River, to Pineapple Street, Brooklyn; from Whitehall Street, Manhattan, under the East River, to Montague Street, Brooklyn; from the Battery, Manhattan, under the East River, to Atlantic Avenue, Brooklyn.

The Public Service Commission of the First District of New York has made public a report on the progress of work on the Fourth Avenue subway in Brooklyn. By this report it appears that 1,400,000 cu. yd., or 80 per cent of the entire excavation, has been done. Taking the work as a whole, approximately five-eighths of the contract value has been performed to date. There are six contracts, the price of which aggregates \$15,886,381.20.

The Question of Franchise Expirations in Toledo

The streets in Toledo, Ohio, on which the city claims that the franchises of the Toledo Railways & Light Company have expired follow: Adams Street, from Michigan to Ashland; Ashland Avenue, from Ashland to Collingwood; Broadway, from Morris to Colburn; Cherry Street, from Summit to Superior; Cherry Street, from Erie to Bancroft; Collingwood Avenue, from Ashland to Central; Collingwood Avenue, from Detroit to Cherry; Detroit Avenue, from the western city limits to Cherry Street; Detroit Avenue, from Monroe to Delaware; Dorr Street, from Washington to the city line; Delaware Avenue, from Collingwood to Detroit; Eleventh Street, from Monroe to Washington; East Broadway, from Starr to Earl; Lagrange, from the western city line to Bancroft; Monroe Street, from Ontario to Auburn; Maumee Avenue, from North Railroad Avenue to Broadway; Main Street, East Toledo, from Front to Starr; St. Clair Street, from Cherry to Orange; St. Clair Street, from Knapp to Maumee; Summit Street, from Cherry to Elm.

Almost every line in the city is affected at some point by these expirations, and the portions in question constitute the property upon which the city demands a rental of \$250 a day from Nov. 10, 1910, when, it is claimed, the franchises expired. The franchises in the business district will not expire for from one to two years.

The ordinance which provides for the rental mentioned went into effect on Aug. 25, 1911, and City Solicitor Schreiber declared that if within twenty-four hours the company did not pay the \$70,000 in rentals which have accumulated since the expiration of the franchise he would ask the court to enjoin the company from operating its cars over the portions of the lines named. A copy of the ordinance was left at the company's office on Aug. 15, 1911, ten days before it went into effect. Albion E. Lang, president of the company, returned to the city from Vermont on Aug. 24. He

stated that he had not had time to study the rental proposition or prepare a reply to it, nor had he had an opportunity to digest the 3-cent-fare ordinance proposed in place of the rental.

At a hearing on the 3-cent-fare ordinance on the evening of Aug. 23 Rathbun Fuller, attorney for the company, addressed the committee of the Council of the Whole. He stated that it would be impossible for him to express himself on the ordinance before giving it careful study. Mr. Fuller said that he believed it useless to endeavor to adjust matters with a short-term franchise. The difficulty with such an arrangement was that the company would have trouble in financing improvements. He suggested that time be given the company and members of the Council to study the ordinance, and it was decided to print and distribute the ordinance in anticipation of another hearing. One of the clauses in the ordinance provides for the complete control of operation, schedules and routes.

Suit was filed by the city on Aug. 28, 1911, to oust the Toledo Railways & Light Company from sections of eighteen streets where franchises are claimed to have expired and over which cars are being operated. A permanent injunction is sought by the city.

Illinois Utility Committee in Massachusetts.—The delegation of Illinois legislators appointed to investigate methods of public-service regulation in various States and to report to the Illinois Legislature of 1913, with recommendations for changes in existing methods in Illinois, consulted with the members of the Massachusetts Railroad Commission and the Massachusetts Gas & Electric Light Commission in Boston on Aug. 24, 1911.

No Third Receiver at Kansas City.—In accordance with a resolution of the City Council of Kansas City, Mo., John G. Park, counsel of that city, visited Judge Hook, of the United States Circuit Court at Kansas City, at Plum Lake, Wis., to ascertain whether the judge would entertain the request of the Council that a third receiver be appointed for the Metropolitan Street Railway. On his return Mr. Park said: "Judge Hook very earnestly informed me that he could not consider such a thing. He said it would reflect upon the present receivers, in whom he has confidence."

Arbitration Agreement Adopted in Des Moines.—The proposed new agreement between the Des Moines (Ia.) City Railway and its employees, to which reference was made in the *ELECTRIC RAILWAY JOURNAL* of Aug. 19, 1911, page 320, was adopted after modification in some of its provisions by agreement on Aug. 23, 1911, between the officers of the company and the representatives of the men. A grievance committee of the men is to pass on all suspensions before the cases of employees are taken up with the management. The new agreement becomes effective on Oct. 11, 1911.

August Outing of New England Street Railway Club.—Plans were made to hold the August outing of the New England Street Railway Club at New Bedford, Mass., on Thursday, Aug. 31, rain or shine. It was proposed to go from the South Station, Boston, to New Bedford by special train. After inspecting the property of the Union Street Railway at New Bedford it was proposed to travel by special cars to Ft. Phoenix, Fairhaven, where a clambake was to be served and a baseball game played between the railway and supply men. Returning to New Bedford those in attendance at the outing were to go by steamer across Buzzard's Bay, the return to Boston to be made by special train from New Bedford at 6:10 p. m.

Public Service Commission Favored for Washington.—It is asserted that at a poll taken in the special session of Congress just ended a majority in both the Senate and the House favored a public service commission to supervise all public utility corporations in the District of Columbia. The bill creating the public service commission will be prepared by the District committee of the House, of which Representative Ben Johnson, of Kentucky, is chairman. It recently became known that the District committee of the House decided before the special session adjourned to make a special order of the public service commission matter and not wait for the report on District affairs which will be rendered under the Oldfield resolution. The com-

mittee hopes to report to Congress about Jan. 1, 1912, and submit at the same time the draft of a public service commission measure.

Consideration of Detroit Municipal Ownership Measure Postponed.—On account of the absence of Alderman Glinman his measure for municipal ownership was not taken up by the committee on charter and city legislation of the City Council of Detroit, Mich., during the week ended Aug. 26, 1911. It seems likely that further consideration of the measure will be postponed until additional information is obtained about the revival of the plan of M. D. Folling to acquire control of the majority of the stock of the Detroit United Railway and have it taken over by the city under the proposed charter amendment. Mr. Folling stated that he was working to secure options on the stock. The par value of the outstanding stock is \$12,500,000 and the price is between 70 and 73. Mr. Folling evaded a discussion of plans for the construction of new north and south lines under municipal ownership.

The Question of Fare on Interurban Cars in Cleveland.—Street Railway Commissioner Dahl, of Cleveland, Ohio, has prepared an ordinance to be introduced in the City Council of Cleveland which will declare all interurban cars to be express cars. The Tayler grant provides that a fare of 5 cents may be charged on express cars within the city limits, and the Dahl ordinance, if passed, will make it impossible to compel the interurban companies to operate their cars at a lower fare. It will also forestall a suit that was started recently to compel them to accept 3 cents, the present rate of fare of the local company. A reduction of the city fare on the interurban cars would result in a loss to the Cleveland Railway Company, which receives a certain proportion of this income for the use of its tracks and power. Mr. Dahl feels that nothing should be done to interfere with this income and that those who use the interurban cars in the city instead of the cars of the Cleveland Railway should be willing to pay the higher fare.

Conference of Governors.—The annual conference of governors will be held in the New Monmouth Hotel, Spring Lake, N. J., beginning Sept. 12, 1911. Special sessions will be held to consider the subjects of employers' liability and workingmen's compensation and the State control of public utilities. It is expected that Sept. 13 will be given up to a discussion of the subject "Employers' Liability and Workingmen's Compensation," with Governors Charles S. Deneen, of Illinois, and Eugene N. Foss, of Massachusetts, making the opening addresses. "The Right of the States to Fix Intrastate Traffic Rates" will be considered in papers by Governors Herbert S. Hadley, of Missouri, and Chester H. Aldrich, of Nebraska. "State Control of Public Utilities" will be the subject on Sept. 15, the principal papers being by Governors Francis C. McGovern, of Wisconsin, and Beryl F. Carroll, of Iowa. The acceptances received indicate that there will be thirty-seven governors in attendance, or four more than there were in attendance at the original conference in Washington called by Mr. Roosevelt.

Evening Technical Courses of Polytechnic Institute, Brooklyn.—The College of Engineering of the Polytechnic Institute, Brooklyn, N. Y., has issued a pamphlet describing the evening technical courses for the term 1911-1912. Courses are offered in chemistry, civil engineering, electrical engineering and physics, mechanical engineering and mathematics. The work offered in electrical engineering and physics includes a series of lectures upon electric railway engineering and high-tension transmission practice by Dr. C. P. Steinmetz, to be given on Nov. 9, Nov. 23, Dec. 7, Dec. 21, Jan. 11, Jan. 25, Feb. 8 and Feb. 29. The subjects of the lectures follow: "The General Traction Problem; Urban, Suburban, Rapid Transit, Trunk Line, Freight and Elevator Service," "Time Speed Curves and Train Efficiency," "Motor Characteristics and Motor Efficiency," "Gear Ratio and Total Efficiency of Locomotion," "Direct-Current Railroading; 600 Volts—1200 Volts—Higher Voltages," "The Generating and Transmission System," "Single-Phase Alternating-Current Railroading; the Generating and Transmission System," "The Three-Phase Motor and Three-Phase System; General Discussion of Electric Railroading."

Financial and Corporate

New York Stock and Money Markets

August 30, 1911.

Sharp declines have taken place during the week throughout the list. At the opening to-day many issues reached the lowest levels this year. Sales at these prices were few in number, however, and trading for the rest of the day was irregular though on an upward scale. More than half of the transactions were in Union Pacific and United States Steel. The principal topics of interest are the labor troubles on the Harriman roads and their influence on foreign exchanges. The money market remains quiet and little change is expected until the financing of crops becomes more pronounced. Quotations to-day were: Call, 2¼@2½ per cent; ninety days, 3@3¼ per cent.

Other Markets

Business in Chicago to-day was on a very narrow scale. Prices declined slightly in the majority of issues.

Traction shares have been very dull in Philadelphia, and the only item of interest in this connection has been the co-operative plan submitted to employees of the Philadelphia Rapid Transit by the management, this being regarded as a favorable sign of plans to put the system on a more stable plane.

Slight advances were made to-day in Boston, but there was little selling pressure and trading was light.

The Baltimore market is very quiet and trading is in limited volume. Prices remain steady.

Quotations of traction and manufacturing securities as compared with last week follow:

	Aug. 23.	Aug. 30.
American Light & Traction Company (common).....	a296	a296
American Light & Traction Company (preferred)....	a106½	a106½
American Railways Company.....	a45	a45
Aurora, Elgin & Chicago Railroad (common).....	a44	44¾
Aurora, Elgin & Chicago Railroad (preferred).....	a87	87
Boston Elevated Railway.....	a127½	a127½
Boston Suburban Electric Companies (common)....	a14	a14
Boston Suburban Electric Companies (preferred)....	a75	a75
Boston & Worcester Electric Companies (common)...	a12½	a13
Boston & Worcester Electric Companies (preferred)..	a56	a56
Brooklyn Rapid Transit Company.....	73¾	75½
Brooklyn Rapid Transit Company, 1st ref. conv. 4c...	86¾	*86¾
Capital Traction Company, Washington.....	a128¾	a130½
Chicago City Railway.....	a190	a190
Chicago & Oak Park Elevated Railroad (common)..	a3	a3
Chicago & Oak Park Elevated Railroad (preferred)..	a5	a5
Chicago Railways, ptctpg., ctf. 1.....	a98	90
Chicago Railways, ptctpg., ctf. 2.....	a29½	a27½
Chicago Railways, ptctpg., ctf. 3.....	a11½	a10
Chicago Railways, ptctpg., ctf. 4.....	a7	*7
Cincinnati Street Railway.....	*130	*130
Cleveland Railway.....	a100¼	*100¼
Columbus Railway (common).....	*82	*82
Columbus Railway (preferred).....	*95	*95
Consolidated Traction of New Jersey.....	a76	a76
Consolidated Traction of N. J., 5 per cent bonds....	a105	a105
Dayton Street Railway (common).....	a25	a25
Dayton Street Railway (preferred).....	a101	a101
Detroit United Railway.....	a70	a70
General Electric Company.....	a154	a153
Georgia Railway & Electric Company (common)....	a159	a165
Georgia Railway & Electric Company (preferred)....	a93	92
Interborough Metropolitan Company (common)....	15	a14½
Interborough Metropolitan Company (preferred)....	41¾	a43¾
Interborough Metropolitan Company (4½s).....	*77¾	79
Kansas City Railway & Light Company (common)....	a19	a19
Kansas City Railway & Light Company (preferred)...	a41	*41
Manhattan Railway.....	a138	a138
Massachusetts Electric Companies (common).....	a18	a17¾
Massachusetts Electric Companies (preferred)....	a89	a88¾
Metropolitan West Side, Chicago (common).....	*27½	27
Metropolitan West Side, Chicago (preferred).....	*75	*75
Metropolitan Street Railway, New York.....	*15	*15
Milwaukee Electric Railway & Light (preferred)....	*110	*110
North American Company.....	a72	a70
Northern Ohio Light & Traction Company.....	*50½	*50½
Northwestern Elevated Railway (common).....	*30	*30
Northwestern Elevated Railway (preferred).....	*70	*70
Philadelphia Company, Pittsburgh (common).....	52	51
Philadelphia Company, Pittsburgh (preferred)....	42½	42½
Philadelphia Rapid Transit Company.....	23	a22¾
Philadelphia Traction Company.....	85	a85
Public Service Corporation, 5% col. notes (1913)....	94	a94
Public Service Corporation, ctf.	107	a106½
Seattle Electric Company (common).....	a111¾	111
Seattle Electric Company (preferred).....	a103	103
South Side Elevated Railroad (Chicago).....	95½	95¾
Third Avenue Railroad, New York.....	a9	a8
Toledo Railways & Light Company.....	*6½	a7
Twin City Rapid Transit, Minneapolis (common)....	a108½	a106
Union Traction Company, Philadelphia.....	50¾	50¾
United Rys. & Electric Company (Baltimore).....	*18	a18
United Rys. Inv. Co. (common).....	a65	*35
United Rys. Inv. Co. (preferred).....	a35	a35
Washington Ry. & Electric Company (common)....	a43	a44¾
Washington Ry. & Electric Company (preferred)....	a90	a89
West End Street Railway, Boston (common).....	a88	a88
West End Street Railway, Boston (preferred).....	*88	100
Westinghouse Elec. & Mfg. Co.....	a67	a64¾
Westinghouse Elec. & Mfg. Co. (1st pref.).....	a114	*114

a Asked. *List sale.

Earnings in Philadelphia for July

At the meeting of the executive committee of the Philadelphia (Pa.) Rapid Transit Company, held on Aug. 23, 1911, the report of the company for July, 1911, was presented. Following the meeting T. E. Mitten, who has been acting as chairman of the board in the absence of E. T. Stotesbury, made public the report of earnings and a summary of the proceedings of the meeting. Mr. Mitten said:

"The report of operation for July was presented and accepted by the committee, who, appreciating the desirability of prompt and full publicity, ordered that a copy be supplied to the press. The report of operation for each succeeding month will hereafter be given to the press following the regular meeting of the directors, which occurs upon the third Monday of each month."

The report for July, 1911, compared with July, 1910, follows:

	1911	1910
Gross passenger earnings.....	\$1,776,020	\$1,706,654
Receipts from other sources.....	80,795	65,299
Total receipts.....	\$1,856,815	\$1,771,953
Operating expenses.....	1,144,766	1,082,201
Net earnings.....	\$712,049	\$689,752
Fixed charges.....	737,289	734,241
Deficit.....	\$25,240	\$44,489

Austin (Tex.) Street Railways.—The Austin Street Railway has called for payment at 105 and interest on Oct. 1, 1911, at the office of the Equitable Trust Company, New York, N. Y., all of the \$350,000 outstanding first mortgage 5 per cent gold bonds issued by it dated April 1, 1903. An equal amount of first and refunding bonds is reserved to provide for their retirement.

Boston (Mass.) Elevated Railway.—The stockholders' of the Boston Elevated Railway on Aug. 24, 1911, by a vote of 107,552 shares out of 107,584 cast, approved the act to provide for the merger of the company with the West End Street Railway.

Chicago (Ill.) Elevated Railways.—C. H. Wacker, Byron L. Smith, William R. Linn, Charles H. Hulburd, T. J. Lefens and William V. Kelley have resigned as directors of the South Side Elevated Railroad and Samuel Insull, Henry A. Blair, Ira M. Cobe, B. I. Budd, William A. Fox and J. H. Gulick were elected in their places. Charles V. Weston resigned as president of the company. Mr. Insull was elected chairman of the board, and B. I. Budd was elected president. Mr. Budd is president also of the Metropolitan West Side Elevated Railway and the Northwestern Elevated Railroad.

Chicago & Milwaukee Electric Railroad, Chicago, Ill.—A statement of the earnings of the Chicago & Milwaukee Electric Railroad for the six months ended June 30, 1911, has been issued by the receiver. Compared with the same period of 1910 the statement shows as follows: Gross revenue for 1911, \$405,776, as against \$390,807 for 1910; net revenue for 1911, \$112,539, as against \$52,805; other income for 1911, \$7,680, as against \$6,710; interest on receiver's obligations for 1911, \$33,805, as against \$31,325; taxes for 1911, \$25,500, as against \$24,500; balance 1911, \$60,914, as compared with \$3,690 in 1910.

Cincinnati (Ohio) Traction Company.—The Cincinnati Traction Company has sold to the Fifth-Third National Bank, Cincinnati, \$220,000 of 5 per cent equipment notes, the proceeds of which will be used to pay for fifty new double-truck cars to be put into service soon.

Fort Dodge, Des Moines & Southern Railroad, Boone, Ia.—Judge Smith McPherson, of the District Court of the United States for the Southern District of Iowa, has authorized the receivers of the Fort Dodge, Des Moines & Southern Railroad to sell as scrap that part of the company's line from Des Moines Junction to Goddard. The receivers are negotiating for the sale of the line between Colfax and Newton to the Inter-Urban Railway, Des Moines.

Nevada County Traction Company, Grass Valley, Cal.—John Martin, president of the Nevada County Traction Company and the California Midland Railroad, and his associates have secured an option on the majority holdings of stock of Mrs. S. A. Kidder in the Nevada County narrow-

gage railroad, which extends from Colfax to Nevada City, 20½ miles.

San Francisco, Vallejo & Napa Valley Railway, Napa, Cal.—Suit has been brought against the San Francisco, Vallejo & Napa Valley Railway by the Mercantile Trust Company, San Francisco, Cal., which desires the appointment of a receiver, the company having defaulted in the payment of interest due in June, 1911, on the bonds.

Syracuse, Lake Shore & Northern Railroad, Syracuse, N. Y.—The Public Service Commission of the Second District of New York has received an application from the Syracuse, Lake Shore & Northern Railroad, asking for an order approving an increase of its preferred stock from \$1,000,000 to \$1,500,000. The additional preferred stock is to be used to pay obligations incurred to the Ontario Construction Company. The construction of the railroad between Fulton and Oswego was completed in July, and the entire line from Syracuse to Oswego is now in operation.

Union Railway, Gas & Electric Company, Springfield, Ill.—E. W. Clark & Company, Philadelphia, are offering for subscription at 93 and interest a block of 5 per cent collateral trust gold bonds of the Union Railway, Gas & Electric Company, of 1909, due July 1, 1939. Of these bonds \$4,000,000 was issued originally, but \$1,000,000 of this amount was converted into preferred stock, leaving \$3,000,000 outstanding. The bonds are convertible into 6 per cent cumulative preferred stock at any interest period on thirty days' notice to the company, and are redeemable at par and interest on any interest date.

Virginia Railway & Power Company, Richmond, Va.—It is reported that negotiations have been entered into for the purchase by the Virginia Railway & Power Company of the property of the Roanoke Railway & Electric Company and the Lynchburg Traction & Light Company, which are now controlled by the American Railways Company, Philadelphia. Besides its properties in Richmond, the Virginia Railway & Power Company also controls the street railway and electric-light plants in Norfolk and Portsmouth, the Norfolk & Portsmouth Traction Company having been merged with it recently.

Dividends Declared

American Railways, Philadelphia, Pa.; quarterly, 1½ per cent.

Louisville (Ky.) Traction Company, 2½ per cent, preferred; quarterly, 1 per cent, common.

Whatcom County Railway & Light Company; \$3, preferred.

MONTHLY ELECTRIC RAILWAY EARNINGS CLEVELAND, SOUTHWESTERN & COLUMBUS RAILWAY.

Period.	Gross Earnings.	Operating Expenses.	Net Earnings.	Fixed Charges.	Net Surplus.
1m., July, '11	\$109,251	\$57,951	\$51,300	\$30,240	\$21,060
1 " " '10	102,184	55,567	46,619	29,794	16,825
7 " " '11	633,521	360,182	273,339	210,516	62,824
7 " " '10	580,577	344,931	235,587	208,558	27,030

EAST ST. LOUIS & SUBURBAN RAILWAY.

1m., July, '11	\$195,688	\$102,833	\$92,855	—	—
1 " " '10	210,844	106,159	104,686	—	—
7 " " '11	1,287,407	690,457	596,951	—	—
7 " " '10	1,330,197	712,223	617,974	—	—

MILWAUKEE LIGHT, HEAT & TRACTION COMPANY.

1m., July, '11	\$172,887	\$47,101	\$125,786	\$78,894	\$46,892
1 " " '10	171,332	44,877	126,456	77,546	48,910
7 " " '11	977,349	278,561	698,787	500,069	198,719
7 " " '10	913,825	262,300	651,525	488,549	162,977

MILWAUKEE ELECTRIC RAILWAY & LIGHT COMPANY.

1m., July, '11	\$422,917	\$223,452	\$199,466	\$129,906	\$69,560
1 " " '10	400,922	207,659	193,263	116,659	76,603
7 " " '11	2,873,180	1,526,084	1,347,096	858,822	488,275
7 " " '10	2,684,139	1,445,281	1,238,858	783,080	455,778

MONTREAL STREET RAILWAY COMPANY.

1m., July, '11	\$437,771	\$231,068	\$206,703	\$72,088	\$134,615
1 " " '10	398,846	215,224	183,623	58,459	125,164
7 " " '11	3,876,711	2,246,208	1,630,504	475,973	1,154,531
7 " " '10	3,490,647	2,021,516	1,469,131	419,547	1,049,584

NORTHERN OHIO TRACTION & LIGHT COMPANY.

1m., July, '11	\$278,431	\$141,003	\$137,428	\$44,321	\$93,107
1 " " '10	262,020	131,938	130,082	43,357	86,725
7 " " '11	1,501,107	838,026	663,081	310,428	352,653
7 " " '10	1,349,355	756,168	593,187	303,274	289,914

TWIN CITY RAPID TRANSIT COMPANY.

1m., July, '11	\$10,067	\$337,555	\$372,512	\$140,079	\$232,433
1 " " '10	682,612	318,594	364,018	140,113	223,905
7 " " '11	4,492,019	2,266,349	2,225,670	980,554	980,554
7 " " '10	4,254,860	2,066,722	2,198,137	981,254	981,254

Traffic and Transportation

Transfer Decision Causes Complications in Seattle

Upon the petition of the Seattle, Renton & Southern Railway, Seattle, Wash., Federal Judge C. H. Hanford on Aug. 22, 1911, modified the injunction against Seattle and the patrons of the company by ordering the company to exchange transfers with the Seattle Electric Company upon payment by passengers of an additional fare of 3 cents. The Seattle, Renton & Southern Railway is directed to issue receipts for the additional 3 cents, which sum will be refunded if the court decides that transfers shall be exchanged upon a 50 per cent basis. The Seattle, Renton & Southern Railway is also commanded to issue receipts for the additional 5-cent fare demanded at Kenyon Street. The court order follows:

"The Seattle, Renton & Southern Railway shall interchange transfers with the Seattle Electric Company upon the following terms and conditions, to wit: That all passengers of the Seattle, Renton & Southern Railway demanding a transfer to the lines of the Seattle Electric Company shall be entitled to such transfer upon the payment of 3 cents in addition to the amount of the regular fare; and all passengers boarding the cars of the Seattle, Renton & Southern Railway at proper transfer points and tendering a transfer slip issued by the Seattle Electric Company to the Seattle, Renton & Southern Railway shall be entitled to passage on the cars of the Seattle, Renton & Southern Railway to all points north of Kenyon Street upon the payment of 3 cents. All persons receiving or surrendering said transfer slips shall be entitled to receipts for the payment of said additional 3 cents in substantially the following form:

"This receipt for 3 cents is given under order of the Circuit Court of the United States for the western district of Washington, Northern Division, rendered on Aug. 22, 1911, in Cause No. 2012.

"If upon final determination of said cause the Seattle, Renton & Southern Railway is obliged to interchange transfers with the Seattle Electric Company upon a basis of the division of the 5-cent fare paid of 50 per cent, then, in such event, the company will take up and pay to the purchaser hereof the sum of 3 cents. Otherwise this receipt is void and of no effect."

In the petition the Seattle, Renton & Southern Railway set forth that divers and certain persons resident along the line of the railway had on Aug. 22 boarded cars and refused to pay a fare unless given a transfer or a receipt. The railway company, says the petition, being bound by the injunction, which it feared to disobey, thereupon refused to issue the receipts or transfers, which resulted in delaying and tying up the service for four hours.

As recited in the company's petition, the people of the Rainier Valley on Aug. 22, despite the injunction of the federal court, refused to pay two fares from south of Kenyon Street, and those north of that street demanded transfers for their 5 cents.

Transfers Used to Secure Co-operation of Passengers

The Portland (Ore.) Railway, Light & Power Company is printing hints on the backs of transfers in order to obtain the co-operation of passengers. The following have appeared:

"It is easy to do.—A favor granted to-day, however small, may come back to you a thousandfold to-morrow. It is a small matter. It is easy to do and will help you out in the end, for you may be wanting the favor to-morrow. If you can get along with one seat please do not use two."

"Be careful of the little ones.—Trainmen must not frighten children into jumping from the car when it is still in motion even though they be in the act of stealing a ride. Slow down the car and put the little ones off with care and gentleness."

"Move up a little.—When you sit down in a seat please do not try to occupy more space than is necessary. Move up just a little and give the standing passenger a chance to rest. When the car is crowded do your part as a gentleman

or a lady and kindly remember that 'one good turn deserves another.' You may be standing next time."

"Two ladies got on the Heights car. One said, 'Why don't you read the back of the transfer to-day?' The transfer was read, and amid much laughter from the women, they went up to the far end of the car and sat down."

"A pleasant smile and cheerful disposition smooths the way for good service. The conductor appreciates courtesy. Benjamin Franklin once said: 'Kind words are paid for in good deeds.'"

"Instructions to trainmen. Rule 9. When old, infirm or crippled people board the train you must be very careful not to start until such persons have been seated or have reached some position where they will not fall when the train starts. Trainmen are requested to give the old and infirm every attention possible for their accommodation and convenience. To the old mankind owes a debt of gratitude that nothing can repay."

Changes in Parlor-Car Service.—The schedule of parlor-car service on the lines of the Illinois Traction System was revised on Aug. 16, 1911.

Advertisements on Outside of Cars.—The Second Avenue Railroad, New York, N. Y., has placed commercial advertising signs on the risers of the steps and on the four corners of its cars.

Street Traffic Rules in Peoria, Ill.—The Peoria legal department is drafting rules for the regulation of street traffic which will be distributed to street railway motormen and vehicle drivers.

Ticket Books on Athol & Orange Street Railway.—The Athol & Orange Street Railway, Athol, Mass., places on sale on Sept. 1 workmen's tickets in book form, and also books of ninety tickets good for bearer.

Dormitories for Trainmen in Savannah.—The Savannah (Ga.) Electric Company plans to build a dormitory at Ott Street and Gwinnett Street for motormen and conductors whose duties require them to be up very early or very late. The building will contain lunch counters and transportation offices of the company.

Special Rates to Los Angeles Beaches.—The Pacific Electric Railway, Los Angeles, Cal., granted a special rate of 25 cents for the round trip from Los Angeles to the beaches on Aug. 22. The company proposes to give several of these special excursions as a basis for data from which the feasibility of a permanent reduction in the fare for this trip may be studied.

Car-Full Signs in Seattle.—Signs which read as follows are being displayed in the cars of the Seattle (Wash.) Electric Company at the suggestion of the supervisor of public utilities of the city: "This car seats forty-eight passengers. Standing room for thirty-one; total, seventy-nine. When this number of passengers is in the car 'full car' signs will be displayed."

Market Produce by Trolley to Kansas City.—The Missouri & Kansas Interurban Railway, Kansas City, Mo., has secured the right from the City Council in Kansas City to put tracks into the City Market House, with a view to delivering fruit and vegetables from the nearby agricultural sections which the road connects. The company expects to put on refrigerator cars.

Outing for Employees of the Milwaukee Electric Railway & Light Company.—The Milwaukee Electric Railway & Light Company, Milwaukee, Wis., gave an outing to its employees and their friends on Aug. 24, 1911, at Waukesha Beach. Lunch was served by the company and prizes were given to winners of various athletic contests. Other features of the entertainment were a band concert and a boat ride.

Coney Island Single-Fare Zones to Be Extended.—The Brooklyn (N. Y.) Rapid Transit Company has announced that, effective Oct. 1, 1911, it will extend still further toward Coney Island the zone at which it will collect the second fare. On the Brighton Beach line the 5-cent zone will be extended from King's Highway to the Sheepshead Bay station, on the Culver line from Avenue P to Gravesend station (Neck Road), on the Sea Beach line from King's Highway to Avenue U, on the West End line from Ulmer Park station to Bay Fiftieth Street.

Complaint Against Auburn & Syracuse Railroad Closed.—The Public Service Commission of the Second District of New York has closed upon its record the complaint of the residents of East Genesee Street, Auburn, as to alleged unreasonable noise from the operation of cars on the Auburn & Syracuse Railroad on that street. The company has assured the commission that a new double track will be laid, work to commence after Labor Day and be finished by Nov. 1, 1911. It is expected that the laying of the new double track will reduce to a minimum the noise of operation on that street.

Rerouting in Buffalo.—The International Traction Company, Buffalo, N. Y., has rerouted its Elmwood and Hoyt cars over the Elmwood Avenue extension to relieve congestion on Main Street. In explanation, Thomas Penney, president of the company, has issued a statement in which he said: "We are endeavoring to adapt our service to the needs of the people and our traffic, and schedule men are investigating conditions now. Where more cars are needed they will be placed whenever possible. With the Elmwood and Hoyt cars off Main Street there will be fewer cars than before, as the need for them will be less. Only in that way could we relieve the congestion and give better service. The running time on the Main Street line will be cut fully ten minutes through the change and about the same on the Hoyt and Elmwood lines."

Wheel Guards in Philadelphia.—Charles O. Kruger, president of the Philadelphia (Pa.) Rapid Transit Company, has announced that 450 cars on various lines of the company are equipped with life guards. Mr. Kruger said: "We are equipping from ten to twelve cars daily and increasing the number as rapidly as possible. We shall endeavor to have the work pushed so that the remainder of the cars to be equipped with the new life guard will be completed in October or as early in November as possible." Instructions have been issued to the motormen that they must observe all signals displayed at danger points. At such points there are "slow up" and "stop" signs, and for guidance at night green and red lights. In approaching "slow up" signals cars must be run at a speed not exceeding 3 m.p.h. When approaching a "stop" signal the motorman must not be seated. For the first violation of any of these rules a penalty of five days' suspension will be imposed.

Traffic Conditions in San Francisco.—Charles N. Black, vice-president and general manager of the United Railroads of San Francisco, Cal., was the guest of the Commonwealth Club of San Francisco at a luncheon given in the Palace Hotel, that city, recently. In addressing the members of the club Mr. Black reverted to the vicissitudes of the company with which he is connected. He said that, whereas before the companies now included in the United Railroads were consolidated it was the rule to pay 5 cents for every ride, under the present elaborate system of transfers the company averaged only 3.37 cents for each ride. The congestion of inbound travel or travel toward the ferry was between 7 a. m. and 8 a. m., and the greatest rush of outbound travel between 5 p. m. and 6 p. m., although between 4 p. m. and 5 p. m. travel was heavy. Mr. Black held that fewer cars on Market Street would better accommodate the crowds, as the cars blocked each other if too numerous. The rule of the road as observed in New York would facilitate street railway travel. He favored the longitudinal seats.

Owl Service on Elevated Successful in Philadelphia.—T. E. Mitten, acting chairman of the board of directors of the Philadelphia (Pa.) Rapid Transit Company, commented recently as follows on the owl service on the company's elevated lines, mention of which was made in the *ELECTRIC RAILWAY JOURNAL* of July 15, 1911, page 137: "As a result of the all-night service which was inaugurated on the Market Street Elevated line July 10 there has been an increase of from 10 per cent to 12 per cent in total passengers carried during the hours of midnight service (from 12 m. to 5 a. m.) upon the elevated and the surface lines affected thereby. Approximately 3800 passengers are carried by the elevated and the surface lines adjacent thereto during the hours of midnight service. Of this total approximately 2000 passengers per night now patronize the elevated, and the number showing preference for the elevated night service is constantly increasing, thus permitting the gradual with-

drawal of night-car service upon the surface lines on the streets where passengers are best served by taking elevated cars.

Through Routes in Chicago.—In an interview in regard to the operation of through routes in Chicago, Michael C. Buckley, city traction expert, is quoted by the *Chicago Journal* as saying: "I have made personal observation of conditions on most of the trunk lines and I am prepared to say that all through routes should be established at once. The local cars, which run a part of the distance along a street or series of streets, designated by ordinances as a through route, should be taken off. Recent withdrawal of cars on some of the lines is a mistake. The motormen cannot possibly make the running time required of them in the new schedules. The condition in Halsted Street is very bad. The transfer system is complicated and confusing. The Western and Kedzie Avenue through routes ought to be put into immediate operation. Neither line has enough cars on it now. Streets on which cars are too few and on which a motorman cannot keep to schedule are Madison Street, Milwaukee Avenue, Elston Avenue and Chicago Avenue. I am keeping the companies fully informed as to conditions, and am giving the same information to the board of supervising engineers and to the local transportation committee. Steps will be taken soon to require the operation of the through routes on which there are no obstacles."

Supposed Conflict Between Law and Commission Order.—Employees of the electric railways of Indiana are undecided whether to obey the law of Indiana or a recent rule of the Railroad Commission. The commission has required that all the doors of electric cars between the smoking compartment and the vestibule occupied by the motorman shall be locked. This rule, it is said, is in direct violation of the following statute: "Whoever, being an employee of any company engaged in transporting passengers, locks any car in which a passenger may be, or who orders the locking of such car when occupied by any passenger, whether the car is running or standing, shall be fined not less than \$5 nor more than \$500." The members of the commission say that its rule should be interpreted to mean that the door between the forward compartment and motorman's vestibule shall be kept closed, but not necessarily locked. The commission is in doubt whether the statute cited applies to interurban cars, and will submit the question to the Attorney General for an opinion. Another recently adopted rule of the commission to which the railways object requires both motorman and conductor to take the orders governing cars. This tends to increase the likelihood of accidents by dividing the responsibility for the reception of orders.

Car Capacity Cases in Minneapolis.—In deciding the cases of the twenty-two car crews arrested recently for violating the Minneapolis car capacity ordinance, Judge Montgomery held that the overcrowding section of the ordinance, as applied to motormen, was unreasonable, and dismissed the cases against the ten motormen arrested with conductors for violating this section of the ordinance. Two conductors were tried at the time the motormen were arraigned, but only one, a conductor on an interurban car, was found guilty. He was fined \$5 for permitting his car to be overcrowded. The other conductor was acquitted, having shown that another car followed his car within 300 ft. The attorney for the company contended that the ordinance was a restricted ordinance for the operation of cars by the Minneapolis Street Railway. Judge Montgomery held that the title was sufficient to embrace the subject matter of the ordinance, and that the restricted sense applied to the running of cars by the Minneapolis Street Railway, a corporation, and included its officers and employees. Section 4 of the ordinance Judge Montgomery held to be unreasonable, as it applies to motormen. This section says that any conductor, motorman or other servant who shall willfully and knowingly allow passengers to board a car which has already reached its legal carrying capacity is liable to fine. The court holds that the motorman works under orders of the conductor, knows nothing about how many persons get on or off a car, and should not be arrested with the conductor. The cases of the eight other conductors were continued until Aug. 30, 1911.

Personal Mention

Mr. J. C. Bacon, who has been superintendent of schedules of the Metropolitan Street Railway, Kansas City, Mo., has accepted the position of general superintendent of the Augusta Railway & Electric Company, Augusta, Ga., effective Sept. 1, 1911.

Mr. Hugh M. Dougherty has succeeded Mr. E. C. Eckar as superintendent of the Kansas City & Westport Belt Railway, an interurban division of the Metropolitan Street Railway in Kansas City, Mo., running to Dodson, Mo. Mr. Dougherty has been chief timekeeper for the Metropolitan Street Railway for several years past.

Mr. J. H. Brinkerhoff, who resigned recently as general superintendent of the Grand Junction & Grand River Valley Railway, Grand Junction, Col., has been appointed to the staff of the vice-president of the Illinois Central Railroad. Mr. Brinkerhoff was formerly superintendent of the Rio Grande Junction Railway. He was also connected continuously with the Union Pacific Railway for a period of fifteen years.

Mr. D. C. Barnes, superintendent of the Pawtucket (R. I.) Electric Company, which is controlled by the Blackstone Valley Gas & Electric Company, managed by Stone & Webster, Boston, Mass., has been appointed manager of the Everett Railway, Light & Water Company and the Seattle-Everett Traction Company, Everett, Wash., to succeed Mr. W. I. Sturtevant, who will continue in the employ of Stone & Webster elsewhere.

Mr. Emil G. Schmidt has been elected president of the County Traction Company, Chicago, Ill., to succeed Mr. George B. Blanchard, resigned, who has been president of the company since December, 1910, when it was organized to take over the property of the Chicago Consolidated Traction Company outside of Chicago, the property within the city having been taken over by the Chicago Railways Company. Mr. Schmidt was formerly vice-president of the Rockford & Interurban Railway, Rockford, Ill.; vice-president and manager of the Peoria Gas & Electric Company, Peoria, Ill.; vice-president of the Evansville Gas & Electric Company, Evansville, Ind.; vice-president and general manager of the Springfield Gas Light Company, Springfield Consolidated Railway, and Springfield Light, Heat & Power Company, Springfield, Ill.

Mr. Patrick Broderick has been appointed by the Board of Public Works of San Francisco, Cal., superintendent of construction of the Geary Street, Park & Ocean Railroad, which is to be operated by the city. All of the other appointees on his work, including Mr. E. S. Hurley, the electrical superintendent, and Mr. A. M. Hunt, the consulting engineer, will be under Mr. Broderick's direction. Mr. Broderick will report to Public Works Commissioner Laumeister. Mr. Broderick has had considerable experience in electric-railway construction work. He supervised the construction of a number of lines which are now part of the system of the United Railroads of San Francisco, and was connected with the San Diego (Cal.) Southern Railway and the San Diego Electric Railway under Mr. John D. Spreckels, now president of both of these companies.

Mr. H. A. Johnson has been appointed master mechanic of the Albany & Southern Railroad, Hudson, N. Y. Mr. Johnson was graduated from Friends' University of Pennsylvania in 1891. He was appointed to a position with the engineering department of the Union Traction Company at Philadelphia on May 1, 1899, and continued with the company until March, 1900, when he resigned to become chief engineer and master mechanic of the Camden & Suburban Railway, Camden, N. J. He remained with the Camden & Suburban Railway after that company had been taken over by the Public Service Corporation of New Jersey, but resigned from the company on Aug. 1, 1906, to become superintendent of construction of the Tri-City Railway & Light Company, Davenport, Ia., for J. G. White & Co., Inc., New York, N. Y. On April 1, 1909, Mr. Johnson returned to New York to accept a position with the Brooklyn Rapid Transit Company. On June 1, 1910, he was appointed chief engineer of the United States Express Company and United States Realty Company, with headquarters in New York.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

***Oakland (Cal.) Railways Company.**—Incorporated in California to operate the railway properties controlled by the United Properties Company of California, including the Oakland Traction Company, San Francisco; Oakland & San Jose Consolidated Railway, and East Shore & Suburban Railway. Capital stock, \$27,000,000. F. M. Smith is interested.

Berlin (Conn.) Street Railway.—Application for a charter has been made in Connecticut by this company to build an electric railway between Meriden and Berlin. Capital stock, \$50,000. Officers: H. M. Kochersperger, vice-president of the Connecticut Company, New Haven, president; J. T. Kelly, secretary, and C. J. Danaher, Meriden, attorney. [E. R. J., Aug. 26, '11.]

Shelton & Bridgeport Traction Company, Bridgeport, Conn.—Incorporated in Connecticut to build an electric railway to connect Shelton, Huntington Centre, Trumbull and Bridgeport. Incorporators: O. G. Beard, Jr., L. E. Moulthrop and B. N. Beard. [E. R. J., Aug. 5, '11.]

***Chicago (Ill.) Suburban Traction Company.**—Incorporated in Illinois to build an interurban railway from Chicago. Capital stock, \$25,000. Incorporators: Louis J. Behin, H. Morton Taylor and Frank R. Utely.

***Kewanee, Bradford & Henry Interurban Railway, Henry, Ill.**—Incorporated in Illinois to build an electric railway to connect Bradford, Henry and Kewanee. Capital stock, \$5,000. Directors: John P. Code, of Bradford; John P. Brady, of Kewanee; Howard G. Stoner, of Henry; William H. Haines and Daniel J. Phenil, of Peoria.

Quincy & Western Illinois Electric Railway, Quincy, Ill.—Incorporated in Illinois to build a 75-mile electric railway from Niota to Quincy, via the counties of Hancock and Adams. Headquarters, Quincy. Capital stock, \$5,000. Incorporators and first board of directors: W. T. Duker, H. F. Dayton, J. P. Wall, William S. Govert and S. B. Montgomery, all of Quincy. [E. R. J., July 22, '11.]

***Oklahoma Central Traction Company, Oklahoma City, Okla.**—Application for a charter has been made in Oklahoma by this company to build a 60-mile electric railway between Oklahoma City and Chickasha, with a branch to Blanchard or Washington. Capital stock, \$2,000,000. Incorporators: M. E. Springer, A. R. Bettis, A. Cook, H. A. Kroeger and Carlos Combs.

Lebanon & Campbelltown Street Railway, Lebanon, Pa.—Chartered in Pennsylvania to build a 10-mile electric railway between Lebanon, Campbelltown and Lebanon via South Londonderry, South Annville and North Cornwall. Capital stock, \$60,000. M. S. Hershey, president. [E. R. J., Aug. 5, '11.]

FRANCHISES.

***Fayetteville, Ark.**—W. A. Fraser and others, of Dallas, Tex., have been granted a fifty-year franchise by the City Council on condition that they build a line connecting the university and East Mountain.

Chico, Cal.—The Fresno, Hanford & Summit Lake Interurban Railway, Fresno, has received a franchise from the Board of Trustees in Chico.

Los Angeles, Cal.—The Los Angeles Railway has asked the Board of Supervisors for a franchise to build an extension from the Boyle Heights line at Gage street, east of the city limits, north to a point east of Eastlake Park.

Riverside, Cal.—The Pacific Electric Railway has asked the City Council for a franchise to build a 2-mile extension of the Riverside & Arlington Electric Railway.

Sebastopol, Cal.—The Petaluma & Santa Rosa Railway has received a fifty-year franchise from the Board of Trustees in Sebastopol.

***Canon City, Col.**—The City Council and the Business Men's Association of Canon City are considering a prop-

osition from F. D. Street and F. L. Kelsey, of New York City, to build an electric line from Canon City to the top of the Royal Gorge. They submitted an offer to construct and operate the proposed line a distance of about 9 miles provided they were guaranteed 6 per cent interest on the investment for five years with franchises and concessions at the top of the gorge for terminals and hotel sites.

Pueblo, Col.—The Pueblo & Suburban Traction & Lighting Company has received a franchise from the City Council to extend its tracks in Pueblo from Abriendo Avenue and Polk Street to the City Park. According to the terms of the franchise this extension must be completed by April 1, 1912.

Ansonia, Conn.—The Connecticut Company, New Haven, has received a franchise to extend its tracks from Ansonia to Beardsley Park via Huntington Centre.

Deep River, Conn.—The Shore Line Electric Railway, Saybrook, has asked the Selectmen for a franchise in Deep River.

Rome, Ga.—The Rome Railway & Light Company has asked the City Council for a franchise to double track its line from Second Avenue to Sixth Avenue on Broad Street in Rome.

East St. Louis, Ill.—The East St. Louis & Suburban Railway has asked the Council for a franchise in East St. Louis east of Thirty-eighth Street.

Marion, Ind.—The Indiana Union Traction Company, Anderson, will ask the City Council for a franchise to extend its tracks on East Fourth Street in Marion to connect with those of the Marion, Bluffton & Eastern Traction Company, Bluffton.

Halstead, Kan.—The Wichita Railroad & Light Company, Wichita, has received a franchise in Halstead. The company proposes to extend its line from Wichita to Hutchinson via Burrton and Halstead. Work will soon be begun.

Brockton, Mass.—The Bay State Street Railway has received a franchise from the City Council of Brockton.

Lynn, Mass.—The Boston & Eastern Railway, Boston, will ask the City Council on Sept. 29 for a franchise in Lynn. This line will connect Boston, Beverly, Danvers, Lynn, Chelsea, Revere, Salem and Swampscott. [E. R. J., Aug. 26, '11.]

Malden, Mass.—The Boston Elevated Railway has asked the City Council for a franchise through Medford and Quincy Streets to the Medford Boulevard, to connect with the Spot Pond line and pass into the Sullivan Square terminal.

Orange, Mass.—The Miller's River Street Railway, Miller's Falls, has received a franchise from the Selectmen in Orange. This is part of a plan to build a 14-mile electric railway to connect Miller's Falls, Montague, Irving, Wendall and Orange. D. P. Abercrombie, Jr., secretary and treasurer of the Connecticut Valley Street Railway, Greenfield, Mass., is interested. [E. R. J., Aug. 19, '11.]

Worcester, Mass.—The Worcester Consolidated Street Railway has asked the City Council for a franchise to extend its Providence Street line through Granite Street in Worcester.

Virginia, Minn.—The Mesaba Electric Railway, Duluth, has received a franchise from the City Council in Virginia. [E. R. J., Aug. 19, '11.]

***Rahway, N. J.**—Richard Hayes and associates have asked the City Council for a franchise to build an electric railway on Rahway Avenue from South Broad Street to the city limits of Rahway.

Waynesburg, Pa.—The Waynesburg & Blacksville Street Railway has received a franchise from the City Council in Waynesburg. This line will connect Waynesburg, Blackville and Spraggtown. W. M. Laws, Waynesburg, president. [E. R. J., Aug. 26, '11.]

Watertown, S. D.—The Watertown Electric Railway has received a franchise in Watertown. W. J. Ferris, La Crosse, Wis., president. [E. R. J., Aug. 26, '11.]

Brigham City, Utah.—The Ogden Portland Cement Company has asked the City Council for a franchise to build an electric line in Brigham and extending 6 miles northwest of the city to its factory.

TRACK AND ROADWAY

British Columbia Electric Railway, Vancouver, B. C.—This company will construct an extension from New Westminster to Millside.

Pacific Electric Railway, Los Angeles, Cal.—Contracts will be awarded by this company at once to build a 7-mile extension from San Bernardino to Riverside via Urbita Springs, Colton, Arrowhead, Highlands and Redlands.

Oakland, Antioch & Eastern Railway, Oakland, Cal.—This company has begun construction at the portal at the west end of its tunnel from Alameda County into Contra Costa County at the head of Redwood Canyon. The tunnel will be 4000 ft. in length and its western entrance will be within 200 yards of the eastern city limits of Oakland.

United Properties Company, San Francisco, Cal.—Surveys have been completed by this company on its line between Oakland and Sacramento. [E. R. J., Jan. 14, '11.]

Illinois Central Electric Railway, Canton, Ill.—This company has awarded the contracts for the construction of its extension from Norris to Farmington to the Porter Construction Company, Mackinaw.

Woodstock & Sycamore Traction Company, Sycamore, Ill.—This company has begun the construction of its extension from Marengo to Union.

Evansville (Ind.) Railways.—This company has closed a lease for the abandoned tracks of the Illinois Central Railroad between Evansville and Henderson, Ky. Later on this company will extend the line from Henderson to Owensboro and will build a bridge across the Green River near Spottsville.

Indianapolis, New Castle & Toledo Railway, New Castle, Ind.—Arrangements are being made by this company for an immediate survey between New Castle and Richmond, via Millville, Hagerstown and Greensfork. It is expected to build this extension next year.

South Bend & Logansport Traction Company, South Bend, Ind.—Work will soon be resumed by this company on the line from South Bend to Logansport, at which point connection will be made with the Indiana Union Traction Company for Indianapolis. The grade is completed as far south as Plymouth.

Vincennes North & South Traction Company, Vincennes, Ind.—Contracts will be awarded for the construction of this company's line between Vincennes and Sullivan. B. M. Willoughby, Vincennes, president. [E. R. J., Jun. 17, '11.]

Vincennes & Southeastern Interurban Railway, Vincennes, Ind.—Plans are being made by this company to obtain a right-of-way for a proposed extension of the line from St. Meinrad, in Spencer County, to Troy, and from Troy through Tell City to Cannelton. The right-of-way from Vincennes to St. Meinrad has already been obtained, and work is in progress on the roadbed between the two points. It is said that if Troy gives the company the proper support the planned extension will be made. G. B. Hazleton, Vincennes, president. [E. R. J., May 27, '11.]

Iowa Traction Company, Oskaloosa, Ia.—C. E. Coon, Omaha, Neb., who was recently awarded the contract by this company for the construction of its 110-mile line between Oskaloosa and Waterloo, has just been awarded an additional contract for the 30-mile section of the line between Oskaloosa and Ottumwa.

Manhattan City & Interurban Railway, Manhattan, Kan.—This company advises that it will soon be in the market for rails, ties, poles, machinery, overhead materials, etc., for the construction of its 15-mile line from Manhattan to Ft. Riley via the Ogden and Eureka Lake stations. Jos. T. West, general manager, 217 Yuma Street, Manhattan.

***Frankfort, Ky.**—The State Board of Control of Charitable Institutions of Kentucky has under consideration plans for the construction of an electric railway from Hopkinsville to the Western Kentucky Asylum for the Insane, 2 miles east of Hopkinsville.

***Kentucky Southwestern Railway, Light & Power Company, Hickman, Ky.**—This company has recently been formed and is securing financial backing for the construction of an electric railway to connect Paducah and Hick-

man. An office has been established in Hickman. E. F. Wheaton, Nashville, Tenn., general manager of the Henderson Interurban Railway, is promoting this organization.

Henderson (Ky.) Interurban Railway.—This company has secured most of the right-of-way between Owensboro, Providence and Uniontown. The Tennis Company, which owns a controlling interest in the Henderson Traction Company and the Owensboro City Railroad, is also planning to build to Owensboro, a distance of 32 miles. An unconfirmed report also has it that the American Traction Company, of Indianapolis, desires to enter the western Kentucky field, and will build from Paducah or Uniontown to the Mississippi River. Malcolm Yeaman, Henderson, president. [E. R. J., April 1, '11.]

Springfield (Mass.) Street Railway.—Birnie, Adams & Ruxton Construction Company, Springfield, Mass., has been awarded the contract for building an extension in Ludlow, Mass., for this company. The work includes some earth excavation and embankment.

Ware & Brookfield Street Railway, Ware, Mass.—This company will at once connect its line at Pond Hill, West Brookfield, with the Warren, Brookfield & Spencer Street Railway, Brookfield.

Duluth (Minn.) Street Railway.—Plans are being made by this company for an extension between Superior and Bayfield via Allouez and Itasco. Several bridges will be necessary.

***Kansas City, Mo.**—John Rowe, Shawnee; George Casebeer, A. L. Howard, Louisburg, and associates plan to construct an electric railway between Kansas City and Ft. Scott, via Stanley, Stillwell and Louisburg.

St. Louis, St. Charles & Northern Traction Company, St. Louis, Mo.—It is reported that this company will erect six bridges on the proposed 77-mile railway from St. Charles to Laddonia, Mo. R. E. Race, Mexico, general manager. [E. R. J., Aug. 19, '11.]

***Westfield, N. J.**—L. P. Naylor and associates are considering plans to build an electric railway between Westfield and Newark, via Irvington, Germantown and along Echo Lake.

International Traction Company, Buffalo, N. Y.—This company has placed in operation its new Elmwood Avenue extension in Buffalo.

Ocean Electric Railway, New York, N. Y.—Within the next few weeks this company's extension from Belle Harbor to Neponsit will be placed in operation.

Oneida (N. Y.) Railway.—Work will be begun at once by this company on the construction of its Madison Street extension in Oneida.

Poughkeepsie City & Wappingers Falls Electric Railway, Poughkeepsie, N. Y.—This company is improving its lines in Poughkeepsie and plans to improve the Wappingers Falls line.

Syracuse (N. Y.) Rapid Transit Company.—The Public Service Commission, Second District, has authorized this company to begin construction of an additional single track in Manlius Street and Hartwell Avenue, East Syracuse, and to exercise a franchise therefor granted by the village.

***Bellefontaine, Ohio.**—The Belle Center Commercial Club, Belle Center, and Eastern capitalists are preparing plans for the construction of a 60-mile electric railway to connect Findlay, Russells Point, Lewistown, Reservoir, Kenton, Belle Center, Huntsville and the reservoir resorts of Lakeridge and Orchard Island.

Cleveland, Barberton, Coshocton & Zanesville Railway, Cleveland, Ohio.—This company has negotiated a bond issue for \$2,000,000 and will begin the construction within thirty days on its electric railway to connect Cleveland, and Zanesville via Elyria, Barberton, Oreville, Millersburg and Coshocton. The company will first build from Cleveland to Orrville, a distance of 52 miles. Surveys have been completed from Orrville to Zanesville. J. J. Breiting, president. [E. R. J., Oct. 29, '11.]

Cincinnati (Ohio) Traction Company.—Officials of this company are considering plans for the construction of a single-track line to give the residents of Bond Hill better service.

Ohio Electric Railway, Cincinnati, Ohio.—The time for

the completion of the extension of the Defiance & Lima branch of this company into Cincinnati has been extended to Jan. 1, 1912.

Portland, Eugene & Eastern Railway, Eugene, Ore.—Work has been begun by this company on its 22-mile extension from Eugene to Monroe to connect with the Corvallis & Alsea River Railway, which the Portland, Eugene & Eastern Railway has absorbed.

Mahoning & Shenango Railway & Light Company, New Castle, Pa.—This company plans to build a belt line at Warren, Ohio.

***Phoenixville, Pa.**—David J. Knauer and associates are said to be promoting an electric railway from St. Peter's to Phoenixville.

Chambersburg, Greencastle & Waynesboro Street Railway, Waynesboro, Pa.—Right-of-way is being secured by this company to build an extension from Chambersburg to Shippensburg.

Ogden (Utah) Rapid Transit Company.—Plans are being considered by this company to build an extension from Brigham City, Utah, to Grace, Idaho.

***Arlington Electric Company, Alexandria, Va.**—It is announced that within a short time work on this company's line to Alexandria county will be begun. It will extend from the end of the Alexandria County Electric Company's line, at Columbia 'pike, to Clarendon, a distance of 2½ miles. When it is completed it is proposed to extend the line to Falls Church. The current will be supplied by the Alexandria County Electric Light Company.

Chehalis & Cowlitz Railroad, Chehalis, Wash.—This company, which was organized to build a railway between Chehalis and a point on the Cowlitz River, has entered into an agreement with the Washington-Oregon Corporation, Chehalis, to build and operate its line in Chehalis and east and south for 1½ miles. The latter company will operate the line temporarily. H. C. Coffman, Chehalis, president. [E. R. J., May 27, '11.]

Tyler Traction Company, Clarksburg, W. Va.—Work has been begun by this company at Sistersville on its electric railway to connect Sistersville, Middlebourne and Shirley. H. W. McCoy, president. [E. R. J., Aug. 19, '11.]

SHOPS AND BUILDINGS

Pacific Electric Railway, Los Angeles, Cal.—Work has been begun by this company on the construction of its new freight and passenger station on Mission Street, east of Fair Oaks Avenue, in Pasadena. The cost is estimated to be \$10,000.

Sacramento Electric, Gas & Railway Company, Sacramento, Cal.—This company has been granted a permit to construct a new carhouse in Sacramento on the block bounded by M and N Streets and Twenty-eighth and Twenty-ninth Streets. The structure will be one story and of brick construction.

Geary Street Municipal Railway, San Francisco, Cal.—A site for this company's new carhouse at Geary Street and Presidio Avenue, in San Francisco, has been contracted for at \$56,000. Contracts will be let by the Board of Public Works of San Francisco for the construction of the building and the installation of machinery.

St. Louis Electric Terminal Railway, Granite City, Ill.—This company, it is reported, plans to build a new temporary passenger station in St. Louis, and will let contracts. The structure will be 60 ft. x 100 ft., of fireproof construction. The cost is estimated to be about \$30,000.

Northern Indiana Railway, South Bend, Ind.—Work has been begun by this company on a 60 ft. x 100-ft. addition to its carhouse in South Bend.

Vincennes & Southeastern Interurban Railway, Vincennes, Ind.—This company plans to build depots in the following towns: At Vincennes, to cost \$10,000; Monroe City, \$1,500; Petersburg, \$1,000; Algiers, \$1,000; Otwell, \$1,500; Leland, \$1,000; Huntingburg \$4,000; Ferdinand, \$1,000, and St. Meinrad, \$1,000. The company's machine shops will be located in Vincennes and in St. Meinrad. George Hazleton, Vincennes, president.

Lewiston, Augusta & Waterville Street Railway, Lewiston, Maine.—This company will soon open a new waiting room and supply depot at Waterville.

Ohio Electric Railway, Cincinnati, Ohio.—This company has secured an option on a building at Second Street and Auglaize Avenue, Cincinnati, to be used as a station.

Scioto Valley Traction Company, Columbus, Ohio.—This company has settled all differences with the authorities of Chillicothe and will shortly begin the construction of a new passenger and freight station there, plans for which have been completed by Frank L. Packard, Columbus.

Portland Railway, Light & Power Company, Portland, Ore.—This company's new carhouse at the rear of its old carhouses fronting on Killingsworth Avenue, Portland, has been completed. The cost is estimated to be \$30,000.

Port Arthur (Tex.) Traction Company.—A site at the corner of Sixth Street and Austin Street in Port Arthur has been purchased by this company on which it will build a four-story brick building 75 ft. x 140 ft. Contracts for construction will be awarded at once. The cost is estimated to be about \$50,000.

Puget Sound Electric Railway, Tacoma, Wash.—This company has begun work on an interurban station in Puyallup. The structure will be 60 ft. x 70 ft.

Fairmont & Clarksburg Traction Company, Clarksburg, W. Va.—This company has awarded the contract for the steel work on the addition to its carhouse in Clarksburg to the Riverside Bridge Company. The tracks will be furnished by the Pennsylvania Steel Company, Steelton, Pa.

Sheboygan Railway & Electric Company, Sheboygan, Wis.—The contract for the construction of a new carhouse at Clara Avenue and South Eighth Street, Sheboygan, has been awarded to William Lange by this company. Work has been begun.

POWER HOUSES AND SUBSTATIONS

Geary Street Municipal Railway, San Francisco, Cal.—The site for this company's new power house at Jefferson Street and Jones Street in San Francisco has been purchased for \$56,000. Contracts for construction will be awarded by the Board of Public Works of San Francisco.

Kentucky Traction & Terminal Company, Louisville, Ky.—The new power house of this company at North Limestone Street, Lexington, will be 120 ft. x 150 ft. and 50 ft. high. The General Electric Company will furnish the equipment, including two 2500-kw turbo-generators, two 750-kw auxiliary machines and two 75-kw exciters. There will be four boilers equipped with automatic stokers to be furnished by the Murphy Iron Works, Detroit, Mich. The Edge Moor Iron Works, Wilmington, Del., will provide the boilers and the superheaters. There will also be two substations, one on the line to Nicholasville and the other on the Georgetown line. The two substations on the Frankfort line and that on the Paris line will be rebuilt. The cost is estimated to be about \$500,000.

Boston & Northern Street Railway, Boston, Mass.—It is reported that this company is considering plans to construct several new power houses and install new machinery.

Rochester Railway & Light Company, Rochester, N. Y.—This company will increase the capacity of power station No. 6 by 2000 hp.

Cincinnati (Ohio) Traction Company.—This company has placed an order with the Westinghouse Electric & Manufacturing Company for equipment for a generating station and three substations consisting of one 6000-kva, 1500-r.p.m., 25-cycle, 13,200/6600-volts, three-phase turbo-generator, with direct-connected exciter; five 1500-kw, 25-cycle, six-phase, 600-volt, direct-connected, 250-r.p.m. rotary converters, self-starting from alternating-current end; sixteen 500-kva, 25-cycle, 13,200/6600-volt, oil-insulated, self-cooled transformers; also four switchboards for control of the above apparatus.

Central Pennsylvania Traction Company, Harrisburg, Pa.—This company has purchased from the Hooven, Owens & Rentschler Company, Hamilton, Ohio, a Hamilton-Corliss, cross-compound condensing engine, to be connected to a GE 500-volt, 1600-kw, direct-current generator, and installed in the company's plant in Harrisburg.

Eastern Wisconsin Railway & Light Company, Fond du Lac, Wis.—Plans are being considered by this company for the construction of an addition to its power house on North Main Street and Rees Street in Fond du Lac. The cost is estimated to be about \$12,000.

Manufactures & Supplies

ROLLING STOCK

Fifth Avenue Coach Company, New York, N. Y., has ordered one 16-ft. 9½-in. omnibus body from the J. G. Brill Company.

Athens Railway & Electric Company, Athens, Ga., has ordered one 25-ft. 4-in. semi-convertible car body from the American Car Company.

Indianapolis (Ind.) Traction & Terminal Company has ordered two direct-current motors from the Westinghouse Electric & Manufacturing Company.

Ontario & San Antonio Heights Railway, Ontario, Cal., has ordered three 38-ft. 8-in. California-type passenger cars, mounted on Brill 39-E trucks, from the G. C. Kuhlman Car Company.

New Jersey & Pennsylvania Traction Company, Trenton, N. J., has ordered one 25-ft. 4-in. closed motor-car body, mounted on Brill 27-G-1 trucks, from The J. G. Brill Company.

Groton & Stonington Street Railway, Mystic, Conn., has ordered three quadruple, direct-current motor equipments with K-6 control from the Westinghouse Electric & Manufacturing Company.

Savannah (Ga.) Electric Company has ordered three double-equipments of No. 307 interpole railway motors with 36-F control from the Westinghouse Electric & Manufacturing Company.

Chattanooga (Tenn.) Railway & Light Company has ordered one Halsey 16-ft. wheelbase radial truck and a 27-ft. car body and two G.E.-210 motors from the Philadelphia Holding Company.

Boston (Mass.) Elevated Railway has ordered forty-one double-equipment No. 300-D motors with type H-L control and twenty double-equipment No. 301 motors with A-L unit switch control from the Westinghouse Electric & Manufacturing Company.

Bakersfield & Kern Electric Railway, Bakersfield, Cal., has ordered six 42-ft. 8-in. California-type motor passenger cars, mounted on Brill 27-GE-1 trucks, from Pierson, Roeding & Company. The American Car Company will build these cars.

TRADE NOTES

S. Severance, who has been president and manager of the S. Severance Manufacturing Company, Glassport, Pa., will sever his connection with that company on Sept. 1.

Perry Ventilator Corporation, New Bedford, Mass., reports the receipt of an order for ventilators for twenty-five cars now being built for the Boston Elevated Railway by the Osgood Bradley Car Company.

The J. G. Brill Company, Philadelphia, Pa., reports the receipt of an order for three 30-ft. first-class passenger cars complete, mounted on Brill 57-D trucks, from Angel Jaramillo & Co., New York, N. Y., for export, and twenty-two Brill 21-E trucks from Tramways Capodimonte, Naples, Italy.

American Locomotive Company, New York, N. Y., has transferred Henry W. Swoyer from the Richmond plant of the American Locomotive Company to its Brooks plant as general manager, to succeed W. A. Wheatley, who resigned to go with the Canadian Locomotive Company, Kingston, Ont.

Southern Car Company, High Point, N. C., has entirely remodeled its plant recently. It has spent about \$20,000 on rebuilding the old structures, has installed approximately \$20,000 worth of new machinery and is spending \$15,000 on other improvements, such as fire protection, sewerage, lighting of plant and transfer table.

Crocker-Wheeler Company, Ampere, N. J., announces the appointment of R. T. Miller as acting manager of its Chicago office, 1330 Monadnock Building, to take effect Aug. 26, to succeed James A. Lister. The company also announces that offices will be opened in San Francisco, Room 400, First National Bank Building, Sept. 1, with John S. Baker in charge.

Westinghouse Electric & Manufacturing Company, Pitts-

burgh, Pa., reports the receipt of the following orders: Pacific Gas & Electric Company, San Francisco, Cal., ten 1000-kva, oil-insulated, water-cooled, 13,200-volt transformers; Great Shoshone & Twin Falls Water Power Company, Twin Falls, Idaho, five 75-kva, 24,000-volt, oil-insulated self-cooled transformers; Minneapolis (Minn.) General Electric Company, three 1000-kva, oil-insulated, water-cooled, 13,200-volt transformers.

Orenstein-Arthur Koppel Company, Pittsburgh, Pa., will put its new and enlarged plant, located at Koppel, Pa., on the Pennsylvania Railroad in operation about Sept. 1. This addition will give about double the former capacity of the Orenstein-Arthur Koppel Company, enabling it to fully take care of the demand for its industrial cars, portable track and other railway equipment. The new shop will also put the company in a better position to handle orders for steel cars of special design.

Alberger Condenser and Alberger Pump Companies, New York, N. Y., have opened a branch office at 97½ Peachtree Street, Atlanta, Ga., which will be in charge of R. S. McMichael. The Pacific branch office of these companies, located at 503 Market Street, San Francisco, is now in charge of C. F. Braun & Company, Inc., of which new corporation Carl F. Braun is president, George C. Singletary vice-president, and Emory S. Singletary secretary. The corporation succeeds that formerly known as Braun, Williams & Russell.

McKean Motor Car Company, Omaha, Neb., reports that through the consular service of the United States McKean motor cars in use on the various railroads of the United States were investigated by the Australian government railway officials and subsequently an inspector representing the Australian railways commissioners visited Omaha to make a more detailed examination. The report of this investigation was so uniformly favorable that the Victorian Railways of the province of Victoria have placed a formal order for two standard 70-ft. gasoline-motor cars, to be delivered in January, 1912. The cars, however, are to be designed to conform to the track gage of 5 ft. 3 in. used in that state. The government has been particular not to specify any changes in the fundamental principles of the engine and car design of the motor car as developed and perfected by the manufacturers. The cars will be equipped with the same style of buffers used on English roads and will have their standard hook and link-coupling device. The cars will be of steel and will be provided with first and second-class passenger and smoking compartments and a baggage compartment.

ADVERTISING LITERATURE

W. N. Matthews & Brother, St. Louis, Mo., have published an illustrated booklet describing the Matthews fuse switch.

Allis-Chalmers Company, Milwaukee, Wis., has published a folder describing a new air-brake expander ring which it has recently placed on the market.

Duplex Metals Company, Chester, Pa., has issued a leaflet showing graphically the advantages of its duplex-metal ground rods over plain iron and copper rods.

Duncan Electric Manufacturing Company, Lafayette, Ind., has issued Bulletin No. 20, which describes its direct-current watt-hour meters for two-wire and three-wire service.

The J. G. Brill Company, Philadelphia, Pa., has issued No. 8 of Vol. V of *Brill Magazine*. This issue contains an article on the conditions which govern the type of car for city service in St. Louis, Mo., and descriptions of several new types of cars built by the company.

Standard Steel Works Company, Philadelphia, Pa., has issued an illustrated catalog describing its steel rings, shells and ring dies and illustrating their application to various industrial needs. Among the pieces manufactured are blanks for built-up gears for heavy electric railway service, bucket wheel rings for steam turbines, rolled steel flywheel bands and steel tires for electric locomotive wheels. A table is also given in the catalog showing the dimensions of standard flanges and electric locomotive wheels.