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Of this issue of the Street Railway Journal 8500 copies are printed. Total circulation for 1906 to date, 66,000 copies, an average of 8250 copies per week.

Shop Lighting by High-Candle-Powered Units

The importance of good lighting in street railway repair shops is still far from appreciated in some quarters, and although we have called attention to this matter before, it would seem worth while to find out if some of the high efficiency lamps now on the market could not be used to good advantage in those shop departments where accurate work is an essential feature of rolling stock maintenance. The Nernst lamp, for example, is being used with considerable success in general machine shop work, and the metallized filament lamps are certainly being tried out pretty thoroughly in installations where the ordinary 16-cp lamp is too inefficient and too small for good general illumination over large areas from a single unit.

On a street railway system it is a natural course to use the same style of lights in the shops as upon the cars, and as power is cheap and easily drawn from the trolley line, it is often considered of little consequence to give much thought to the quality of the light at the bench and pit. Efficiency is not the main point in such cases. Convenience is the object most sought. With the concentration of light found in the new types of lamps, and the frequent availability of both alternating and direct current for shop supply purposes, there ought to be a good field for experiment in the way of securing better light for the important work of equipment repairs.

Car House Protection

We have many times preached upon the defective condition of car wiring as it is found on those roads which do not pay especial attention to this subject, and we propose to say something upon a subject of equal, if not greater, importance from a fire insurance standpoint, viz., the maintenance of the wiring and the general condition of the car house. When defective car wiring develops a short-circuit on the road and an arc results, it may destroy a single car. Defective conditions of the same kind in the car house, whether in the building itself or when in part of a car equipment, imperils many cars. An excuse is hardly needed, therefore, for touching upon this topic.

Car house construction has undergone a continuous evolution from the time that horse car barns were considered amply sufficient to shelter the new rolling stock. The first step away from the old barn was toward securing wide areas in the car houses. Sometimes as many as 100 cars were stored in what was then considered and called fireproof construction, but which consisted of brick walls surmounted by a slate roof which was carried on light steel girders with wide spans. This form of car house soon proved to be more objectionable from a fire insurance standpoint than even the old horse car barn with its slow-burning wooden construction, and in the reaction which followed from the so-called fireproof construction of five or six years ago, some companies have gone to storing cars in the open. We do not intend to present here a discussion on fireproof construction, but to mention a few of the undesirable features which are often seen in street railway car houses.

To begin at the bottom, a basement is usually an undesirable adjunct in a car house, as it nearly always becomes a receptacle for the storage of various kinds of rubbish, and sometimes even of more inflammable material, like oils and paint. For the same reason a second story should be avoided if possible, even when used for office purposes or for employees. A second story is not always so easy to avoid as a basement, but where there is plenty of space, the advantages of placing employees' rooms, winding departments and even offices elsewhere than on the second story are obvious. The best design

for a car house is generally admitted to be a one-story building divided into fireproof sections not exceeding 10,000 sq. ft. in area, and provided with ample facilities for the speedy removal of cars under all conditions. To this can be added as desirable auxiliaries, protection by sprinklers, hydrants, watchmen and an efficient local fire department. In all consideration of car house protection, the fact should be remembered that a car is not only a very inflammable structure, but also one into which it is very difficult under ordinary conditions to get water quickly. For this reason all car house fires are very rapid; in most cases not more than from 35 to 40 minutes are sufficient to accomplish the work of destruction. Hence the fire-fighting apparatus should be so arranged that it is quickly available, and a few extra hydrants equipped with reels of hose and extinguishers of various kinds will often prevent a disastrous conflagration. The day of the open pail filled with water, which is liable to freeze, has passed.

Owing to the inflammable condition of its contents, there is no portion of the system where a higher premium is paid for cleanliness than in the car house. The pits are an especial danger on this account. The floor and sides of the pit when of wood usually soon become soaked with oil and grease, and if the pit is also made the recipient and catch-all of loose paper and waste, it constitutes a serious source of danger. This is particularly true where the pits communicate with each other. The same precaution should be observed in transfer-table pits, especially where the transfer table is operated from conductors in a conduit, as waste paper often accumulates in the conduit or pit and is liable to be set on fire by sparking from the underground trolley.

Feeder Problems in Large Cities

The design of feeder layouts for heavy city service is very far from being an academic problem, with Ohm's law as the solvent. It is, of course, important to figure voltage drops in urban feeders over a wide range of loads, in order to determine the size of wire which should stand as the minimum permissible cross section, but after this has been done, it is high time to get out the map of the entire system of trolley wires and existing feeders, including section insulators and street switches, and to co-ordinate the proposed additions or changes with the regular and emergency car service. Inexperienced technical graduates often fail to realize in work of this kind the immense importance of keeping the traffic perpetually on the move.

Two extremes of feeder layouts are worth considering in heavy urban service. One of these is the plan of tying the whole system together, and thus multiplying all the routes at the bus-bars with innumerable cross connections between the outgoing lines, so as to secure the most economical service with the lowest feeder investment. As long as no heavy short-circuits occur between the positive lines and the ground return, this arrangement is certainly efficient in handling localized peaks, and in a general way holding up the voltage all over the system, but when trouble comes—and no section of an overhead system can be insured against breakage or crosses with foreign conductors—it is frequently the case that the entire system is seriously disturbed. If the short-circuit can be burned off, the paramount evil of a general shutdown may be avoided; if not, the saving in first cost may quickly be wiped out and turned into a considerable loss by the revenue missed through the blockade and stoppage of the cars. Such a system leaves the power house force practically helpless in case of severe line troubles.

The other plan consists of feeding every section of the system with a separate line from the power house, thereby localizing any trouble which may occur upon the positive side of the distribution layout. With a very large number of sections, the load per section can be taken care of efficiently if the individual feeders are designed to handle the traffic without heavy voltage drops when the cars are bunched, and in case of a broken trolley wire or a grounded feeder, the switchboard attendants have no cause to fear a general short-circuit, unless the breakers fail. Any extreme design of this kind lacks flexibility unless jumper connections with special street switches are installed, and the investment and maintenance are likely to be large.

The layout most capable of meeting the requirements must, then, fit into the existing system with some measure of flexibility, if it is to be satisfactory from the operating standpoint. A certain amount of tying sections together is imperative, if the emergency conditions growing out of break-downs and blockades are to be overcome. The location of each line with respect to the traffic of the system as a whole, the nearness or remoteness of intersecting or parallel lines, the through service to be handled, facilities for isolating the sections in case of fires along the route, and the possibility of traffic being diverted in case of paralysis upon some adjacent part of the system—these are the conditions which determine the feeder layout in great cities, rather than nice balancings of theoretical annual power losses, arbitrarily figured at so much per kw-hour. It is not necessary to employ the differential calculus in order to realize that blockades are vastly more expensive than the integrated power losses of any small group of feeders. Whether a city be laid out upon the radial or the checkerboard plan, these points hold, but the key to the whole matter is the map of the system rather than the slide rule. Exhaustive calculations are valuable enough in their way, and certainly cannot be entirely dispensed with in a proper feeder design, but the crux of the solution is that compromise between the above extremes which will insure the maximum operating flexibility.

Two Papers on Heavy Electric Traction

Two papers on this subject have recently appeared, one of which we abstract in these columns. Both are characterized by a gloomy view of the possibilities of electric traction, and cannot exactly be commended as cheerful reading for the electrical engineer. The first is a paper by Mr. Muhlfeld, before the New York Railway Club, dealing with the comparative results obtained on the B. & O. system with electric and with steam locomotives. The author is one of the very few men to whose lot it has fallen to have considerable practical experience with both types of machine, and hence his opinions, were they thoroughly unbiased, should carry considerable weight. Mr. Muhlfeld, however, labored under the disadvantage of having first, the earliest large electric locomotives, second of operating them in tunnel work under conditions that forbid high-plant efficiency and do not tend to economical operation of the locomotives, and third, he has, to judge from his requirements laid down for electric locomotives, a somewhat strong bias against them. He has,

in fact, fallen into the error common among railway men of demanding not that the electric locomotives should have operative qualities as good as or better than those of steam locomotives, but that they should have also properties that would never be demanded of a steam locomotive. In other words, they expect a machine with no failings of its own, and with all the virtues and none of the vices of the present engines. This makes a somewhat extensive provisional programme. For example, Mr. Muhlfeld demands a fire and collision-proof structure, made in separate sections, operable separately or together from either end of any section, having 60-in. drivers neither carrying the armatures nor geared to them, with a very high center of gravity, wheels interconnected so as to prevent their independent revolutions, capable of operating over foreign tracks, provided with automatic electric brakes, and devices for returning to the line energy acquired on down grades, and with a steam train-heating equipment. And he asks that this shall be simple in design and reasonable in first cost.

This is certainly a very nice requisition and we can hardly wonder that Mr. Muhlfeld is not enthusiastic about electricity. He gives, however, some figures on performance that are not without interest. The electric locomotives were charged with an expense of $34.50 per 100 miles of run, of which $6.10 was the amount chargeable to running and shop repairs. They were, however, machines that had seen several years of hard service. The big duplex compound steam locomotives, with which comparison was made, weighed half as much again as the electrics for a 5 per cent increase in maximum traction effort, made over three-quarters the mileage at a lower speed on less grades, and showed an estimated repair charge of $9.00 per 100 miles. They had, in addition, the advantage of a clear, straightaway run over open track, instead of continually struggling with the grades and special work of a long tunnel system. All in all, it does not strike us that the electric locomotives made such a bad showing, although Mr. Muhlfeld did not call particular attention to the fact he cites, and which are here brought together. A tunnel is not an easy field of operations, particularly when it is the sole field, and one would hardly expect a really good power-house performance, so that the repair bill becomes especially pertinent. It would be interesting to know the probable result of using the electric locomotives on the free run and the steam locomotives on the tunnel service. When the New York Central and the N. Y., N. H. & H. locomotives get into service, we shall have a much better basis for comparison of results, and we shall be much surprised if the electric machines do not give a good account of themselves, particularly in the matter of maintenance. The power-house conditions, too, will be much better than in Baltimore, and should enable the power to be far more cheaply supplied. Electric traction has intrinsic advantages in suburban work that makes it desirable in itself, but there is also good reason to believe that it can be made economical under favorable conditions elsewhere. Do not, however, ask it to achieve the impossible.

The second paper concerned, is one read before the British Institution of Electrical Engineers by Mr. Carter. It is a somewhat systematic account of the procedure of electric railway design, a bit academic in treatment, and characterized by a deeply cerulean view of the future of electric traction, unless carried out by the canonical third rail, low-voltage methods of the present time. Unquestionably, British conditions are somewhat different from American ones, especially in the drastic B. of T. regulations concerning drop in the rail return, yet we can hardly think that what is promising here is foredoomed to failure there. Especially is Mr. Carter a bear on the alternating-motor question, damning with faint praise the whole tribe in all its ramifications. He takes the view, in fact, not unknown here, that alternating-current motors may be good enough for some other fellow under other circumstances, but are altogether wrong here and now. Now we hold no brief for the a. c. motor and, in fact, have now and then raised the ire of its friends by asking for results instead of calculations, but we do not believe Mr. Carter's views as to its great cost, outrageous weight and low efficiency are based upon fact. He mentions one matter of interest, which has been little referred to in this country—the track booster system available in single-phase work for transferring the voltage drop from the rails to the insulated conductor. The rails are broken at intervals by insulating joints and the current is led around a current transformer of unity transformation ratio with its second winding in the feed circuit. It seems hardly necessary, however, to have recourse to so intricate a scheme when it is so easy to raise the working voltage to a point where the current in the rails ceases to be formidable. There may be in future practice cases in which the alternating return current must be considerable enough to require the boosting system, but they are hardly in sight yet.

Continuing his rather cheerless view of the situation, Mr. Carter holds to the belief that British railroad systems are not well suited to electrification. About this there must naturally be considerable difference of opinion, but broadly viewed it would appear that a region of comparative short distances and dense traffic was not altogether a hopeless situation for electric traction. We grant that if all railway electrification must be done by the third-rail system at low voltage, the outlook is bad in England or anywhere else. Such, however, we do not believe to be the case, and when one begins to work at high potential with overhead conductors the difficulties begin to disappear. Certainly we shall be hopeful until we see some reason for retrogression to low voltage. The electrification of railways, in general, is obviously a tremendous task, and it may never be carried out in its entirety. Each year, however, sees some advance made in the right direction and the past few years in particular have been full of hopeful signs. When the New York suburban service on the Central, New Haven and Erie railroads is given over to electricity, and the electrified lines begin to stretch out into the open country, there will be a demonstration of heavy electric traction that will not be without its effect. Special work in tunnels and yards is only a stepping stone on the general road. From the technical standpoint, the key to the situation is in high-line voltage carried clear through to the cars, and it is surely coming, if not by present methods then by improvements upon them. It is not so many years ago since electric distribution of power from Niagara was pronounced impracticable by high authorities, and now we have trunk lines negotiating for Niagara power with something more than bob-tailed trolley cars in view. It is a long road to the bigger electric traction, but it will not end in a blind alley.

KINKS AND PRACTICE IN THE CHICAGO & JOLIET ELECTRIC RAILWAY SHOPS

The variety of problems to be met in a street railway shop is so great and the time for solution sometimes so small that the master mechanic cannot possibly be previously prepared for every occasion. He is frequently compelled to exercise

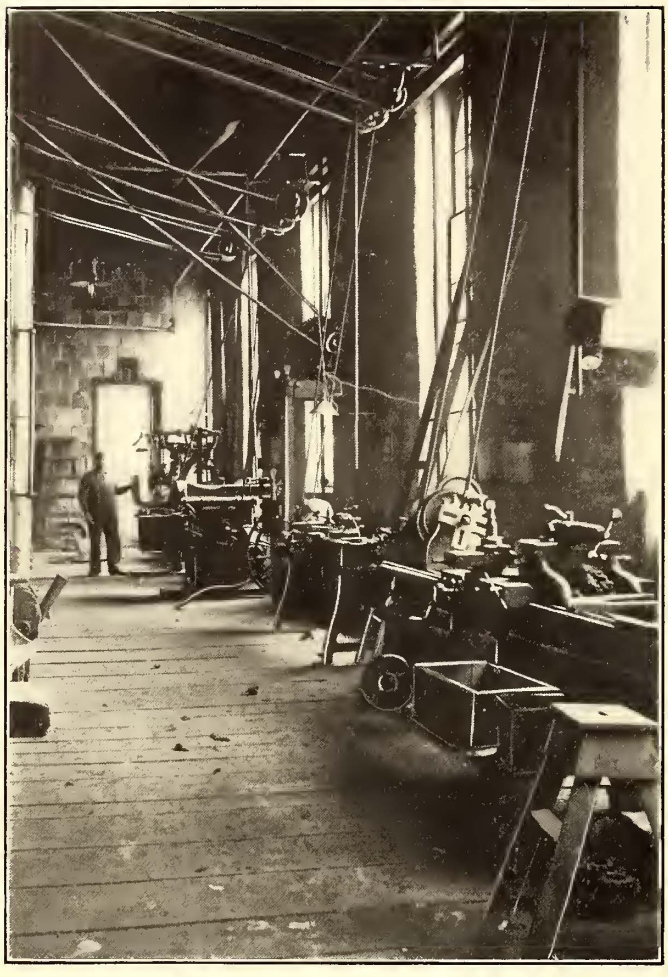


FIG. 1.—MACHINE TOOLS DRIVEN BY ONE MOTOR

considerable ingenuity and inventive genius in devising means to meet new problems. Some of the methods employed by G. S. Patterson, master mechanic of the Chicago & Joliet Electric Railway, in this department of railway work at the shops of the company in Joliet, and an account of certain features of his shop practice may be of interest to others.

CLEANING CARS

The exteriors of the cars are washed with a hose. This work is carried out on a special washing floor of concrete, which slopes toward a drain, and is conducted by men who also clean the spittoons. For taking care of the interior of the cars, women are employed. Mr. Patterson states that women do the work in a much more satisfactory manner, are more thorough than men; that they work conscientiously, and, in fact, require no attention or direction except when special work is to be done.

LIGHTING OF MACHINES AND BENCHES

The machine tools are arranged along one wall and derive power from one motor through line shafting placed well overhead. The proper lighting of machines and work benches is well demonstrated in the machine room. The view of the carpenter's bench, Fig. 2, shows what can be done in this direction. The aim here has been to supply enough light, to distribute it properly and to put it where it will be thrown on the work without casting shadows. Ten lights are employed; these are set in an inverted trough, which is painted white, and which acts as a reflector. The light is well distributed, and is placed just high enough to prevent glare to the eye, yet low enough to prevent one's shadow being cast on the work on the bench.

A good method of lighting an individual machine is illustrated in Fig. 3, which shows the circular saw table. In this case a cluster of lamps with a large enameled reflector is placed directly over the saw. The cut of the saw is therefore always visible, as there is no occasion for the operator to get between the light and the saw. In lighting the lathe where commutators are turned, a cluster of ten lamps is employed. This cluster is provided with a tin reflector, and is hinged on an arm which extends from the wall in such a manner that the light may be thrown where needed. The apparatus is crude, yet it serves the purpose well.

ARMATURE TESTING

The armature room presents several interesting features. A method of testing armatures, which is illustrated in Fig. 4, has several advantages over those usually employed. The terminals from a battery and bell are placed on segments between which are two intervening segments. The terminals of a head telephone are placed on these two intervening segments.

FIG. 2.—LIGHTING OF CARPENTER'S BENCH

The bell causes a pulsating current to flow through the whole armature. If the armature coils connected to the segments on which the telephone terminals are placed are all right, a faint buzzing sound, induced by the voltage drop between the two segments, is heard in the telephone. Should the segments be shortened, there is, of course, no sound. In the case of an

open circuit, the telephone terminals are subjected to the total drop through the armature, and a loud noise in the telephone results.

If two top or two bottom leads are crossed, the telephone is silent, acting the same as when two segments are short-circuited. Crossing the coils causes two segments on opposite sides of the armature and two connected coils to be isolated from the rest of the winding. When one of the telephone terminals is on one of these segments, no current will pass through the telephone, as the circuit is open. Such a cross may be distinguished from a short-circuit, however, by first placing one of the terminals of the bell on the same segment with one of the telephone terminals, and then, if no sound is heard, returning this terminal to its original segment and placing the other bell terminal on the other telephone terminal. If no sound is heard in either case, the defect is a short circuit. A sound in either instance indicates a cross. With a little practice and some reasoning, practically all the rough armature tests can be made with this instrument as with a milli-voltmeter. The box containing the battery bell is also provided with five incandescent lamps, and when required it may be used as an ordinary lamp bank.

For testing field coils a New Century testing outfit is employed. The instrument is connected by means of a cord and socket into an incandescent lamp circuit on the car, and the fields are tested while in the motor.

A HANDY ARMATURE CART

An armature cart employed about the shops is shown in Fig. 5. This was described at some length by Mr. Patterson in the STREET RAILWAY JOURNAL of Feb. 6, 1904. It was constructed at a cost of about $10. Two 40-in. buggy wheels are placed 20 ins. apart, and the armature is picked up by means of a system of levers. As the ratio of these levers is 13 to 1, the operator is not required to strain himself. When the armature is once picked up, the cart balances itself, as the armature hangs below the axle.

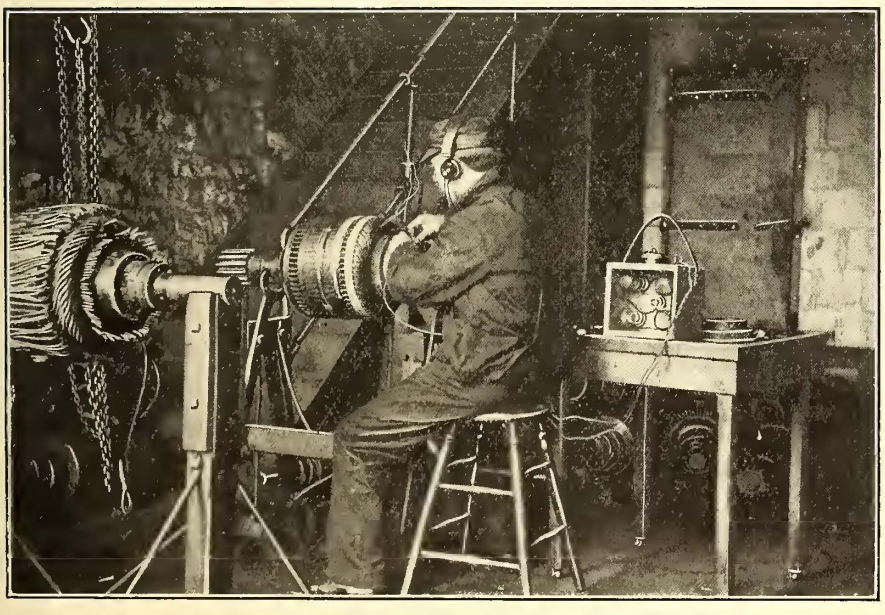


FIG. 4.—ARMATURE TESTING WITH A TELEPHONE

PORTABLE LIGHT STANDS AND CLUSTERS

Some handy light stands, Fig. 6, have been constructed especially for use in the paint shop. These are made adjustable in height, and consist primarily of a ½-in. pipe, which slides in a tube of proper size. A thumb screw fastens the lamp at any height desired. A wood plug in the top of the ½-in. pipe insulates the lamp from the holder, the wires being carried to the lamp through a hole in the plug. The feet are made by splitting the end of a ¾-in. pipe into three sections and spreading them in the proper shape. A portion of the pipe is not split, and into this portion the tube previously referred to is riveted. When desired the ½-in. pipe carrying the lamp may be removed from the stand and the lamp can then be used as an ordinary drop light. As constructed, these stands are made with an adjustment of about 2½ ft. They can be placed up close against a car, where light is needed for lettering or striping, and have been found very convenient for many purposes.

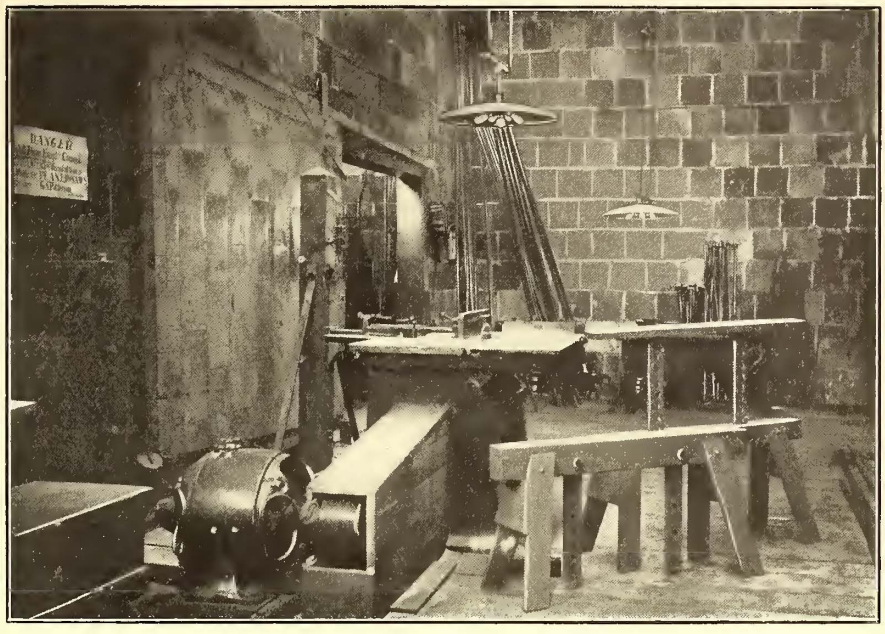


FIG. 3.— LIGHTING CLUSTER FOR THE CIRCULAR SAW TABLE

A cluster of lights, Fig. 7, found very useful in pit work has the five sockets mounted on a board. A second board of fibre, placed over this mounting and flush with the end of the sockets, carries a reflector of tin. The space between the boards serves as a reel for the trolley and ground wires. A snap switch placed on the board makes it unnecessary to pull the trolley off the wire to put the lights out. If an extension light is needed, the plug is screwed into one of the sockets, as shown in the illustration. Those in use about the shop have the cord covered with rubber tubing, as a precautionary measure.

AN ADJUSTABLE HEADLIGHT BRACKET

Mr. Patterson has placed a rather useful headlight bracket on the line cars. This, as may be observed in Fig. 8, admits

of adjustment to any angle within a limit of about 45 degs. The light may be permanently set in any position by means of a pin inserted in holes in the arc and in the handle or lever.

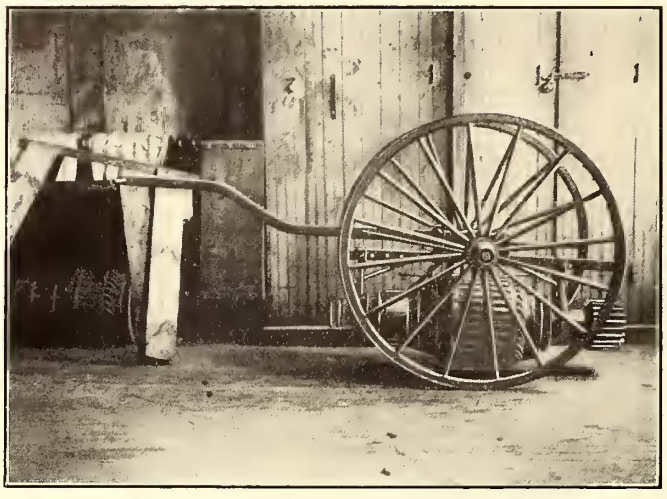


FIG. 5.—AN ARMATURE CART WHICH ELIMINATES HEAVY LIFTING

The mechanism is comparatively simple, and the general principle may be gathered from the illustrations.

WATTMETERS ON CARS

Recording wattmeters are placed on all of the interurban cars of the system. Readings are taken each trip and entered up similarly to register readings. Notices are posted on the bulletin board each month, giving the consumption per car-mile of each man. The readings also check any irregularities in the motor. On one occasion they were the means of discovering too closely adjusted brakes. One motorman, who was known to be very careful, remained for a long time at the foot of the list as regards current consumption. This aroused suspicion, and an investigation showed that the man was in the habit of readjusting his brakes, setting them up closer, after the shop men had passed over the car. When the practice was stopped, the man's current consumption record fell at once, and he now retains a place near the top of the list.

For quite a period considerable inconvenience was experienced through burning out of the wattmeters by lightning. To prevent this, an additional choke coil and lightning arrester were installed on top of the car in the circuit just after leaving the trolley stands. Since making this change but one wattmeter has been lost through lightning.

CARE OF HEADLIGHTS

Mr. Patterson has found that better results are obtained by letting the motormen take care of the arc headlights. When headlights were trimmed in the shop, men were continually being sent from the shop to repair them on the road. Usually the trouble was something trivial, which the motorman, had he been at all familiar with the light, could have repaired without help.

Since the practice of letting the motormen care for their own lights has been adopted, the men have become familiar with the mechanism of the lamps, and many needless calls on shop men have been obviated.

NIGHT WORK

Night work has been abandoned as much as possible in the shops. Usually but three men are employed at night. These men take register readings and clean those cars that cannot be gotten at during the day.

FIG. 6.—ADJUSTABLE LAMP STANDS FOR USE IN THE PAINT SHOP

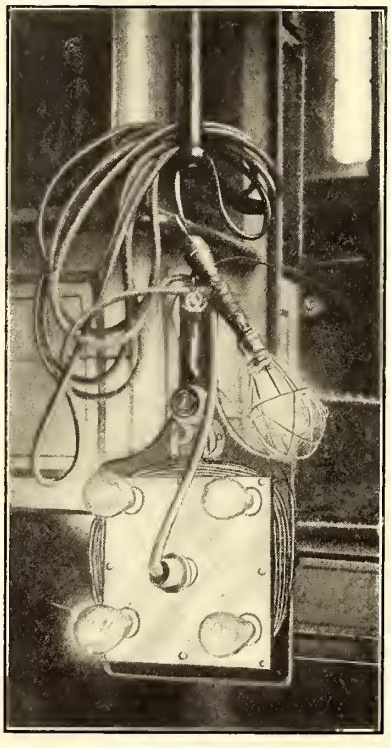


FIG. 7.—LAMP CLUSTER FOR PIT WORK

FIG. 8.—ADJUSTABLE HEADLIGHT BRACKET FOR LINE CAR

The Toledo, Port Clinton & Lakeside Railway Company will institute an express and freight service beginning March 1. Cars will be operated over the Lake Shore Electric Railway from Genoa, but the business will be independent of the Electric Package Company, which handles the business on the Lake Shore Electric.

RECENT TESTS WITH A 15,000-VOLT, SINGLE-PHASE LOCOMOTIVE IN SWITZERLAND

The announcement of the intention of the New York, New Haven & Hartford Railroad Company to use an 11,000-volt trolley wire, calls for renewed attention to the Seebach-Wettingen railway in Switzerland. This line, whose electrical equipment was compared to that of the New Haven road, in the editorial on the New Haven electrification which was published in the issue of Feb. 17, has been in operation since Jan. 16, 1905. It is a part of the railroad system owned by the Swiss government, from which the Oerlikon Machine Works received permission more than a year ago to equip a section of track between Seebach and Wettingen, a distance of over 15 miles. Up to the present, the electrification has been carried from Seebach only as far as Affoltern, a distance of 2.4 miles, and the tests mentioned below have been conducted upon this section of track.

Since the last account of this road in the STREET RAILWAY JOURNAL (see April 8, 1905), a number of important changes have been made. At that time 14,000 volts were used. The e. m. f. has since been raised to 15,000 volts. Experiments have also been conducted upon carrying the trolley wires in a number of ways, and the latest is by catenaries mounted on steel bridges spanning the track, upon practically the same plan as that decided upon for the New Haven line. In fact, the view of the road shown in the accompanying engraving gives a very good idea of the future appearance of the New Haven railroad.

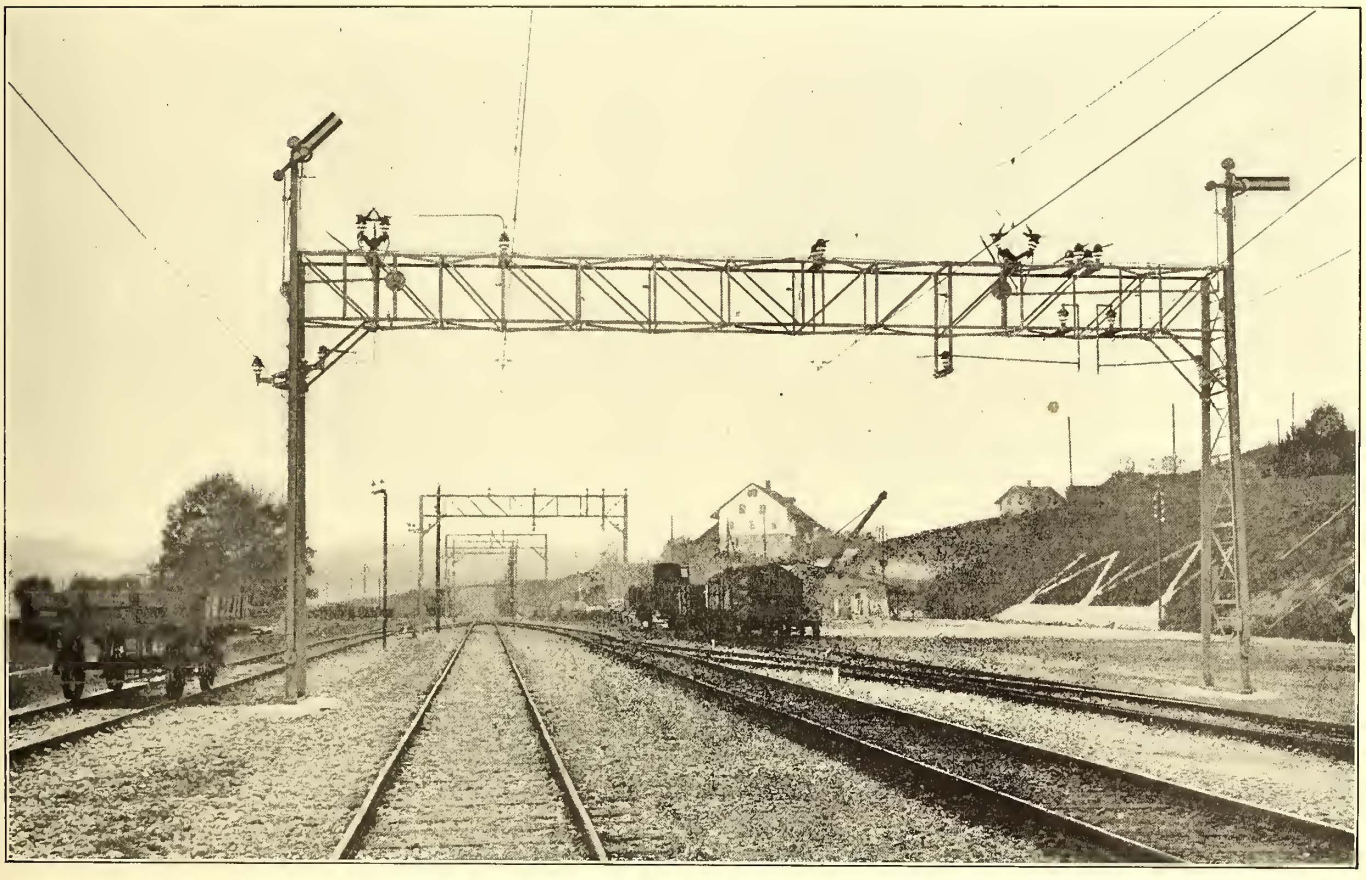
Experiments have also been conducted with two types of locomotives. At the time that the article in the issue of April 8 was published, the company was using a Ward-Leonard converter locomotive, which took single-phase current at 14,000 volts from the trolley wire, and had also just finished the design of an electric locomotive equipped with series-commutating, single-phase motors. Before describing the details of the new locomotive it may be of interest to present the following data covering the amount of work done by each of the locomotives during the period indicated.

Record of Work Done.	Converter Locomotive. Jan. 16 to Oct. 1, 1905.	Single-Phase Locomotive. Oct. 1 to Dec. 1, 1905
Days trips were made	164	51
Trips made	1,442	304
Train-km. made on test division, including switching	4,850	997
Gross ton-km. carried	496,000	135,209

It is stated that during this time not a single defect appeared in the insulation of either locomotive.

From the illustration of the locomotive on the next page, it will be noted that the current collectors comprise four flexible rods mounted in pairs on longitudinal supports. These supports are so placed that one pair of rods collects current when the power wire is carried on poles on the right hand side of the track, and the other pair when the power wire is on the left. The methods of insulating the collecting rod from the locomotive and its pneumatic control, were described in the previous article referred to, but an improvement has been made in the rod itself. It now consists of a split-steel tube, with the convex side turned up and arranged to hold a piece of brass at the contact end. This piece of brass, which is fastened with three small screws, collects the current and is the only part of the rod subject to wear. For protection against lightning, the locomotive carries choke coils, horn lightning arresters and liquid resistances. The choke coils and arresters are mounted on the roof.

After passing an automatic circuit high-tension breaker, which is located under the roof, and which can also be actuated either mechanically or pneumatically from the motorman's compartment, the current passes to a pair of air-



A VIEW ALONG THE SEEBACH-WETTINGEN 15,000-VOLT, SINGLE-PHASE LINE, SHOWING THE FORM OF OVERHEAD CONSTRUCTION BY CATENARIES CARRIED ON BRIDGES SPANNING THE TRACK

cooled transformers placed in the middle of the locomotive. All of the high-tension wiring is placed in micanite tubes, which are of such insulating strength that they may be touched with impunity. These transformers reduce the

MOTORMAN'S CAB OF 15,000-VOLT, SINGLE-PHASE LOCOMOTIVE

voltage from 15,000 to 750, and each has a full load capacity of 200 K. V. A. The return circuit of the high-tension circuit is through the locomotive truck and the rails.

Two systems of control have been installed for experimental purposes. One is the tap method, and twenty-one taps are used from the 750-volt secondary, which would give a difference in potential between consecutive taps of 37.5 volts. The outside taps are also lead to an induction regulator of the usual type, which is controlled from the motorman's cab through a hand wheel by means of a shaft and worm gear. The tap controller is also operated by a hand wheel in the motorman's cab. Only one of these controllers will be used in the final equipment. It will be so arranged that it can be operated electrically from the motorman's stand.

From the controllers the current passes to the motor switches and thence to the motors, which are of 200-hp each, at 650 r. p. m. They are of the series-commutator type, and each has 8 poles with additional "inter-poles" for compensation. A description of the motors, together with some of their early performance curves, appeared in the Street Railway Journal of April 8, 1905. The gear ratio is 1 : 3.14.

The air compressor for use with the Westinghouse brakes, current collectors, main circuit breaker and sanding and signaling apparatus, is driven by a 240-volt, 6-hp, single-phase motor running at 500 r. p. m. As under ordinary circumstances, the low frequency of 15 cycles would cause flickering in any lamp used, the lamps are designated for only 20 volts, and have such thick filaments that they retain their glow irrespective of the alternations.

Each motor is mounted in the middle of its four-wheel trucks, and the power is transmitted through gearing to a driving shaft which is connected to the wheels by side rods.

The total weight of the locomotive is 43 metric tons (946,000 lbs.); body and trucks, 23,500 kg (91,700 lbs.); electric equipment and brake apparatus, 19,500 kg (42,900 lbs.); motor, without the gearing, 3380 kg (7436 lbs.); induction regulator with base plate and gearing, 4000 kg (8800 lbs.); speed regulator with oil receptacle, 310 kg (682 lbs.).

This locomotive drew loads weighing 200 tons at 30 km speed on curves up to 8 per cent, without appreciable sparking at the commutator. The starting current, when the motors are connected in series, is about 1000 amps., and is about 780 amps. when the locomotive is running on an 8 per cent grade at 27 km an hour with the motors taking 450 volts.

THE REINCARNATION OF AN ELECTRICAL IDEA

Under this title Frank J. Sprague contributes an article to this week's issue of the "Electrical World," discussing the history of the modern inter-pole motor, and its adaptability to heavy electric railway operation at 1500 volts. Mr. Sprague refers to a number of his early patents on electric motor design, in which two sets of field coils are used. One set was normal. The other two poles were variable, dependent on the current flow through the armature, and their object was to prevent field distortion and consequent sparking at the brushes. The effect of this construction was practically to produce an inter-pole motor. This system was used by Mr. Sprague in both his stationary motors and elevated-railway motors built in 1886. With this system, he believes that electric locomotives can be used to restore energy to the line on down grades and that 1500 volts. d. c. in the motor can be employed without difficulty. He also believes that the compensating coils used on some commutating types of a. c. motors are for the same practical purpose and are consequently the reincarnation of his old method for neutralizing armature reaction.

VIEW OF THE 15,000-VOLT, SINGLE-PHASE LOCOMOTIVE ON THE SEEBACH-WETTINGEN LINE

LARGE ELECTRIC AND STEAM LOCOMOTIVE

An interesting paper on this subject was presented Feb. 16 before the New York Railroad Club, by J. E. Muhlfeld, general superintendent of motive power of the Baltimore & Ohio Railroad. The author first described the six electric locomotives owned by his company. Of these, Nos. 1, 2 and 3 each weigh 196,000 lbs. carried on four pair of driver wheels, and No. 4 is a small switching locomotive. These four have all been in service for the past ten years. Nos. 5-6 and 7-8, put into service about Sept., 1903, are specially designed freight train helping locomotives, each having a total weight in working order of 160 tons (80 tons per section), distributed over 16 driver wheels (8 per section), with a total wheel-base of 44 ft. 2¾ in. (14 ft. 6¾ in. per section), and two 14 ft. 6¾ in. rigid wheel bases. The driver wheels are 42 ins. in diameter, each pair being geared to a 200-hp, 625-volt motor, with ratio of gearing 81 to 19, providing for a total tractive effort at full working load on eight motors of 70,000 lbs., and at starting of 80,000 lbs., assuming 25 per cent tractive coefficient, giving a nominal rating of 1600 hp. These locomotives are equipped with electric air compressors for the operation of the brake, signal, third-rail, safety, cut-out switches, track sander, bell and whistle, and also with the usual steam locomotive equipment.

The source of power is a central steam plant generating direct current of 560 volts, from which it is transmitted through feed cables direct to the booster stations where the voltage is increased to 625 volts. The current is then conveyed to a storage battery which is used as a reserve and for peak loads, as well as to a surface third-rail system of contact line, equipped with safety cut-out device. The locomotive motors obtain about one-half the required current direct from the storage and booster stations.

The free running speed of these locomotives is about 20 miles per hour. On level track, with good current, rail and weather conditions, they are capable of moving a train weighing 3000 tons with a current consumption of 2200 amps., which consumption, when speed increases to about 10 miles per hour, reduces to about 900 amps. On a 1 per cent grade these locomotives, under similar conditions, will move a train weighing 1400 tons with a current consumption of 2200 amps., which consumption, when speed increases to about 10 miles per hour, reduces to about 1600 amps.

These locomotives handle eastbound through freight steam locomotives and trains at Baltimore, Md., from Camden Yard to Waverly, a distance of a little over 3.4 miles, returning light. This distance includes seven curves ranging from 5 degs. to 11 degs.; seven tunnels from 400 ft. to 7000 ft. in length, and gradient about as follows:

	Per Cent
The first 9,000 feet average	1
The next 2,000 feet average	1.4
The next 2,500 feet average	1.5
The next 4,500 feet average	.8

The time consumed when hauling freight trains weighing 1395 tons in cars of various capacities and lading, 105 tons in steam locomotives and 160 tons in electric locomotive, or a total moving load of 1660 tons, averages 23 minutes actual running time, from start until the electric helper locomotive cuts from the head end of the train to return light.

During the past one year's service the combined mileage of these two electric locomotives has been 121,015 miles, or an average of 5042 miles per month per locomotive, computed on the basis of straight light and loaded mileage. The proportion of light and loaded mileage was half and half, about 200 miles per month per locomotive was in passenger helper service.

Considering $1.25 per net ton as a base cost for fuel delivered at the power plant, the average total operating and maintenance expenses during the year for generating the current, the labor and material for the locomotive electrical and mechanical repairs, the engineer's wages, wiping, hostlering, inspecting, oiling, dispatching, lubricating and miscellaneous supplies, was approximately $34.50 per 100 miles run per locomotive. Of this amount, the average cost of labor and material applied to each locomotive for the running and shop repairs would be $3.20 or 52 per cent for the electrical, and $2.90 or 48 per cent for the mechanical, making a total average cost of $6.10 per 100 miles run for both the electrical and mechanical repairs. These figures do not take into consideration interest, depreciation, taxes nor insurance on the investment, nor do they include the expenses incident to the maintenance of such equipment as batteries, feeders, third rail, bonding wires, insulation, safety cut-out switches, extra motors, etc., which is not required for steam locomotive operation. The wages for conductor, or second man on the locomotive have also been omitted.

During their service considerably difficulty has been experienced with the shoes used for collecting the current from the surface third rail; the loosening, wear and breakage of pinions used to transmit the power from the motors to the gears on the driver-wheel axles; the lubrication, heating and wear at the armature bearings; the flange and tread wear of driver-wheel tire; derailments; stallings and breaking in two of freight trains due to slipping of driver wheels, more especially with wet rail or when tire of drivers connected in series are not of exact diameters, and in miscellaneous renewals and shop repairs.

The driver-wheel tires which when new were 2⅞ ins. thick, are now 1¾ ins. thick, showing only 7500 miles run per one-sixteenth inch metal removed at tread, and will have to be renewed within a few months.

From experience, to the present date it would appear that an electric locomotive and its source of power, to produce the proper efficiency and economy in operation for either passenger, freight or helper service should fulfill the following essential requirements:

(1.) A fire and collision resisting locomotive construction within the present clearance and weight limits; simple in design; reasonable in first cost; safe, reliable and economical for operation at varying speeds and power; and accessible for inspection, lubrication, cleaning, repairs and for replacement on track in event of derailment of any or all wheels, by the ordinary steam locomotive and car methods, without the necessity for the use of a power crane.

(2.) A locomotive that can be interchanged and operated over home and foreign tracks, which are suitable for steam locomotive or motor-car equipment.

(3) A locomotive composed of two or more interchangeable sections, each a duplicate of the other, and equipped so that each section may be operated from either end, and independenly or jointly, with any number of coupled sections; the operation under any arrangement to be controlled from a single section by one engineer.

(4.) The elimination of pilot wheels and the concentration of the entire weight on the driver wheels, with a maximum weight per wheel at the rail of 25,000 lbs.; and an arrangement of driver wheels providing for a short, rigid, and long, flexible wheel base, without excessive end play at axle bearings.

(5.) The elimination of armatures from locomotive driver-wheel axles and the transmission of power to driver wheels not less than 60-in. initial diameter without the use of gearing, in a manner that will insure the economical use of cur-

rent at the motors for starting and running, and eliminate the accumulation of unbalanced pressure at the wheel and rail contacts, as well as the independent revolution of one or more pairs of driver wheels when coupled in series, which occur as the driver wheels become slightly different in diameter due to ordinary wear of material, when making transmission in current at motors, or when operating on slippery track or over rails, frogs and switches of varying wear, surface, alignment and elevation.

(6.) The least weight between the track and the locomotive frame-carrying springs, to minimize the pressures, lateral th.usts and wear at the rail and wheel flanges.

(7.) A high centre of gravity so that the vibration of the locomotive, due to the variation in surface, alignment, elevation and curvature of track can be absorbed by the weight suspended over the driver springs.

(8.) A proper proportion between the electrical, mechanical and dead equipment weight of the locomotive.

(9.) Locomotive motors compact, ventilated, cooled, protected from internal damage and mechanical injury, and of ample range of adjustment and capacity to permit of continuous operation at varying or full speed or power without excessive heating of armatures, commutators or field above the temperature of the surrounding atmosphere. A thin, tough and elastic insulation material, unaffected by humidity or a temperature of 400 degs. F., and having the requisite dielectric strength.

(10.) A development of the maximum locomotive power for rapid acceleration and regular working, requiring no transition, as from series to multiple, in the transmission of the current to the motors, and providing for a uniform increase or decrease in tractive power to prevent irregular drawbar stresses.

(11.) Suitable pumps to provide compressed air for the locomotive power brake, track sander, bell and signal operation, together with steam train heating device, and the other usual equipment.

(12.) Automatic positive devices on the locomotive to insure protection in event of accidental short circuit, or disablement of the engineer.

(13.) An arrangement on the locomotive which will automatically provide for electrical breaking and return to the line for the use of pulling locomotives, a considerable percentage of the energy that is generated by trains descending grades, or stopping, and which energy is ordinarily wasted in destroying material and equipment by brake-shoe action on wheels or rails.

(14.) A high potential current producing, and an aerial conveying system, reasonable in first cost and economical for maintenance; the generation of the electrical energy at a central plant for the least cost per kilowatt-hour; the transmission of the lowest current over the minimum amount of metal contained in overhead contact lines, protected for weather, voltage and lightning conditions, and insuring continuous operation in event of line or equipment failure or accident; the conservative use of battery as storage for extra power that can be generated at small cost during light load and utilized to good advantage during intermittent and peak loads; the least number of transformer or convertor stations; the minimum feeder, conversion and resistance losses in current, and the elimination of electrolytic action.

The speaker then described steam locomotive No. 2400, which is of the Mallet articulated duplex-compound type, and which has been in service on the Connellsville Division since Jan. 6, 1905. The total weight of 334,500 lbs. for the engine in working order is all carried on the driver wheels, which are 57 ins. in diameter. Including the tender, which has a capacity of 16 tons of coal and 7000 gals. of water, the total weight is 479,500 lbs. The drawbar pull is about 74,000 lbs. when working compound, and 84,000 lbs. when working simple. The locomotive is used for pushing or hauling freight trains on grades and a statement of its performance for one year from Jan. 6, 1905, to Jan. 6, 1906, both inclusive, follows:

Total locomotive mileage (computed on basis of 6 miles per hour when locomotive is in helper service, and straight mileage allowed when locomotive is handling through freight trains)	44,976 miles
Miles run per ton of 2000 lbs. run-of-mine, 20 to 40 per cent volatile bituminous coal used	9.26
Gallons of water used per 100 miles run	15,207
Pounds of water used per pound of coal consumed, at temperature of feed water	5.870
Miles run per pint of engine oil	145
Miles run per pint of valve oil	200
Miles run per pound of crank-pin grease	294
Miles run per ton of sand used	485
Cost for labor and material for repairs, per 100 miles run	$3.16

The average total operating and maintenance expenses during the year for fuel, water, labor and material for the locomotive repairs, engineer's and fireman's wages, wiping, hostlering, washing boiler, inspecting and dispatching, lubrication and miscellaneous supplies, was approximately $24.50 per 100 miles run. To this figure can be added an allowance on account of general repairs and renewals to locomotive, mileage credited but not actually run, difference in cost of fuel delivered at power plant and on locomotive tender, and for the mantenance of fuel and water supply plants, and there will still be a large margin in favor of the steam as compared with electric locomotive performance, under fairly similar conditions.

During the last six months of its year's service, Aug. 7, 1905, to Jan. 6, 1906, both inclusive, the locomotive was out of service eleven days on which no mileage was made, on account of boiler washing, staybolt tests, repairs, etc., due to ordinary wear and tear, or about 6 per cent of its time unavailable for transportation department work. Allowing for firebox and boiler-tube renewals, heavy machinery, repairs, etc., we estimate, from the last year's performance, that at the end of ten years the shop charges for working repairs will have averaged not to exceed 9 per cent per mile run. The threads of tires show even wearing amounting to 3-16 in., or about 1-64 in. per month; tires calipered uniform in diameter.

After describing in detail the condition of the locomotive at the end of the period mentioned, the speaker gave the following as some of the results that can be obtained from this compound-cylinder, articulated type of freight locomotive, which he states cannot be duplicated by other single units of steam, electric or internal combustion locomotives now in use on American railroads.

1. A tractive power of about 84,000 lbs. for starting heavy trains and for a speed of 5 miles per hour; and of 74,000 lbs. at a speed of 10 miles per hour, placed under control of one engineer and one fireman.

2. A self-contained machine generating the power necessary to develop its hauling capacity. With electric locomotives, where the source of power is separate from the machine which develops the hauling capacity, the first cost of the locomotive alone is, at present, about 50 per cent greater per pound of tractive power developed under working load than for steam locomotives of the 2400 type. To this must be added the greater cost for repairs and operation per mile run for the electric locomotive, and the installation, maintenance and operation of a current producing, conveying, storage, converting and distributing system, which would not be re-

quired by either a steam or an internal combustion locomotive, and all of which increase the capital and operating expenses very materially.

3. A total locomotive weight utilized for the development of tractive power in connection with a running gear, which makes the locomotive suitable for either hauling, pushing or braking freight trains containing the maximum paying load per foot of track space, over level or mountainous railroads of maximum curvature.

4. A maximum tractive power with a minimum rail pressure per driver wheel, on account of the total weight of 334,500 lbs. being distributed over 12 drivers, and a 30 ft. 6 in. total, with a 10-ft. rigid wheel base, resulting in minimum wear and tear on bridges, rails, ties and roadway. With electrical locomotives the excessive weight concentrated on a short, rigid driver-wheel base and below the springs, together with the extremely low center of gravity, results in extraordinary rail pressures, thrusts and wear.

5. The elimination of retard movement and stalling of trains, on account of the usual slipping of driver wheels, as in the case of ordinary simple or compound-cylinder steam locomotives, or with electric locomotives where the driver wheels are uncoupled and the current is naturally transmitted to the point of least resistance, which is the slipping wheels, resulting in no increase of power at the dead wheels. A higher tractive power is obtained to the weight per axle than with the ordinary steam locomotive, as the slipping due to the accumulation of high unbalanced pressure at the points of wheel and rail contact, does not occur at the same time in both engines. When one engine commences to slip a reduction in mean effective pressure follows, and it regains its grip on the rail without making it necessary to shut off or throttle the steam supply. The other engine, meantime, has been gaining power, thus preventing any loss of speed and consequent stalling of the train at a critical moment. These conditions are the same whether the slipping occurs with either the high or the low-pressure engine, and the most frequent cause for stalling with electric or simple cylinder locomotive is thus overcome.

6. A tonnage and speed per train that will provide for the least number of locomotives and crews under the control of which the movement of the business is placed. This will result in the balancing of the power and movement of the maximum number of loaded and empty cars per hour over a single piece of track, with the proper degree of safety.

7. A minimum capital, repair, fuel, engine and crew, oil, supply and displacement cost per locomotive train, car or ton mile.

8. A maximum retarding effect for the safe handling of heavy trains down steep grades at the highest speed permissible for a proper degree of safety.

9. A uniform turning movement to overcome journal friction of axles; rolling and flange friction of wheels; wave resistance of rail; atmospheric friction at ends and sides of rolling stock and inertia of train at time of starting, which will insure the minimum draft gear, machinery and boiler stresses, and reduce the tire and rail wear.

10. A sub-division of power and balancing, resulting in the minimum strains on the locomotive and track, and a reduced liability for wear, breakage or accident. Broken driver-wheel axles on electric locomotives indicate that the more uniform torque does not eliminate the liability for such failures under normal conditions.

11. The minimum amount of dead weight and non-paying load, and the smallest number of bearings and parts per unit of power developed.

12. Ability to move itself and train of one-half rating in the event one set of its machinery or engines becomes disabled.

The speaker admitted that electricity as a motive power is superseding steam in many cases, for suburban passenger and freight traffic, and that it may displace the latter for through passenger service, but thought it would be some time before electrical energy will supplant steam power for the handling of heavy tonnage for any considerable distance. He also thought that their performance, when compared with steam locomotives, shows a cost which makes their present use prohibitive, when fuel must be used to generate power, except in cases of absolute necessity. An electric locomotive complete and crewed, ready for operation, would require: For terminal handling: a running repair shed with drop pit and auxiliary facilities; tracks and switches; inspection pit and sand, repair material and general stores supply. For maintenance: a general repair shop and equipment, and many expensive extra parts for quick repairs and renewals for locomotive and plant. And for line operation: standard gage tracks; sand supply station; power plant building; boilers; draft arrangement; stokers; coal, water and ash intake storage and distributing appliances; coal crushers; superheaters; economizers; feed-water heaters and pumps; condenser equipment; heating, fire protection, compressed air and general and detail lighting systems; engines and generators; exciters; switchboards; piping; oil system; overhead cranes and machine tools; general and auxiliary feeder and distributing systems; transformers; rotary convertors; storage battery; overhead or surface contact lines; bonding; insulation; safety cut-out device; lightning protection device, etc.

On the other hand, a steam locomotive complete and crewed, ready for operation, would require: For terminal handling: a running repair shed with drop pit and auxiliary facilities; tracks and switches; turntable; ash pit; and coal, water, sand, repair material and general stores supply. For maintenance: a general repair shop and equipment, with a few inexpensive parts for locomotive repairs. And for line operation: standard gage tracks, and coal, water and sand supply stations.

After concluding his paper, Mr. Muhlfeld added some general remarks to the effect that while some steam railroads presented attractive opportunities for electrification, particularly those operating in districts where fuel or water power is cheap, electricity could not be expected to supersede steam until the promised performances of electric locomotives were forthcoming. All of the present electric locomotives were of different types. The steam locomotive was capable of handling any reasonable load but, in some instances, the installation of electric locomotives would perhaps be justified because they would increase the capacity of the line on account of their more rapid acceleration. It should be remembered that the initial cost per hp with electricity is much greater than with steam locomotives, and while the extravagant power consumption of the latter was admitted, there were no power station, conversion and transmission losses.

DISCUSSION

The discussion was opened by F. F. Gaines, mechanical engineer of the Philadelphia & Reading Railroad, who said that he could not agree that the use of high steam pressures, like 200 lbs., were economical. In his experience, such high pressures wore out the boiler and other parts, and, in general, is might be said that the cost of repairs was in direct proportion to the pressure used.

Mr. Cole, of the American Locomotive Company, gave some further data on the performances of the Mallet articulated locomotive mentioned by Mr. Muhlfeld.

C. F. Scott, chief electrician of the Westinghouse Electric & Manufacturing Company, called attention to the fact that the B. & O. electric locomotives were being used in a service which could not be properly performed by any steam locomotives; that they represent the first attempt in heavy electric traction, and yet have been doing their work at a cost comparable with that of ordinary steam locomotives; hence Mr. Muhlfeld's comparison in cost of maintenance had been made between the oldest style of electric locomotive and the latest type of steam locomotive, which had not been in operation over a year. Taking up Mr. Muhlfeld's specifications, both mechanical and electrical, in detail, he said that all of the essential mechanical features were embodied in the locomotives which his company was building for the New York, New Haven & Hartford Railroad. As to the electrical electrifications, it was interesting to note in what respects one system of electric operation seemed to meet them better than the other. For example, the requirement that the locomotive should be capable of operation at varied speeds and power. With a d. c. locomotive there are but two economical speeds, one when the motors are in series, and the other when they are in parallel, but with a. c. motors, a transformer can be used furnished with potential taps to give any desired number of speeds. Another point, is the desirability of preventing the independent revolution of wheels coupled in series, this being due principally to the operation of motors in series when at times the first motor takes more power than its share, causing one pair of wheels to slip more and more. With a. c. operation, the motors can always be connected in parallel, thereby giving a condition in which each pair of wheels is held separately. As to returning energy to the line, this can be done easily with alternating current, but with direct current considerable complications would be involved and regeneration possible only at certain speeds. He regretted that Mr. Muhlfeld had not given more particulars about the operating characteristics of the third rail. With a. c. work, a form of overhead construction could be employed far superior to that originally tried by the Baltimore & Ohio Railroad. Other particulars mentioned by the author, such as minimum line conversion and feeder losses, least number of sub-stations, elimination of electrolytic action, etc., are all features secured by the use of alternating-current motors.

H. H. Vaughn, vice-president of the Canadian Pacific Railroad, expressed his belief in the future success of the Mallet engine, especially on account of its low cost. First year repair costs, however, were not fair criterions for judging either electric or steam locomotives. He believed that the development of electric locomotives had not reached its highest point, particularly in hp per ton of metal, and that there was a field for them under certain special conditions as outlined by Mr. Muhlfeld.

Mr. Scott took the floor again, to point out that the greater part of the total maintenance cost of the B. & O. electrical equipment was based on the operation of an old uneconomical type of power plant, low-voltage transmission, involving high-battery losses, etc.—conditions which would not exist in a large modern plant.

W. B. Potter, of the General Electric Company, said that Mr. Muhlfeld's paper had impressed him as an argument for the further development of the electric locomotive. The keynote of the whole situation was that the first requirement by the transportation of the mechanical department, is for locomotives of such capacity and condition as will move the maximum tonnage per foot of track at the greatest speed consistent with safety. Mr. Potter said that it had been well demonstrated that by combining electric locomotives in units, it is possible to secure a more powerful train movement than with steam locomotives. After referring to the fact that the B. & O. locomotives were designed for the special work of hauling heavy trains for short distances, Mr. Potter mentioned the performances of the New York Central electric locomotives, which have been previously reported on in the Street Railway Journal. The low-maintenance costs of other recent General Electric Company locomotives were also given. The criticism made of the low number of hp developed per ton of metal in the electric locomotive, applied only to the old low-speed locomotives. In the New York Central locomotive there were normally 22-hp per ton, but a maximum of 30 hp could be obtained at the highest speed.

WELFARE WORK DISCUSSED BY THE NATIONAL CIVIC FEDERATION

The annual meeting of the New York branch of the National Civic Federation was held at the Park Avenue Hotel Wednesday evening, Feb. 14. Charles A. Moore, chief executive of the New York branch of the Federation, presided.

H. H. Vreeland, chairman of the welfare department of the National Civic Federation, and August Belmont, president of the National Civic Federation, discussed welfare work for street railway companies.

Mr. Vreeland said that one of the methods used to extend the practice of welfare work, which the department has found of especial value, is the holding of conferences of employers under its auspices in different sections of the country for the interchange of experiences. His opinion is that successful welfare work, when pictured by practical business men in connection with the industries, exerts an influence toward gaining the application of similar ideas by other employers. A bureau of exchange is maintained at the headquarters, where literature, plans and photographs relating to welfare work may be obtained by employers. The department also undertakes to supply upon request experts to examine industrial establishments, make suitable recommendations for the introduction of welfare work and, if desired, superintend its installation. For this service the time of the expert is furnished by the Federation without cost to the employer, beyond traveling expenses.

In discussing the welfare work of the New York City Railway Company, Mr. Vreeland said in part: "It has been said that it is impossible to extend the influence of welfare work into the homes of employees in cities. My own experience refutes the assertion. When I installed a library in the club rooms of our Employees' Association, it was my purpose to reach the families. I stated at a meeting where there were 6000 of our employees with their families, that it was the desire of the management that the catalogues of the library should go into the home of every married employee. I made it clear that we wanted the wives and sons and daughters of the employees to read the books. I also announced that if there were a man who had a son and daughter working for an education—technical education, perhaps—and special text-books or books of reference were needed, the books would be bought and put in the library upon application. The library is, so to speak, a family concern, and it was turned over at least twenty-five times the first winter we had it. It was astonishing, too, to see the high grade of literature that was taken out.

"Our Relief Association provides for a man in case of illness or accident, a pension in old age and at the time of death, a fund for burial. I have found that the wife of the average laboring man will always land on her feet, if she is

tided over for a few weeks, when the husband dies suddenly. All these benefits lead us into the home life again.

"My own experience as a wage earner having taught me that the unmarried man has no place to go evenings, except a hall bedroom, cold in winter, led me to establish club rooms for the men employed on the street railways in New York City. A large percentage of the ten thousand men employed by our company live in boarding houses. Many are from the country. Thirty years ago, as a brakeman on a steam railway, I was in the same position, away from home and forced to live in a boarding house, such as the railroad terminals and my wages could afford. There was absolutely no place for me in the evenings, where it was warm, except the saloon and the pool room. I said to myself, 'Here my own experience shows me something our men need.' The club rooms we established include an auditorium, where monthly entertainments are given, a library, a pool room, and a physician's office. They were used immediately and extensively, and a chance visitor will find the rooms filled every night in the week.

"It is, of course, impossible in a large city, where the employees live in widely distributed districts, to promote frequent evening entertainments, but the plan of taking a large hall, which is pursued by many large employers in New York and other cities, for an annual entertainment or ball, has become quite customary. These entertainments are much enjoyed by the employees, their sweethearts and families. In my own experience, I have never been able to secure a hall large enough to accommodate all who desire to attend.

"At our annual entertainment the president of the company, who is also president of the Employees' Association, reports upon the financial status of the work of that organization. We always arrange to have the best features from the different vaudeville entertainments in the city on that occasion."

Mr. Vreeland then made a general statement on welfare work, in which he said: "All of the welfare activities which apply to the sanitary conditions of the work places are applicable alike to the mill village and to the city. An employer who is noted among his employees for fair dealing, need have no fear of introducing welfare work after a careful study of conditions have been made. That is to say, after recognizing the first needs of the employees to be steady work, an equitable wage and hours as short as competitive conditions will permit, the employer may successfully install welfare work, if the proper attention is given to its introduction. All of our investigations of failures in this line have shown us conclusively that a just and fair policy of dealing with labor must be the foundation for all welfare work. With that foundation, it may be emphatically stated that employees will welcome all such efforts to provide for their welfare. Through welfare work we find re-established the personal touch between the employer and employees, which was lost when commercial organizations grew to such vast proportions. The welfare work establishes a bond of sympathy, because these efforts to provide for the comfort of employees indicate to them that the employer is interested in their welfare. While the employer cannot, under present conditions, meet individually each employee, he can periodically attend their functions, and this active participation of the employer not only brings him into communication with the employees but it is highly appreciated by them, and is essential to the successful prosecution of welfare work."

August Belmont was the last speaker of the evening. He said in part: "My interest in the subject before you to-night was such as to impel me to disobey my doctor's instructions, for he had told me to remain at home.

"Before leaving I want to say that the subject of welfare work has the closest attention of the Interborough Company. A complete method of insurance was worked out by experts in the company's employ on lines similar to those in use on the Pennsylvania Railroad and submitted to our men. For some reason they saw fit to reject it.

"We conferred long before there was any thought of our interests becoming identified with the New York City Railway officials on the subject of welfare work, and we are only waiting now for the return of our vice-president to inaugurate our own welfare department.

"In addition, although it has probably escaped you because of other aspects in which the association of traction interests —I won't say merger, for it is really but the association of the interests of the stockholders—the new corporation proposes to interest itself to a very large extent in the matter of suburban homes, and a subscription of a seriously substantial sum has been arranged for, to the end that such of its men as desire may avail themselves of comfortable homes."

It was determined at the meeting to enter thoroughly into the sphere of welfare work, and to this end a resolution was adopted, providing for the appointment of a committee to be composed of employers, labor representatives, and representatives of the general public, to confer with the welfare department of the National Civic Federation, as well as subcommittees, to give consideration to improving the condition of employees in New York City and in the different trades in the vicinity.

MONTHLY TRAIN RECORDS OF DELAYS

The Columbus, London & Springfield Railway Company has been keeping for some time monthly records of all train delays, and the following shows the statement for the month of January, 1906. It was not selected as a remarkable record in any way, but as illustrating the method followed and as a typical monthly report. The limited cars referred to in the report have now been discontinued on account of deficiency of power, and on this account the company never claimed to operate them as regularly as the rest of the service.

TRAIN RECORD ON THE COLUMBUS, LONDON & SPRINGFIELD FOR JANUARY, 1906.

NO. OF TRAINS.	LIMITED.	LOCAL.	FREIGHT.	TOTAL.	TOTAL CAR HRS.
Scheduled	72	1170	130	1372	3114.22
Annulled	8			8	16.00
Run	64	1170	130	1364	3098.22
NO. OF DELAYS CAUSED BY ORIGINAL FAULT IN	LIMITED.	NO. OF TRAINS DELAYED.	MINUTES EACH TRAIN DELAYED.		TOTAL HRS.
Power	1	3	15, 15, 15,		.45
Track	1	1	8		.08
Wire					
'Phone					
Car	4	4	18, 35, 9, 15,		1.17
Derailment	1	1	10		.10
Collision					
Sleet on Trolley					
Slippery Track					
Deep Snow					
Heavy Travel	2	2	9, 6,		.15
Total	9	11			2.35
NO. OF DELAYS CAUSED BY OTHER COMPANIES OR PERSONS.					
Connections late	2	2	15, 18,		.33
Other Car Derailed	3	4	15, 15, 20, 30,		1.20
R. R. CROSSINGS					
H. V.	1	1	10,		.10
B. & O.			7, 7, 15, 20,		
Big Four, Col's.			13, 8, 12, 15, 5, 11,		
Penn., W. Jeff.			5, 15, 12, 18, 13, 20,		
Big Four, Springfield	14	22	20, 20, 14, 16, 11, 18,		4.58
Total	20	29			7.01
Grand Total	29	40			9.36

On January 8th deep snow (storm), all west bound trains running from ten to thirty-five minutes late; east bound trains running from ten minutes to one hour late. Heavy load on station, power bad.

4 Limited trains annulled on account of defective cars.

4 Limited trains annulled on account of deep snow (storm).

THE MANAGEMENT AND EQUIPMENT OF PLEASURE RESORTS

The park idea has taken so firm a hold upon electric railway companies that its feasibility in most instances has long ceased to be a question, and the principal considerations have become those relating to operation and equipment. There are still quite a number of railway companies, especially those serving territory of great scenic beauty, which regard the park business solely as a profitable method for increasing the passenger traffic and do not attempt to make the park a paying investment in itself. Experience in many quarters, however, has shown that it is worth while to treat the park question as something more than a secondary matter. Of course, there are many railway companies whose possible development of park business would not prove big enough to warrant the employment of an amusement specialist, yet even these companies can increase their income from this source by learning what kind of attractions have succeeded in other places and under what conditions they have been presented.

A GROUP OF BUILDINGS IN CANOBIE LAKE PARK, OWNED BY THE NEW HAMPSHIRE ELECTRIC RAILWAYS COMPANY

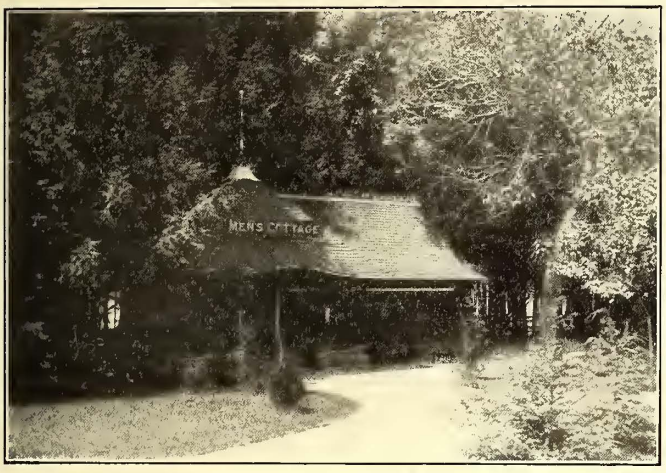
ROLLER SKATING RINKS

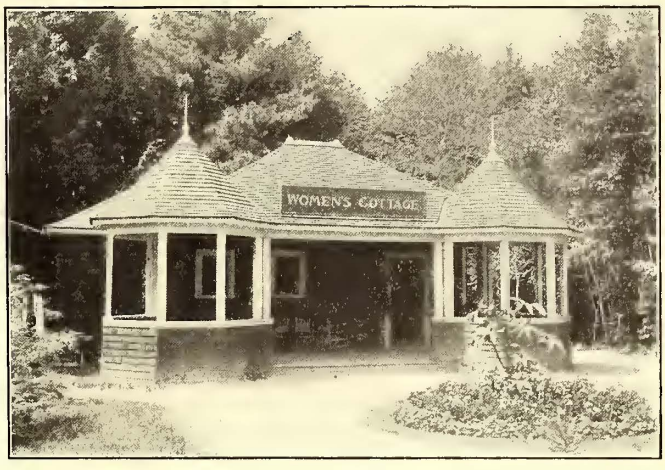
One of the most remarkable features of the last season was the great revival of roller skating rinks. Emboldened by the success of the few who had by proper management successfully revived this pastime the year before, several other rinks were erected along the same lines of management and operated with considerable profit. It can hardly be doubted that the coming season will witness a large increase in the number of skating rinks, and that they will meet with financial success, provided they are operated so as to keep out all rowdy elements and at rental rates which will encourage the majority to take advantage of this splendid recreation. Through the courtesy of several railway companies which have installed rinks, it is possible to give here the methods they pursued in presenting this feature and the results secured.

Among the railway systems which took up roller skating during the past season is the New Hampshire Electric Railways, which erected a rink at its famous summer resort, Canobie Lake Park, located at Salem, N. H., 10⅓ miles from Haverhill, Mass., 8½ miles from Lawrence, Mass., 15 miles from Lowell, Mass., and 16 1-5 miles from Nashua, N. H. The park contains 50 acres of land and is situated on the shore of Canobie Lake. Among the attractions here are a large open-air theatre seating 3000 people; a figure-eight roller coaster; merry-go-round; box-ball alleys; shooting gallery; photograph gallery; boat house and wharf, where a large number of boats and canoes are let, besides two large naphtha launches, which make frequent trips around the lake; a large restaurant seating 500 people, and offering a cuisine and service said to be unsurpassed by the best hotels in the country; a small restaurant containing a lunch counter, pop-corn stand, candy souvenirs, etc.; extensive dance hall; penny arcade; and a rink structure 146 ft. long and 70 ft. wide, with a skating space of 126 ft. x 50 ft. All of the privileges in the park, with the exception of the theatre, are let on a percentage basis. There is also an athletic ground, with seats for 3000 people, where baseball games are played and free, open-air exhibitions given, such as high-wire, diving horses, balloon ascensions, wild animals and fireworks. Within the grounds there is a large picnic grove set apart for outings by particular churches or other organizations. With reference to the roller skating rink, which was equipped with skates made by the Union Hardware Company, of Torrington, Conn., and the Samuel Winslow Skate Manufacturing Company, of Worcester, Mass., the company found it to be a good drawing card in connection with the other park attractions, and it was liberally patronized during the entire season. The charge for admission, including the use of skates, was 25 cents. The parties operating this atttraction had a force of gentlemanly attendants, and the rink was managed in a first-class manner in every respect, thereby insuring the continued patronage of the best classes of people. It is expected that the patronage of this feature will be even greater during the coming season. The success of roller skat-

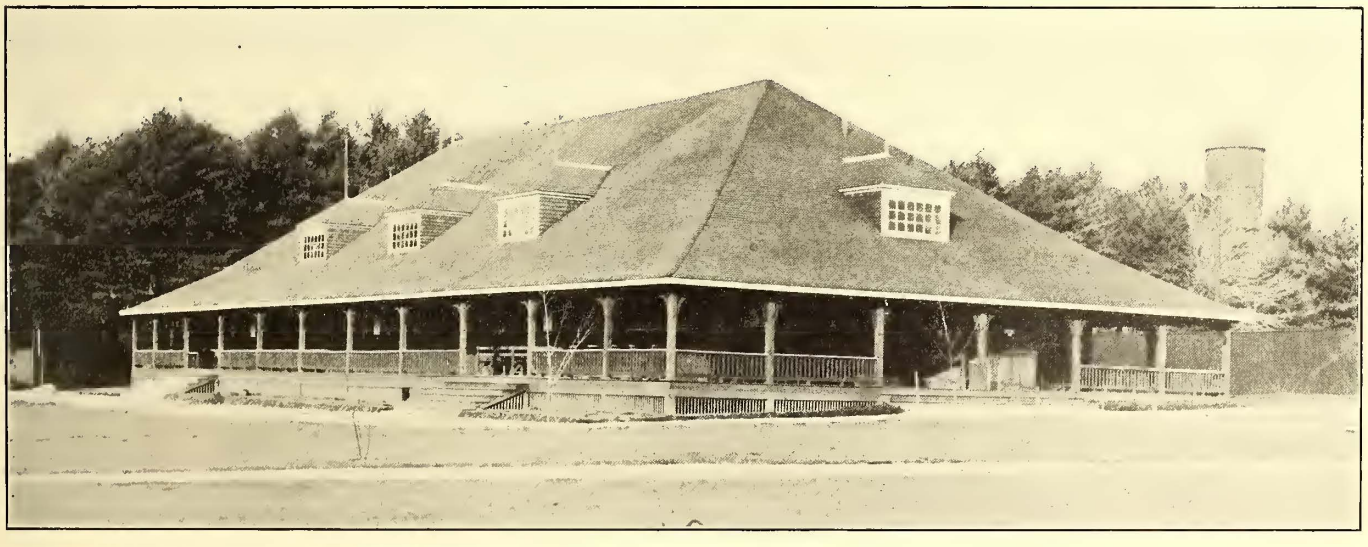
ing is particularly noticeable on account of the numerous high-class attractions with which it had to compete, and this fact, taken in connection with the success of the same feature under widely different conditions in other places, shows that roller skating appeals favorably to all classes of people. It might be added here, that other park managements could imitate with profit the neat style of architecture shown in the accompanying views of Canobie Park buildings.

One of the first railway parks where roller skating was revived is Bushkill Park, a prominent pleasure resort near Easton, Pa., along the line of the Northampton Traction Company. It was very much of an experiment on the company's part to find out whether the people were ready for this amusement or not. The company built a pavilion that cost nearly $10,000. It is 230 ft. long, 80 ft. wide and has a hard maple floor. The pavilion is enclosed in glass in sash form, which can be taken out intact, and the sides are in regular panels which are used for tables in the park. The first skates used were of the Winslow wooden, ball-bearing, roller type. This year the company has disposed of all the wooden rollers and put in Winslow ball-bearing, web-steel rollers. These latter skates have been found more durable than anything else, and the patrons greatly prefer them. No admission is charged to the rink itself, and only 10 cents for the use of the skates. As the park is within the 5-cent fare limit, the sport is placed within the means of the poorest, and has become very popular. The building is operated as a roller skating rink from the middle of October to the middle of May, but for the rest of the year is run as a dancing pavilion. By this combination the park has become a source of profitable income all the year round. This rotation was introduced because the patrons are also very fond of dancing, and prefer it during the hot weather. Further north, of course, the skating period could be extended. During the skating season the management presents numerous attractions such as fancy and trick skaters, and one and two-mile races once a week with local people. There are fancy-dress carnivals about every four weeks, upon which occasions small prizes in money or roller skates are offered, as the company has found that this practice does very much toward keeping up the interest of the people in this amusement. The building has held as many as 1400 people in one evening, which has convinced the management that it would have been a great mistake not to have installed roller skating, for in that event the pavilion would have lain idle seven months in the year. There is another economical side to the question of roller skating that appeals to the Northampton Traction Company, namely, that since the park buildings are cared for and watched all the year round, they remain uninjured and do not become dilapidated. During the winter the pavilion is heated with stoves, and when spring comes it will be in practically as good condition as it was in the fall. The company's experience so far has been that the skating receipts have taken care of all the expenses of operating the park and the rink this winter, leaving all of the fares of the passengers to and from the park as additional revenue to the railway.





TWO TYPES OF THE ARTISTIC STRUCTURES INSTALLED IN CANOBIE LAKE PARK



A VIEW OF THE SKATING RINK AT CANOBIE LAKE PARK

The Virginia Passenger & Power Company, of Richmond, Va., has also had some interesting results with roller skating. The company has under its control a large horse show building with a seating capacity of about 4000 people, and an oval exhibition ring 190 ft. x 70 ft. Last spring this was floored over and a skating rink opened. It ran very successfully during the summer. The floor was removed for the Horse Show in the fall, but was replaced later, and the rink has been operated successfully since the close of the Horse Show with Winslow skates. Novel features, which General Manager Huff introduced in conjunction with the skating rink, are band concerts and moving pictures, the latter being presented while the skating is in progress.

INTERIOR OF THE BUSHKILL PARK SKATING RINK

One important point of the roller skate question must not be overloked, namely, the skate itself. Convenient and cheap transportation, a handsome pavilion, polite attendants and elimination of all tendency to rowdyism, are all necessary factors toward success, but their good effect is nullified if the skates are hard running or liable to breakage on account of flimsy construction. Therefore, it behooves the rink manager to investigate carefully before purchasing the hundreds of pairs required.

The skates made by the Union Hardware Company, of Torrington, Conn., are being used to a very considerable extent by the railway park managers and, in particular, the following companies may be mentioned: The Consolidated Railway, Light & Power Company, of Wilmington, N. C.; the New Hampshire Electric Railways, of Haverhill, Mass.; the Lexington & Boston Street Railway Company, of Lexington, Mass., and the Nahant & Lynn Street Railway Company, of Lynn, Mass. As a great number of rinks are let to private parties who purchased their equipment through the hardware dealers, it is rather difficult to say just how many railways are using these, or other, skates, but the foregoing list shows how quickly the revival has taken hold. One of the illustrations on page 315 shows the company's men's roller skate No. 15. These skates are supplied for both men and women with either hemacite or steel rolls, as may be desired when ball-bearing models are used, and with hemacite or lignum-vitae rolls when plain bearing skates are employed.

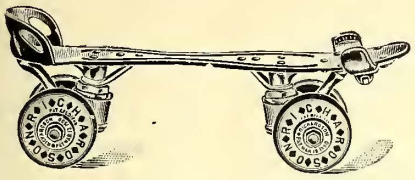
Another type which has been giving satisfaction, as already noted in the description of the Bushkill Park and Richmond rinks, is the Winslow ball-bearing skate with web-steel rolls. Among the principal features of this line are the following: A web-steel, ball-bearing roll; a rubber-adjusting mechanism which permits, if desired, the shortest possible turning; and a novel bridge truss reinforcement beneath the foot-plate to prevent any springing or bending of the plates. The latest type of skate made by this company, No. 17 or 1906 model, is shown in an illustration on page 315. The Pittsburg Railways Company is also using a large number of these skates. A remarkably large skating pavilion is the Park Square rink in Boston, for which over 5000 pairs have been furnished.

The Richardson Ball-Bearing Skate Company, Chicago, also report a most phenomenal boom in roller skating throughout the country, and the present demand for these skates exceeds that of any previous period during the past twenty years, and notwithstanding the fact that the company is manufacturing from five to six hundred pairs of skates daily, some difficulty is experienced in filling orders. Over

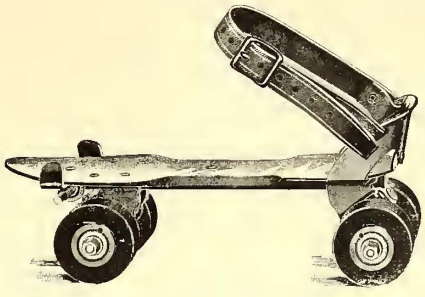
THE MERRY-GO-ROUND IN CANOBIE LAKE PARK

A VIEW OF THE EXTERIOR OF THE SKATING RINK IN BUSHKILL PARK

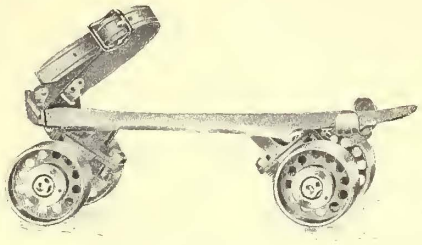
seventy thousand pairs of these skates have been sold during the past year, and they are used exclusively in many of the prominent rinks of the country, including Mechanics' Pavilion, San Francisco, Cal.; Music Hall Roller Rink, Cincinnati, Ohio; Delmar Skating Academy, St. Louis, Mo.; Princess Skating Rink, Louisville, Ky.; Westport Palace Skating Rink, Baltimore, Md.; Convention Hall, Kansas City; Royal Rink, Cleveland; Wayne & Washington Rinks, Detroit; Casino Rink, Minneapolis; Auditorium, Omaha; Coliseum, Chicago; also the Auditorium Rink, Columbus, Ohio.



RICHARDSON RINK SKATE WITH RUBBER CUSHION

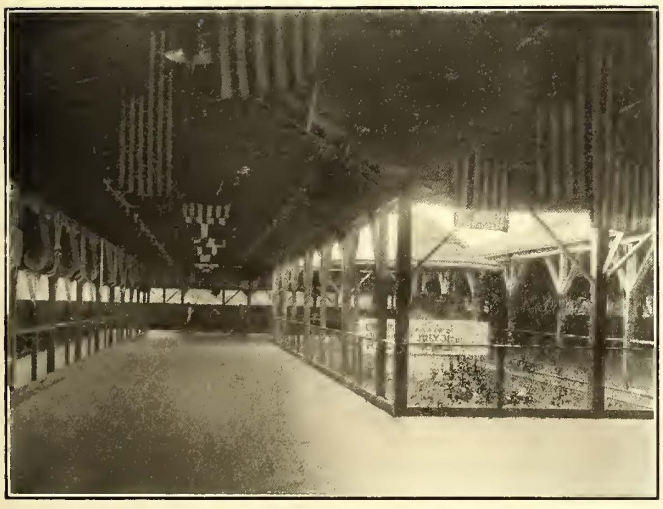


UNION HARDWARE SKATE FOR RINK USE



WINSLOW RINK SKATE WITH WEB STEEL ROLLS

A view of Manhattan Beach Park, Denver, Col., is reproduced herewith. The construction of this building is novel and especially desirable for open-air skating rinks. The structure is about 180 ft. long, 85 ft. wide, with an open center of 25 ft. The covered track on each side is 20 ft., the promenade on each side 10 ft., and the tracks on the ends 35 ft. The structure cost about $4,500. Considering the fact that skates are not now used to any extent for sidewalk skating, and only the highest grade ball-bearing skates are manufactured by the company, the great sales above mentioned indicate very clearly the popularity of roller skating throughout the country; in fact, it is estimated that there are from twelve to fifteen hundred flourishing rinks in America at the present time, and the number is increasing daily. The mechanical construction of the Richardson skate embodies great simplicity. One of the most essential features is that which provides for a large rubber cushion on which the skater rides, and which eliminates all jar and vibration. The foot-plates are framed up from the finest cold-rolled steel, corrugated and otherwise reinforced to assure great strength. Every foot-plate is guaranteed against breaking for one year. The bearings are turned from first quality machinery steel, case hardened and polished, every part being interchangeable. Steel, aluminum and wood fibre rollers are furnished on regular rink skates, and boxwood or aluminum on racers. As regards the Richardson Racer, the company claims to have held every world's record since 1884.



SKATING RINK INSTALLED AT MANHATTAN BEACH PARK, DENVER, COL.

PENNY ARCADES AND SLOT MACHINES

Not so long ago the idea of grouping in one place a number of penny-in-the-slot machines was not thought of by their owners. The weighing machines, scales, gum vendors, etc., were usually scattered throughout the park, no special attempt being made to encourage their use. In fact, slot machines were not supposed to be worth any more attention than that incident to collecting the accumulated coins and replenishing the stock. Naturally enough, the isolated situations of these machines often resulted in their being tampered with to such an extent that in a short time they would be in very bad condition and fail to work at all, much to the chagrin of the would-be customer, who thereupon resolved to steer clear of what he termed "bunco" devices. However, the later developments in slot contrivances of more expensive and entertaining character, such as mutoscopes, phonographs, punching and lung-testing machines, soon demonstrated that the best results could be secured only by placing all of the machines under cover in one building and in the care of capable attendants. Thus began what are now known as "Penny Arcades." These arcades have proven so popular and profitable both in the city and country, that it is well worth while to study the practices of those who have achieved success in this field.

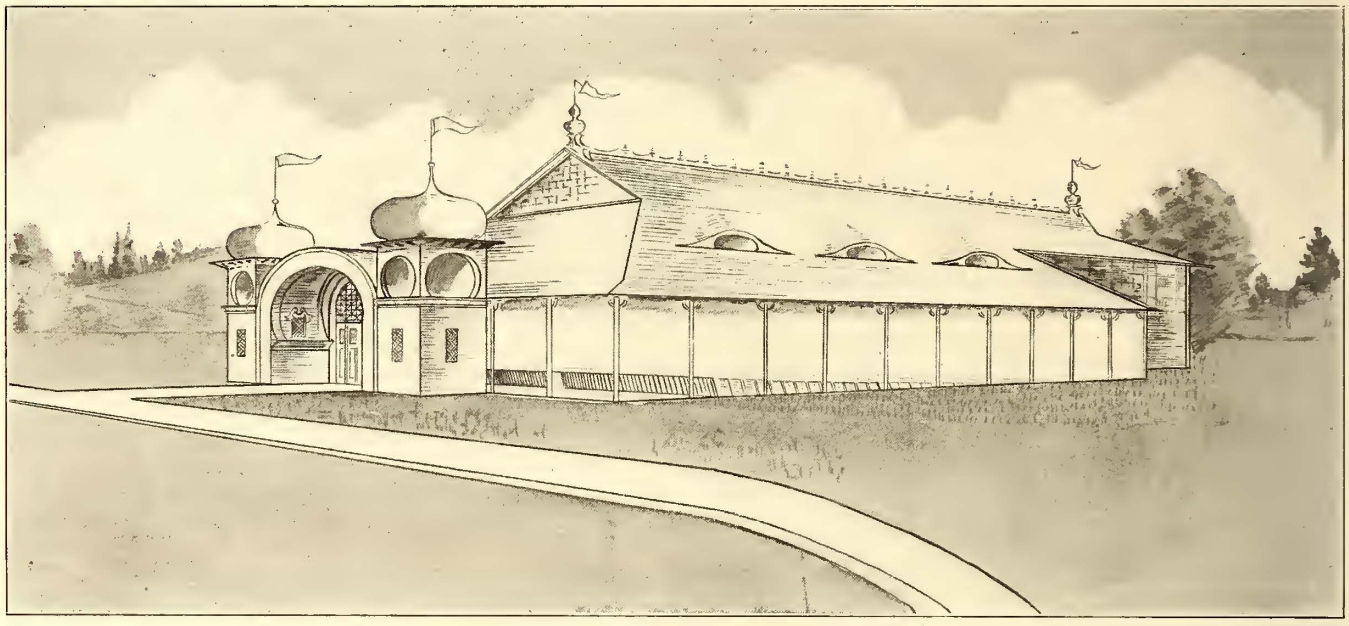
Where the penny arcade is intended as a railway park attraction, the machines should be placed in a tastefully designed building, open nearly all the way round, with passages so arranged that patrons entering one place can make use of the various slot devices and then leave the building without being obliged to turn around and interfere with later comers. By constructing the building with an overhanging roof, an excellent shelter is provided for protection from summer rain storms, on which occasion the public is sure to patronize the machines more than ever. The building can also be used during cold weather by adapting the outer framework for the reception of glass or other panels. A corner of the building should be reserved for storage and repairs.

The first requisite in the success of penny arcade operation is the reliability of the machines. Nothing can be more injurious than to have a patron fail to get the proper return for his money. For this reason, a competent mechanic should go over all of the machines from time to time to keep them in trim, but when a customer does find it necessary to complain of the failure of some device, the cashier should refund his money without question. The second requisite is cleanliness, a very important matter in any place which is frequented by all classes and conditions of people. The floors should always be kept as free as possible from dirt, cigar

and cigarette stubs, papers, etc., so that the ladies will not suffer the annoyance of soiling their skirts whenever they wish to patronize the arcade. All of the various devices should also be kept well painted or polished, the phonograph ear-pieces cleaned frequently, etc. The third requisite, is to keep the attraction new. No hesitation should be felt in spending the little extra money required for new phonograph records or mutoscope reels, as the public cannot be expected to pay for listening to the same songs or seeing the same pictures day after day. The manufacturers of these devices are only too glad to co-operate in this respect by making only nominal charges whenever desired to exchange reels or purchase records. For instance, the American Mutoscope & Biograph Company, of New York, charges but three cents a day for changing its mutoscope pictures, which number over 5000 subjects. The fourth requisite, is to secure all the money entering the machines. Even if an arcade is improperly operated, it would show a profit were it not for the ease with which dishonest employees can rob the machines. It is therefore wise to have the cash collected only by bonded employees who are known to be trustworthy.

It is hardly necessary to add that the moral tone of an arcade should be such that none of the attractions offered will offend anyone's susceptibilities. Some of the machines using stereoscopic pictures have been of such objectionable character as to disgust the majority of the patrons, but this has never been true of mutoscope photographs, and the park manager has the choice of thousands of high-class attractions from which he can select whatever is most likely to appeal to his patrons. Because the revenue comes in one-cent pieces instead of quarter or half-dollars, the park manager must not assume that the penny arcade will not give a better return on the investment than many other attractions which require an outlay amounting to thousands of dollars. In fact, the first cost of the machines is so small that it usually is much more profitable to buy them outright than to rent them from the manufacturers. While no one company makes all of the slot machines needed for a first-class arcade, the rapid increase in the popularity of this feature has given the manufacturers of these devices all that they can do. The park manager, therefore, should not delay his preparations for the coming season until the warm weather begins.

Another example of the success of penny arcades in high-class resorts is afforded by Norumbega Park, which is operated by the Boston Suburban Electric Companies. It is stated by Matthew C. Brush, vice-president and general manager of the company, that this particular feature of the park was such a marked success that last year the management doubled the size of the building, and the results for the past season were such as to fully warrant it in this move. In this building there is a souvenir counter, at which souvenirs are sold; there are also in this building all kinds, classes and descriptions of penny-in-the-slot machines; a Japanese bowling alley; a penny-in-the-slot target device; an arc-light photograph device, etc. The floor space of the building is divided in such a way as to facilitate the handling of a very large crowd. A special effort was made to see that the building was especially attractive both inside and out, and in the endeavor to accomplish this, incandescent lights were placed around the edge of the roof of the entire building, and in the center of the building, inside, a fountain with running water and electric lights, the base of the fountain being approximately 12 ft. in diameter. The management has found that it has no particular feature in the park which is more remunerative and apparently more appreciated by the public. It conducts the same on a very clean policy, being especially particular in regard to the class of pictures, etc., shown in the slot machines. Experience leads the management to believe that the more machines one can place in the building the more will be the returns, as there are apparently a number of cases where patrons will try each and every machine. It has also been found advisable to change the views, music, etc., rather often, as the park is largely patronized by regular patrons each week. Everything in this penny arcade or chalet is operated on a percentage basis, the lessee furnishing the material or device, with the exception of the souvenir counter, which is run by the management.



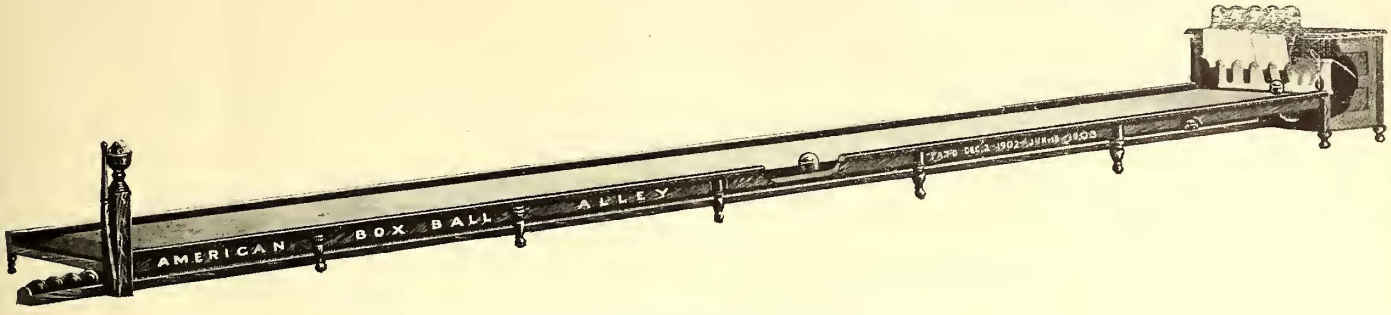
A TYPICAL SUMMER THEATER, INSTALLED FOR A SMALL RAILWAY PARK

THE PLANNING OF AMUSEMENT BUILDINGS AND SPECIAL SHOW STRUCTURES

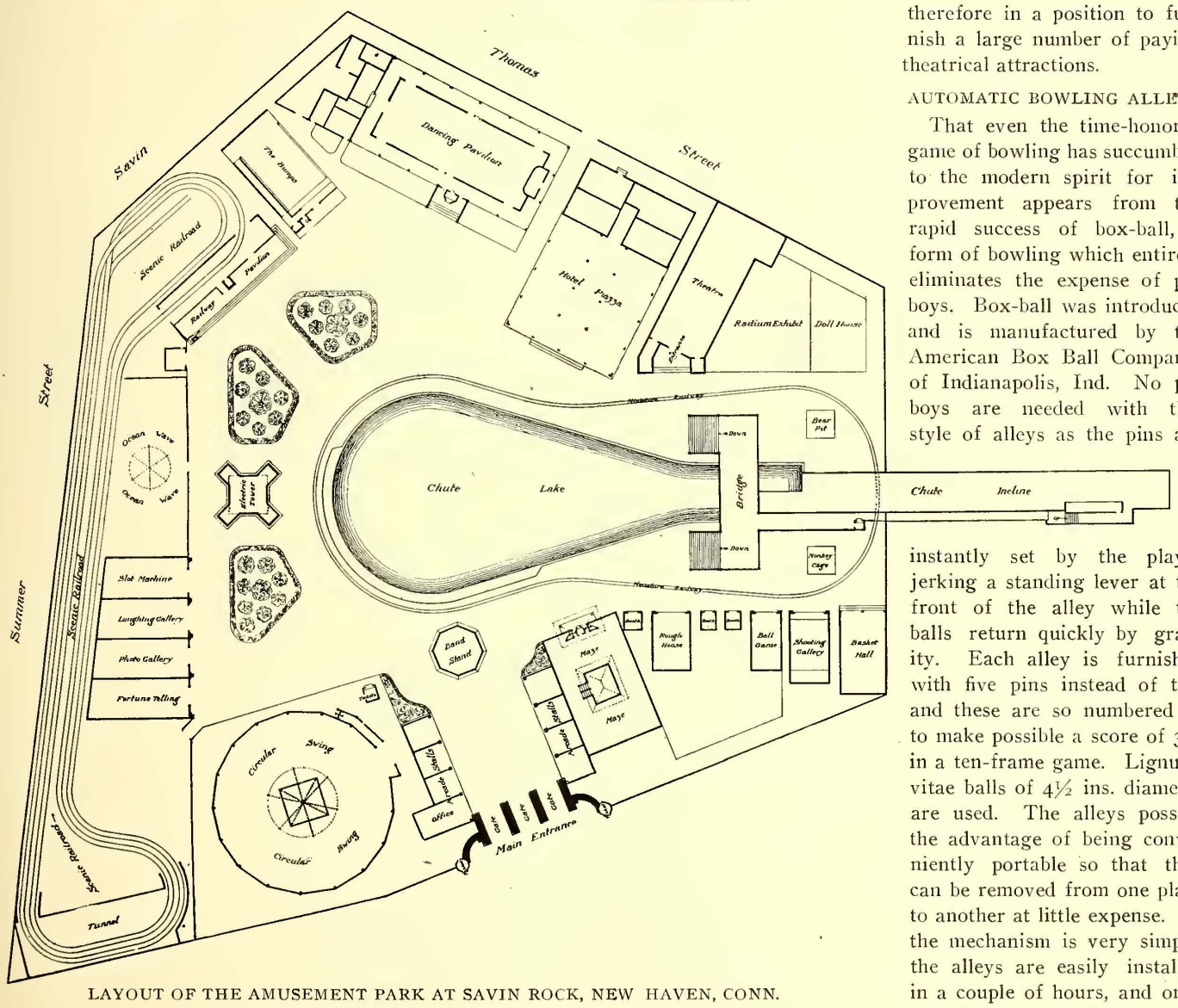
The number and variety of structures needed even in a park of ordinary size is such that their proper construction requires a great deal of experience in this class of work. To lighten the park manager's problems in this respect, the well-known park builder, Ed. C. Boyce, Inc., of New York, is

prepared to sell detail plans of such features as figure-eight roller-coasters, "Bump the Bumps," "Canals of Venice," "Great Coal Mine," etc., which can then be erected on the grounds by any ordinary carpenters and mechanics, the designer also furnishing any special material that may be needed. This plan of making designs to suit the local conditions combines the advantages of economy with this corporation's varied experience in the summer amusement field tends to insure a reliability in service which might otherwise be unattainable.

The design of summer park theaters has long been a specialty with J. W. Gorman, of Boston, Mass. The accompanying illustration on page 316 shows one of his designs for which he has prepared detail construction drawings. As the result of his long experience in this field Mr. Gorman has arrived at the conclusion that, while a big park with varied attractions is the best proposition where the population is large, a summer theater involving a small initial outlay and low running expenses will prove much better as an investment in moderately populated territory, if good attractions are secured and there is a weekly change of bill. Mr. Gorman controls an extensive circuit of summer parks, and is therefore in a position to furnish a large number of paying theatrical attractions.



A COMPLETE BOX BALL ALLEY



LAYOUT OF THE AMUSEMENT PARK AT SAVIN ROCK, NEW HAVEN, CONN.

AUTOMATIC BOWLING ALLEYS

That even the time-honored game of bowling has succumbed to the modern spirit for improvement appears from the rapid success of box-ball, a form of bowling which entirely eliminates the expense of pin boys. Box-ball was introduced and is manufactured by the American Box Ball Company, of Indianapolis, Ind. No pin boys are needed with this style of alleys as the pins are instantly set by the player jerking a standing lever at the front of the alley while the balls return quickly by gravity. Each alley is furnished with five pins instead of ten, and these are so numbered as to make possible a score of 300 in a ten-frame game. Lignum-vitae balls of 4½ ins. diameter are used. The alleys possess the advantage of being conveniently portable so that they can be removed from one place to another at little expense. As the mechanism is very simple, the alleys are easily installed in a couple of hours, and once in place are maintained at small expense. The remarkable popularity of this form of bowling is apparent from the manufacturer's statement that over 3000 alleys have been sold since the first one was made about three years ago. About 50 parks were equipped last year, and the company already has orders for the season of 1906. Figures submitted by users of box-ball alleys show that this sport is even more popular than the game of ten pins, and, of course,

is far more profitable to the operator of the alley since the only labor expense is that for the cashier, who can also act as general supervisor and caretaker.

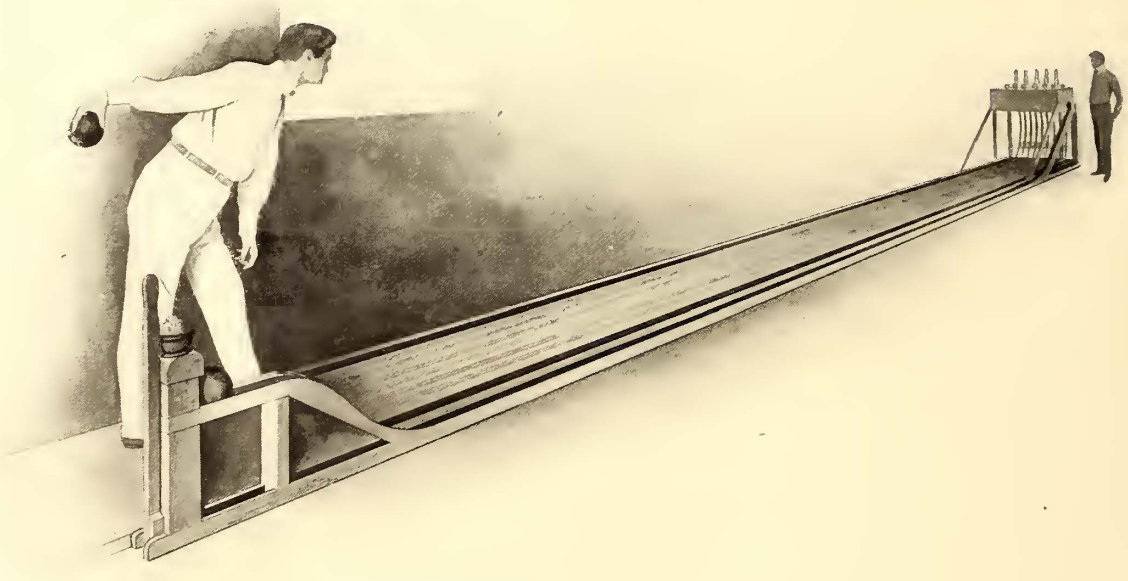
The Matthews-Fahl Company, of St. Louis, has also achieved successful results with its ingenious boy-less bowling alley, and recently has perfected several designs especially serviceable for park use. One of these, which is a double alley, was described and illustrated in the Street Railway Journal of Sept. 23, 1905. The accompanying illustration shows this company's new, single-cork alley, intended for fast playing. Its construction is such as to increase greatly the possible number of games played within a given period, thereby producing more revenue to the operator. Another feature that reduces the time of playing is the fact that a "strike" or a "spare" can be made as in regular bowling.

THE BOX-BALL ALLEY IN OPERATION

TOBOGGAN SLIDES, RIDING GALLERIES, ETC.

The work of the Philadelphia Toboggan Company, of Philadelphia, is the construction of forest coasters, toboggan slides, carousels and similar amusements for summer parks. It has equipped a large number of resorts throughout the country, and the neat, artistic character of its structures are well shown by the reproductions on page 319 of portions of a park in Columbus, Ohio, and another at Chestnut Hill, Philadelphia. Among other towns containing parks with profitable features recently furnished by this company are New Orleans, Milwaukee, Denver, Norfolk and Topeka. The toboggan slides and roller coasters made by this concern are laid out on the best engineering principles to insure safe operation, but they are also designed with an eye to their enhancing the appearance of the park itself. The carousels are made to keep pace with the excellence of the company's other productions, both the orchestrions and animals being the work of high-class artisans.

The world-wide popularity of the merry-go-round is attested by the installations of the Herschell-Spillman Company, of North Tonawanda, N. Y., which are to be found in numerous parks in the United States, Mexico, Brazil and other countries. The accompanying view of a merry-go-round in Mexico shows how popular this amusement is across the southern border. The variety of the company's machines is so great as to make detailed descriptions impracticable, but the company will build these devices in any desired size



THE BOY-LESS BOWLING ALLEY

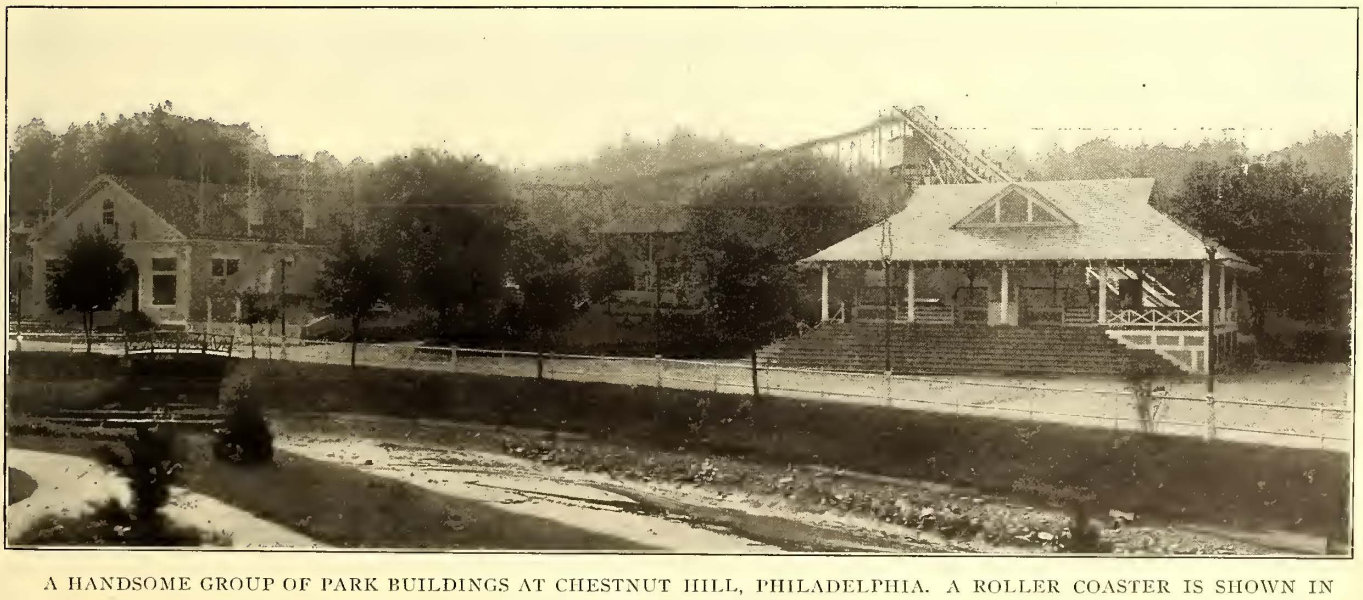
and degree of elaboration. Lately the company has brought out some other amusement devices, such as the "House-Front Doll-Rack," containing comic heads to be knocked back by baseballs; the "African Dodger," which serves the same purpose as the doll-rack, except that the opening is for one head only, which is placed in an imitation tree trunk on a canvas depicting a watermelon patch; and the "Old Woman," a substantial figure, arranged to swing like a pendulum while the patron endeavors to break a pipe in her mouth with the little shillalah" supplied with the equipment. The company also builds striking machines, miniature railways, as will be mentioned later, under the special heading of "Miniature Railways," "Ocean Waves," Ferris Wheels, and other attractions.

Another builder of park structures is the Franklin Toboggan Company, of Philadelphia, Pa., which has recently brought out three new toboggan slide designs. The first of these is known as the "Clover Leaf," and as the name implies, this structure is built in the shape of a clover leaf. The ground required for the same is about 150 ft. x 225 ft. It is

VIEW OF ONE OF THE FINE STRUCTURES IN A PARK AT COLUMBUS, OHIO

AN ORDINARY CROWD AT A MERRY-GO-ROUND IN MEXICO

The slide is equipped with safety devices to prevent danger. The pavilion is designed in old colonial style and is about 35 ft. x 74 ft. deep. It covers entirely the loading and unloading platform, also the main entrance, ticket booth and manager's office. A 30-hp motor or steam engine is used to carry the handsomely carved and richly upholstered cars up to the top of the incline, from which point they run along on a hard maple track by gravity, smoothly and easily. From the highest point of the toboggan the cars wind their way around the clover-leaf figure, crossing and recrossing until they have made the trip three times, arriving at last under the brake-shed, where they are gradually brought to a stop. The ground covered by the second design, or racing toboggan slide, is 100 ft. wide by 250 ft. deep. This toboggan is built in the shape of an oval, and consists of a double track. It is a very exhilarating and most exciting ride from start to finish. Two cars are run parallel to each other in the same direction, one fast and the other slow (similar to racing horses), thereby adding greatly to the amusement of the occupants of the cars. The track is so constructed that the cars arrive at the terminal at the same



A HANDSOME GROUP OF PARK BUILDINGS AT CHESTNUT HILL, PHILADELPHIA. A ROLLER COASTER IS SHOWN IN THE BACKGROUND

claimed that it cannot be excelled as a profitable drawing-card. The structural lumber used is the very best long-leaf Georgia pine, and all joints are strongly bolted together.

time. The third design, or portable toboggan slide, is especially constructed for street railway parks, county fairs, carnivals, etc. The ground required for the structure is 60 ft. x 110 ft. All structural parts are connected by means of bolts and screws only, and it requires seven to eight hours to erect complete such a machine. Two railroad box cars are ample for transporting the whole structure, including six to seven toboggan cars. In other respects the construction is about the same as for permanent toboggan slides. A 15-hp motor, steam or gasoline engine is used to carry the cars to the top of the incline.

MINIATURE RAILWAYS

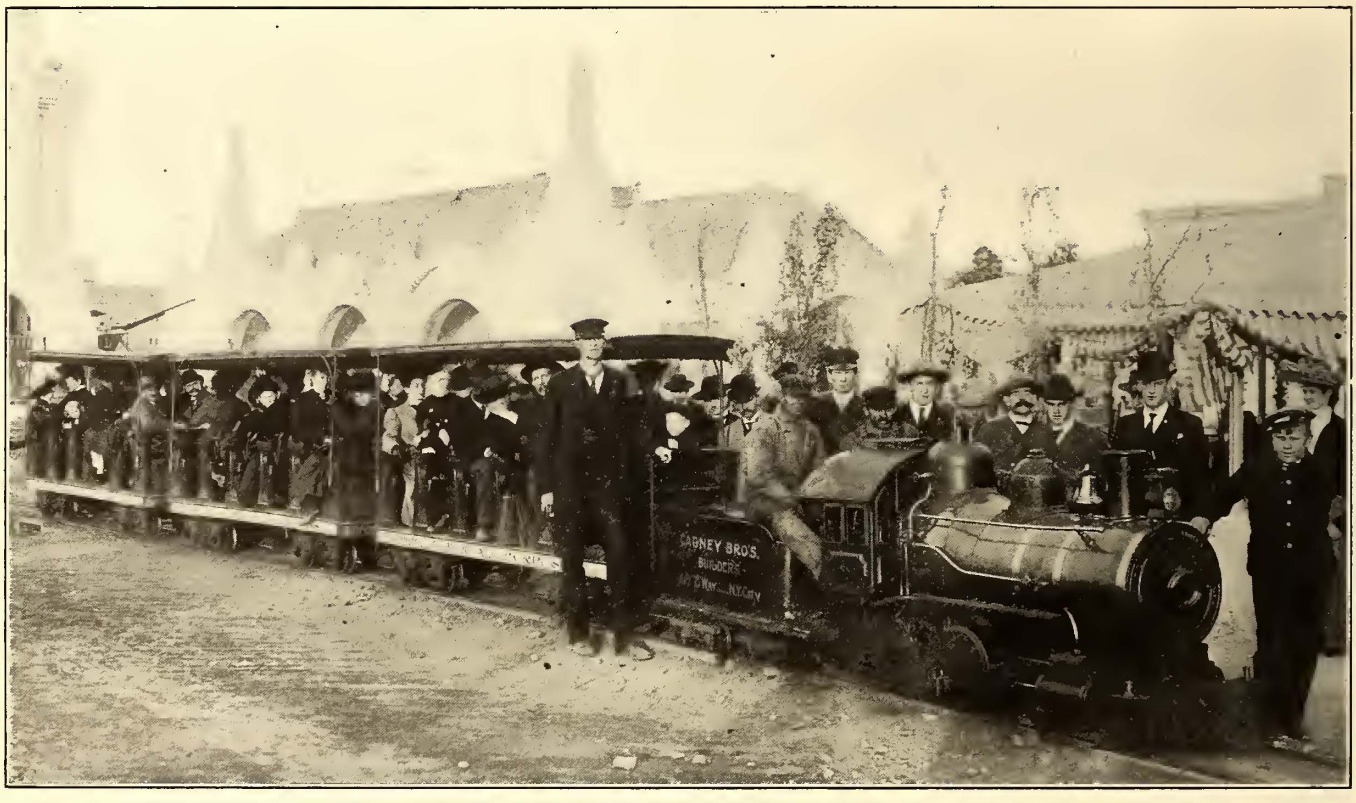
When an amusement feature has become so fixed in popularity as the miniature railway, it hardly seems necessary to go into any details regarding its construction. It suffices to state that it has been found a good money-maker in many parks where it serves not only for the gratification of the children, but also for the older folks who like to take a pleasant ride about the grounds. It has been found in quite a number of amusement resorts that additional attraction can be given to the miniature railway feature by the construction of tunnels, the placing of imitation boulders along the route, etc., the variety and amount of this kind of work depending, of course, on the character of the park land.

Cagney Brothers' Miniature Railroad Company, of New York, has long been favorably known for its manufactures in this branch of the amusement business. The rolling stock is usually built for either 15-in. or 22-in. gage, but can be made from 12⅝-in. gage to standard. The company is making its 15-in. gage equipment considerably heavier this year, and is also adding other improvements. That these little railways are thoroughly practical and safe, is demonstrated by the fact that they transported many thousands of passengers on the crowded Louisiana Exposition grounds without a single accident. More recently this company has supplied 22-in. railways to George C. Tilyou's "Steeplechase" parks at Bridgeport, Conn., and Coney Island, New York. Other orders are for Wichita, Kan., and such foreign points as Valparaiso and Havana. It is reported that the Brighton Beach Development Company, of New York, expects to install a miniature railroad from Brighton Beach to Manhattan Beach.

The Armitage-Herschell miniature railways (now controlled by the Herschell-Spillman Company, of North Tonawanda, N. Y.) are also widely used in pleasure parks in this and other countries. Every means has been taken to make them perfectly safe and enduring. In order to carry out this idea completely, the trains are equipped with air brakes which keep them under control at all times, and increase the life of the locomotives by eliminating the necessity of reversing. A large number of this company's miniature railways are built for 15-in. gage, but when desired larger gages, such as 22-in. or 24-in., are employed.

THE CIRCLE SWING AND AIRSHIP

Among the new amusement devices operated in the various pleasure resorts of the country, none enjoys a wider popularity and gives greater satisfaction than the circle swing flying machines or "airships," as they are generally called. The chief attraction of these devices is the exhilarating and cooling effect produced upon the passenger by the rapid motion through the air without any sensation of dizziness. A very attractive type of this apparatus, which is illustrated herewith, is made by the Traver Circle Swing Company, of New York. It was first brought out in the season of 1903, and since that time 68 have been built in many of the principal resorts of the country. No other large device has been placed in the principal resorts of the country so rapidly. The cars are suspended from strongly-supported arms at the top of the tower by ½-in. steel cables. These arms are attached to a solid steel shaft which runs to the base of the swing where the bottom of it is turned in a step-bearing, giving the greatest strength and safety to this all-steel structure. All of the steel parts of the plant are thoroughly galvan-

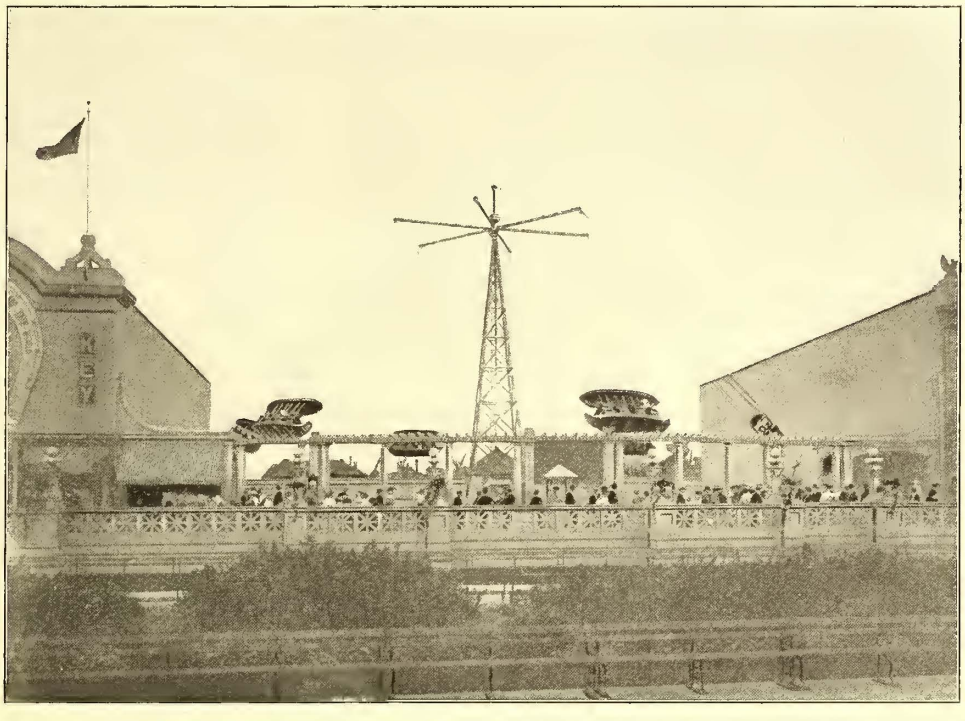


A MINIATURE RAILWAY IN ACTIVE SERVICE DURING THE LOUISIANA PURCHASE EXPOSITON

ized to prevent rust. The cars are built for four, six, eight or twelve persons. They are modeled after airships to complete the illusion of an airship ride produced by the flight through the air. The seats are made of rattan stiffened with iron and upholstered with reed work over a frame in which many springs are placed. It is stated that the ride is so smooth and easy, that when tested it was found that a pail full of water could be placed upon a seat and the cars run to the maximum height and brought back to the starting point without spilling a single drop of water. The operation of the swing is noiseless and unaccompanied by any vibration, since the cars are swung into the circle by centrifugal force. The cars start from the ground level and are gradually moved faster and faster, the radius of movement and the speed being increased until the cars have attained their greatest height, after which the power is slowly reduced and the car is gently lowered to the ground where the passengers alight. The speed regulation is secured by an electric controller. The erection of these plants is superintended by expert and trained engineers, who have become specialists in this work. The company has installed swings from Maine to California, and from the Lakes to the Gulf, some of which are located in the following places: Paragon Park, Nantasket Beach, Boston, Mass.; the White City, Chicago, Ill.; Elitch Garden, Denver, Col.; The Chutes, San Francisco, Cal.: Forest Park Highlands, St. Louis, Mo., and Paradise Park, Fort George, N. Y.

A novel design of circle swing has been invented by K. Richardson, of New York, who was an architect at the late expositions at Buffalo and St. Louis. Briefly described, the Richardson circle swing consists of a circular umbrella-shaped tower supporting the mechanism, motor and arms from which the cars or "airships" are suspended. When the swing is in operation the airships move off in widening circles, affording a most delightful ride to its passengers. The principal features of this swing, aside from its more artistic design, are that it costs 50 per cent less; that the stability of the structure is in no way affected when overloaded on one side; that the tower, being constructed of wood, may be erected by a local builder, thus saving the expense in shipping and erecting a steel structure; and that it can be built very quickly.

Mr. Richardson is ready to furnish to his clients the plans and specifications of tower and cars and motor and mechanism of his invention, and also supervise the installation of the same if desired.



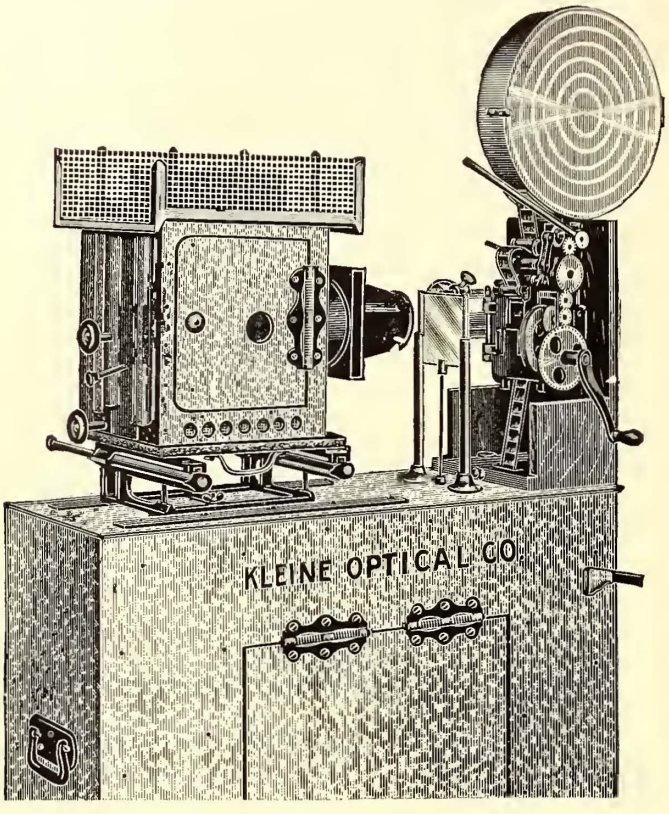
A CIRCLE SWING IN OPERATION AT THE "WHITE CITY," CHICAGO

MOTION PICTURES AND MOTION-PICTURE MACHINES

Moving pictures can be had in such interesting variety today that there is little reason to fear that they will not prove good money-makers where the management exercises proper care in selecting the subjects. In this matter it is well to co-operate with the film dealers, who can give the park manager the benefit of their experience with this form of amusement in many different localities. Among the leading firms in this line may be named Miles Brothers, of New York and San Francisco, who not only originate a large number of attractive moving picture subjects, but are also in position to furnish practically every interesting film made. Miles Brothers have a special department devoted to the requirements of summer parks, and are prepared to co-operate with the railway managements in every way to make the moving picture feature one that will surely prove an excellent attraction and a most satisfactory investment.

After a great deal of experimenting, the Kleine Optical Company, of Chicago, has finally evolved a fireproof motion picture machine, which has not only passed the official Chicago inspection, but has met with the enthusiastic approval of exhibitors to whom the model has been shown. The various features embodied in this machine are intended to make it thoroughly practical as well as fireproof. Theaters operating in places which do not require precautions against fire will find this instrument a profitable investment, if for no other reason than that it saves films in case of accident, and may prevent panics. Among its points of merit are: A lamp-house entirely enclosed at all times, yet admitting all necessary adjustments of the lamp; equipped with wire netting and gauze according to city requirements. An electric lamp whose carbon-holders grip the carbons at all points, making perfect contact and holding carbons rigid. A lamp-house base which is absolutely impervious to heat. A heat shield between the lamp and the film, which is lowered by means of a treadle; when the operator removes his foot the shield returns automatically into place. An upper reel-box made of aluminum into which the flame cannot pass, if from any cause the film catches fire. A receiving box into which the exposed film passes. At the opening is a trap-door which is closed instantaneously by the operator in case of danger. There are four stout 7/8-in. steel supports, separately adjustable for inequalities in the floor, to support the complete machine. The moving picture mechanism, lamp-house, etc., are placed upon a heavy aluminum bed-plate which rests upon the receiving film box. The lamp-house slides to the right and left for stereopticon adjustment. The crank which actuates the motion picture mechanism is fastened with screws and cannot slip off while in use. The motion picture mech-

anism is the Edison exhibition model, equipped with special long, short or medium distance lenses, for stereopticon and moving pictures, as may be selected, but other mechanism can be used. The receiving film box is stoutly braced; the entire machine is strong, and will run without vibration.



FIREPROOF MOTION PICTURE MACHINE

Every machine bears the official approval stamp of the department of electricity of the city of Chicago.

LAUGHING GALLERIES

The J. M. Naughton Amusement Construction Company, of Columbus, Ohio, is handling the lastest types of comic glass mirrors as well as composition metal ones, which answer the same purpose. The laughing gallery has been a special study with this company, and it can offer some original ideas for installing and operating this attraction, furnishing construction drawings, ornamental designs, etc. One

FRONT VIEW OF THE "FUN FACTORY"

of the latest amusement houses devised by this company is the "Fun Factory," shown in the view herewith.

PARK MUSIC

For several years past Frank Willard Kimball, of San Francisco, has conducted a saxophone band which is declared to be the only organization of its kind in existence. The manager has labored for several years in preparing an extensive concert repertoire for the band, and the highest grade overtures, standard and operatic selections, etc., are readily played the same as in the large concert military bands and string orchestras. Some musical critics regard Mr. Kimball's success in this line as phenomenal, inasmuch as compositions of the character referred to have heretofore been considered out of the line of being effectively adapted or arranged for a small combination of instruments. Mr. Kimball's organization is composed of seven artists, and the organization is not only unique and a great musical novelty before the public, but the music produced is strikingly captivating and inspiring, for the saxophone voice fills a never-before-occupied place in the realm of tonal color, supplanting the somewhat disagreeable harshness of the brass instruments found in both orchestras and military bands. The organization is said to be one of the strongest musical attractions to-day in either America or Europe, and easily takes its place as the headliner on many programmes.

ELECTRIC SIGNS

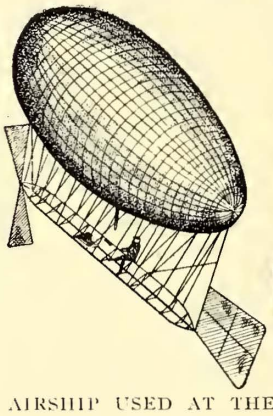
One of the invaluable accessories to an amusement park is the electric sign, for it indicates at a single glance the character of the individual resort and its attractions. When properly planned, such signs add very materially to the cheer-

A TYPICAL CAFE SIGN

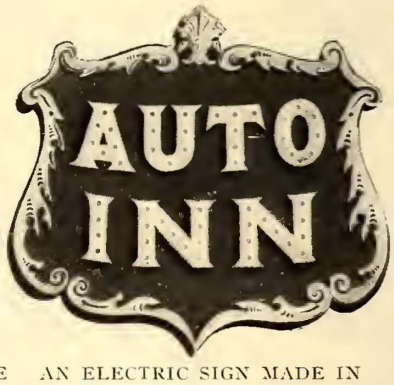
fulness of a park as well as to its illumination. A couple of neat and inexpensive styles of these electrical signs are those reproduced herewith, which were made by the Haller Machine Company, of Chicago.

AERIAL NAVIGATION

After years of effort by hundreds of inventors to make a dirigible airship, a few types have been developed which bid fair to make aerial navigation possible. It goes without saying that airships have such a strong hold on the curiosity



AIRSHIP USED AT THE WHITE CITY, CHICAGO



AN ELECTRIC SIGN MADE IN SHIELD FORM

of the public that enormous crowds will be attracted whenever an airship flight is announced. In this connection, the exploits of Roy Knabenshue have become well known all over the country, particularly on account of his flights in Toledo, and later in Chicago and New York. Mr. Knabenshue is now with the U. S. Aerial Amusement Company, of Chicago, which is prepared to arrange for airship ascension from railway parks in any part of the country.

TWIN CITY RAPID TRANSIT COMPANY CREATES A DEPARTMENT FOR THE ENCOURAGEMENT OF EXCURSION TRAFFIC

A systematic effort is to be made by the Twin City Rapid Transit Company, operating in Minneapolis and St. Paul, and between those cities, to bring to the attention of the residents of that territory and also to visitors, the natural splendors available by means of the company's lines. In order to do this, a new department of the company has been created, to be known as the traffic department, in charge of which has been placed A. W. Warnock. The company's lines from Stillwater to Minnetonka abound with beautiful scenic waterways and resorts, and here is the beautiful view from Fort Snelling bridge, picturesque Minnehaha glen, pretty Como Park, Calhoun, Harriet and White Bear Lakes. And then there are rides from Stillwater to Lake Minnetonka. With a fleet of nine swift steamers on Minnetonka, the company will soon be in a position with its rail and lake lines to attract all the summer cottagers and make all-year-round cottagers of them, and will appeal most strongly to parties whether large or small to visit "the big lake" and enjoy its beauties. The company will makes its plans so attractive that Sunday Schools, lodges, societies and private parties will consider it an opportunity to make use of the lines. Chartered cars are to be popularized, and tours are to be arranged for parties which woud enjoy traveling exclusively, and yet economically.

APPLEYARD LINES SOLD

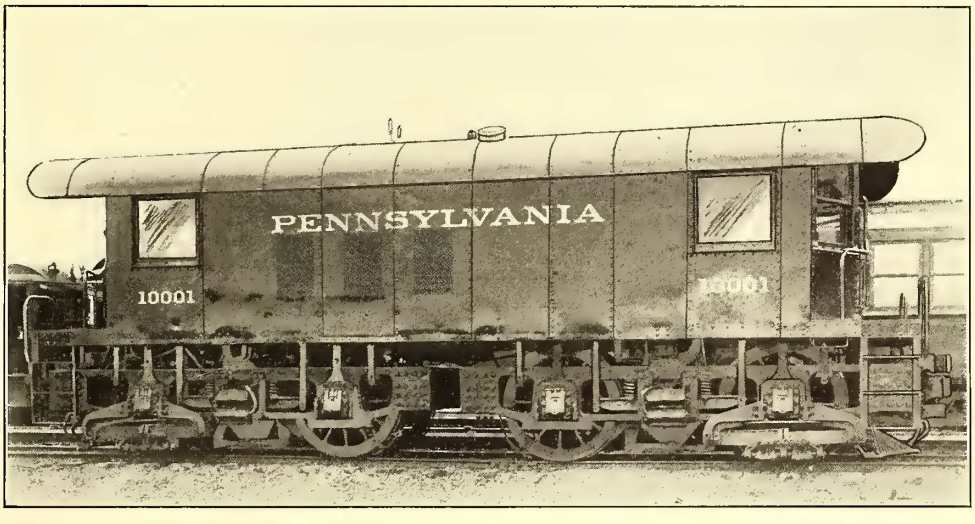
Two of the lines of the Appleyard system were sold at receiver's sale at Springfield, Ohio, Monday, Feb. 19. J. E. Locke, of Boston, representing the reorganization committee of bondholders, purchased both for the so-called Widener-Elkins syndicate, of Boston, paying $600,000 for the Dayton, Springfield & Urbana Railway, and $250,000 for the Columbus, London & Springfield Railway. These roads will be improved, and will form part of a through system across Ohio and Indiana. It had been intimated that there would be considerable competition in these sales, but the only other bidder on the Dayton, Springfield & Urbana was Graft Kennedy, who represented the stockholders. The Widener-Elkins interests also bought the lease of the Springfield & Western Railway, which is operated by the Dayton, Springfield & Urbana. Mr. Locke bought Tecumseh Park, on the line of the Dayton, Springfield & Urbana, for $2,000. About fifteen prominent traction men attended the sale.

MAYOR JOHNSON OPENS NEGOTIATIONS FOR CLEVELAND PROPERTY

Mayor Tom L. Johnson, of Cleveland, has reopened negotiations with the Cleveland Electric Railway Company looking to the sale of that company's property to a holding company to be controlled by the municipality. This scheme was broached some time ago, and was outlined in detail in this paper at that time. Without consenting to accept the proposition, Horace Andrews, president of the company, has agreed that Secretary Davies, representing the company, and E. W. Bemis, Mayor Johnson's expert, shall compile figures showing the earnings and operating expenses of the company and the probable increase in gross earnings, as a basis upon which to determine the purchase value of the property. Mayor Johnson is said to have intimated to Mr. Andrews that he had given up his 3-cent fare ideas and that he would not favor granting any extension of franchises to the company under any fare agreement or reduction from the present charge. Thus far he has been unable to induce the Legislature to legalize municipal ownership of street railway properties, and the scheme of a holding company is the nearest he can come to it. It would appear from this that the long investigation which the Chamber of Commerce has been conducting with a view to settling the franchise question is likely to come to naught as long as Mayor Johnson remains in office.

LONG ISLAND ELECTRIC LOCOMOTIVE

The "Brooklyn Eagle" recently published the accompanying engraving of one of the two electric locomotives recently delivered by the Westinghouse Electric & Manufacturing Company to the Long Island Railroad, and which are now at the Morris Park shops. As will be seen, the locomotive body is mounted on two swivel trucks and is equipped with third-rail shoes. No electrical details of the locomotive were published.



DIRECT-CURRENT ELECTRIC LOCOMOTIVE FOR THE LONG ISLAND RAILROAD

SERIOUS WRECK ON THE LINE OF WESTERN OHIO RAILWAY COMPANY

One of the famous Lima Limiteds on the line of the Western Ohio Railway was wrecked Monday, this week; one passenger was killed and four were injured. Newspaper reports intimate that the accident was occasioned by the failure of the train crew to properly flag the rear end after a stop had been made to make some slight repairs to the trolley. It is stated there was a heavy fog, which prevented the crew of a northbound express car from seeing the limited, and a rear-end collision occurred. Morrice Stein, assistant auditor of the Western Ohio, had his neck broken by the accident, and was killed instantly. This is the first accident that has occurred since the Lima Limited service was instituted two years ago.

TESTING BONDS BY SNOW

Apropos of the question as to the best method of testing rail bonds, Frank W. Rivers, supervisor of tracks for the West Penn Railway Company, of Connellsville, Pa., writes that from observations he has discovered that when the tracks are covered with a light fall of snow, the snow will melt away at all joints where the bonds are defective more quickly than at joints where bonds are good. Accordingly, after a light snow storm a man is sent over the tracks with a pail of paint, and wherever a bad bond is shown by the melting of the snow, the joint is marked with paint and the track gang starts out immediately to replace the defective bonds. Some managers may have wondered at what possible use a snow storm ever was, and to what service it could be put, but the suggestion made by Mr. Rivers may perhaps point out one useful purpose in the street railway business to which snow can be applied after all.

MEETING OF EXECUTIVE COMMITTEES OF ENGINEERING AND ACCOUNTANTS' ASSOCIATIONS

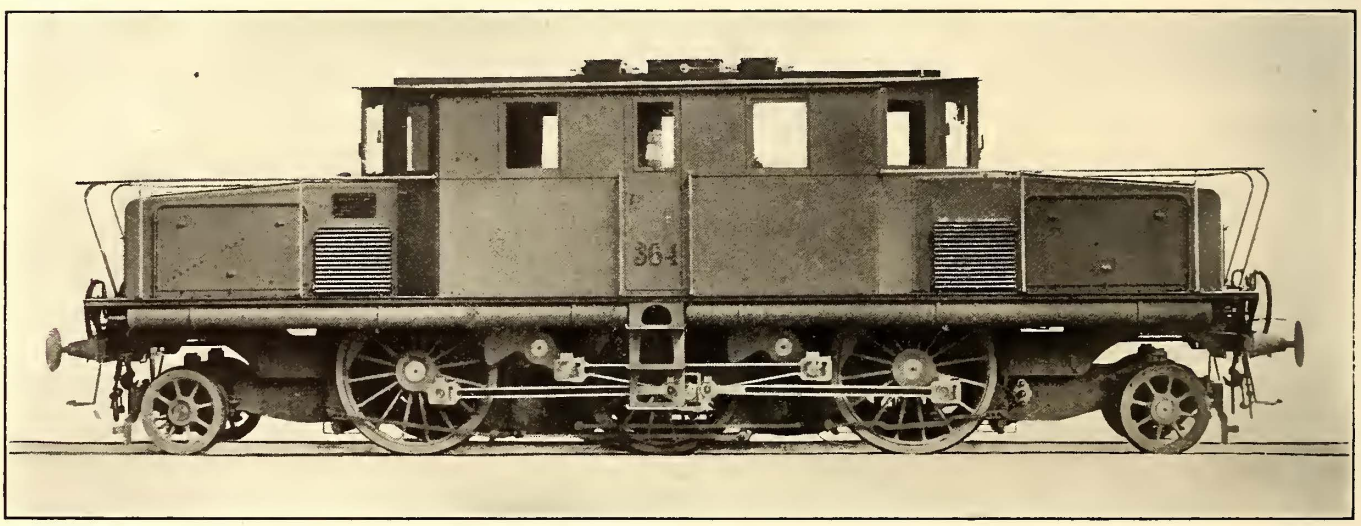
Meetings were held on Feb. 19 of the executive committees of the American Street and Interurban Railway Engineering Association and of the American Street and Interurban Railway Accountants' Association.

The former was held at the Manhattan Hotel, New York, and the following were present: Messrs. Adams, of Baltimore; Simons, of Milwaukee; Doyle, of New York; Winsor, of Boston; Twining, of Philadelphia; Bushnell, of Providence; Reed, of New York, and Mower, of Detroit. The meetings were devoted principally to drafting the new constitutions as required by the resolution adopted at the Philadelphia convention, so as to harmonize with the general plan of reorganization. A tentative form of constitution was adopted and will be submitted to the special committee, which consists of Messrs. Brockway, Adams and Swenson, and which was appointed by the American Street and Interurban Railway Association to pass upon it. At the conclusion of the work of revising the constitution, President Adams appointed the member of the association to represent the Railway Engineering Association on the committee on "Subjects" of the main association. An informal discussion followed upon topics to be discussed at the next convention.

The meeting of the executive committee of the American Street and Interurban Railway Accountants' Association was held in Mr. Brockway's office in New York. There were present Messrs. Brockway, of New York; Young, of Newark; Wallis, of Fitchburg; White, of Birmingham, and Tingley, of Philadelphia. The resignation from the executive committee of Mr. Pardee was announced, and E. F. J. Gaynor, auditor of the Interborough Rapid Transit Company, of New York, was appointed to fill the vacancy. The form of constitution was decided upon. In this constitution no provision is made for associate members, and the only active members are the member companies of the American Street and Interurban Railway Association. A programme of papers was also drawn up, and it was decided to have a question box this year, the same as last year.

THREE-PHASE LOCOMOTIVE FOR THE SIMPLON TUNNEL

The decision of the Swiss and Italian governments to equip the Simplon tunnel with three-phase traction has already been announced in these columns, and the accompanying engraving shows one of the locomotives built for this service by Brown, Boveri & Co., of Baden, Switzerland. The locomotives are equipped with two gearless motors, whose shafts are connected to the driving wheels by connecting-rods. Each motor is designed for two speeds, viz., 34 and 68 km per hour. The drawbar pull at the lower speed is 6 tons and at the higher speed is 3½ tons. The total weight of the locomotive is 62 tons and the weight on the driving wheels is given as approximately 42 tons.



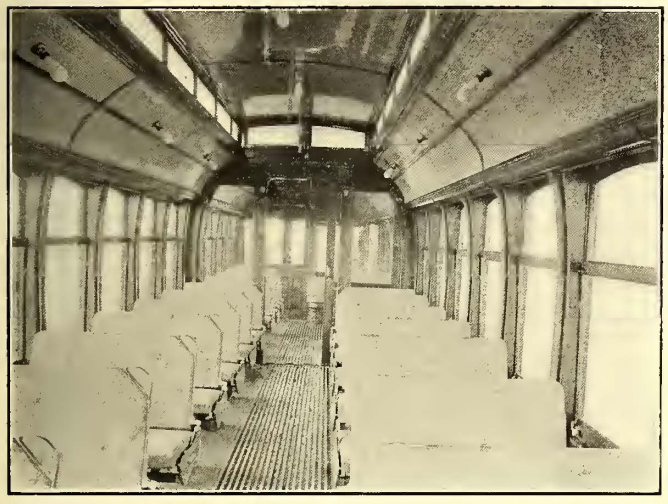
ONE OF THE THREE-PHASE GEARLESS-MOTOR LOCOMOTIVES BUILT FOR OPERATION THROUGH THE SIMPLON TUNNEL

The electric locomotives will haul a train between Brigue and Iselle, a distance of about 20 km. The steepest grade is 1 per cent. The passenger trains will weigh 365 metric tons and the freight trains 465 metric tons. Current will be generated at 3300 volts and 15 cycles, and trolley wires will be used in the tunnel supported on span wires 25 meters apart.

An order has been posted on the bulletin board at the Augusta Railway & Electric Company's office to the conductors, giving them orders to allow negro nurses, accompaniel by white children to use any seat in the cars. It has been a rule in the past to allow the negroes the three rear seats in the cars, but when they have a white child with them it was thought best by the road to let them occupy the front seats. Shortly after a riot occurred on the cars several years ago, there was an order issued requiring all negroes to use the three rear seats. In South Carolina a railway is fined $100 if a conductor allows a negro to use any other seats.

SEMI-CONVERTIBLE CARS FOR THE CENTRAL KENTUCKY TRACTION COMPANY

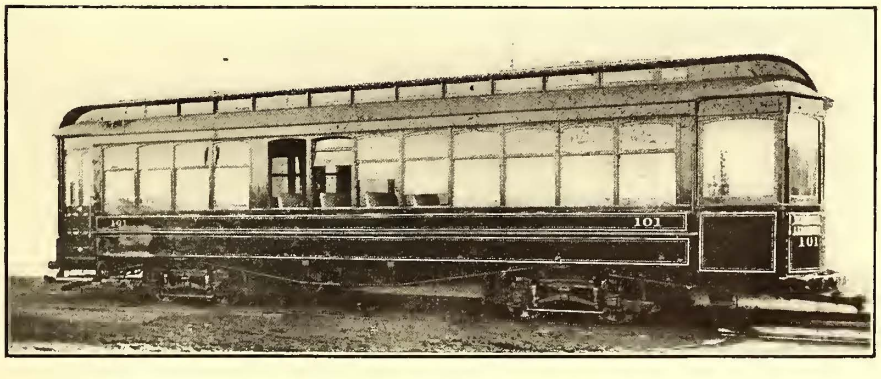
The Central Kentucky Traction Company, which is connected with the Lexington Railway Company, has lately placed on its lines a number of semi-convertible cars of the Brill grooveless-post type, built by the American Car Company. Each car is divided into two compartments by a hardwood partition with glass in the upper part of the sliding door and sides. One compartment seats thirty-three passengers and is for white people, and the other seats seventeen and is for the use of the colored people. Both compartments are finished in the same manner, the woodwork being of cherry



INTERIOR VIEW OF LEXINGTON CAR, SHOWING SEATING AND LIGHTING ARRANGEMENT

and the ceiling of birch veneer, decorated. The lights are placed singly in the dome and upon the side lining and have frosted-glass bulbs. The vestibules have doors at one side only, and as the entrances are at opposite sides of the car, it is intended that passengers shall enter and leave at the rear end. At the body ends the doors are set to one side close to the platform entrance, so that the platform affords considerable standing room without the danger of obstructing the movement of passengers in and out of the car.

The seats are all of the push-over back type with the exception of those against the body ends, which have stationary backs and accommodate three passengers each. The seats are 36-in. long, upholstered in spring cane and are of Brill manufacture. Gates are provided at the entrances for use during warm weather. All of the sashes in the vestibules are arranged to drop into pockets, and the sashes in the car body are raised into pockets in the side roof when not in use. Several sash lock stops are provided to hold the windows open at any desired height. The bottom framing is of the usual substantial form employed in this type of car, and includes 12 ins. x 3/8 in. steel sill plates on the inside of the side sills, to which the base of the posts is secured. Under-truss rods are also used, as may be seen in the illustration. The cars measure 34 ft. 4 ins. over the end panels, and 44 ft. 4 ins. over the vestibules. The compartment for colored people is 11 ft. 10 ins. long; width over the sills, including panels, 8 ft. 2½ ins., and over the posts at belt, 8 ft. 6 ins.; distance between the centers of the posts, 2 ft. 8 ins.; height from the floor to the ceiling, 8 ft. 5⅞ ins.; height from the track to the under-side of the sill, 2 ft. 9 ins., and from the under-side of the sills over the trolley-board, 9 ft. 6 ins. The treads of the platform steps are 17¾ ins. above the rails. The distance from the steps to the platforms is 14 ins., and from the platform to the car floor, 8 ins. The cars are mounted on No. 27-G-1 trucks, with 4 ft. 6 in. wheel base, 33-in. wheels and 4½ in. axles. Four motors are used per car of 40-hp each. The weight of a car and trucks without motors, is 28,000 lbs.



GROOVELESS POST SEMI-CONVERTIBLE CAR FOR THE CENTRAL KENTUCKY TRACTION COMPANY, LEXINGTON, KY.

TWO NEW FARE REGISTERS

The Recording Fare Register Company, of New Haven, Conn., is just placing on the market two new types of registers, whose general appearance is shown in the accompanying cut. The principal features are simplicity in construc-

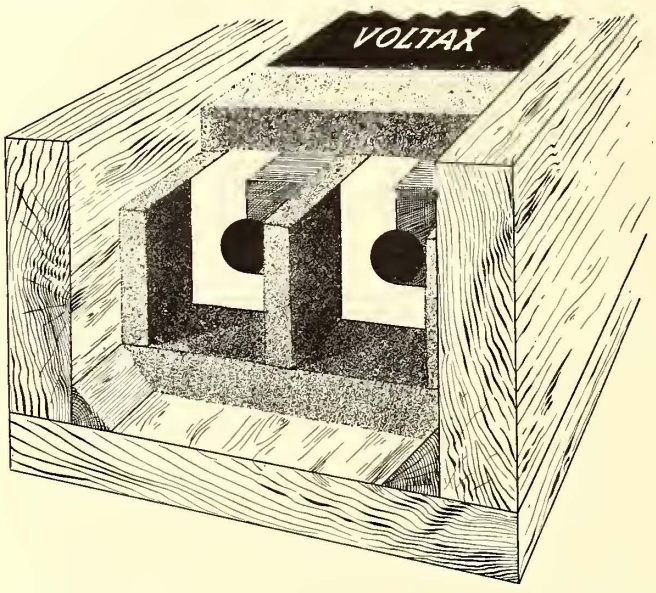
NEW TYPE OF FARE REGISTER

tion, few springs, practically no small parts, very large figures for both the trip and the totalizer, and ease of operation.

The registers are of the round pattern, eleven inches in diameter, and will be known as Types F and G. Type F is non-recording, while Type G is a recording machine. During the operation of resetting the trip register a record is made of the totalizer reading. The standard types of the recording fare register give a record of the actual number of fares registered on each half trip, while Type G records only the total statement at the end of each half trip. Both of the new types are full geared machines, with very large totalizer figures and extra large trip figures.

A NOVEL UNDERGROUND TRANSMISSION SYSTEM

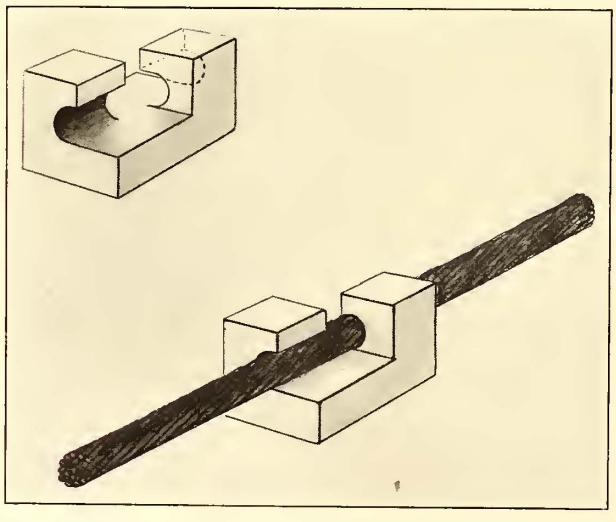
The Electric Cable Company, of New York, whose Voltax insulating compound was described in detail in the Street Railway Journal of Feb. 10, is introducing to American electrical companies an improved form of the wooden conduit transmission system used to a considerable extent by electric railway and lighting corporations in Germany. Instead of employing asphalt for filling the space between the wires



A PERSPECTIVE VIEW OF THE TRANSMISSION SYSTEM, SHOWING LAYERS OF IMPREGNATED FELT SURROUNDING THE BRIDGE WORK, AND VOLTAX BACKING

or cables, this company uses felt or other suitable material impregnated with Voltax, a compound whose resistance has been found to be so high that no commercial voltage ever generated can break down the insulation between the cables laid in a conduit with which it is filled.

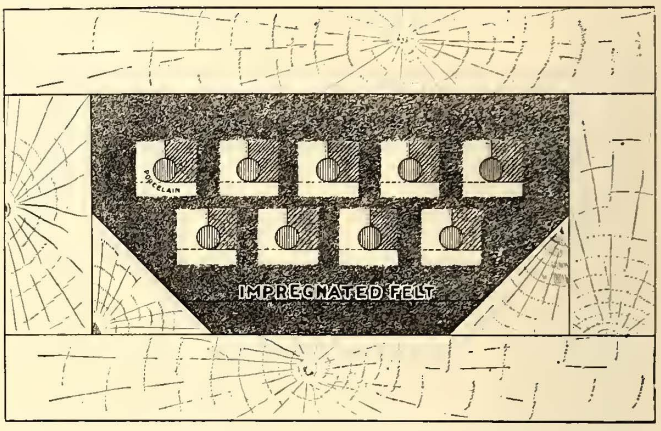
When it is desired to lay down either a high or low-ten-



FORM OF PORCELAIN BRIDGE USED FOR CARRYING CABLES

sion transmission system according to this system, a trench is dug about 18 ins. deep. In this trench a wooden trough is laid and porcelain bridgework placed therein for carrying the cables. These porcelain carriers, which are laid at intervals of 4 ft. or 5 ft., rest on and are enveloped by impregnated felt or similar material placed in the manner shown in the accompanying perspective sketch, the wires having been stretched and placed in position on this bridgework. The space between the bridge work is then filled with Voltax, which soon becomes solid.

As this material will neither harden nor crack, it is next to impossible to get a short circuit between the conductors. Once laid the entire system is so durable that it requires no expense for maintenance, as there is no danger from short circuits, and even the wodwork is preserved from decay by a complete outer covering of Voltax which, it may be recalled, is waterproof and chemically neutral. In case a connection is required at any time, the trench is opened at the point desired, then by opening the box and melting the compound with a plumber's blow torch, the connection can be made eas-



CROSS SECTION OF CONDUIT, SHOWING BRIDGEWORK SURROUNDED BY IMPREGNATED FELT

ily. After this the conduit may be restored to its former state of filling the box up at this point with a little of the compound mentioned.

The cost of installing feed wires or transmission cables in this manner ready for service is between 25 per cent and 33⅓ per cent less than for cables of like size laid on the duct system, and it is believed will show a far superior efficiency and reliability. In answer to the prejudice still existing among some engineers against a solid system of insulation on the ground that they are unable to increase the capacity as readily as in conduits where they can lay extra idle ducts, it is asserted that by wiping out the cost of the annual maintenance which has always been borne in duct system, a solid system embodying two or three dead wires will cost less to lay than ducts, and that the interest on these extra wires is appreciably less than the cost of annual maintenance and extra ducts. Aside from these considerations, this system by avoiding the use of lead-covered cables prevents all possibilities of attracting stray outside currents or the electrical troubles caused by the breakdown of the insulation wall between the wire and its metal sheath.

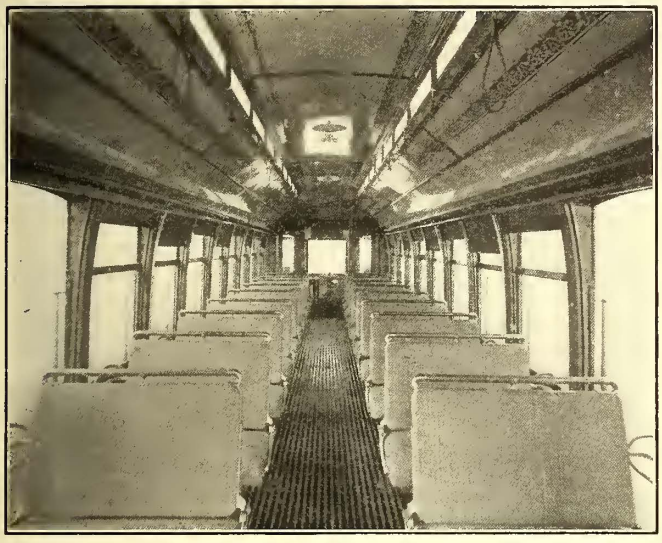
WELFARE WORK IN ST. LOUIS

Extensive preparations for the welfare of the employees of the United Railways Company have been made by Capt. Robert McCulloch, vice-president and general manager. Already a hospital is nearing completion. A club house is being planned, and a loan fund has been started. Employees can borrow from this loan fund without fee or interest to the entire amount of their indebtedness. They can then repay the loans in small installments. Employees of the road can become members of the hospital association by paying 50 cents a month. Two fifteen-room residences have been purchased and are being converted into modern hospitals. Men injured on duty, who are members of the association, will receive treatment free and $1.50 a day besides, while

they are unable to work. Men injured when not on duty will receive treatment and 50 cents a day. The hospital will be opened about April 1. The company recently purchased an old mansion, which is being fitted up as a club house, and will be accessible to all employees of the company. A brass band will be organized, and the members furnished with instruments and uniforms. A plot of ground will also be fenced in to be used for ball and other outdoor games.

CONVERTIBLE CARS FOR CHARLESTOWN, W. VA.

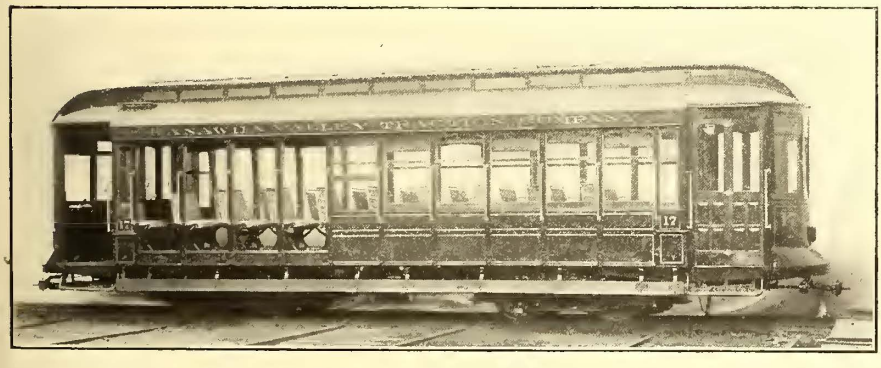
Four handsome, grooveless-post, convertible cars, like the one shown in the illustration, have lately been delivered to the Kanawha Valley Traction Company, of Charleston, W.



INTERIOR OF KANAWHA CAR, SHOWING STYLE OF SEATING

VIEW OF PART OF ONE SIDE OF THE KANAWHA CAR, ILLUSTRATING Z-BAR SILL CONSTRUCTION

Va., by the J. G. Brill Company, and six more of the same kind have been ordered. These cars are particularly interesting on account of the "Narragansett" type, double-step arrangement. This step arrangement is the same as used in the one-hundred convertible cars of the Brill type, built by the G. C. Kuhlman Car Company, for the Cleveland Electric Railway Company, and consists of Z-bar sills with the upper step on the outward extending lower flange of the bar.



CONVERTIBLE CAR FOR THE KANAWHA VALLEY TRACTION COMPANY, PARTLY OPEN

Corrugated malleable iron plates extend the step beyond the flange and give ample foothold for passengers. The illustration of a section of a side of the car gives a good idea of the arrangement. It will be seen that the sliding panels rest on the sill steps when lowered. The openings above the steps are covered by metal plates when the panels are down, and when the panels are raised into roof pockets, these cover plates fold against the back of the steps. One of these plates may be seen under the half-raised panel in the illustration lifted up to cover the opening. The reason for having the panels rest upon the sill steps is entirely for the sake of the better appearance of the exterior of the car, for if they are made to rest on top of the sills the open steps underneath leave a somewhat unfinished appearance.

The height of the running-boards from the rails is the same as the platform steps, 16½ ins., and the sill steps are on the same level with the platforms, the distance between running-boards and sill steps being 14½ ins., and from sill steps to the car floor, 8 ins. The arrangements permits the cars to be mounted on double-trucks having equal size wheels.

In addition to the grab handles, which are formed by the brackets between the backs of the seats and the posts, short grab handles are placed on the outsides of the posts. The guard rails slide on steel guides inside the posts. They may be seen in their raised position under the curtain-roller enclosure in the illustration of the interior of the car.

Cherry in the natural color constitutes the interior finish and the ceilings are of three-ply birch veneer, decorated. Brill seats are used which have push-over backs and wooden hand rails extending across the top of the seat backs. The length of the cars over the end panels is 28 ft. 4 ins., and over the vestibules, 38 ft. 4 ins.; width over the posts at the belts, 8 ft. 6¼ ins.; sweep of the posts 1½ ins.

The cars are mounted on No. 27-GE-1 trucks with solid forged-steel frames. The wheel base is 4 ft. 6 ins., the diameter of the wheels 33 ins., and the diameter of the axles 4½ ins.

FINANCIAL INTELLIGENCE

Wall Street, Feb. 20, 1906.

The Money Market

There have been no important changes in the monetary situation during the past week. The tone of the market has been a trifle easier, but this has been caused largely by the falling off in the demand for money, as a result of the liquidation in the stock market, rather than to any pressure of funds by the banks and other lenders. On the contrary, the larger lenders of money do not look for any material easing off in rates in the near future, and for that reason they are not disposed to offer with any degree of freedom except at the full asking rates. The usual spring outflow of funds to the interior is now under way, and the surplus reserves of the New York City banks are smaller than at any corresponding period in recent years. In addition to the contemplated bond issues referred to last week, several new issues have been announced during the current week, the most important of which are an increase of $16,267,400 in the common stock of the Chicago & Northwestern Railway, which will be offered to stockholders at par, and an increase in the capital stock of the Delaware & Hudson Company of $7,000,000, the proceeds of which will be used largely to reimburse the company's treasury for the money spent in acquiring a half interest in the Schenectady Railway Company, and to pay for the stock of the United Traction Company, of Albany, which was recently acquired by the Delaware & Hudson Company. A noteworthy feature of the week has been a sharp decline in the rates of sterling exchange, the price of prime demand bills ruling fully a cent on the pound sterling below those prevailing at the close of last week. This slump in exchange was the direct result of the free offerings of finance bills by foreign houses, the proceeds of which were made available for local market purposes, and which eliminates all possibilities of gold exports to Europe. Government finances continue to show improvement. Receipts are still in excess of disbursements, the surplus for the month of February to date being $1,515,774, as against a deficit of $1,857,951 in the corresponding period of 1905. For the fiscal year to date the deficit amounts to only $1,857,951, as against a deficit of $25,100,524 in the same period last year. The bank statement, published last Saturday, was considerably better than had been expected. Loans decreased $9,616,000, owing to the shifting of loans from local institutions to foreign bankers. Deposits decreased $12,317,800. The loss in cash amounted to $3,233,100, but as the reserve required was $3,079,450 less than in the previous week, the surplus was reduced by only $153,650. The surplus now stands at $5,789,925, as against $9,204,425 in 1905, $27,506,600 in 1904, $9,041,675 in 1903, $12,456,650 in 1902, $14,546,675 in 1901, and $24,015,675 in 1900. The foreign money markets have ruled quiet and without material change in rates for money or discounts.

In the local market call money has loaned at 5 per cent and 3 per cent, the average rate for the week being about 4¼ per cent. Time money ruled practically unchanged at 5½ per cent for sixty and ninety days, and 5¼ per cent for four and six months. Specialists in commercial paper report a rather free movement of choice material at 5 per cent on the minimum rate. Other grades are quoted at from 5¼ per cent to 6 per cent.

The Stock Market

There was a further decided unsettlement of the stock market during the past week, which resulted in carrying the average of prices to a somewhat lower level than had been reached for a considerable time past, although during the greater portion of the period speculation was comparatively inactive and there was an absence of demoralization, such as might have been expected in consideration of the great pessimism that was manifest on every hand. Some liquidation of long stock took place, but the volume of this selling was extremely limited in comparison with that indulged in on the part of the bears, who detected in the rather gloomy feeling prevailing an opportunity to make a "turn" on the short side of the account. The fact that many of the so-called "big men" of the street were about to absent themselves on their customary midwinter vacations was taken advantage of by the professional operators in question, as was also the prevailing uncertainty regarding the probable outcome of the railway rate regulation discussion now on in Congress and the doubts existing concerning the likelihood of a coal strike. But the chief influencing factor was the hardening tendency of the market for time money, which created more or less apprehension that before long rates for call loans would be advanced to a much higher level, with a consequent depressing effect upon security values in general. The usual February lull in stock market operations was likewise counted upon as likely to be the occasion of a downward tendency, and in consideration of this and the other foregoing facts, it is not surprising that the market sagged. As previously noted, however, there was very little genuine liquidation, and stocks put out by the shorts invariably found ready takers. This not only served to check the downward current of values, but before the end of the week brought about quite a substantial rally from the low level, and at the close speculative sentiment was somewhat more cheerful, though it was still the general opinion that the market would continue rather narrow and more or less professional until such time as the prevailing uncertainties are cleared up. London gave evidence of the confidence in our securities by becoming a considerable purchaser thereof. Other favorable developments of the week included a declining tendency in rates for foreign exchange, a declaration of a large stock dividend by the Northwestern Railway, the placing of the Union Pacific dividend on a 6 per cent basis, and the publication of some phenomenal reports of railroad earnings, all indicating the great prosperity of the railroad industry, and the present exceptionally mild winter gave promise not only of continued large earnings, but of a material reduction in operating expenses. Thus the shares of the railroad companies, as a rule, were quicker to rally from the previous depressed state than the general run of shares, although the industrial securities were likewise looking up at the close.

The shares of the local traction companies moved more or less in unison with the general list, that is to say, they were depressed in the early portion of the week, but toward the close manifested a distinct rallying tendency. This latter condition is accounted for in part by the announcement that opposition to the Interborough-Metropolitan merger had been withdrawn. The "open" winter was another consideration that made for a better feeling in all these stocks, while in the case of Brooklyn Rapid Transit estimates were furnished that the earnings for the fiscal year would amount to about $18,500,000, or $2,000,000 in excess of those for the previous year.

Philadelphia

The local traction issues have been fairly active and generally firm during the past week. Philadelphia Rapid Transit was about the only stock to display weakness, the price declining from 32½ to 31¼, on selling said to be for New York account. About 5500 shares were traded in. Otherwise price fluctuations were confined to unusually narrow limits. American Railways sold at 53¼, and Consolidated Traction of New Jersey brought 82½ and 82 for about 1000 shares. Philadelphia Traction sold at 101¼ and 101 for small amounts. Union Traction was dealt in to the extent of about 800 shares at 63½, and an odd lot brought 63¾. The offer of the United Railway Investment Company, of San Francisco, for the purchase of a controlling interest in the Philadelphia company, was announced during the week, but the publication of the terms had no influence upon prices of the stocks of the latter company. Upwards of 10,000 shares of the common changed hands, at 53¼ to 52⅞ and back to 53, while small amounts of the preferred stock brought 49⅝ and 50. Other transactions included Railways General at 7 and 7⅛, Rochester Railway & Light preferred at 103½, and Fairmount Park Transportation at 20.

Baltimore

The Baltimore market has been less active and irregular. Interest was again centered in the United Railway issues, nearly all of which sustained moderate reactions as a result of profit-taking sales. About 1500 shares of the free stock sold at from 18⅝ to 17½, a loss of a point, while a like amount of the pooled stock brought prices ranging from 19¼ to 18½, a decline of three-

fourths of a point. The free income bonds were fairly active, about $300,000 ehanging hands at from 74¼ to 73½. Of the deposited incomes only $41,000 were traded in, at from 73 to 72½. The 4 per cents were quiet but exceptionally strong, the price advancing to 94⅝, the highest price attained for a long time. Other transaetions included Baltimore Passenger 5s at 105½, $46,000 Norfolk Railway & Light 5s at 100½, Virginia Railway & Development 5s at 99, Maeon Railway & Light 5s at 100¼, Washington City & Suburban 5s at 105, Citizen's Railway & Light of Newport News at 88¼, and Knoxville 5s at 108½.

Other Traction Securities

The Chicago market has ruled quiet but firm. Metropolitan Elevated issues were exceptionally strong, 1200 shares of the common changing hands at from 27⅛ to 29, while 1500 shares of the preferred stocks brought prices ranging from 70 to 71¼. Chicago & Oak Park eommon advanced from 6½ to 7½, on the purehase ot about 500 shares. Northwest Elevated sold at 26. A small lot of South Side Elevated brought 95, and twenty-nine shares of West Chicago Street Railway sold at 45. The Boston market was quiet, and prices generally displayed a downward tendency. Massachusetts Electric common was the active feature, upwards of 2200 shares selling at from 20¾ to 19. Of the preferred several hundred shares brought 69 and 68. Other transactions were: Boston Elevated at 156 to 155, Boston & Suburban common from 27 to 25, the preferred from 75 to 74 and back to 74¾; Boston & Worcester preferred from 83¾ to 83, West End common from 99½ to 99, and the preferred at 114. Interborough Rapid Transit exhibited decided weakness in the New York eurb market. Opening at 232 it declined steadily to 227, the lowest price reached in weeks, and then rallied to and closed at 228. Upwards of 400 shares were dealt in. Interborough-Metropolitan common, when issued, was sympathetically weak, about 5000 shares selling at from 54¼ to 53. Of the new 4½ per cent bonds about $220,000 changed hands at prices ranging from 93¼ to 92½, and back to 92¾. American Light & Traction common sold at 122 and 124, and the preferred at from 102½ to 100. Other sales included 200 New Orleans Railway common at 38½, $35,000 Publie Service Corporation certificates at 75 and 75½, $20,000 Publie Serviee Corporation notes at 96 and interest, and $10,000 Jersey City, Hoboken & Paterson 4s at 76½.

Security Quotations

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

	Feb. 14	Feb. 20
American Railways	53¼	52
Boston Elevated	155	154¾
Brooklyn Rapid Transit	85	80⅛
Chicago City	190	190
Chicago Union Traction (common)	11½	12½
Chicago Union Traction (prefcrred)	42	44
Cleveland Electric	82	82
Consolidated Traction of New Jersey	81	81½
Detroit United	101	99
Interborough Rapid Transit	232	228½
Interborough-Metropolitan Co. (common), W. I.	53¾	53¼
Interborough-Mctropolitan Co. (preferred), W. I.	94½	90
Interborough-Metropolitan Co. 4½s, W. I.	93⅜	92½
International Traction (common)	38	38
International Traction (preferred), 4s	75	75
Manhattan Railway	160½	158½
Massachusetts Electric Cos. (common)	19	18½
Massachusetts Electric Cos. (preferred)	68½	67
Metropolitan Elevated, Chicago (common)	26	29
Metropolitan Elevated, Chicago (preferred)	69½	70½
Metropolitan Street	120¾	117¼
Metropolitan Securities	71	69⅜
New Orleans Railways (con.mon)	38	37
New Orleans Railways (preferred)	83	83½
New Orleans Railways, 4½s	—	90½
North American	102¾	100½
North Jersey Strcet Railway	—	25
Philadelphia Company (common)	52¾	52⅛
Philadelphia Rapid Transit	32⅝	31
Philadelphia Traction	101	101
Public Service Corporation 5 per cent notes	—	95½
Public Service Corporation certificates	—	74½
South Side Elevated (Chicago)	94	94½
Third Avenue	135	132
Twin City, Minneapolis (common)	118	116
Union Traction (Philadelphia)	63	63¼
West End (common)	99	99
West End (preferred)	113½	113½

W. I., when issued.

Iron and Steel

The iron and steel markets continue active and strong. The recent heavy purchases by the United States Steel Corporation has resulted in an advance in Bessemer of 25 cents a ton, and has also materially increased the demand and strengthened prices for foundry iron. The demand for structural steel is enormous, and it is estimated that between 400,000 and 500,000 tons of structural business is pending at the principal consuming eenters. The American Bridge Company will probably book 50,000 tons of new business during February, the orders already received exceeding the tonnage of January.

INTERNATIONAL COMPANY'S CAR HOUSES BURNED

The car houses of the International Railway Company, at Stamford Township, just outside of Niagara Falls, Ont., were destroyed by fire Feb. 12. In the car houses were stored the cars of the Niagara Park & River road, the summer cars of the International belt line, and also the cars in use on the belt line at the present time. These were all destroyed, as well as several snowplows of an up-to-date pattern, which had been purchased recently. The loss, estimated at $75,000, is fully covered by insurance.

EARNINGS OF THE NEW YORK CITY RAILWAY COMPANY

New York City Railway's statement for the Dec. 31 quarter compares as follows:

	1905	1904
Gross receipts	$4,453,875	$4,286,275
Operating expenses	2,471,462	2,354,407
Net earnings	$1,982,413	$1,931,868
Other income	313,956	318,731
Total	$2,296,369	$2,250,599
Fixed charges	2,812,000	2,791,543
Deficit	$515,631	$540,944

The general balance sheet of the New York City Railway Company, as of Dec. 31, 1905, compares as follows:

Assets—	1905	1904
Road and equipment	$5,106,883	$5,101,788
Stocks and bonds	8,657,877	8,613,332
Dividends accrued on stocks owned	13,893	13,893
Accrued interest	7,806	.....
Supplies on hand	352,202	339,824
Open accounts	10,105,771	10,550,640
Cash	220,300	158,493
Cash on deposit and pay coupons	1,387,911	1,070,650
Prepaid accounts, insurance, rent, etc.	477,013	326,455
Profit and loss, deficit	5,566,555	2,481,213
Total	$31,896,215	$28,656,288
Liabilities—		
Capital stock	$9,099,200	$8,459,200
N. Y. City Railway 10-year notes	1,460,000	660,000
Loans and bills payable	5,200,000	1,800,000
Interest due and accrued	45,666	1,000,131
Rentals due and accrued	1,778,158	1,740,647
Taxes due and accrued	1,093,218	931,121
Coupons due, not presented	1,387,911	106,185
Open accounts	1,399,568	2,598,270
Due for wages and supplies	1,072,196	973,267
Metropolitan Securities Company, due them under subscriptions	8,116,800	9,556,800
Reserves for controlled companies	1,243,495	820,667
Employees' deposits	.....	.....
Total	$31,896,215	$28,656,288

CHICAGO AROUSED OVER DALRYMPLE INTERVIEW

Chicago was thrown into great excitement a few days ago by the publication in the "Tribune" of that city of an interview with James Dalrymple, manager of the Glasgow municipal tramways, who came to Chicago last year on invitation of Mayor Dunne to look over the street railway system and advise as to the possibilities of municipalizing the lines. Mr. Dalrymple in this interview says that Chicago street railways are in wretched condition; that the companies have no inducements to spend money on betterments owing to their uncertain position; that the proposals made by the companies for municipalization are fair; that if the city insists upon taking over all the lines at once, $75,000,000 would be only a starter, and enormous sums would have to be spent for improvements; that Glasgow, under municipal ownership, does not operate street cars any cheaper per car-mile than do the private companies of Chicago.

Mr. Dalrymple considers that when Mayor Dunne, of Chicago, asked him to visit that city and to make to him a report of the condition of the Chicago street car system with reference to its proposed municipalization, he did so for the city of Chicago, and not for the Mayor individually. This view also was held by the corporation of the city of Glasgow when it approved of Mr. Dalrymple's coming to America to study the Chicago street car problem. The report that was made to the Mayor has been suppressed, and Mr. Dalrymple has had a number of letters from prominent citizens of Chicago asking for copies of his report. To these requests Mr. Dalrymple replied that he regarded his letter to Mayor Dunne as more or less private, but that if the municipality of Chicago formally asked him for a report covering the same points as mentioned in the Mayor's letter he would be glad to send on such a report. The Chicago municipality did pass such a resolution asking for this report, and Mr. Dalrymple placed the whole matter before his corporation, so that they would have the responsibility. The corporation considered the matter for some time, and finally sent a letter to Mayor Dunne stating that they considered that when they gave Mr. Dalrymple permission to go to Chicago he was acting for the city of Chicago, and not simply as a private guest of Mayor Dunne, otherwise he never would have thought of going. The corporation also asked Mayor Dunne to hand out Mr. Dalrymple's letter and submit it to the City Council, or let them have a substantial reason why it should not be made public, and are now waiting for a reply from the Mayor.

In the interview Mr. Dalrymple said:

"Ever since my visit to Chicago I have closely followed the Chicago tramways problem, and can only confirm the opinion expressed in my first report submitted to Mayor Dunne that the condition of the plant of the Chicago railways to-day, owing mainly to the disputes going on between the different companies and the city, is in a most wretched condition. The tracks are miserable, and the entire system in a dreadful state of disrepair. I do not consider that the plant, roadbeds, or tracks ever were substantial, but to-day they are worse than ever. The entire plant and rails are utterly worn out. Of course, there has been no inducement to spend money on bettering the systems, owing to the uncertain position of the companies with reference to the continuance of private operation.

"As to the municipalization of the Chicago tramways, I have in my letter to Mayor Dunne given my ideas as to the best and quickest way of bringing this about under present circumstances. Undoubtedly there are difficulties in the way of doing this, one of these being the long franchise owned by the companies.

"I have been following the course of events closely and have considered carefully all proposals made by the companies to the city with reference to the terms of purchase. In my opinion the suggestions made by the companies are fair and reasonable.

"Of course, I am not saying whether the municipality should extend the franchises or not, but if they were not in a mind to extend the franchises the proposal of the companies that the city should acquire the entire systems is fair on a basis of the municipality gradually getting charge of the different lines and systems at stated times. This would surmount the difficulties of the long franchises owned by the companies. Therefore, I can see no reason why the city should not acquire the roads if it really wants them.

"To take over the railways would cost a vast sum of money, but the greatest cost would come in putting the lines and the plant in repair. I understand that $75,000,000 is proposed for this purpose. Well, that sum would just be a starter. The roads are in such a terrible condition that enormous sums would have to be spent on them to bring them up to what I call efficiency.

"I might mention that our entire Glasgow system cost only $15,000,000, but, of course, the Chicago street railway system is ten times larger than Glasgow.

"As to the question of municipalization itself I can only say that it works well here in Glasgow, but that is because we operate the lines just the same as if we were a private company. We are not in the least influenced by questions of politics. Our main concern is to run the lines and make them beneficial to our citizens and efficiently operated, just the same as they would be by a well organized private company, with all the advantages of private management, irrespective of public control, political influence, or jobbery.

"Glasgow to-day has the best paying street railway system in the world. Everything in connection with our tramways, both in regard to revenue and expenditure, is done as in operation by a private company. Whatever surplus we make goes toward the improvement of the plant and car service, extension of the lines, and increased facilities. We put on two cars in place of one wherever we consider it will better the service, and our equipment and plant are kept up to the highest order of efficiency.

"Our cost of operation is not any cheaper per car-mile than the cost in Chicago, for, though our wages are lower, our operatives do not work such long hours, and our cars are not run so fast as in Chicago. If you don't run your cars so fast you don't get as much work done. Neither is our revenue per mile much different from the American tramway lines, but our fares to the man on the street are cheaper. We have a 1-cent fare, and fares are graded according to distance up to 10 cents. The revenue works out about the same as the American 5-cent fare with transfers, but we think the 1-cent fare, ranging up to 4 cents, suits the largest body of the community.

"One great difference is that our cars carry almost twice as many people as those of the Chicago system. Therefore we can give twice as many people seats. We have seats on top of all our cars, each car carrying twenty-four inside and thirty-six on top. We carry twice as many people per car-mile as Chicago, and all our people get seating accommodation. One-third of our population pays only a 1-cent fare, and our average fare is considerably less than 2 cents."

Mayor Dunne challenged the testimony of Mr. Dalrymple in a statement which he made to the press on the morning following the publication of the article in the "Tribune." He laid especial emphasis on his argument that Mr. Dalrymple's report to him was privately, and not municipally, owned, and then attacked the assertion of Mr. Dalrymple that $75,000,000 would be only a starter of the cost to Chicago if it should buy and run its street railway properties. He said he preferred the estimates of Mayor Tom Johnson, of Cleveland, to those of Mr. Dalrymple.

The Mayor's reply was submitted to Alderman Forman, who represents the majority in the committee on local transportation, for an expression of opinion. He ridiculed the position taken by the Mayor that the Dalrymple report was his private property, and then suggested that if the Mayor really believed that Mr. Dalrymple was wrong in his position, it would be well to take the public into his confidence and tell the people of Chicago what plan he really has in mind in his attempt to obtain control of the street railway properties.

THE OHIO TWO-CENT LAW

The Ohio Legislature has passed a measure requiring steam railroads to give a 2-cent passenger rate. The measure, which will become operative March 10, attracted a great deal of attention among traction men, who differ as to the effect it will have upon traction roads. By many it is believed that it will result in the closer affiliation of, and the interchange of business between, the the two systems. Steam roads have always objected to electrics because of their lower rates, but as the majority of electrics have recently worked up to the 2-cent rate this objection is removed. The general opinion seems to be that the steam roads will still further, under the new law, reduce the short hauls and the frequent stops, which have always been spoken of as expensive and unprofitable, and also discontinue Sunday and holiday excursions. If this be done much of this business will revert to the electrics. On the other hand, there are those who think the new law will hasten the electrification of the steam trunk lines for passenger service, at least, and result in the steam roads taking over certain of the electric lines for the short-haul traffic, leaving the main trunk lines for through passenger and freight.

CAPT. McCULLOCH ON TRANSIT A DECADE HENCE IN ST. LOUIS.

Capt. Robert McCulloch, vice-president and general manager of the United Railways Company, of St. Louis, in an address before the Missouri Historical Society, Friday evening, Feb. 16, said: "Underground railways for St. Louis ought to come within ten years. If the present rate of increase is maintained the million mark in population will have been reached in that time. Surface transit conditions will then demand improvement. There is such serious opposition to elevated railways that the underground system probably will be adopted to relieve surface congestion. The question has been discussed but only informally among our officials. During the year 1905 a total of 264,000,000 people rode on the street railways in St. Louis, or about 750,000 every day. This is more than four times the average of twenty years ago, when the city was half its present size. The habit of car-riding grows far more rapidly than the city itself, and overcrowded cars are already becoming unavoidable. Under its new management the United Railways Company is making preparations to improve its service immediately. Tracks will be laid with the ties imbedded in concrete 21 ins. thick, making the roadbed indestructible. Track construction will cost, approximately, $30,000 per mile. Ground is now being graded for the erection of a construction shop, where at least two cars a week, of the best known make, will be turned out until conditions are amply remedied. These cars will be of the latest and most commodious style."

Capt. McCulloch referred at length to the plans of the company in erecting club rooms and hospitals for the use of employees, the system of relief payments for absence enforced by injury, and other schemes adopted for the comfort and convenience of the men.

MERCHANTS' ASSOCIATION OF SAN FRANCISCO FAVORS OVERHEAD TROLLEY

The board of directors of the Merchants' Association, of San Francisco, has completed the poll of its members on the best method of improving the city's street railways. The poll was taken on the recommendations embodied in the report of William Barclay Parsons, who was retained by the association to report. Only 364 members voted, a disappointment to the board, as the number does not represent 25 per cent of the membership. The vote was on five propositions, as follows:

1. A uniform system of overhead trolley lines throughout the city, the railroad company to furnish a central line of ornamental trolley poles with lights between the tracks on Market and Sutter Streets. Yes, 121; no, 204.

2. An overhead trolley system throughout the city, except on Market Street. Yes, 67; no, 212.

3. Underground conduit system on Market Street and cable lines leading into Market Street in central downtown and adjacent residence district, remainder of the system to be overhead trolley. Yes, 198; no, 84.

4. What system do you favor for Sutter street: (*a*) Underground conduit, (*b*) overhead trolley with ornamental poles and lights, (*c*) and improved cable system?

	Conduit	Trolley	Cable
First choice.....	217	93	5
Second choice.....	42	83	62
Third choice.....	7	14	94

5. Do you favor changing the cable lines on Nob Hill to electric lines by tunneling the hill and constructing a winding driveway with parks on California Street? Yes, 158; no, 140.

In its report on the canvass the board says it originally favored the underground conduit system, and had intimated as much to Mr. Parsons, but that he reported in favor of the overhead trolley system. The report says further that the United Railroads was opposed to the underground conduit system, on the grounds that it increased complexity, introduced a third method, and that 98 per cent of all electric roads in this country used the overhead trolley. The report says that the board is informed by its attorney that there is no legal way by which the railroads can be compelled to install the underground system; that most of the franchises will not expire for twenty-three years, and if the roads so desire they can maintain the present system for that time; that only in the case of new franchises can the city dictate the system to be used. The board declares that immediate relief is needed; that strap-hangers are increasing in number; that the cities across the bay are growing at the expense of San Francisco; that it is no longer a question of overhead trolley or underground conduit, but of overhead trolley or cable, and that as a choice between the two it would be better to have an overhead trolley of the best system established on Market Street and throughout the city than to have the cables occupy the streets for the next twenty-three years. In its conclusion the board says:

We are convinced that it is for the best interest of San Francisco that the best system that can be had at the present time should be secured, and that it is the duty of the municipality to take all necessary steps to this end, without delay. Therefore, as the result of long deliberation, and after a thorough study of Mr. Parson's report and of all the conditions existing here, your board has unanimously reached the following conclusions:

1. That all cable lines, except those on steep grades, be abolished as soon as possible. Their slot-rails and underground construction should be completely removed from the streets, which should be left in the best possible order.

2. That as the overhead trolley appears to be the only possible system that can now be secured for lines with existing franchises, that system should be adopted generally upon certain definite terms.

3. That overhead trolley lines be installed as soon as possible on Market, Valencia, Castro to Twentieth, Haight, Hayes, McAllister, Sutter, Polk, Larkin, Ninth, Montgomery Avenue, Powell and Union Streets, under the following conditions:

(A) That on Market Street, from the ferries to Castro Street, a central line of ornamental poles, with electric lights, of the same design as those used in Cologne, Germany, be placed between the tracks, the lamps on said poles to be kept lighted every night, all night, by the railroad company, free of cost to the city, and that all feed wires be placed underground.

(B) That only acceptable ornamental side poles be used on all other streets where cable lines are changed to electric, and that all feed wires on these streets be placed underground.

(C) That the same kind of ornamental trolley poles be substituted for the present unsightly trolley poles on all other electric lines now existing within the district bounded as follows: Devisadero, Seventeenth, Guerrero, Twenty-Sixth, Folsom, Tenth, Brannan and the bay shore

(D) That the company maintain, free of cost to the city, ornamental arc lights, lighted every night and all night, on all poles on the following streets, on which the cable lines are changed to trolley: Valencia Street, Hayes, from Market to Fillmore; McAllister, Market to Fillmore; Sutter, Market to Polk; Post to Pacific Avenue; Larkin, Market to Post, Ninth, Market to Folsom; Montgomery Avenue, Washington to Union, and Powell, Market to Sutter.

(E) That all cars on the new electric lines substituted for cables be provided with air brakes.

(F) That the United Railroads shall, within twenty-four months, extend its electric lines into the following outlying districts, over routes to be determined by the Board of Supervisors, provided said board is willing to grant the company the necessary franchises:

1. Sunset district.
2. University Mound district.
3. South San Francisco, to the dry dock at Hunter's Point.
4. Golden Gate valley district (between Van Ness Avenue and the Presidio) and along the water front, from Broadway to Montgomery Avenue.

(G) That the horse-car line on California Street, from Montgomery Street to the ferries, be either abolished or changed into an electric line.

(H) That the horse-car lines from the ferries to Montgomery Avenue be abolished, and an electric line be substituted.

(I) That if the property owners on Pacific Avenue prefer a cable line to a trolley, improved cars be furnished, and that such cars connect with the Washington Street line and go to the ferries via that route.

STOCK GUARDS FOR PENNSYLVANIA ELECTRIC LINE

The Pennsylvania Railroad has placed an order for the cattle guards to be used on the new electrified division of the West Jersey & Seashore Railroad, between Camden, N. J., and Atlantic City, with the Climax Stock Guard Company, of Chicago. This contract calls also for their complete installation. These guards are of the clay type, and about thirty carloads will be required.

The Pennsylvania Railroad Company expects to have this line in operation by electricity on July 1.

ANNUAL MEETING OF CHICAGO CITY RAILWAY—CHANGES IN PERSONNEL—OPERATING FIGURES

At the annual meeting of the stockholders of the Chicago City Railway Company, held on Friday, Feb. 16, the policy of improvements of the present management was indorsed, sanction was given for carrying on important new work, and a number of changes were made in the personnel of the company. The directors were re-elected as follows: John A. Spoor, chairman; E. J. Earling, Robert M. Fair, T. E. Mitten, Edward Morris, P. A. Valentine and Lawrence A. Young. Mr. Spoor and Mr. Morris were made the executive committee of the board, Mr. Morris succeeding Mr. Valentine, whose business requires most of his time in New York. The officers elected are T. E. Mitten, president; Mason B. Starring, vice-president and general manager; J. B. Hogarth, secretary and auditor; J. P. Burke, treasurer. The retiring officers are Lawrence A. Young as vice-president; C. N. Duffy as secretary and auditor; T. C. Penington as treasurer. Mr. Penington was voted half-pay on retirement by the directors, in view of his long service with the company. Most important among the new work decided upon are the purchase of fifty new cars and the improvement of the company's plant at Vincennes Avenue and Seventy-Seventh Street.

The report of operations of the company for the year 1905, as submitted to the stockholders, showed net earnings of $1,679,473, a loss of $67,385, or 3.86 per cent. The loss was made notwithstanding an increase of $631,170 in gross earnings. Operating expenses, however, increased $720,486. The earnings on the stock were equal to 9.33 per cent on the outstanding capital of $18,000,000, which compares with earnings equal to 9.7 per cent last year. The gross earnings for the year were $7,322,080, an increase of $653,100.87, or 9.79 per cent. The local expenses were $5,642,606, an increase of $720,486, or 14.64 per cent. This increase is due principally to the additional number of cars operated, the additional expense incurred in improving the heating facilities and sanitary conditions of the cars, together with the increased amount necessarily charged to depreciation to cover the value of a number of the older cars, which have been retired from service and destroyed. Following are the figures of operation, with comparisons:

	1905	1904
Passenger receipts	$7,240,671	$6,609,501
Receipts from other sources	81,408	59,478
Total earnings	$7,322,080	$6,668,979
*Operating expenses and taxes	5,642,606	4,802,120
Net income	$1,679,473	$1,866,859
Depreciation	.....	120,000
Earnings on stock	$1,679,473	$1,746,859
Dividends	1,620,000	1,620,000
Surplus for year	$59,473	$126,859

* Includes depreciation charges for 1905.

Following the usual custom, the company issued no balance sheet. The percentage of expenses to gross earnings was 77.06, an increase of 3.25 per cent. Passenger receipts per day were $19,834, an increase of $1,778. With an increase of but 9.52 per cent in passengers paying fare, there was an increase of 13.09 per cent in passengers using transfers, over 60 per cent of the passengers paying fare having taken advantage of the transfer system, the average fare being but 8.10 cents per passenger carried. The operating statistics for the year follow:

PASSENGERS CARRIED	
Fare passengers (increase 9.52 per cent)	145,500,483
Transfer passengers (increase 13.09 per cent)	87,911,785
Fare and transfer passengers (increase 10.84 per cent)	233,412,268
Percentage of transfer to fare passengers	60.42
CAR EQUIPMENT	
Electric (53.90 per cent of total, increase 28.37 per cent)	905
Cable (45.68 per cent of total, decrease 2.66 per cent)	767
Horse (0.52 per cent of total)	7
All (increase 11.93 per cent)	1,679
MILES OF SINGLE TRACK	
Electric (84.14 per cent of total)	184.20
Cable (15.86 per cent of total)	34.75
All	219.14

President Mitten submitted the following report:

"After very careful investigation a large and commodious type of car, suitable for both summer and winter service, was decided upon, and 200 cars of this description purchased and placed in service.

"The 205 large electric cars now operated on Wentworth Avenue and Halsted Street are being rebuilt, rewired, equipped with modern electric heaters, repainted, and as nearly as possible brought up to the same standard of excellence as the new car. This work is being done as rapidly as shop facilities will permit.

"Two hundred and fifty of the better type of single-truck electric cars have been equipped with electric heaters, thoroughly overhauled and repainted, and are now in good operative condition.

"In order to meet the public demand for increased car service and also to heat the cars satisfactorily, a contract for the purchase of electric power from the Commonwealth Electric Company has been entered into. Sub-stations for the distribution of this power have been erected on this company's property at Twentieth and Dearborn Streets and on Wentworth Avenue near Sixty-Third Street. These sub-stations are of the most substantial character, and contain the most modern and economical electrical machinery, capable of transforming a maximum of approximately 15,000 hp, which amount should be sufficient to meet all demands prior to the electrification of the cable lines. Portions of the track on Twenty-Sixth Street, Sixty-Third Street and Forty-Seventh Street have been reconstructed, and new terminals established on Wentworth Avenue near Sixty-Third Street, and also at a point on Sixty-Third Street convenient to the White City. Material improvement in the fire risk at the several power houses and other buildings of the company has been effected, which has considerably decreased the possibility of loss by fire. These changes have also served to materially decrease the rate of insurance for the current year."

FREIGHT BY TROLLEY AND STEAMER FROM BOSTON TO NEW YORK

A rather peculiar and interesting feature of the pending negotiations of the Old Colony Street Railway Company, looking to the establishment of a freight and express business over its lines between the cities in southeastern Massachusetts, Providence, R. I., and Boston, is the possibility that this service will be extended to handle matter through from this territory to New York City by way of a steamboat connection through Long Island Sound. That such an outlet to New York is contemplated by the Old Colony Street Railway is virtually admitted by its effort recently to get a franchise for tracks in Fall River, connecting the company's existing trunk line in that city with the wharf of the Enterprise Transportation Company, a new company operating a line of steamers somewhat smaller in size than the big sound liners.

This connection will be the first attempted between steamboat and railway lines in Massachusetts for any considerable amount of mercantile traffic; but it is looked upon as likely to have a very interesting effect on the general freight business between Boston and New York, to say nothing of passenger business. It is not inconceivable that a considerable amount of the light freight between Boston, or at least the manufacturing cities of Taunton, Brockton and New Bedford, and New York might be deflected from the railroad and carried by way of the trolley route and the independent steamboat line.

It is barely possible that the Fall River grant to the Old Colony Street Railway Company may not get by the Railroad Commissioners without some considerable revision. It includes numerous restrictions or conditions, imposed on the company by the local authorities. These are not only in excess of the requirements imposed by Taunton and Brockton, but it is a question if they are not contrary to the policy approved by the Railroad Commission in other freight petitions so far approved. The Commission has in general been loth to approve any special conditions imposed by the local authorities, taking the ground that the companies should have equal chances in all communities without being hampered by special impositions not strictly related to the business of carrying freight. Some of the conditions in the Fall River grant now awaiting action by the Railroad Commission are that the freight cars shall make no stops on the public streets except where obliged to stop by other traffic; that cars shall not be run in pairs or trains; nor on Sundays except for through baggage; nor at any time except between 10 p. m. and 5 a. m., and that the company shall remove all snow, and shall be required to have its freight rights renewed after five years, and if it makes any traffic agreements with connecting roads shall make them for not more than one-year terms. Whether the State Board will allow all these to stand appears to be an open question.

COMPARATIVE COST OF ELECTRIFICATION OF TWO EUROPEAN RAILROADS

In the course of an address on the electrification of steam railroads, delivered recently before the Austrian Engineers' and Architects' Society, Baron Ferstel presented an interesting comparison of the relative costs per mile of electrically equipping the trunk lines of Sweden, as given by Mr. Dahlander, the engineer in charge of that project, and of a typical Austrian railroad operating in a mountainous country.

The State railroads of Sweden comprise two north and south lines with very few branches. This fact, taken in connection with the sparse traffic, presents a very unfavorable condition as regards the economy of electrification. Consequently, all of the changes must be made at the lowest possible cost. One favorable circumstance, however, is the availabilty of using water powers, which, in general, are quite near the main lines, so that expensive transmission systems can be avoided. To fill the power gaps which would be left by the seventeen hydro-electric plants totaling 80,000 hp, there will be five steam stations, giving a total of 22,000 hp. The fuel used for these stations is a Swedish turf, which has been found unavailable for locomotive use. The annual expenses for interest on the investment, maintenance and renewals of the transmission lines, hydro-electric and steam power stations, operating costs, wages, etc., are figured at $2,667,500, while the saving resulting from giving up the steam service is estimated at $2,182,500, leaving a yearly deficit of $485,000. On this basis the Swedish Government has consented to electrification in the belief that the present cost of coal (about $4.73 per ton) is an extraordinarily low one, for if the price of coal should advance only $1.45 (and at times it has been $3.05 higher than at present) electrical operation would be cheaper than steam. An increase in traffic would also involve less expense with electrical operation than with steam, as in the latter case the cost is proportional to the number of trains.

Baron Ferstel then presented an estimate which he had prepared for an existing 400-km line in the Austrian Alps. The line is single track, and has annually 9000-train-km, 2,000,000 gross ton-km, and 324,000-axle-km, against 170,000-axle-km on the Swedish railroads. The average grade of the 400-km line is 2.658.

The transmission line, including transformers, working conductor, feeders, etc., for single-phase service, would cost $8,487.50 per km. Electric locomotives (including repair facilities and reserve) for handling the traffic mentioned were placed at $7,275 per km. The cost per horse-power from the proposed hydro-electric stations would be $100.40, and as the total amount of power required was estimated at 75 hp per km, the cost of power generation will be $7,275 per mile of line. The total cost per km would then be $23,037.50.

Comparing these figures with those given by Mr. Dahlander (also for single-phase operation) the following differences will be noted: Cost per km for transmission system of Swedish line $3,637.50, and of Austrian $7,275; cost of Swedish electric locomotives per km of line $2,425, and of the Austrian $7,275. The installation cost of the Swedish power stations is not given, but according to the estimate covering interest on the investment, maintenance and operation, the charge per horse-power-year from the hydro-electric stations would be $11.64, while $14 would be the average cost for the combined hydro-electric and steam plants using turf for fuel. For the Austrian project the cost per horse-power-year from a water-power station would be only $8.58.

The great differences in the costs of the corresponding factors entering into these projects may be ascribed partly to the less traffic on the Swedish line, which reduces the locomotive cost per km, and partly to the fact that in the Swedish installation the hydro-electric and steam stations will be so located that no long and expensive transmission system will be required. In comparing the annual cost of power per km in Sweden the figures are $334.65, as against $643.84 in Austria. This is due to the denser traffic, which requires 75 hp per km in Austria, as against 24 hp per km in Sweden.

Assuming that under electrical operation the renewal, maintenance and labor cost will not be higher than with steam, then at a capitalization of $24,250 per km the interest charges of $927.50 per km should be less than the saving in coal to make the change commercially successful. The coal required to transport 1000 gross ton-km on level track is 63.8 kg, but on the proposed line, which has an average grade of 2.685 per cent, the coal consumption is 171.3 kg. This gives a consumption of 342.6 tons for the traffic of 2,000,000 gross tons per km. Coal delivered costs $4.31, and multiplied by the tons used (342.6) gives a total of $1,478.76 per km, whereas the interest on the total electrical investment per mile would be only $848.75, so that the difference in favor of electrification is about $630.50 per km. This saving would increase with denser traffic and higher coal, and decrease with lighter traffic and cheaper coal. The saving would be $242.50 greater if the war department did not require the steam locomotives to be held as a reserve.

Another, and practically the deciding, factor entering into this problem is that of the comparative costs. This amount depends upon whether one man per electric locomotive will be sufficient, as on the Valtellina line, or whether two men will be employed, as is done on certain of the English electrified railways. On the 400-km line under discussion there are in all 162 locomotive employees, whose wages are $47,142 per year, or $121.25 per km.

Baron Ferstel also pointed out that the cost for maintaining tunnels would be greatly reduced by eliminating locomotive gases, and the repairs of electric locomotives would be less than for steam. On the latter point it must be remembered that repairs to the weakest part of a steam locomotive, the boiler, put the entire machine out of commission, whereas the weakest part of an electric locomotive, the motors, can be repaired separately, and the machine put in service with new motors in an hour or two. When the maintenance cost of the generating and transmission systems are added, the difference in favor of electricity is not so overwhelming, but is still considerable if the Valtellina figures be accepted as a criterion. In discussing the 400-km line no attempt was made to place the electrical operating costs at a minimum, yet the estimated difference from the steam figures proved so small as to be negligible. Minor advantages, due to electrical operation, are the diminution in the number of firemen, reduction in shop expenses, lower cost for illumination, abolition of water and coaling depots, etc.

In conclusion, the speaker mentioned that about 3000 km of railways which pay high prices for coal are favorably situated for the utilization of water power. This condition has not been overlooked by the Austrian Government Railroad Commissioners, who are now making a detailed study of the situation, with a view toward electrification of some of the existing lines.

MICHIGAN PROPERTY FORMALLY TRANSFERRED

The St. Joseph River Traction Company, organized to build an electric railway from Benton Harbor to Niles, Dowagiac and Kalamazoo, has been consolidated with the Southern Michigan Light & Power Company, under the name of the Benton Harbor & St. Joseph Electric Railroad & Light Company. The capital of the new organization is $1,000,000. Col. W. W. Bean, former owner of the Benton Harbor & St. Joseph Street Railway & Lighting Company, has turned over the property to the new owners. James G. McMichael, vice-president of the merged companies, is also president of the Atlas Railway Supply Company, of Chicago. The other directors of the company are: F. M. Mills, of Benton Harbor; Charles Minary, of Springfield, Ill.; William Jarvis, of Louisville; Humphrey S. Gray. The officers are: Charles K. Minary, president; L. W. Botts, of Louisville, secretary; Frank M. Mills, of Benton Harbor, treasurer; Henry C. Mason, general manager, and H. S. Gray, of Benton Harbor, attorney. Among the important financial interests connected with the new company are: William Jarvis, of the Louisville Railway, of Louisville, Ky., and Mr. Botts, vice-president of the Columbia Finance & Trust Company, of Louisville.

The St. Joseph Company has purchased the rails for the extension of the line to Eau Claire, by the way of Fair Plain and Tabor's. The grading for this line is now completed, and it is expected that the road will be ready for operation to Fair Plain by April 1, and to Eau Claire by June 16. Besides the line to Eau Claire the company has in contemplation a road to Kalamazoo, the construction of which will probably be undertaken later in the season. Power is expected to be delivered from Buchanan this month. With its installation the rates for light and power will be reduced and better service will be given. Col. Bean, who retires from the company, will take a well-earned vacation. He came to Benton Harbor from Dayton, Ky., seventeen years ago, and bought the street railway line between Benton Harbor and St. Joseph, which he equipped with electricity.

The administration of the Ferro-Carril Urbano de Tampico, S. A. Tampico, Tamaulipas, Mexico, has determined to extend its lines outside of the city to Paso de Dona Cecillia y La Barra. This new road will be 10 kilos long, will be narrow-gauge, employ rails weighing 40 lbs. per yard, and will use steam.

THE CENTRAL ELECTRIC RAILWAY ASSOCIATION

As previously stated in the Street Railway Journal the Central Electric Railway Association, which is the consolidation of the Ohio Interurban Railway Association and the Indiana Electric Railway Association, will establish a permanent office in the Traction Terminal Building, Indianapolis, March 1. John H. Merrill, at present auditor of the Western Ohio Railway, will resign at that date to become permanent secretary of the organization. Before going with the Western Ohio Company, Mr. Merrill was manager of the Ohio Central Traction Company. He has been prominently identified with the Ohio Interurban Railway Association, having been one of its organizers and its first secretary. He is chairman of the transportation committee of the organization, and it was due almost entirely to his efforts that the interchangeable coupon plan of transportation was put through and adopted by more than thirty-five roads in Ohio, Michigan and Indiana. The duties of the new office will consist of compiling and promulgating operating data of value to the members, the handling of interchangeable transportation matters, working out through passenger and freight arrangements, the publication of time cards and folders, covering all the roads in the district, and general publicity work in the interests of traction lines. It was at first thought that the office would be located in Dayton, but Indianapolis was decided upon because of the interest in the movement being shown by some of the Western roads. In event of their joining Indianapolis would be the central point in the association territory. The next meeting of the association will be held in Indianapolis on March 22.

J. H. MERRILL

EVERETT-MOORE SYNDICATE NEGOTIATING FOR DETROIT, MONROE & TOLEDO SHORT LINE

Negotiations are said to be pending between the Everett-Moore syndicate, of Cleveland, which controls the Detroit United Railways of Detroit, and the owners of the Detroit, Monroe & Toledo Short Line, for the purchase of the latter property. The Detroit, Monroe & Toledo is one of the finest high-speed roads in the Central West. Shortly before its embarrassment the Everett-Moore syndicate acquired this property and the Detroit & Toledo Short Line, a steam road, the plan being to make a double track system between Detroit and Toledo. After the embarrassment both properties were sold, the Detroit, Monroe & Toledo Short Line reverting to Mathew Slush, Judge Riley and associates of Detroit. The members of the Cleveland syndicate were disappointed at being obliged to dispose of these properties on account of their plans for a through system, and it is known that they have long contemplated getting it back as soon as they were in position to do so. If the deal is put through the road will doubtless be merged with the Detroit United Railways, which controls all of the interurban roads out of Detroit except two.

STREET RAILWAY PATENTS

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

STREET RAILWAY PATENTS ISSUED FEB. 13, 1906

812,277. Turbine-Driven Locomotive; Hugo Lentz, Berlin, Germany. App. filed Aug. 16, 1905. Relates to novel means for mounting a turbine on a locomotive.

812,561. Overhead Line; Emile Giraud, Paris, France. App. filed Oct. 31, 1903. A hinged hanger which moves to ground the conductor or connect it to another circuit in case the conductor breaks.

812,571. Car Fender; John Landau, Jr., New York, N. Y. App. filed June 24, 1905. Comprises a lever frame fulcrumed on the car body, a basket removably connected with the lever frame, spring-pressed rods pivotally connected with the lever frame, and a manually-controlled device for imparting a swinging motion to the lever frame and basket to bring the forward end of the basket to the desired distance relative to the track.

812,581. Switch-Throwing Mechanism; Henry O. Marquis, Superior, Pa. App. filed Nov. 21, 1905. A casing mounted in the roadbed has recesses in its upper face, and eccentrics mounted in the casing adjacent to the recesses and adapted to protrude therein. Means on the car for engaging the eccentrics in the recesses to thereby throw the switch through suitable connections.

812,595. Amusement Apparatus; Otis Roberts, Winfield, Mass. App. filed Nov. 1. 1905. A spiral ascending trackway and a descending trackway in which are incorporated a "loop-the-loop" and a "loop-the-gap."

812,597. Railway Traffic Control System; William Rowe, Marrichville, N. S. W., Australia. App. filed Feb. 23, 1905. A block-signal system, including contact plates along the track, by means of which various semaphore signals are operated and telegraphic communication had with the various stations along the route under certain circumstances.

812,725. Surface Contact System; Frank E. Case, Schenectady, N. Y. App. filed July 22, 1904. An auxiliary generator operated by compressed air, together with such circuit connections that when the generator is set in operation and the controller is moved to its first position, current passes from the generator to the operating magnets of one or more pick-up switches, causing the switch or switches to be closed, completing the motor circuit for the main line, and cutting out the auxiliary generator.

812,781. Electrically Conductive Rail-Joint and Bond Therefor; Bancroft G. Braine, New York, N. Y. App. filed April 11, 1904. The rail splice-bar had a longitudinal groove therein, which has a convex bottom and undercut side walls.

812,790. Electric Railway System; William N. Haring, Nyack, N. Y. App. fied Oct. 31, 1903. Relates to an underground conduit system having a sectional conductor, the connections of which are spring-pressed upward. When the car passes they are depressed by the collector shoe and temporarily charged by contact with the potential source.

PERSONAL MENTION

MR. D. G. EDWARDS, of Cincinnati, who was appointed general traffic manager of the so-called Widener-Elkins interurban properties in Ohio and Indiana, has been elected vice-president and director of the Cincinnati Northern Traction Company.

MR. C. H. YOUNG, of Cleveland, has been appointed general passenger agent of the Lake Shore Electric Railway, succeeding Mr. F. W. Coen, who was recently elected treasurer as well as secretary of the company. Mr. Young is traveling passenger agent of the Rock Island Railroad, and he has had considerable experience in the passenger field.

MR. E. P. CLARK, heretofore president and general manager of the Los Angeles-Pacific Railroad Company, has assigned the duties of general management of the company to Mr. T. R. Gabel, general superintendent and traffic manager. Mr. Clark, who has been actively engaged in the management of the property for about ten years, will now confine his labors to the work of the chief executive of the company.

MR. C. NESBITT DUFFY has severed his connection with the Chicago City Railway Company as secretary and auditor. Mr. Duffy has an extended and varied experience in the street railway business. He was one of the organizers of the Street Railway Accountants' Association of America, was president of the Association in 1899-1900, and is chairman of the committee on standard classification of accounts and chairman of the committee on international form of report.

MR. T. C. PENINGTON retired as treasurer of the Chicago City Railway Company at the annual meeting held last week. Mr. Penington has been connected with that company and its constituents for thirty-three years. During that time he was advanced in the service of the company by assiduous application to work, combined with natural ability in the control and management of financial affairs. In 1895 he was elected secretary and treasurer of the American Street Railway Association, the duties of which office he performed until the reorganization of the association last year as the American Street & Interurban Railway Association. Mr. Penington became well known to all attendants at the different conventions when acting as secretary and treasurer of the American Street Railway Association where his genial ways made him popular with all. His plans for the future are undecided, but he expects to continue in business.