

that there is need of improvement in the systems of car wiring commonly used. Car bodies being necessarily built of combustible material, and the amount of heat generated by a short circuit in the car wiring before the circuit breaker is opened being large, there is always a chance for a blaze, unless the car wiring is in some way protected from the combustible part of the structure. It is not so easy to improve on present methods of car wiring as might at first be thought. It has been found by the underwriters that the most dangerous feature of electrical circuits is the possibility that arcs will form at places where wires may become broken, or in the establishment of an arc by dirt or moisture between two wires of different potential. The overheating of conductors by a short circuit is not considered a source of much danger, because the fuses will soon interrupt the current in case of a dead short circuit, but in the case of a formation of an arc there is no assurance that the fuses will blow. The same thing probably holds true in car wiring as in the wiring of buildings. The arc between two adjacent wires of different potential or between a wire and some grounded part of the car may not be interrupted quickly enough by the fuse or circuit breaker to prevent starting a fire. In most cases it would not, but it is the exceptional case that must be guarded against. Improvements in electric wiring the last few years have been along three distinct lines—namely, increase in mechanical strength of the conductors at points where they are especially subject to breakage, increase in the electrical strength of the insulation, and increase in mechanical protection to the insulation. It is along mechanical, rather than electrical, lines that most of the recent improvements have been made, as shown by the wiring rules. In other words, it has been found necessary not so much to increase the thickness or dielectric strength of the insulation as to insure the mechanical protection of what insulation the wire already has. Now, in wiring electric cars these general principles undoubtedly hold good as well as in the wiring of buildings. It is doubtful whether many improvements can be made as to mechanical strength of conductors at points where there is the greatest chance of breakage, as these weak points were recognized a number of years ago, and all car wiring is done in such a way as to keep the breakage of wires on account of jars and twists as low as possible. This has been done by the use of flexible leads where formerly solid conductors were used, and the use of devices at terminals and binding posts which will prevent an undue amount of strain being put on a conductor at one point. Whatever improvements are made in car wiring will probably have to be mainly in the way of increased mechanical protection for the insulation and the conductor it surrounds, and possibly in the use of iron conduit, which will tend to confine the troubles to the inside of an iron pipe.

The Pennsylvania Tunnel Franchise

The attitude of the Pennsylvania Railroad Company throughout its negotiations with the Rapid Transit Commission for permission to install a tunnel under Manhattan and thus connect Jersey City and Long Island, as well as secure improved terminal facilities in this city, has been marked by a liberality and progressiveness that are truly commendable. The essential features of the contract are described elsewhere in this issue. It will be seen that they provide for an annual expenditure for the first 10 years of \$1,961,535 to secure the improvements that have been decided upon. This includes a rental of \$75,535 for tunnel and street rights, and taxes aggregating \$468,000 on real estate. In addition to this there will be interest at 3½ per cent upon an investment of \$40,000,000, which will be required to complete these extensions, amounting to \$1,400,000 a year. At the expiration of 10 years the annual rental paid to the city for the tunnel and street rights will be increased \$39,336 for 15 years, and then the entire question of compensation to the city will come up again for readjustment. Both the city and the railroad company have every reason to be satisfied with the agreement. The city receives as a result of this arrangement a higher rate of compensation for the privileges extended to the Pennsylvania Company than it has ever

before obtained for any public franchise, and the company in return secures a contract in perpetuity which will insure it greatly increased traffic and improved terminal facilities in the metropolis. The railroad officials show their faith in the future of the city by their acceptance of these terms. It is a matter of gratification to find that the company and city officials are unanimous in the opinion that the only suitable motive power for the operation of trains in this tunnel is electricity, and that the Pennsylvania Company, acting on the advice of its engineers, has decided that the plan is entirely feasible. Instead of looking upon this innovation as an experiment, the railroad company welcomes the development of the electric system as the only practical solution of the difficult problems that arise in work of this kind. This position is unquestionably warranted by the advancement that has been made in the art, but the friendly attitude which it discloses is no less gratifying to the electrical interests. We trust that the spirit with which the Pennsylvania Company has approached this subject will be fully appreciated by the Board of Aldermen and the Board of Estimate and Apportionment, and that these city officials will follow the example of the Rapid Transit Commission and lend hearty co-operation in securing this great public improvement.

Electric Railway Securities

The character and value of street railway securities have greatly improved during the last few years, and they are now regarded with favor by conservative investors who desire a fair return on their money as well as ample security. This change in the attitude of capitalists toward these properties is partly due to the fact that their management is growing more and more conservative every year, and that the possibilities of the electric railway are becoming more generally recognized. Another important factor is the scarcity and constantly increasing demand for good steam railroad securities. Men who are accustomed to investing in the bonds of transportation companies naturally turn to the electric railway when they find it impossible to secure those of steam railroads at what they consider a reasonable figure.

With the development of the last few years in the street railway field recognized standards of business management have been adopted, and to-day the great street railway systems of the country are as well handled in every respect as the big steam trunk lines. The improved conditions are recognized and appreciated by those who have investigated the organization and management of the leading companies, and their influence on public opinion is shown in the attitude of the Massachusetts Legislature, which is now considering the advisability of authorizing savings banks to invest in the bonds of street railway companies. A bill has been prepared and has received the approval of the committee on banks and banking, which provides for the authorization of investments of this character. The only serious objection that was raised to this bill was the fact that it was drafted particularly in the interests of street railway companies, and that their object in seeking this legislation was said to be their desire to secure the support of the savings banks in making their tenure of track location practically permanent. This objection was overcome when a careful investigation was made by the committee, a majority of the members of which became convinced that street railway locations are practically permanent anyway, and because of this fact they considered that the support of such conservative interests as the savings banks would in reality redound to the benefit of the companies and to the investing public. It was agreed, therefore, that the bill should be reported permitting savings banks to invest in the bonds of such street railway companies as had paid 5 per cent upon their stocks for five years, and furthermore had been approved by the Board of Railroad Commissioners as offering safe advantages for investment. The bill directs the board to publish periodically a list of companies which have paid these dividends and are otherwise entitled to be enumerated in this class.

Many financial advisers and experts, recognizing the tendency of the times, have given the electric railway securities much care-

ful study. It is now generally admitted by this class that in the natural order of things the construction of steam railroads will not continue in the same proportion as heretofore, and consequently the supply of steam railroad securities will diminish, whereas the construction of electric systems will constantly increase, resulting in a correspondingly increasing volume of this class of securities. Nowadays an electric railway, operating under a long-time franchise in a populous and growing territory and favored with sound management, is regarded as a thoroughly safe and profitable enterprise by conservative investors. Of course good judgment and discrimination must be exercised in selecting electric properties in which to invest, as in steam railroads and other securities. There are plenty of strong electric railway companies whose securities offer an excellent investment, and this number is increasing every year as the development and importance of this field becomes more generally recognized. One financial expert who has given this subject considerable attention lately, declared that it was impossible to evade the conviction that the securities of these roads, if selected with discrimination, were a better investment than those of steam railroads, especially when their interest basis and comparatively small bonded indebtedness were considered. It should be borne in mind, too, that these securities will be constantly increasing in value, as the earning capacity of very few of these systems may now be said to have been reached. As a matter of fact many of the most attractive are comparatively new properties, that will not attain their full development for several years.

The Practical Capacity of Motors

Mr. Armstrong's paper on the heating of railway motors, which we publish this week, gives in convenient form a great mass of data bearing upon the practical operation of modern roads. It is not altogether easy to summarize so useful a contribution to our knowledge, but if we were to pick out a single fundamental idea upon which to lay particular stress it would be the formidable effect of heavy acceleration upon the capacity of the motors and the demand for power. A polar diagram, like Fig. 5, shows this condition with telling effect. Few among practical men realize fully how modern requirements in the way of fast schedules and frequent stops react upon the equipment necessary to do the work. Some interesting figures on the cost of stopping a street car were long ago worked out, but their significance is trivial compared with the quantities involved in stopping a suburban car service every quarter of a mile instead of every half mile. No simple ratio connects energy with frequency of stops, but Mr. Armstrong's curves show plainly enough that, when one attempts a fast service with frequent stops, the demand for energy and motor capacity is very serious. As the schedule speed rises, too, the conditions get rapidly worse, and it is a well-known fact that even on steam roads some of the suburban trains rise to a maximum speed that would send them by a fast through train as the latter would slip past a local freight. And when one stops to realize the effect of such conditions upon the work required of electric motors there is constant cause for wonder at the success with which these trying requirements are met. Really, one could establish a system of fast electric trains between New York and Philadelphia with far less difficulty than one could organize an adequate suburban service between New York and Yonkers.

So long as electric railroading was practically confined to ordinary tramway work in which the schedule speed was low and did not need to be very rigorously preserved—in fact, could not be so preserved—motor design was a comparatively easy matter. But the times have changed, and it is not too much to say that the suburban traffic of a big city is by far the toughest problem that the electrical engineer has ever undertaken. The ordinary layman thinks, with easy optimism, that it is simple enough to displace steam on a suburban system like that running out of New York, while, in fact, it involves more troublesome factors than any other known variety of railroading.

It is probable that a successful solution of these difficulties would involve not only a change of motive power, but a very far-reaching reorganization of terminal arrangements and of facilities for train dispatching. In other words, it is a problem: in practical railroading instead of merely motive power.

The details of the effects of acceleration are somewhat complicated. At times it seems the best policy to get the extra work over quickly and be done with it, and again, at higher speed, it makes little difference within reasonable bounds whether acceleration is pushed or not. Throughout, the essential point is that in certain classes of service the energy is spent mostly in acceleration, and the consideration of the motor equipment necessary for running the train or car at a steady speed is of very little account. One result of this state of things is very effectively brought out in Mr. Armstrong's study of the gear reduction question, showing that the gearing should be arranged for the lowest maximum speed that will produce the required schedule. In discussing the effects of high speed, we think Mr. Armstrong has been somewhat misled by the enormously high results of Davis, but the principle of the deductions is still sound, even if the data are somewhat exaggerated. As the speed rises the work of acceleration becomes relatively very much lessened, and the question of motor capacity is immensely simplified. In severe suburban work the cars are practically never held at speed at all, while in fast running, with infrequent stops, the work is mostly against the ordinary train resistances and is quite easy to reckon with. Finally, in long-distance and high-speed work, acceleration is an altogether insignificant factor in the situation. To discuss fully the conditions relating to even a single type of motor is a difficult task, and we are not surprised that Mr. Armstrong found that no simple method of rating would express the facts. A problem involving so many unknown constants must in fact be solved empirically, if at all, and our present method of commercial rating seems on the whole as serviceable as any other.

Among other important matters Mr. Armstrong takes up the much-discussed question of trains versus single cars for high-speed service. Here again his reliance on Davis' formula may be a bit unsafe, but in less degree any recent value of air resistance points out the increased power required to drive single cars. In this connection Mr. Armstrong very properly suggests that a minimum power consumption is not the chief end of electric railroading and that frequent service produces traffic. This principle obviously dominates the matter of equipment to no small extent, for the one thing most important is to carry passengers. It is not, however, either obvious or probable that increased frequency of service can increase traffic beyond certain moderate limits. So far as we are aware, the relation of time-table and schedule speed to traffic has never been properly investigated, nor, indeed, is it possible fully to do so. But we think that in the proper domain of high-speed work at least there is small gain in the single-car system. A schedule speed, for example, of 75 miles per hour is a thing which cannot apply to short runs nor accommodate local traffic. Its field of action does not lie within the radius of casual riding. Suppose a train were put on between New York and Philadelphia, scheduled at an even hour for the trip. We have not the slightest idea that a half-hourly service of single cars would pick up a single passenger who would not also be caught by an hourly service of two or three car trains, and we greatly doubt whether single cars every fifteen minutes would win much traffic over an hourly service; certainly not enough to make the game worth the candle. Even in suburban service proper, the train seems to be the advisable unit from a practical standpoint, and we think that this condition will hold so long as there is a definite schedule to which the passenger accommodates himself. The greatest difference in traffic comes in passing from a distinct schedule to a frequency of service which renders schedules superfluous. So, while Mr. Armstrong's point is theoretically well taken, we have some doubts as to its applicability to the great mass of fast electric railroading with which we to-day have to deal.

Providence and Pawtucket Railway Strike

Rioting and disorder in the streets of Pawtucket attended the efforts of the United Traction & Electric Company, of Providence, to operate its cars last week. While the strike in Providence diminished in importance and seriousness, at Pawtucket crowds gathered in the streets, stoned the cars and those in charge of them, and caused, on Thursday, the probably fatal injury of a young boy, Venner Peterson, who was shot in the neck in an encounter between a party of deputy sheriffs and a gang who were stoning a car. The inadequacy of police protection at Pawtucket led to the calling out of a number of deputy sheriffs and later to the assembling of nearly 1500 militiamen. Governor Kimball issued a proclamation requiring the unruly elements to desist and disperse. On Thursday, in spite of the presence of the troops, there was continued rioting, the soldiers apparently being uncertain

the residents of the city to remain in their homes and avoid riotous gatherings. The presence of the militia did not appear to have much effect on the Pawtucket rioters early in the day. The chief scene of disorder was at the junction of East and Pawtucket Avenues, where a crowd of 300 roughs gathered, and a car containing about a dozen deputy sheriffs and a few passengers and surrounded by a squad of cavalry, was attacked. The car windows were smashed and some of the deputies were injured, but the cavalry made no attempt to disperse the crowd and simply marched on with the car. These scenes were repeated until Governor Kimball, hearing about the passive attitude of the militia, issued more stringent orders, and later in the day the crowds were kept on the move. Car service in Pawtucket was almost entirely suspended.

Next day order was preserved, but none of the lines of the Pawtucket City system were in operation, and the lines in Central Falls, Cumberland and Albion, suburban towns, were tied up.



STREET SCENE IN PAWTUCKET DURING STRIKE—"SCAB" SIGNS AND EFFIGIES DISPLAYED

as to what was expected of them. Meanwhile the business interests of Pawtucket were suffering and the reputation of the city was seriously impaired. But on Friday the militia took matters in hand and rioting was brought to a speedy end. Meanwhile the deputy sheriffs were withdrawn. On Saturday there was little or no disturbance of a serious nature, and on Sunday an attempt was made to reopen the lines, but this proved a signal for renewed outrages. The scenes of disorder that had disgraced the city during the week were repeated every day until the mob would be dispersed by the troops.

The company has done everything in its power to furnish service, and it has been prepared to operate its cars continuously, but the city has not afforded sufficient protection. Mayor Fitzgerald and the police are in sympathy with the strikers and have taken no effective measures whatever to prevent outbreaks; in fact, their attitude has rather encouraged the lawless element, and consequently there have been many serious conflicts.

Recognizing these conditions, Governor Kimball, on Wednesday, June 11, called upon the adjutant-general for militia to suppress the disorders in Pawtucket. Six companies of infantry and two of cavalry were assembled at Pawtucket on Thursday, and later in the day the Governor issued a riot proclamation calling upon

When the first car of the Pawtucket Avenue line reached the city that day it was flanked and guarded by companies of militia and troops of cavalry, with machine guns trailing along. The car was escorted safely past the point where the attacks of Thursday were made. Volunteers from the naval militia climbed the poles and removed the effigies that were hanging along the streets. Then the order was given to clear Pawtucket Avenue to the city line in Providence. Every vehicle was driven from the street, pedestrians were turned back and citizens were ordered to close doors and windows and to get away from the front of their houses. Stragglers who shouted "spotters" and "scabs" were placed under arrest and the highway was cleared of all boulders, stumps and other obstacles. The cavalry and infantry formed a complete cordon and the machine gun battery was stationed where the guns could sweep the places in which the mobs had gathered day by day.

There was a conference in the evening to consider a proposition made by Manager Potter, of the Union Traction Company, looking to the opening of the Main Street line for Providence Saturday morning. This and the Pawtucket Avenue, the manager explained, were the most important of the four Pawtucket lines, and he was particularly anxious to see it in operation again. Main Street is for a good part of its length about three-quarters of a

mile from Pawtucket Avenue, where the soldiers were then located. If the force was divided it was considered that it would take an hour to call troops from Main Street to Pawtucket Avenue in the event of disorder and a necessity for reinforcements. Mr. Potter was told that it was deemed wiser to await developments before opening the Main Street line, contenting himself with the Pawtucket and East Avenue and Garden Street lines, which lie closely enough to one another to keep the men within easy call.

An attempt to extend the service on Sunday resulted in riotous demonstrations in Central Falls, through which no cars had been run since the beginning of the trouble. At 1 o'clock the first car was sent out. It was met with a volley of stones and missiles. Windows were smashed and the conductor was struck by several stones and injured. This happened near the city line of Pawtucket and Central Falls, the crowd being gathered in the latter city. The troops marched through the city and then marched back to Pawtucket, being followed by a crowd of several thousand. The latter cheered the militia, but declared in no uncertain tones that no cars would be run through their city. Other cars sent into Central Falls got a reception of stones and epithets and many windows were broken. About 3:30 p. m. the railroad company decided to abandon for the day its attempt to run cars. In Pawtucket and Providence there were no acts of violence on Sunday. On Monday, however, in spite of the Mayor's claim that he could control the mob, violence was re-

At a meeting of prominent business men of Pawtucket on Monday it was decided to keep the militia on hand until order had



ELECTRIC CAR IN EAST AVENUE, PAWTUCKET, AFTER TROOPS TOOK CHARGE OF STREETS

been completely restored, in spite of Mayor Fitzgerald's efforts to have the troops withdrawn. When in the opinion of ten promi-



ARRIVAL OF RHODE ISLAND STATE MILITIA AT PAWTUCKET, SUMMONED TO SUPPRESS VIOLENCE

nented in Pawtucket and a murderous assault was made upon a motorman. Fortunately, the assailant's aim was poor and the motorman escaped.

nent citizens tranquillity has been restored in place of mob rule the militia will be withdrawn. With the exception of stone-throwing the day was one of quiet. Cars were operated on all local lines

during the day and in Central Falls as usual, but were withdrawn at night. The views are presented through courtesy of the Providence Journal.

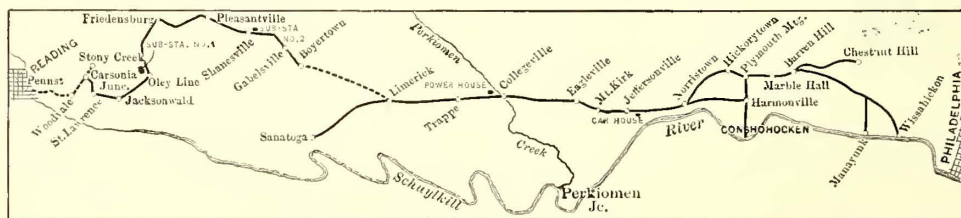
The United Traction & Electric Company has offered \$500 reward for the detection and conviction of any person participating in the destruction of its property, the obstruction of its lines, interference with its employees or in any way preventing the safe operation of the Union Railroad Company, the Pawtucket Street Railway Company or the Rhode Island Suburban Railway Company.

The strikers have not only stoned the cars, but they have attempted to wreck them when they were operated at night. One accident was reported Thursday night on the last run. On the short mile of track on which the transfer car runs between Pawtucket and Lakewood are six curves. At one place the track turns sharply to the left and then to the right, making an S curve. At this place an attempt was made late Thursday night to derail the transfer car by placing stones in the grooves of the rail at the curve. It is customary for the men on the car to run on their last trip only as far into Lakewood as they carry their last passenger. This done the trolley is reversed and the car started at good speed for the car house at South Providence. The last passenger was carried about halfway into Lakewood, at about a quarter before midnight, and the car started for the barn, running at a good speed, when the motorman felt the car strike a stone at the beginning of the curve at Atlantic Avenue and South Fair Street. The car was stopped immediately, just at the edge of a line of other stones, which had been placed in the groove of the track at the curve and wedged in, that they might not be forced out by the wheels. They would easily have derailed the car if it had been running at its usual speed.

We have already explained that the cause of the strike was the ten-hour law, enacted by the last Legislature. The company was advised by its counsel that this law was unconstitutional, and when the time came for enforcement the company announced that it was willing to submit it to a court of competent jurisdiction in order to have the matter settled by the proper authorities, but the labor leaders evidently were not sure of their ground, for they immediately ordered a strike. Before the law went into effect General Manager A. T. Potter issued a letter to the conductors and motormen, defining the position of the company and explaining the application of the law. All conductors, motormen and gripmen who wished to continue work under their existing contracts were free to do so; and those who wished to reduce their time to ten hours per day, with proportionate reduction of pay, were equally free to make that choice. The company did not exact from its conductors, motormen or gripmen more than ten hours work per day with the rate of pay proportionate to the number of hours of service. It was announced, furthermore, that papers were being prepared and proceedings taken by the company to have all questions as to the constitutionality and true meaning of the law determined by the courts at once. Many employees remained in the service of the company, others withdrew, and when the latter learned that their places were being filled by new men, scenes of violence and intimidation followed that would have disgraced a frontier town.

Tour of Inspection of the Trappe & Limerick and Oley Valley Railways

At the invitation of President J. A. Rigg, of the United Power & Transportation Company, of Philadelphia, a large party of railway men, financiers and representatives of numerous industries



MAP SHOWING ROUTE TAKEN BY GUESTS

in the several towns passed through had a very pleasant outing on Wednesday, June 11, while inspecting the new lines recently opened between Norristown and Sanatoga and Boyertown and Reading. The party left Chestnut Hill, Philadelphia, on the new Brill semi-convertible cars which are used in the through service recently started between Philadelphia and Sanatoga. The accompanying map shows the route taken by President Rigg and guests. After reaching Sanatoga the cars returned to Limerick, where large buses and other vehicles were provided for the ride across country, shown by the dotted lines, to Boyertown. The United

Power & Transportation Company owns a franchise for this connecting link, and a road may be built here in the near future. The party boarded the new cars of the Oley Valley Railway Company and were taken over this new road to Reading, where dinner was served at the Mineral Springs Hotel.

During the trip every opportunity was given for a thorough inspection not only of the rolling stock and track of the system, but the new car house recently built at Norristown, the new power station at Collegeville and the new sub-stations on the Oley Valley line. The weather was fine throughout the whole trip, except for a slight shower which came up shortly after leaving Philadelphia. This shower, however, lasted only a few minutes and gave to the guests an excellent opportunity for witnessing the serviceability of the semi-convertible type of car for making quick changes and accommodating itself to all kinds of climate. The windows were closed and opened as easily as if they had been simply a single sash, and many of the railway men present complimented the wisdom of the management in selecting this type of rolling stock. The banquet at the Mineral Springs Hotel, to which about 100 sat down, was a gratifying success in every respect, and all heartily enjoyed themselves. The guests listened with a great deal of interest to the speakers, a number of whom represented the various sections of country which the new roads traverse. The speakers were R. L. Jones and John Dampman, of Reading; Joseph L. Caven, John C. Bell and W. F. Dixon, of Philadelphia; N. H. Larzalere, of Norristown; P. J. Ford and W. H. Hayes, of Wilmington; S. P. Light and Howard Shirk, of Lebanon, and J. K. Grant, of Boyertown. George F. Baer, president of the Philadelphia & Reading Railroad Company, was compelled to send his regrets at the last moment, but with his characteristic generosity and forethought provided a couple of Pullman parlor cars on the train the party had planned to take, for the exclusive use of the railway people and their guests, and no fares of any kind were collected.

Among those present from Philadelphia were Joseph L. Caven, president Real Estate Title Insurance & Trust Company; William F. North, treasurer Real Estate Trust Company; Henry Tatnall, president Franklin National Bank; Edwin A. Landell, president Kensington National Bank; E. J. Moore, head of banking firm of E. J. Moore & Co.; Charles W. Welsh, member of banking firm of Robert Glendinning & Co.; S. L. Levy, head of banking firm of Levy & Lewis; Charles H. Bean, head of C. H. Bean & Co.; H. J. Verner, head of Verner & Co.; John C. Bell, attorney-at-law; G. Martin Brill, president J. G. Brill Company; James Rawle, treasurer J. G. Brill Company; J. W. and D. B. Shepp, proprietors Globe Publishing Company. Wilmington (Del.) was represented by Peter J. Ford, capitalist, and Walter H. Hayes, attorney-at-law; Wilkesbarre (Pa.) by James M. Bolland, insurance broker, and James Fagin, electrical engineer; Norristown (Pa.) by N. H. Larzalere, attorney-at-law; Collegeville (Pa.) by E. S. Moser, proprietor of the Independent; Woodbury (N. J.) by H. S. Talman, Farmers & Mechanics' National Bank; Trenton (N. J.) by Senator J. H. Blackwell; Lebanon (Pa.) by S. P. Light, attorney-at-law, and Howard Shirk, president Lebanon National Bank; Womelsdorf (Pa.) by Samuel B. Keppel, president Reading & Womelsdorf Electric Railway Company; Adamstown (Pa.) by L. T. Custer, capitalist; Birdsboro (Pa.) by L. H. Focht, contractor and builder, and Boyertown (Pa.) by Dr. Rhodes, Charles Spotts, proprietor Boyertown Democrat, and J. K. Grant, attorney-at-law.

There was a large delegation from Reading, Pa., among those present being Hon. Thomas P. Merritt, ex-Mayor of Reading; C. H. Schaeffer, president National Union Bank; A. J. Brumbach, president Penn National Bank; Isaac Hiester, president Second National Bank; Isaac Eckert, president Farmers' National Bank; Louis F. Kraemer, president Colonial Trust Company; O. S. Geiger, director Colonial Trust Company; C. H. Ruhl, president Berks County Trust Company; W. W. Light, banker; Samuel F. Prince, master mechanic Philadelphia & Reading Railway Company; B. F. Owen, president Reading City Passenger Railway Company; J. G. Leinbach, president Mount Penn Gravity Railway Company; F. S. Livingood, secretary and treasurer Reading & Temple Electric Railway Company; C. H. Sembower, president Orr & Sembower Manufacturing Company; James W. Yocum, president Montello Brick Company; James Rick, president Rick Brothers Hardware Company; Jerome L. Boyer, engine builder; John B. Dampman, journalist; Dr. Horace Schlemm, Dr. D. B. D. Beaver, Dr. W. F. Mullenberg, Ellwood H. Deysler, attorney-at-law; C. C. Long, electrical engineer; Dr. Samuel B. Rigg, and J. Milton Miller, attorney-at-law.

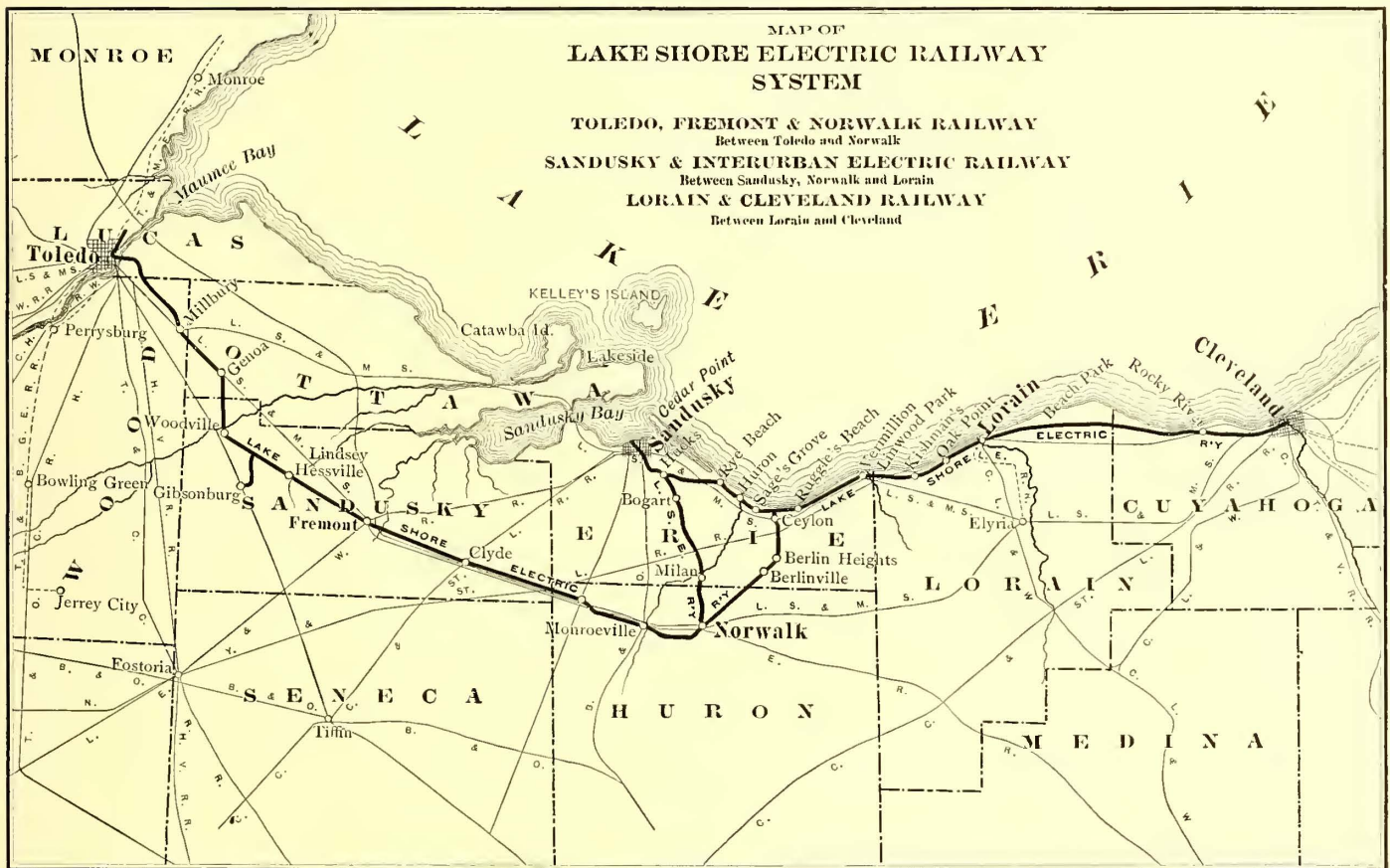
Excursion Business on Interurban Roads

While the majority of electric interurban roads are prepared to handle special excursion business when it is offered to them, there are comparatively few which make a feature of pushing and promoting this class of business; the majority of roads limiting their efforts in this direction to operating theater cars connecting large centers with outlying points during the winter months, and increasing their service to parks during the summer months.

The few roads which have created departments for the express purpose of soliciting and actually creating special excursion business have been generally satisfied with the results obtained on a small outlay. A road having large terminal cities with pleasure resorts within a reasonable radius should be able, through the efforts of a live passenger solicitor to secure a steady income at practically all seasons of the year, from the special excursion business.

There is probably no road in the country which has better demonstrated this fact than the Lake Shore Electric Railway, now

Avon Beach and Sages Grove, the former thirty acres, and the latter sixty-three acres, are owned by the company. There are pavilions at both places and many summer cottages. The company runs numerous trolley parties to these places. Linwood Park is the Chautauqua of the Lutheran Church, and has about sixty cottages, a large hotel and auditorium. Ruggles Grove is the oldest picnic ground in Northern Ohio. Farmers for miles around hold their outings there, and Grangers throughout Northern Ohio meet there every year. Cedar Point is probably the most noted resort in Ohio—the Atlantic City of the lake region. It is a unique spot, being a peninsula 8 miles long, from 700 ft. to 2500 ft. wide. There is a large vaudeville casino, three large hotels, ten bowling alleys, several dancing pavilions, and numerous other attractions. Excursions from all parts of Ohio and Indiana are run to Cedar Point, and there are two steamers daily to Sandusky. Over 6,000,000 people visited this resort last year. The electric line is preparing to build a spur into the center of the grounds, and this will increase its already large proportion of the business to this point. An immense amount of summer traffic goes through the



MAP OF TOLEDO AND CLEVELAND INTERURBAN SERVICE

operating between Cleveland and Toledo. To be sure its 160 miles of track and large terminal cities, give it an advantage in this respect, but unquestionably this company is actually creating a large amount of business which would never have existed without steady and systematic effort.

General Superintendent F. J. Stout, of the Toledo, Fremont & Norwalk Railway, now one of the divisions of the Lake Shore Electric Railway, created the office of Passenger Solicitor soon after the road was placed in operation. At that time the road's efforts were confined largely to developing the theater and entertainment business to and from Toledo, there being practically no summer resorts on the line. With the consolidation of the Toledo, Fremont & Norwalk with the Sandusky, Norwalk & Southern, the Sandusky & Interurban and the Lorain & Cleveland, the opportunities for theater business were of course greatly improved, and the summer resort traffic possibilities are now, perhaps, better than those of any road in the country, the shores of Lake Erie being practically lined with parks and resorts of every description. For the entire distance between Cleveland and Sandusky the road runs within sight of the lake and touches the following resorts: Hans Grove, Dover Bay Park, Mulberry Park, Avon Beach Park, Randall's Grove, Glenwood Beach Park, Oak Point, Shattocks Grove, Linwood Park, Ruggles Grove, Sages Grove, Cedar Point and Rye Beach.

city of Sandusky, this being the gateway for steamers to the numerous islands in Lake Erie, as well as the direct connection by boat for Lakeside, the famous summer city of the Methodists.

The passenger solicitor, who has his headquarters at Fremont, the center of the system, keeps constantly in touch with lodges, societies and churches in the several towns in or tributary to the road, and by means of special rates, secures almost daily picnics and excursions during the summer season. Advertisements are inserted in the country papers announcing events which would be of interest to societies in these places. The country fairs afford much heavy traffic, for the company advertises them in the surrounding towns as well as in the large cities, and there are many people in the cities who will take advantage of fair rates to visit their old homes. The management pursues the policy of offering excursion rates on Sundays, and the result is that this day is generally the most profitable of the week, because of the inducements offered to take an outing.

On a day when the passenger solicitor expects heavy business, such as circus day, fair or holiday, he keeps in constant communication with agents, over the company telephone line, as to ticket sales, and if necessary, orders extra cars through the division superintendent. Arrangements have been made with the owners of several small naphtha launches on the Sandusky River at Fremont to take excursion and fishing parties down that picturesque river to

Lake Erie and return, affording a delightful outing at small cost. This feature is proving especially attractive and dates have been booked for a greater portion of the season, parties coming from all parts of the system.

Arrangements have been made with the owners of a large lake steamer at Toledo to run excursions to Detroit in connection with excursions over the electric road. Coupon tickets are on sale at all of the company's offices, and on Thursday and Saturday evenings special excursions are run from towns along the line to Toledo, where the lake steamer takes the party for a three-hour moonlight ride. These excursions are also proving very attractive, as they afford an opportunity for outing to clerks, laborers and others of the middle walks of life who cannot afford summer vacations. When the system is in full running order the company will endeavor to arrange similar excursions from Sandusky and Cleveland, so that these features may be enjoyed by people on all parts of the system. In advertising these features the company makes a strong point of the country and lake view ride, and the absence of dust and smoke which make a steam road outing undesirable.

The attractions offered by this company during the winter months afford almost as good returns as those of the summer months. Special theater parties are run from towns within 40 miles to 60 miles of Toledo, and next winter there will be similar excursions to Cleveland theaters. For these excursions the solicitor secures options on a block of select seats in the center of the house for the evening decided upon. Special theater cars are advertised in the local papers for that night, and the solicitor calls on a number of regular patrons and induces them to get up a party, or it frequently happens that the parties are organized by the patrons themselves, and the solicitor is asked to arrange an excursion for a certain attraction. As the car nears the city an agent telephones to the theater and informs it as to the number of tickets unsold, so that these may be disposed of.

A novel feature introduced for these parties during the last theatrical season was to equip several cars with removable card tables so that frequently when parties were from the same town and were acquainted, progressive card games were arranged, making the outing a card party, as well as a theater party. On a number of occasions the company has secured the services of a caterer and served hot coffee and light luncheon; this being a particularly desirable feature since the return trip can be made immediately after the theater closes. On other occasions entertainment has been provided, such as a mandolin club or an orchestra gramophone. These features serve to while away the time pleasantly, and the passengers forget that they have gone 60 miles to attend a theater. The excursions have been uniformly successful, and on several occasions from 250 to 300 people have been carried to a Toledo theater from Norwalk, Monroeville, Clyde, Bellevue, Fremont and other towns. The company has one of its representatives on each car, in addition to the conductor, and it is his duty to look after the comfort of the passengers. This "personally conducted" idea makes patrons feel that the company has an interest in their welfare, and it also tends to eliminate any possibility of disorder. These special theater parties are in addition to the regular theater cars, which run in and out of Cleveland and Toledo as part of the regular schedule.

Through the local papers from towns on the line the passenger solicitor keeps informed as to entertainments given by schools, lodges or societies, and when there is an affair which he thinks might be of interest to similar organizations in neighboring places he calls on the leading people and arranges to provide ample accommodations, both in the way of seats and transportation. If the number warrants he offers reduced rates for the excursion.

The residents of the towns along the line are becoming familiar with these excursions and opportunities for new ventures in this direction are constantly developing. The writer is indebted to H. K. Surbeck, passenger solicitor of the Lake Shore Electric Railway Company, for much of the information presented herewith.

New Way to Boom Suburban Real Estate

What the enterprising promoter of suburban towns will not think of in the way of booming real estate would not fill a very large volume. The latest plan proposed by a Chicago real estate man is nothing less than an effort to secure dining car service on some of the electric lines reaching the more distant suburbs. The idea is, of course, to encourage the morning nap of the poor suburbanite, who depends on the trolley car and who has to rise at an early hour in order to get breakfast and reach town in time for business. The scheme is advocated as one that will promote comfort and prevent indigestion from hurried morning meals. It is a serious question, however, whether the kind of breakfast the aforesaid suburbanite would be willing to pay for when served at

the expense incident to dining-car service on a trolley line would be sufficient to fortify him for the labors of the day, or, if it were sufficient in quantity, whether it would be of a quality calculated to promote good digestion. There may be more in the idea, however, than would appear at first sight, and if someone wishes to give it a trial by all means let the good work go on. The greatest objection, of course, from a street railway man's standpoint, is the limited number that could be accommodated. The revenue from the dining car feature would have to be large to compensate for the losses in the transportation department in connection with such a service, unless high fares were charged. As to the popularity of the scheme no man can tell about such things until they have been tried, and much depends on local conditions. The desire of the average American to save time in the morning may overcome the drawbacks already mentioned, and make the proposed service popular.

Proposed Subway for Chicago

Confirmation has been received of the announcement made last week that ex-Mayor Hempstead Washburne and W. A. Alexander, of the George A. Fuller Company of Chicago, will petition the City Council of Chicago for an ordinance authorizing the building of an immense subway system, and that Chicago capitalists are to furnish the money. The subways contemplated would cost at least \$35,000,000, according to the estimates of those who are behind the project. W. A. Alexander has made the following public statement:

We shall ask the Council to grant us the right to construct a subway in the downtown district large enough for street car transportation and for the accommodation of the public utilities, such as water and gas pipes and electric light wires. The purpose primarily is to relieve the congestion of this part of the city. That the city cannot build such a subway itself is well known, because it has already exceeded its legal bonded indebtedness. The work, if done at all, then, must be done with private capital.

Roughly, it is expected the line within the loop will be some 6 miles long. Necessarily we will go beyond the river by tunnels on the North and West Sides in order to find egress from the business district. The depth of the subway proposed is 24 ft. In other words, the base of the subway will be that distance from the surface of the streets.

Of the proposed subway former Mayor Washburne said that he first took up the subway question as a municipal proposition, and found that the municipality, under its present charter, could not build subways, and that a constitutional amendment giving it the necessary authority would delay the work a number of years.

"It is not our intention to sell the grant," concluded Mr. Washburne, "and provision covering that point will be incorporated in the ordinance to the satisfaction of all concerned. Our purpose is to build the subways. When I have said that I have covered the point, and the character of the backing the project has should be ample assurances of good faith."

As the Illinois Telephone and Telegraph Company is already boring a deep subway, there is a possibility of interference between the two schemes, and B. J. Arnold, consulting engineer for the local transportation committee, is to make a report on this.

Multiple Unit System for the Northwestern Elevated

The Northwestern Elevated Railroad of Chicago is now equipping thirty new cars with four G. E.-55 motors each. On these cars the General Electric type M control is used. This controller is the one used on the multiple unit system. For the present these motor cars will be used simply as are the other motor cars on this road, putting one motor car at the head of each train. It will be possible, however, in the future to put two or three motor cars in a train on the multiple-unit system, similar to that on the Manhattan Elevated in New York. This is the first move made in the direction of the multiple-unit system by the Lake Street or Northwestern Elevated roads. The use of the type M train control system makes it possible to use a smaller motorman's cab, as it does away with the large type L controller, and puts all heavy contact-making apparatus under the car. Should it be found advisable in the future to convert all of the cars to a mixed multiple unit system, it could be done by removing the present controllers from the older motor cars and substituting type M control, at the same time putting train controlling wires and plug receptacles on the trail cars.

The present motor equipment is being changed by decreasing the number of turns on the field coils, and at the same time increasing the gear ratio so that the motors will revolve at a higher speed to give the same train speed in miles per hour. The maximum speed will be 28 miles per hour, as formerly. The object of this change is to reduce heating in the field coils by reducing the current density therein.

Study of the Heating of Railway Motors *

BY A. H. ARMSTRONG

The electric traction problem presents many new features for investigation which are not met with in steam railroading, and upon which little accurate data has been published. This is especially true of that class of service calling for maximum speeds greater than 35 or 40 mph, where stops are infrequent and cars are run singly or in trains of two cars or more. It is the purpose of this paper to enter into a discussion of some of the variables met with and their influence upon the motive power and station output for the higher as well as lower speed schedules.

The electrical engineer has to take care of two factors with which the steam engineer is unacquainted, keeping the temperature of the motive power within reasonable limits and also the operation of single cars at maximum speeds of 60 to 70 mph. That wind friction is a considerable factor with trains operating at high speeds has been abundantly proved by many tests, but these tests are worthless when used to determine the power required to propel a single car at the same high speeds. As the electric motor has invaded the high-speed interurban field and has done so successfully because of the frequency of service furnished with single-car trains, it becomes pertinent to inquire into the size of the motive power necessary to prevent overheat-

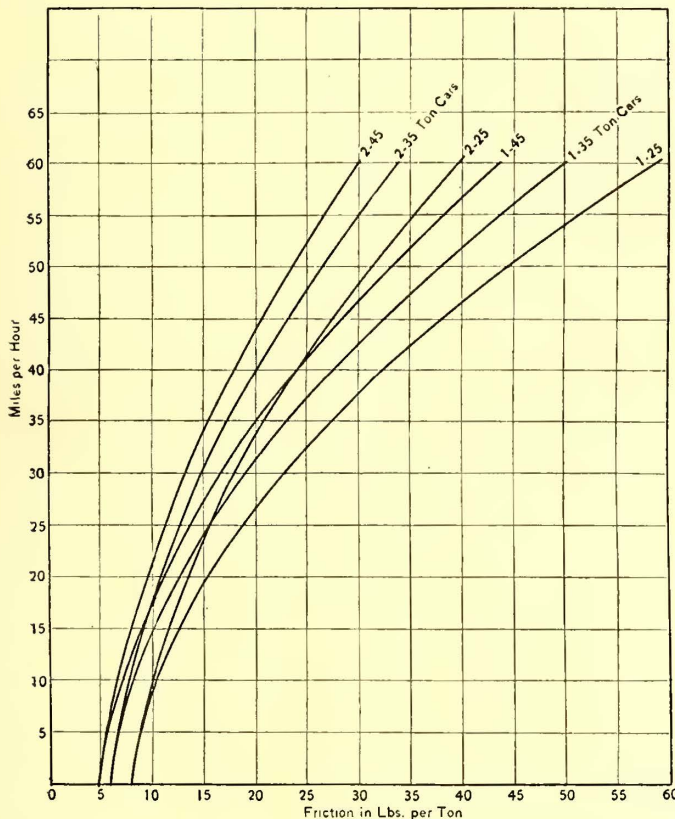


FIG. 1

ing and also the amount of power needed with the high speed schedules and frequent stops made.

Regarding the tractive effort required to propel trains of one or two cars at speeds of 60 mph or more, there is almost a complete lack of experimental data. Formule based upon tests of steam trains made up of a number of heavy coaches cannot be applied with any accuracy to the operation of single car units. A series of tests made by the General Electric Company on the Buffalo & Lockport tracks, with trains of different sizes, provides almost the only data upon which to base such calculations. These tests were carried up to speeds approaching 60 mph with ordinary steam railway coaches, hauled by a 38-ton electric locomotive. The cars were not vestibuled and the conditions were not, therefore, such as to give results directly applicable to the operation of single suburban cars of the vestibule type. For want of more accurate data, these tests will be used as the basis of the following calculations, and, as the curves deduced are used for comparison only, it makes little difference if the friction values are not absolutely correct. These train

*Read at the nineteenth annual convention of the American Institute of Electrical Engineers, Great Barrington, Mass., June 19, 1902.

friction tests were published in the May issue of the STREET RAILWAY JOURNAL by W. J. Davis, Jr., and for convenience of reference some of the curves are here reproduced as Fig. 1.

The tendency of the electric roads has been toward heavier cars, especially on the higher speed lines, where the car weights run from 25 to 45 tons, including equipment and seated passenger load. Suppose we equip cars weighing 25, 35 and 45 tons with the same four-motor equipment, geared for 60 mph with the 35-ton car, there would then result speed time-curves as in Fig. 2, the speed curve of the 45-ton car falling below, and that of the 25-ton car rising above, that of the 35-ton car for the same gear ratio. A tractive effort of 120 lbs. per ton gross has been taken with all three equipments, as representing average conditions for this class of work, giving a net acceleration of about 1.06 mph per second, after deducting friction loss and the power required to accelerate the revolving parts. Any other rate of acceleration could have been taken with little or no effect upon the heating of the motive power or its energy consumption, as will be shown later, the larger part of the energy input being used up in overcoming air resistance at this high speed.

Speed and amperes input are plotted as ordinates with time as abscissa and power may be shut off at any time, the car allowed to coast and brought to rest by brakes, making the enclosed area of the speed time-curve proportional to the distance covered, and the area of the ampere time-curve equal the ampere hours input. For the sake of simplicity it has been assumed that the friction will be the same at the same speeds during acceleration and coasting; that is, that the energy given up by the rotating parts during coasting will equal the gear and friction loss of the motors running light, an assumption which is approximately correct. The coasting curve will, therefore, follow the shape of the friction curves in Fig. 1, will be curved and show a greater retardation at high than at low speeds.

While power is applied, the motive power has internal losses, varying not only in intensity, but in their distribution. At zero speed, the losses are all in the copper of field and armature, being divided according to their relative resistance, but as the armature speed increases there is an iron loss distributed between the iron of armature and pole face and tips, depending upon the design of the motor. This iron loss starts from zero at standstill and increases to a maximum at the moment of cutting out start-

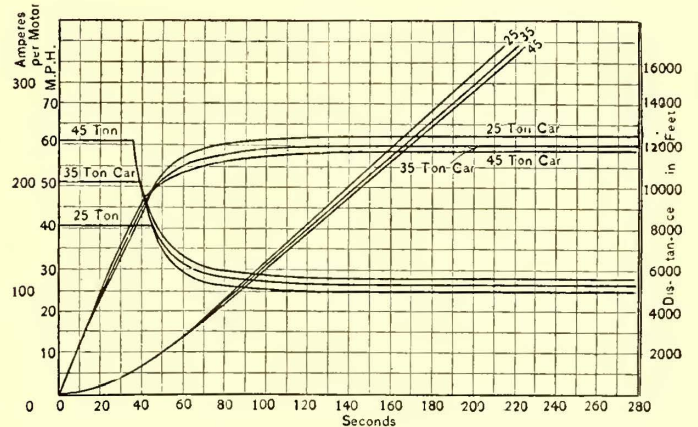


FIG. 2

ing resistances, after which it falls off somewhat, but this again is a matter of motor design. As these various losses are the cause of our motive power heating, it is necessary to trace their influence upon the individual parts of the motor under study.

As the heating of a motor is the result of the average losses within it, the average losses and their distribution up to any moment of shutting off power must be determined. Such losses are shown in Fig. 3 for our 35-ton car equipment, speed and ampere curves of which are shown in Fig. 2. The motor losses for 25 and 45-ton cars have been left off to avoid confusion, but from the shape of the ampere time-curve in Fig. 2, it is evident that the curves will vary greatly from those shown only during the fractional speed or acceleration period, these differences being virtually wiped out with a considerable amount of running upon the motor curve. Thus, while there is a total average copper loss of 5000 watts during acceleration upon resistance, the copper loss curve becomes flat in about 400 seconds at the value of 1800 watts in the copper, with the motor constants chosen. As an equipment geared for a maximum speed of 60 mph would hardly be used for an average run of less than 15,000 feet, requiring power on for fully 160 seconds for its accomplishment,

it will be seen that the acceleration losses play a comparatively unimportant part in very high speed work, so far as the motor heating is concerned. That this is not true of low speed work will be discussed later.

The iron loss has been assumed to be dissipated entirely from the armature in arriving at the "ratio of losses" in Fig. 3. This is not strictly true, but the true subdivision of losses, whatever it may be, will be practically the same with the same "ratio of

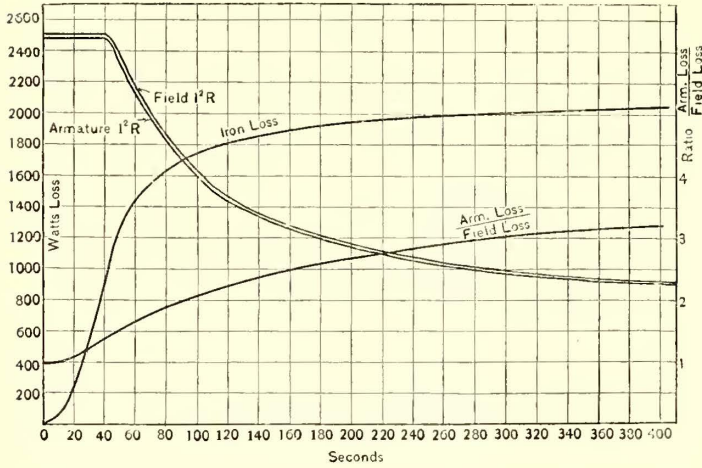


FIG. 3

losses," and hence any values of motor heating deduced from curves similar to Fig. 3 must be consistent. For example, if we know the degrees rise per watt loss for field and armature with any given "ratio of losses," the temperature arrived at would be correct, provided the temperature constants were obtained from experimental runs where the motor went through the same cycle as in the run to be determined.

Suppose we take our motor equipment, place it upon a car and run it over a measured length of level track, keeping an accurate record of the current input and voltage per motor at each instant. Then let this sample run be repeated successively for a period of 10 hours, or long enough for the motor temperatures to have reached their maximum, and we have the relation between energy lost in the motor and its temperature for a given set of conditions. Vary the length of the test run and repeat the 10-hour test, and we have another relation between temperature rise and energy loss for another set of conditions. It is evident that a series of such tests taken on a given type of motor would give material from which the relation between its internal losses

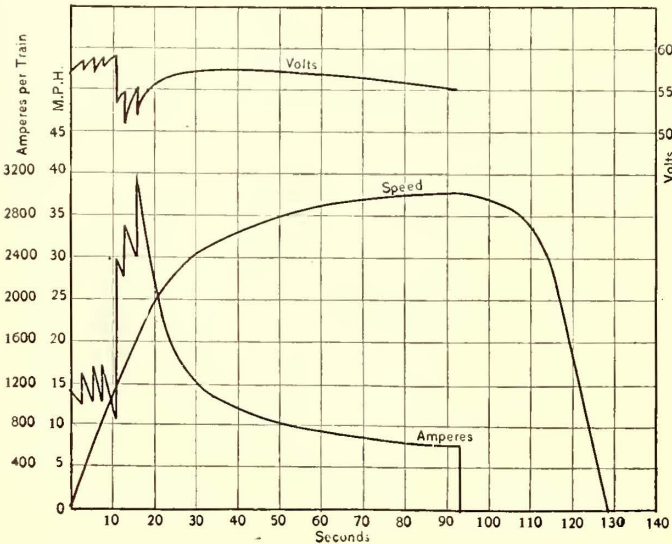


FIG. 4

and temperature rise would be known for any set of conditions, and, moreover, these values could be used directly in calculations for any given service as they were obtained under operative conditions, and need no constant applied to make them approximately correct for service conditions.

It may be urged that it is difficult to reproduce with any accuracy the sample run agreed upon, or that it is difficult to follow through and keep an accurate record of just what takes place in

the motor during its cycle of operation. If necessary, an automatic device for applying the current could be used, such as a motor to throw on the controller at a pre-determined speed. Sufficiently good results can be obtained, however, by ordinary

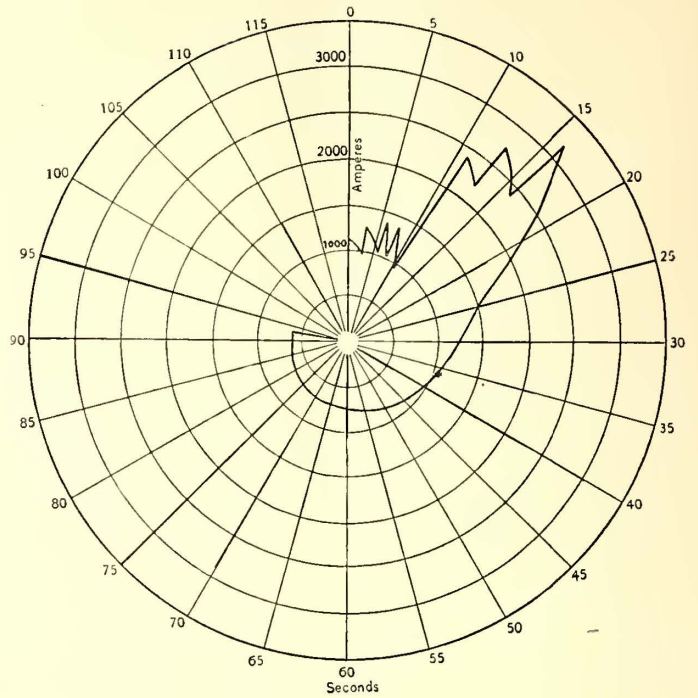


FIG. 5

hand control with a trained operator, while sample runs taken every few minutes by recording instruments serve as a check and furnish the material upon which to base the motor's performance during the test.

A sample set of curves of such a test is shown in Fig. 4 indicating voltage, amperes and speed upon a time basis, all taken by recording instruments. The voltage indicated is that between third-rail and ground, but the motor voltage during running upon resistance may be taken as proportional to its full internal voltage at the moment of cutting out final starting resistance, without making any appreciable error in arriving at iron loss values. The ampere curves give the means of determining the copper losses by plotting on polar co-ordinates as in Fig. 5, and determining the area by planimeter, giving directly the square root of mean square value. Both Fig. 4 and Fig. 5 show curves produced by a recording instrument placed directly in the main circuit of the car, thus giving the series parallel effect of the motors so connected. In our motor calculations we are concerned with the amperes per motor which will be independent of

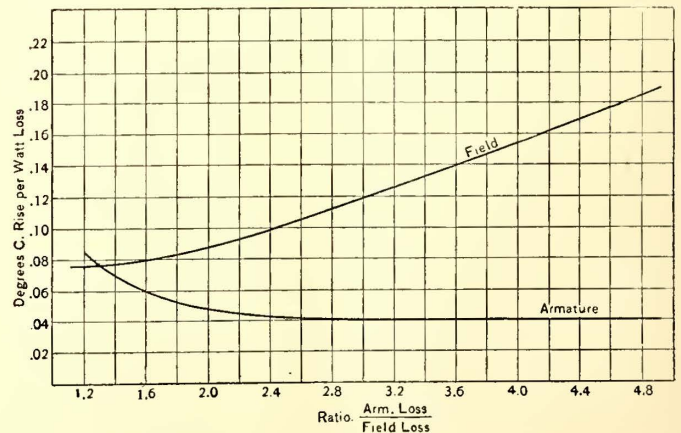


FIG. 6

the series parallel control. The curves in Fig. 4 and Fig. 5, however, are shown simply to demonstrate the accuracy of the recording instrument, and while Fig. 5 could not be used directly to determine the square root of mean square current per motor, it shows the method used in determining this constant.

It will be seen that by using recording instruments and by taking a sufficiently large number of curves, it is possible to determine very accurately the average losses dissipated as heat.

by the motor during the test run, and also ascertain the distribution of these losses in the several parts of the motor. The motor ventilation is the same as in a service run; it is operated at varying speeds, remains at rest the required proportion of the total cycle, and in every way the average conditions pertaining to a service run are reproduced in the test run, thus making the data so obtained directly applicable to service problems without the use of any constant.

A curve showing the results of a number of such tests is given in Fig. 6, indicating the degrees rise per watt loss in field copper and in armature with any relation between total armature and field loss. Here, also, the total loss is assumed to be in the armature, and this loss, added to that of the armature copper, gives its total loss, used in determining the "ratio of losses."

Taking up again the study of the motors mounted upon the 25, 35 and 45-ton cars, we are now in a position to apply the motor losses obtained in Fig. 3 with the 35-ton car, and similar curves with the 25 and 45-ton cars. By completing the cycle in Fig. 2 and bringing the car to rest in any given distance, the time of shutting off power can be determined, the average losses and their distribution ascertained by curves in Fig. 3, and the temperature rise found out by applying the constants in Fig. 6. That is, for any given schedule, we can determine the temperature rise of field and armature for the three-car train weights and

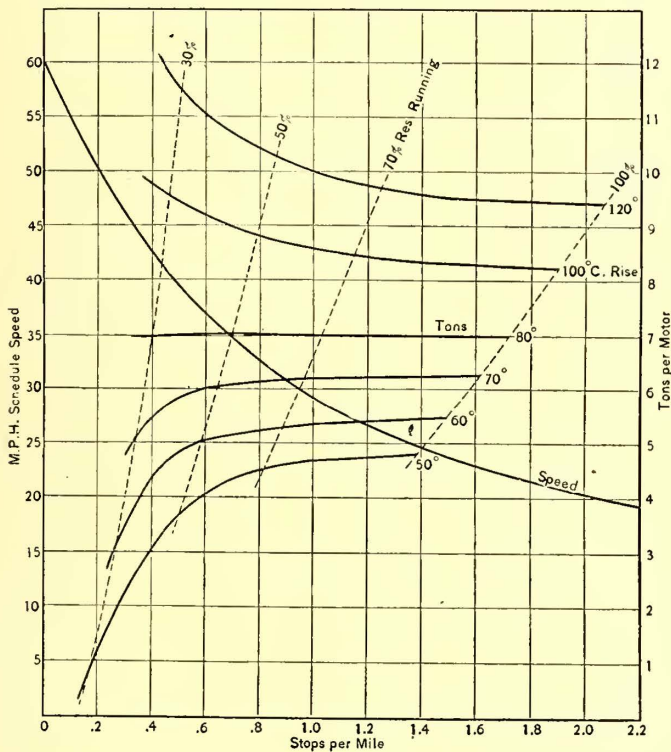


FIG. 7

the given gear ratio assumed. By plotting a sufficient number of schedules, a curve similar to Fig. 7 will result, which affords a very interesting study.

Such a curve in lieu of a better name might be termed a "service capacity curve" of the General Electric "H" motor. It shows the temperature rise per motor for any weight of car and the schedule that can be performed with the gear ratio chosen, all plotted in terms of the number of stops per mile. The temperature rise is given as that of the hottest part, whichever it may be. The schedule includes stops lasting 15 seconds each. Acceleration is the result of a constant tractive effort of 120 lbs. per ton during resistance running, and braking is effected at the rate of 150 lbs. per ton. Coasting is assumed to continue 10 per cent. of the duration of the running cycle. Curves of higher temperature cannot be completed without greatly exceeding the commutation limit during acceleration, but would reverse and approach zero the same as those of lower temperature for infrequent stops.

The relation between train weight and temperature rise for a given schedule and frequency of stops is instructive. With one stop per mile and 5 tons weight per motor, a temperature rise of 54 degs. is noted, while 10 tons per motor increases the temperature to 120 degs. rise. That is, the motor temperature increases faster than proportionately to the increase in train weight, due, as we should expect, to copper losses increasing as the square of

current; but our friction curves indicate a much larger friction in pounds per ton for the lighter-weight cars, thus bringing the accelerating current required to propel a car at 60 mph to about that required for cars varying considerably in weight. We would expect, therefore, that for continued runs where the losses

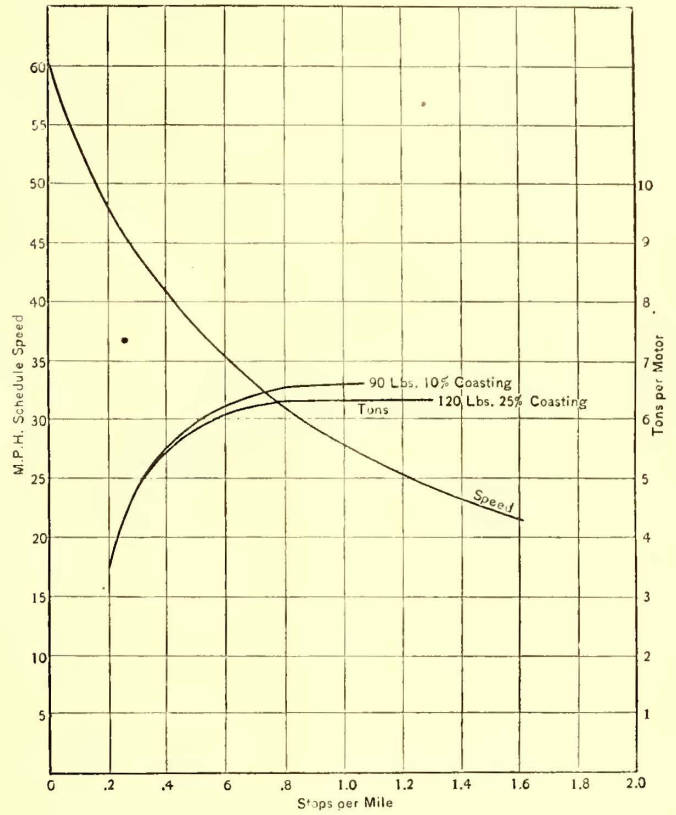


FIG. 8

due to acceleration are subordinated to the running losses, this increase in temperature with increased car weight would not be so marked. That such is the case is shown by comparing temperatures in the case of train weights of 5 and 10 tons per motor with more infrequent stops, say one stop in 4 miles, giving tem-

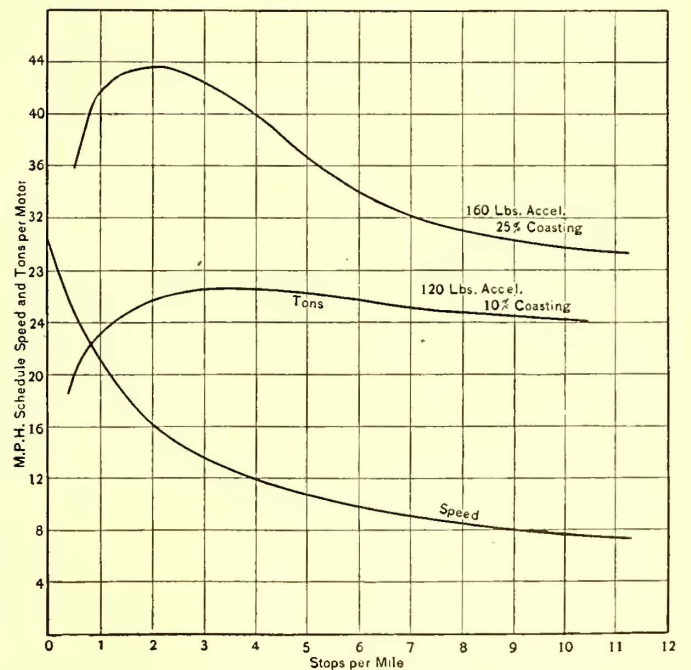


FIG. 9

perature rises of 72 degs. and 98 degs. respectively for the same schedule in 48 mph. The curve for 80 degs. rise is very curious, as it indicates a constant weight train with our equipment, regardless of the frequency of stops, while higher temperatures increase and lower temperatures decrease the train weight with the infrequency of stops. The percentage of the time that motors are op-

erating upon starting resistance is indicated by dotted lines.

Curves shown in Fig. 7 are all based upon the same gross tractive effect, giving practically the same rate of acceleration. It is evident that the same schedules could have been made with innumerable other accelerating rates, costing less with the slower and more with the more rapid rates. In order to make our study of the "H" motor more complete, two sets of curves similar to Fig. 7 were plotted, the first with an accelerating rate of 90 lbs. per ton gross and 10 per cent. coasting, and the second with 120 lbs. per ton and 25 per cent. coasting, both making the same schedule with the same frequency of stops. The comparison of these two curves is shown in Fig. 8, plotted for a temperature rise of 60 degs. only in order to avoid confusion. The lower rate and less coasting has some advantage for more frequent stops, but as such an equipment would not be used geared for 60 mph, with much less than a 2-mile run average, it follows that the

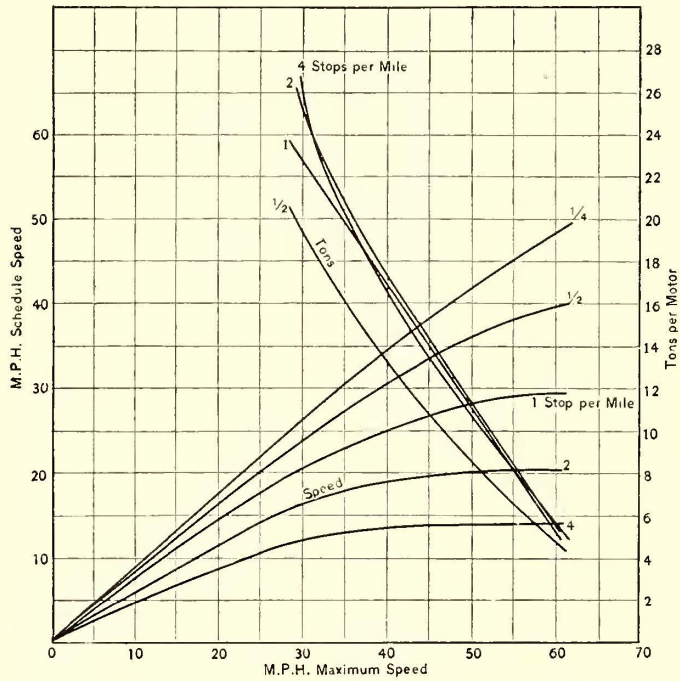


FIG 10

at a capacity of our "H" motor for any schedule, any gear ratio and any frequency of stops. This may be plotted in terms of any temperature rise, and a set of such curves is plotted in Fig. 10 for a temperature rise of 60 degs. This set of curves still retains 120 lbs. per ton tractive effort, 15-second stops, 150 lbs. braking effort, and is based upon the performance of a single car using a four-motor equipment, following the lines of the friction curves given in Fig. 1. The relation between schedule speed and maximum speed on the level is shown with stops varying from one in 4 miles to four per mile, and the tons per motor for a maximum temperature rise in any part of the motor of 60 degs. C. are shown from one stop in 2 miles to four stops per mile.

A careful study of the curves in Fig. 10 gives very interesting results. For instance, the "H" motor geared for 60 mph can operate between the limit of one stop in 2 miles and four stops per mile, making a schedule of from 40 mph down to 14 mph, with approximately 5 tons per motor in all cases and the same temperature rise. In other words, an equipment of this character

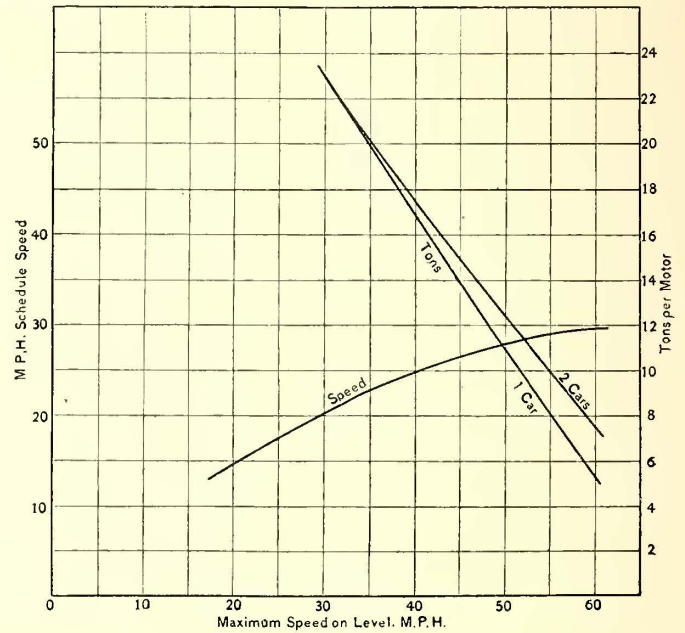


FIG 11

temperature rise would be virtually the same with either rate of acceleration.

Lower speed equipments, however, present results differing from this, as shown in Fig. 9, illustrating the 60 degs. rise curve for a maximum speed equipment of 30 mph. Here 160 lbs. and 25 per cent. coasting contrast very favorably with 120 lbs. and 10 per cent. coasting. In other words, the motor capacity is greatly increased by raising the accelerating rate while still maintaining the same schedule and frequency of stops. Increasing the accelerating rate does not necessarily mean going beyond the commutating limit of our motors, as a lower speed gearing can increase the rate of acceleration with the same current flowing in the motors as with the slower rate of a higher speed gearing.

A study of the foregoing curves seems to indicate that, so far as motor heating is concerned, it is preferable to use the largest gear ratio and highest rate of acceleration possible for the accomplishment of the service contemplated, provided the maximum speeds are low, but that practically any rational rate of acceleration can be used where speeds approach a maximum of 60 mph. As will be shown later, the energy consumption is less for a higher rate of acceleration permitting more coasting, but unfortunately the fluctuations on the distribution system and the load curve on the generating station may both be much poorer if the accelerating rate is carried too high and the number of units in service is small. In the choice of gear ratio for a given service, therefore, not only must account be taken of the question of motor heating with different rates of acceleration, but due heed must be paid to the question of line fluctuations, station load and energy input. It may be possible that what is gained in car energy by a more rapid acceleration may be lost by the poorer coal economy resulting from a more irregular load curve upon the generating station.

So far we have considered the question of capacity of our "H" motor for one gear ratio only. It is obvious that similar calculations may be made for any other gear ratio corresponding to a different maximum speed on the level, and by combining the results of several sets of such calculations, it is possible to arrive

is protected from overheating by properly proportioning its gear ratio to the car weight. The possible schedule speed for a given gear ratio is controlled by the number of stops per mile, but the heating of the equipment, with the proper weight of car, will be the same over a very wide range of schedules and stops. The curves, also, bring out very forcibly the importance of properly gearing an equipment for the work which it has to do. For instance, a gearing giving 60 mph on a level track can make but 20.5 mph schedule with two stops per mile with a train weight of 5.6 tons per motor, while the same equipment geared for 47.5 mph can perform 20 mph schedule (practically the same), but can do so with a total train weight of 12.8 tons per motor, or more than double the train weight possible for the same temperature rise with the 60 mph equipment. In other words, the equipment should be geared for the lowest possible maximum speed that will permit the maintenance of the schedule in question, as a gear ratio giving too high a maximum speed for the work to be done not only overheats the motors, but produces needless demands upon the generating and distribution systems.

The curves in Fig. 10 give a fairly complete study of the type "H" motor when applied to the operation of single cars equipped with four motors. All points in the curve, except for a maximum speed of 30 mph, are obtained with the operation of single cars, and as our friction curves may be inaccurate, being based upon a single set of tests, or trains of more than one car may be run, it is instructive to reproduce a similar set of curves for two, three, four cars, etc., per train. The motor capacity for a given temperature rise is governed largely by the shape of the friction curve used at high speeds, especially for the longer runs, and in Fig. 11 is shown a comparison between the operation of one and two-car trains making the same schedule, and using the same accelerating tractive effort per ton, braking and stop intervals as in Fig. 10. This set of curves is also plotted for a temperature rise of 60 degs. C., but it is obvious that from the foregoing material we could plot similar curves for any other temperature rise. As the curves showing the relation between tons per motor and maximum speed for a given temperature rise come so close together

for the different frequency of stops, this sheet has considered only the relation between tons per motor and maximum speed for one stop per mile. Thus we see that at 60 mph the type "H" motor operating a single car has capacity of but 5.3 tons per motor for 60 degs. rise, while if two cars are coupled together and operated as a single train the reduction in wind friction per ton of train weight increases the capacity per motor to 7.5 tons for the same 60 degs. temperature rise, an increase of 42 per cent. This opens up a new field of inquiry as to whether it is commercially advisable to run single car units at this high speed when the motive power, and, as it will be shown later on, the energy input are both larger than would result from operating the same seating capacity in trains of two cars or more with a correspondingly increased time interval between trains. In other words, is the electric traction idea of small units at frequent intervals a proper method of attacking the very high speed electric traction problem, or are we compelled to go back to the steam method of operating heavier trains at more infrequent intervals, in order to prevent a prohibitive investment in motors, and generating and distributing systems, and a ruinous expense for operation? It is true that the electric system, being eminently adapted to subdivision, has created the demand for travel, by means of its frequent service, where none previously existed, but it may be possible that for very high speed work too great a price may be paid for the privilege of operating very frequent small units.

The foregoing discussion has described a method of determining the probable heating of a given motor when operated under any known conditions. The results obtained are so complete and give such a mass of working data directly applicable to service requirements, that labor of the detailed calculations necessary seems amply justified. Specifications of stationary apparatus are prepared in careful detail and acceptance tests carried out in great exactness, but the tendency to slight the railway motor problem, owing largely to its seeming complexity, is hardly warranted, when it is considered that the capital invested in such apparatus may be double that required for generator power to drive it. Then, too, the generator is carefully housed, provided with an attendant and otherwise taken care of, while the motor is exposed to outside climatic conditions and only gives evidence of being overloaded by burning out. The selection of such apparatus should receive the most careful attention, the proposed service conditions fully worked out and the proper size of motor and correct gearing chosen to insure a reasonably small expense for maintenance.

The present method of rating railway motors is to determine the current which they will carry at 500 volts on a stand test giving a temperature rise of 75 degs. C. in the hottest part after 60 minutes' run. In other words, the 1-hour rating of railway motors gives only an indication of the comparative capacity of two motors in actual service, and affords no data to serve as the basis of calculating the service capacity of the motor. It does determine the mechanical qualities of the motor, as the 1-hour test is generally very severe, and it also affords a means of observing commutation at the maximum current for which the motor will probably be called upon in service operation. Some method of rating railway motors which would give an accurate comparison of their service capacity under different conditions, if such a rating is possible, would be of great advantage over the present very general 1-hour rating.

The foregoing investigation has pointed out the very variable nature of the work which a railway motor has to do, and the different relations between service performed, distribution of losses and the ultimate heating of the motor. In Fig. 3 the various motor losses are shown for the type "H" motor, taken as an example, but it is evident that different motor loss curves, even for the same service performed, could not be compared directly with any assurance of arriving at their comparative temperature rise. Proceeding further, we come to the values given in Fig. 6, showing the relation between motor losses, their distribution and the resulting temperature per watt loss. Similar curves of different motors could be compared directly and give some means of their relative capacity, but here, also, there is no direct comparison, as different motors do not have the same efficiency, and therefore will not give the same loss for the same service performed. In other words, two motors having the same thermal constants, that is, the same degrees rise per watt loss, the motor having the poorer efficiency will rise to a higher temperature for the same service performed, owing to its greater loss. We cannot, therefore, look to the thermal curves as giving the comparative rating needed.

In Fig. 7 we have a fairly complete history of the type "H" motor operating under a given set of assumptions. These assumptions are those pertaining to service operation, and such a set of curves for another motor calculated for the same conditions would give accurately the comparative size, or, in other words,

the comparative temperature of the two motors for the same service performed. In Fig. 7 the "service capacity curves" approach much nearer to a basis of comparing different motors, but as a method of rating railway motors it is incomplete. In the first place, we have assumed a given rate of acceleration, while it is obvious that the demands of different classes of service, especially low speed service, will call for different rates of acceleration, and hence a separate sheet would have to be made out for every rate of acceleration. The effect of increasing the rate of acceleration and increasing the time of coasting is shown in Fig. 9, giving such discrepancy between tons per motor for a given temperature as to make sheets similar to Fig. 7 entirely unreliable for comparing different motors, especially when the maximum speeds are low and the acceleration energy is the determining factor in the motor heating.

There is another variable, the rate of braking, which has not been entered into in this discussion, and which also affects the heating of the motor, especially on low speed high acceleration problems. On the higher speed problems, where friction is the ruling factor, it is found that we must also assume a certain friction rate, or, in fact, a friction curve plotted to a definite formula in order to arrive at consistent results with different motors. Having once determined on this friction curve for a single car, our calculations are immediately disqualified when we couple two of these same cars together and perform the same service, the

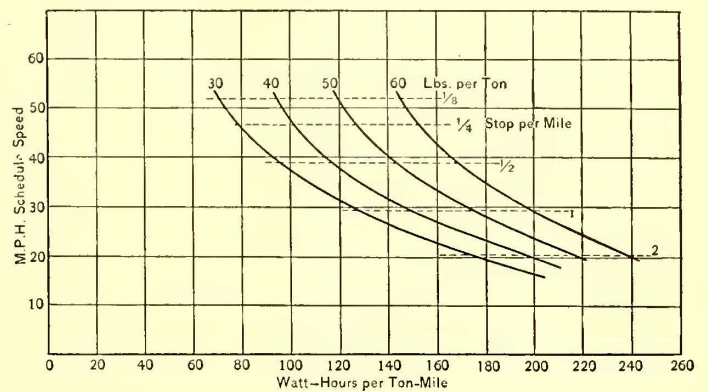


FIG. 12

friction rate at speeds of 50 or 60 mph falling off considerably as we approach a train composed of several units.

In addition to the foregoing variables, we have the element of the energy consumed by the rotating parts during acceleration. This factor is practically negligible at very high speeds, but figures very prominently in acceleration problems with low speeds. In giving the rating of a railway motor, it will be necessary, therefore, to fix definitely upon the weight and center of gyration of car wheels and armatures, and furthermore determine the effect of the motor parts for a given gear ratio.

After all these variables are definitely fixed, we must repeat the same set of conditions for each motor gear ratio, or, as a more general case, for each different maximum speed on level, thus eliminating the question of the total number of teeth in gear and pinion. It is not intended in any way to discourage an effort to rate a railway motor by the same method that will give its comparative capacity, but it is well to canvass carefully the large field of variables which must enter into such a rating, and to have clearly in mind the bearing which these different variables have in determining the temperature of the motor. It is evident that by affixing certain values to accelerating rate, train friction, braking effort, energy of rotating parts, etc., it will be possible to prepare a set of curves giving the relation between schedule, frequency of stops and temperature rise for any car weight, which would give accurately the comparative size of a railway motor in relation to any other motor for which curves were similarly plotted. Such work is being done by the General Electric Company on their standard railway motors, and, in fact, it is necessary, in order to be able to give the probable performance of a motor under any set of conditions, and follow through the effect of changing the conditions. The method, however, is cumbersome, and has so many factors entering into the case that it probably may never serve as a commercial rating; furthermore, such relation could only be expressed by curves, or a long, tabulated statement, and neither method is short and concise enough for a commercial rating.

As a result of considerable investigation along these lines, the writer has not arrived at any commercial rating of a railway motor which serves its purpose better than the 1-hour test now universally used. Admitting that such a test does not give the com-

parative size of different motors, it does serve the purpose of largely determining its commutating qualities and possesses the advantage of being commercial. Unless a rating can be proposed which will indicate accurately the relative size of motors, the present method of 1-hour rating possesses advantages which would hardly warrant its being superseded.

Although insufficient data is at hand from the foregoing calculations to form the basis of a complete treatise on the subject of train energy, sufficient material is provided to furnish some very interesting comparisons. As the basis of calculations, we assume the operation of single-car trains composed of 25, 35 and 45-ton cars, geared for a maximum speed of 60 mph for the 35-ton car. From our friction curves we find that these three cars at 60 mph require a tractive effort of 5 lbs., 50 lbs. and 43.5 lbs. per ton respectively. The same calculations were carried through for trains composed of two cars or more, the cars being of different weights, so that we are able to plot a set of curves showing the relation between schedule speed and watt hours per ton per mile input to the train, virtually ignoring any fixed formula for train friction. Such a set of curves is shown in Fig. 12, being plotted for 30, 40, 50 and 60 lbs. per ton friction rate at 60 mph. These curves may be regarded as fairly general in their scope, except that they follow the general form of the friction curves given in Fig. 1. In other words, we can get from these curves in Fig. 12 the energy consumption for any friction rate at 60 mph, the error introduced by assuming a general shape of curve being very small.

An inspection of Fig. 12 brings out forcibly the fact that the

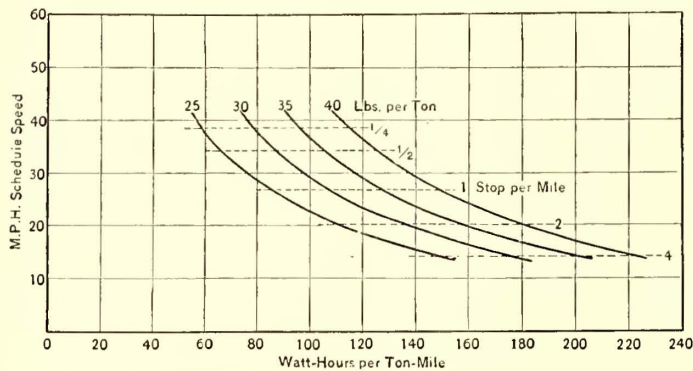


FIG. 13

subject of car energy at high speed is most intimately interlinked with the question of train friction. As the schedule speed decreases with the increasing number of stops, or, in other words, as the energy of acceleration becomes a more important factor, the per cent difference between the energy values for different train frictions becomes less, as would be expected.

The electric road has almost universally used one car units, and as it has branched out into suburban high-speed work the advantages of more frequent service have made the operators of such roads retain the single car idea. From the curves given in Fig. 12 some figures can be secured of what it costs to operate a single car, and also trains of two or more cars, where the maximum speed is 60 mph and the stops very infrequent; that is, the more advanced type of our private right-of-way suburban road. A single 35-ton car having a friction, say, of 50 lbs. per ton at 60 mph will consume 119 watt hours per ton mile at a schedule of 52 mph with one stop in eight miles. Let two such cars be coupled together in a train, reducing the friction to 33.5 lbs. per ton, and the train will require an input of only 78 watt hours per ton mile, of 65.5 per cent of the energy rate per ton required in a single car operation. In other words, single cars on 30-minute headway would require 52.5 per cent more energy for their operation than would two-car trains on 1-hour headway. With five-car trains composed of 35-ton cars, the energy is reduced to 56 watt hours per ton mile for the same schedule, or less than half what will be required per ton for the operation of single car trains.

From a purely energy standpoint it would seem that the operation of single-car trains was disadvantageous, but experience has shown that it is not fair to assume that two cars operated every hour will attract the same custom as one car operated every 30 minutes. In other words, the frequency of service creates travel, and in many cases warrants the extra expenditure for coal. There is another aspect of the case to be considered, and that is that with two-car train at more infrequent intervals the load upon the feeding points is more fluctuating, the size of rotary converters must be somewhat increased, and in all probability a larger amount of feeder copper will be required to keep the drop within the same limits. Although a saving may be effected in the coal pile by in-

creasing the train headway and giving the same seating capacity in trains of two or more cars, there is every reason to expect a call for a greater expenditure of money to install the road, and an increase in interest and maintenance account that may go far toward eating up the saving in the fuel expense.

In Fig. 13 and Fig. 14 are given curves showing the relation between schedule speed and train energy for maximum speeds of 45 and 30 mph respectively. It will be noticed that, particularly for 30 mph maximum speed, the train friction becomes a very much smaller factor in determining the energy input, especially as the number of stops per mile increases.

All these three sets of curves are plotted for an accelerating rate corresponding to 120 lbs. per ton and a braking effort of 150 lbs. per ton. The values given will, therefore, be subject to considerable variation for different accelerating and braking efforts where the schedule speed is low and stops numerous. The curves are, however, of fairly general use, especially for runs of a mile or more, as the effect of rate of acceleration and braking is not so marked on longer runs.

In Figs. Nos. 12, 13 and 14 is considered, also, a period of coasting equaling 10 per cent of the time the train is in motion. While this is a fairly general assumption and will give sufficient margin for a large majority of problems, it will be found in carrying out the subject to a conclusion that the per cent of coasting is a very large factor in determining the train energy output. For instance,

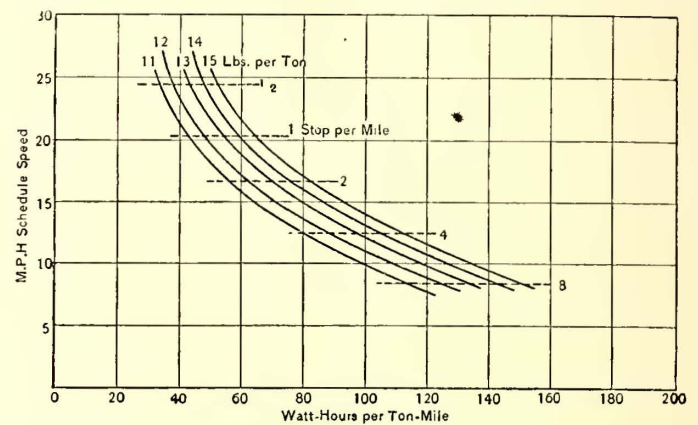


FIG. 14

a high rate of acceleration with a long period of coasting will demand less energy input to the train than a lower rate and little or no coasting. The reason for this is obviously that the efficiency of acceleration of two runs may be approximately 70 per cent, while the speed at which brakes are applied is less with a longer coasting period, and hence the work demanded by the equipment is less.

In all three of the energy curves given a variable friction during acceleration and coasting is considered, but straight line braking is assumed. The energy required to accelerate the rotating parts is also considered, so that the curves as given are of fairly general application.

In this paper the writer has attempted to outline a method of determining the probable heating and energy consumption of a given equipment for any class of work, having in mind, also, the possibility of arriving at some short, concise method of rating different railway motors, so that their comparative service capacity might be accurately indicated. As the subject of motor capacity is so dependent upon experimental tests, not only of car friction and braking, but also of heat radiation under working conditions, the conclusions drawn were based, so far as possible, upon actual experiments made. Were it not for the fact that car friction, or, rather, train friction, is such a variable quantity, dependent not only upon the condition of track, but upon the speed and composition of the train, it would be possible to plot a set of curves for a given friction and distance, and apply these curves for similar shaped runs over greater or less distances by taking the co-ordinates proportional to the square root of the area of the speed time curves, that is, proportional to the square root of the distances covered. As, however, the wind friction at the higher speeds changes the value of friction per ton to such an extent, it is only possible to draw up curves for a given set of conditions and generalize, as is done in Figs. 12, 13 and 14, for different friction parts.

While it is thus possible to prepare a set of energy curves which are of fairly general application to all problems, it is only feasible to express the relation between motors of different capacity by a series of curves similar to those described in Figs. 7, 8, 9 and 10.

It is entirely possible to approximate the probable heating of motors of different sizes when the resistance, core loss and general construction are known, but such short-cut methods are at best only approximations, and no true comparison of different motors can be made which will take into account their different losses for the same work performed and their capacity for radiating these losses at different speeds, without considering the subject in detail for each motor alone along the general lines indicated in this paper.

In dealing with the railway motor where the temperatures approximate 60 degs. C. rise in practice, with an air temperature in summer reaching 30 degs. to 35 degs. C., we have not much leeway below a temperature injurious to the insulation, and approximate methods giving rise to errors of 10 degs. or 20 degs. C. in temperature cannot be seriously considered in such important calculations as the determination of railway motor temperatures. For this reason the methods outlined, although entailing a large amount of experimental work and subsequent calculations, provide an accurate method of determining the temperature of railway motors operating under any known conditions, and although they fail to provide a method of rating railway motors, it is due to the fact that such a method of rating cannot be expressed by any short term, but necessitates some such general curves as are indicated in the paper.

The writer wishes to acknowledge the services of E. F. Gould in preparing material for this paper, and the kindness of the General Electric Company in furnishing results of experimental tests which served as a basis of all calculations.

Tunnel Franchise

The terms of the tunnel franchise of the Pennsylvania Railroad Company, granting permission to build a subway under Manhattan and connecting Jersey City and Long Island, were adopted by the Rapid Transit Commission on Monday as reported by the committee. Under this contract the Pennsylvania Company must begin construction within three months after obtaining the necessary consents and must complete the railroad within five years, the railroad to be entirely in the tunnel except where it approaches the Thompson Avenue terminal in Queens; the excavations to be done without disturbing the surface of the streets; the company to make good all damage done to public and private property; the tracks to be so constructed as to avoid noise or tremor; the motive power to be electricity; the city to have a lien on the franchise and real property of the company to secure the payment of rental; the company to have no right to carry local traffic except for additional consideration to be paid to the city, and the city to have a right to examine the railroad at all times, either to see if it is operated with due regard to the convenience of the public or for other purposes.

In the matter of compensation, it is provided that \$75,535 shall be paid each year for the first 10 years and \$114,871 each year for the next 15 years, aggregating \$2,478,415 in the first 25 years of the contract. Although the franchise is to be a perpetual one, it is provided that the rental shall be readjusted every 25 years. The annual charges for the first 10 years and the following 15 years have been arranged as follows:

	First 10 Years	Next 15 Years
For river rights	\$200	\$200
For tunnel rights in Manhattan Borough, being 44,341 ft. (partly estimated) of single track.....	22,170	44,341
For tunnel rights in Queens Borough, being 8100 ft. (partly estimated) of single track.....	2,025	4,050
For street rights on Thirty-First and Thirty-Third Streets, north and south of terminal.....	14,000	28,000
For secondary station at Thirty-Third Street and Fourth Avenue	1,140	2,280
For portions of Thirty-Second Street.....	36,000	36,000
In all, yearly	\$75,535	\$114,871

Permission is granted the company to build two tracks from Jersey City under the Hudson River to the foot of West Thirty-First Street, beneath that street to the East River and thence to a terminus in the Borough of Queens. The right to build two tracks from Jersey City under Thirty-Second Street is granted, with a provision for additional tracks west of Ninth Avenue and between Seventh and Fifth Avenues. Two more tracks are to be permitted under Thirty-Third Street from the Seventh Avenue Station to the East River and thence to Queens. The terminal station in Manhattan will be in the four blocks bounded by Thirty-First Street, Seventh Avenue, Thirty-Third Street and Ninth Avenue, including the lots on the east side of Seventh Avenue from Thirty-First Street to Thirty-Third Street, and the underground portions of those two streets between Seventh and Ninth Avenues. The com-

pany is to acquire all the land for the terminal. Thirty-Second Street will be closed from Seventh Avenue to Ninth Avenue, the company buying the street space as soon as the city obtains a statutory right to make the conveyance of the property. There is to be a subordinate station under Thirty-Third Street extending from 400 ft. west of Fourth Avenue to 600 ft. east of it.

Before the contract can be executed the terms of the franchise must be approved by the Board of Aldermen, the Board of Estimate and Apportionment and the Mayor. It is not anticipated that any objections will be raised, as it is generally recognized that the city has secured a very favorable deal and the railroad company is anxious to proceed with the work at once.

Chicago Street Railway Franchise Renewals

In all the discussions which have taken place during the last two years on the subject of renewal of street railway franchises in Chicago the operating companies have taken but little part. Indeed, no formal action of any kind looking toward franchise renewals had been taken by them until President Hamilton, of the Chicago City Railway Company, last week addressed a letter to the Mayor on behalf of the South Side Company. As the Council had passed a resolution asking the Chicago City Railway Company and the Chicago Union Traction Company to begin negotiations for the renewal of franchises June 15, the Chicago City Railway has responded as follows, under date of June 13:

Your invitation to the Chicago City Railway Company to confer with the representatives of the city of Chicago upon the subject matter tentatively outlined in the report of your committee on local transportation, with a view of arriving at some satisfactory conclusion as between the city and this company, is accepted, with the assurance that this company is ready and willing to furnish you with such information as may be necessary, and at your suggestion to assist and advise, so far as possible, in the solution of the questions involved.

Under the conditions now existing in Chicago President Hamilton is undoubtedly pursuing a wise course in practically throwing the burden of formulating propositions upon the local transportation committee of the Chicago City Council. That committee already has its ideas, as formulated in the report presented last winter (STREET RAILWAY JOURNAL, Dec. 28, 1901), and it has further secured an expert engineer to report on various questions that come up in connection with granting the franchises. Any ordinance the company might propose would be tossed about and torn to pieces by the city officials and the daily press, and it is much more sensible to let the city take the initiative. The company can then accept or not, as it sees fit, and can refuse to accept any terms that are too burdensome. The officers of the Chicago City Railway have many times indicated in conversation with city officers and by published interviews their willingness to give the South Side of Chicago the finest system of surface transportation in the world, if only satisfactory terms of franchise were granted.

In an interview in the Chicago Record-Herald, following the publication of the foregoing letter, President Hamilton said, in part:

"It is now the city's move. We have always been ready to come to some determination by which the question might be settled, but it is not for us to prescribe a method of procedure. This is a serious matter, not alone for us, but for the city. We are ready to compensate the city for the extensions and to undertake any reasonable obligations that the city might demand. I am not prepared to discuss what we want; that is for negotiation."

"Are any radical departures from present conditions contemplated?" Mr. Hamilton was asked.

"Yes. The cable for downtown traffic is out of the question. We shall have to use electricity—overhead in the outlying districts, and I am willing to try the conduit trolley downtown, but I am not at all sure that it will meet all the requirements. Whenever it rains hard, on account of the dead level of the city, the sewers back up into the conduits, and unless we can devise some way of preventing it I greatly fear that it will be impossible to maintain our insulation.

"Is it possible to provide a downtown system of loops that will accommodate all the cars of all the lines?"

"Certainly not; our cars alone, taking those of the Wabash, State and Clark Street lines, would never be able to get over one loop. But our Wabash Avenue and State Street loops will do us as they are, even under the contemplated improvements, and will handle all the traffic, but we shall have to make some disposition of the Clark Street terminus. That is going to be our heaviest traffic in the near future."

"Have you given any thought to an underground union loop?"

"Yes; but it would be out of the question for any road to build it with a 20-year franchise. If it could be done at all it would be better undertaken by the city or by a separate company."

Mr. Hamilton said further that the company had already secured property at Thirty-Ninth and Halstead Streets for an immense power house, and that as soon as the franchise question was settled a power house to cost nearly \$3,000,000 would be constructed, and that instead of the present 500-volt current for power a voltage approximately 11,000 would be used.

"We have now about 600 tons of copper wire in use," he concluded, "and if we are to keep the same voltage as we have now, with the increased mileage that we shall have to put in, the interest on the cost of copper wire would not be earned by the company, much less allow for the necessary dividends to stockholders."

In the same article Mayor Harrison is again quoted as being opposed to any franchise grants whatever until the State Legislature passes an act enabling the city to buy the street railways.

A dispatch from Chicago, dated June 16, announces that John M. Roach, president of the Union Traction Company, operating the surface lines on the north and west sides of Chicago, has accepted the invitation of the City Council to confer with the local transportation committee on the subject of renewing the franchises now held by that corporation. The text of the letter is not given in the dispatch, but it is stated that the company made it clear that in opening negotiations in the matter of franchise renewals it did not care to prejudice its claims under the 99-year act, which was the subject of a recent suit in the Federal Court.

Everett-Moore Affairs

Important steps were taken last week in the work of settling up the affairs of the Everett-Moore Syndicate, and it is now announced that the syndicate will speedily assume control of the properties which remain and will be on a sound financial basis. Through Kean, Van Courtland & Company, of New York, the syndicate has disposed of 40,000 shares of the stock of the Toledo Railways & Light Company. This deal netted the syndicate \$22 per share, or \$880,000 in cash, upon which an average of less than \$10 per share has been borrowed. The stock cost the syndicate between \$12 and \$14 per share. Deliveries will be made July 15 and August 1, 20,000 shares on each date. The stock sold, together with the remaining Everett-Moore holdings of 30,000 shares, will be pooled until July, 1903. The property will continue under the control of the syndicate, with Albion E. Lang remaining as president.

Another transaction was the sale to the bond houses of Claude Ashbrook and W. E. Hutton, of Cincinnati, and Denison, Prior & Company and Lamprecht Brothers & Company, of Cleveland, of all the preferred stock in the Northern Ohio Traction Company in its control. The price obtained was between \$80 and \$85. The syndicate will continue the control of the property through the ownership of 25,000 shares of the common stock which will be retained.

It is stated that only one traction property controlled by the syndicate is now for sale—the London (Ont.) Street Railway. This will not be sold except for a good price, as it is considered a very valuable property. In its telephone interests, the syndicate is disposing of several of the subsidiary properties of the Federal Telephone Company, and the others will soon be in very good shape.

There are several remarkable features about the manner in which the tangled affairs of this syndicate have been straightened. Only a single property, the Cleveland Electric Railway Company, has passed wholly out of its control. Within a short time practically all of its debts will have been taken care of and the syndicate will still be in control of a vast system of interurban electric railways extending from Painesville, Ohio, to Flint and Port Huron, Mich. The independent telephone system of Ohio will also continue to be dominated by the Cleveland people, although it seems quite probable that the long-distance system will pass from its control. A matter of congratulation not only to Messrs. Everett and Moore, but to every one interested in electric railway properties, is that the securities of these companies were not sold at panic prices. On the contrary, the longer the bankers' committee dickered the better prices it demanded. In the early stages of the settlement the entire interests of the syndicate in the individual properties were offered at low clearance prices, but as the true value of the roads came to be appreciated the prices advanced. For instance, the entire interests in Detroit United were offered at 70. A portion of the interests were finally disposed of at 72, and later blocks sold at between 75 and 80. The price obtained for the Toledo stock was also considerably better than was expected. That affairs are now on a very satisfactory basis is shown by the fact that Henry Everett and Albion E. Lang have gone to the Rocky Mountains on an extended hunting trip.

Topics of the Week

The twenty-hour trains between New York and Chicago have revived the discussion of the possibility of reducing the time limit between large cities by the introduction of electric locomotives instead of the present steam engines. The adoption by the Pennsylvania Company of electricity for the operation of trains in the Manhattan tunnel may be the entering wedge. The New York Central has plans for a similar equipment for its New York terminal, but has not yet agreed upon terms with the city for the improvement of its terminal facilities.

In pursuance of a custom started about five years ago the Woman's Christian Temperance Union recently presented a floral token to every motorman and conductor employed by the Union Traction Company, of Philadelphia. Shortly after daybreak groups of women, tugging huge clothes baskets filled with flowers, appeared at the different car houses of the company, and as each trolley operative reported for duty a fragrant boutonhole bouquet was given him. Attached to each boutonniere was a tiny strip of ribbon bearing some Scriptural text.

Charles Stewart Smith, of the Rapid Transit Commission, is quoted as saying that President Cassatt, of the Pennsylvania Railroad Company, assured him that the railroad company is convinced that it is entirely practicable to build electric motors that will draw a 500-ton train through the proposed tunnel from Jersey City to Queens Borough, through and under Manhattan Borough, at the average rate of 35 miles an hour. Mr. Cassatt is further quoted as saying that the Pennsylvania Company contemplates contracting for an equipment of this kind immediately, and that the construction of a power house will be commenced at once.

The enforcement of the Jim Crow law in Virginia resulted in a curious complication last week, and one that could scarcely have been anticipated when the act was passed. Miss Mary Custis Lee, daughter of General Robert E. Lee, was arrested at Alexandria on the charge of riding in an electric car intended for the exclusive use of colored passengers on the Washington, Alexandria & Mount Vernon Street Railway. Miss Lee boarded the car at Washington and refused to transfer when requested to do so by the conductor. After repeated warnings she was placed under arrest, and the following day a fine of \$5 was imposed upon her by the police magistrate. Miss Lee had been paroled, and did not appear in court. It was stated at the hearing that Miss Lee had offended in this manner before, but that out of consideration severe measures had been avoided. The magistrate created a mild sensation by commending the conductor for fearlessly discharging his duty.

During the last week the complaints against the Manhattan Elevated Railway Company for burning soft coal on the Ninth and Sixth Avenue lines have been so numerous that the Health Commissioner appealed to the District Attorney and the Corporation Counsel for an opinion as to his official duty. On Monday, as the result of a conference, it was decided to lay the matter before a police magistrate, and an application was made for a warrant against officials representing the Manhattan Company. This was denied by the magistrate, but a summons was issued directing the company's representatives to appear in court in order to submit to an examination as to the actual condition of affairs. It has been intimated that the Manhattan Company is using soft coal merely because of the advance in the price of hard coal due to the strike, but the officials of the company declared that it was impossible to get suitable hard coal. It was explained that 4,000 tons of coal a week were required for the operation of the trains on the Ninth and Sixth Avenue lines, and that at the time of the strike, the company had 15,000 tons of hard coal on hand, and 50,000 tons in the yards of the railroad companies, but that the latter supply was confiscated by the railways as soon as the strike was declared. The company admits that it is using soft coal mixed with anthracite, and that it is compelled to do this because it has been unable to secure an additional supply of hard coal. If the courts insist upon the enforcement of the ordinance against burning soft coal, the railway officials say, it will be necessary to stop the operation of all the trains excepting those which are operated by electricity. The company has advertised in the daily papers for hard coal, but it is not very hopeful of the results. The city government recently advertised for anthracite coal, but did not receive a single bid, and has since been unable to secure coal in the open market. The officers of the railway company say they will have no difficulty in convincing the court that they have done everything in their power to comply with the requirement of the ordinance, but that under existing circumstances it is simply impossible for them to operate their trains unless they are permitted to burn soft coal.

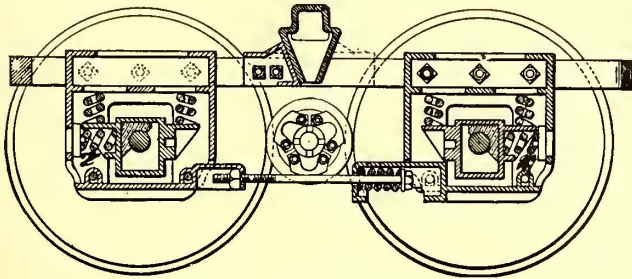
Street Railway Patents

[This department is conducted by W. A. Rosenbaum, patent attorney, Room No. 1203-7 Nassau-Beekman Building, New York.]

UNITED STATES PATENTS ISSUED JUNE 10, 1902

701,837. Bolster for Cars. S. P. Bush, Columbus, Ohio. Application filed Aug. 19, 1901. An integrally formed compression member and strut in connection with a single-plate tension member.

701,877. Sanding Machine. O. S. Hammond, Toronto, Can. Application filed Jan. 25, 1902. Sand conveyors at the mouth of the hoppers are rotated step by step by means of a treadle to convey sand to the rail.

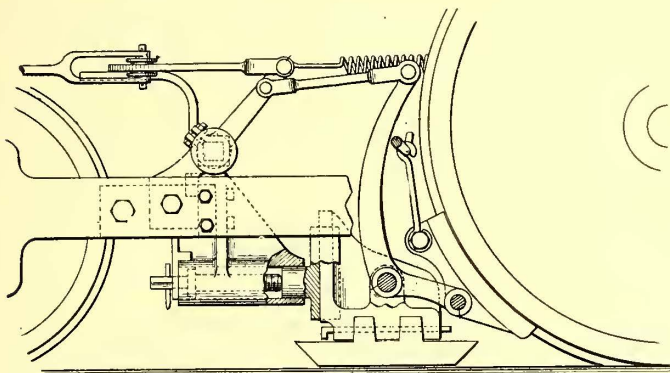


PATENT NO 702,025

701,889. Switch-throwing Device. C. C. James, Memphis, Tenn. Application filed Sept. 6, 1901. The motorman can throw the switch by depressing a foot-operated mechanism which throws an arm into engagement with a lever immediately before the switch is reached.

701,920. Bolsters for Railway Cars. G. C. Murray, Chicago, Ill. Application filed March 8, 1902. The bolster is provided with a compression and a tension member separated by a strut; the ends of the tension member pass through and around the ends of the compression member.

701,945. Car Fender. E. A. Sample, Fredericktown, Mo. Application filed Jan. 14, 1902. Details.



PATENT NO. 702,384

702,025. Friction-Driven Truck. J. F. McElroy, Albany, N. Y. Application filed Dec. 15, 1898. A construction of truck whereby a positive friction is maintained between a motor-driven roller and the truck wheels regardless of the amount of load carried by the truck.

702,141. Railway Construction. G. L. De Lencheres, Vierzon, France. Application filed Dec. 26, 1901. The track consists essentially of siderolite longitudinal supports assembled with siderolite ties which afford a solid foundation for the rail.

702,231. Track-Sanding Device for Railroads. A. C. Monfort, East Providence, R. I. Application filed March 6, 1902. Details.

702,384. Brake Mechanism. L. Van Cott and J. D. Keiley, New York, N. Y. Application filed May 18, 1901. Mechanism actuated from the vehicle wheels for setting a wheel brake and a track brake.

PERSONAL MENTION

MR. EDWARD McDONNELL, of Niagara Falls, for several years superintendent of the Buffalo and Niagara Falls branch of the International Railway Company, has been appointed assistant general manager of the International Traction Company.

MR. S. L. TONE has been appointed second vice-president of the Pittsburgh Railways Company, a newly created position. Mr. Tone has been assistant to President James D. Callery, of the company, and prior to the consolidation of the Pittsburgh companies was chief engineer of the United and Southern Traction Companies.

MR. W. J. HEALY, cashier and paymaster of the Mexican Electric Tramway Company, of Mexico City, is visiting the United States and is now in Dayton, Ohio, for the express purpose of studying the Ohmer fare register and its best application to the Mexico Tramway Company's lines, 300 cars of which are to be equipped with Ohmer registers.

MR. W. T. THOMPSON, formerly master mechanic of the Kings County Elevated Railroad, of Brooklyn, N. Y., has been appointed assistant to Consulting Engineer George Gibbs, of the Rapid Transit Subway Construction Company, of New York City. Mr. Thompson's principal work will be in connection with the rolling stock of New York's new underground railway.

MR. DAVID YOUNG, JR., the son of the president of the New Jersey Street Railway Company, has been elected president of the Orange Mountain Traction Company, of Orange, N. J. Mr. Young is a graduate of Newark Academy, and has supplemented the training he received there with many months of practical training as an employee of the New Jersey Street Railway Company.

MR. F. N. BUSHNELL, chief mechanical engineer of the Union Railroad, of Providence, R. I., and the Naragansett Electric Lighting Company, has been appointed chief engineer of the Union Railroad, Rhode Island Suburban Railway, Inter-State Consolidated Street Railway and the Pawtucket Street Railway, succeeding Mr. George B. Francis, resigned, who has become connected with Westinghouse, Church, Kerr & Co.

MR. JAMES F. JACKSON, chairman of the Boston Rapid Transit Commission, and Mr. George F. Swam, professor of civil engineering in the Massachusetts Institute of Technology and chief engineer to the commission, have sailed for Europe, and while abroad will inspect new subways and investigate the use of electricity as a railway motive power, paying special attention to the rapid-transit systems in and about London, Berlin and Paris.

MR. FRANK J. DUFFY has resigned his position as superintendent of transportation of the Richmond Traction Company, to accept a similar position with the Savannah Electric Company, and will enter upon the duties of his new position at once. The Savannah Electric Company operates all the street railways of Savannah, Ga., and is controlled by Stone & Webster, of Boston. Mr. Duffy has made an excellent record at Richmond, and his resignation will be the cause of much regret on the part of the management.

MR. F. C. BOYD, of New Haven, Conn., has recently returned from Logansport, Ind., where he has been spending six weeks in the interest of the Wabash & Logansport Traction Company, of which he is vice president. Mr. Boyd is looking after the construction of the new line now being built between Peru and Logansport. This line will be opened for traffic in the middle of September. When this is completed there will be through traffic between Wabash and Logansport. Further extensions are contemplated. The whole system when completed will exceed 50 miles in length and will be one of the important systems in the Middle West. A power station of 1500 hp is soon to be erected at Logansport.

MR. D. S. SMITH, superintendent of the Twin City Rapid Transit Company, of Minneapolis and St. Paul, has accepted the position of general superintendent of the Brooklyn Heights Railroad Company, of Brooklyn. Mr. Smith will have charge of the operation of both the elevated and surface systems. The organization of the company has recently been considerably changed, and the repair shops for the elevated and surface lines which were formerly under one management are now entirely distinct, the master mechanic of each division reporting directly to the general superintendent. Mr. Smith will have entire control of the Brooklyn system outside of the power stations and track work. He was connected with the Twin City Rapid Transit Company for about eight years and is thoroughly familiar with every detail of practical street railroading. He is an indefatigable worker and enjoys an enviable reputation because of his work in perfecting the mechanical and operating organization of the St. Paul road, which was under his supervision.

LEGAL DEPARTMENT

CONDUCTED BY WILBUR LARREMORE OF THE NEW YORK BAR

Slippery Platforms and Steps

In *Herbert vs. St. Paul City Railway Company*, recently decided by the Supreme Court of Minnesota (88 N. W., 996), the rule is laid down that a street railway is required to exercise the highest degree of care to keep its platforms and steps in safe condition for use in the season when operated, so far as it practically can do so, in consideration of the climate, temperature and condition of the air with respect to snow, moisture and frost. In the application of this general rule the defendant railway company was held liable for personal injuries sustained by a passenger in attempting to leave a car through slipping upon ice or snow on the steps of the platform. The facts as to the probable time when the ice or snow formed upon the steps are not very fully set forth, but there is a statement in the opinion that "two days before the accident 2.8 in. of snow had fallen; that the ground was at the time covered with snow," from which the inference is suggested that the steps might not have been cleared of snow which gathered upon them two days before the time when the plaintiff slipped and fell. If this were the truth, it cannot be said that the action of the court was improper.

Under the rule here stated and according to many similar authorities, a street railway company is under obligation not to send out cars with slippery steps, if such condition can, by the exercise of the utmost care, be avoided. Incrustations of snow or ice should be removed before starting a street car on a trip, and cars should not be suffered to leave the yard with very wet steps on very cold days, so that a coating of ice would be formed almost immediately upon being exposed to the air. It might not be held that permitting a car to go out with wet steps would constitute negligence as a matter of law, that is, negligence for which no excuse would be accepted. The question of inherent liability would probably depend to some extent upon the peculiar facts involved, but the burden of explanation would be upon the company under such circumstances, and, of course, it would be far more prudent to see that car steps were dry, or practically dry, before exposing them to a very low temperature.

With regard to platforms and steps that become slippery during a trip, the courts have justly evinced a very considerable leniency. There are several decisions upon the point in steam railway cases, and the principles laid down would substantially apply to street railways. A somewhat peculiar case was adjudicated by the Supreme Court of New Jersey in 1900 (*Proud vs. Philadelphia & Reading Railroad Company*, 64 N. J. law, 702). The plaintiff boarded a train at the Reading terminal in the city of Philadelphia to go to the Huntington Street station, in the same city, a distance of from 2 to 3 miles. When the train stopped at its destination plaintiff, in attempting to alight, lost his footing on some offensive matter with which the steps were covered. The matter was not frozen, though the night was cold, which tended to show that it had been recently deposited. There was also evidence to show that the cars had been inspected in the depot by employees of the company ten or fifteen minutes before the train started, and that the car steps in question were then in good condition. The court accordingly said: "The nuisance was one of the existence of which neither the conductor nor a brakeman would naturally have notice or warning. The evidence, therefore, would not have justified the jury in concluding that the defilement of the steps was a thing that the employees of the defendant should have apprehended or looked for or discovered. It is against dangers which may reasonably be expected by a carrier that it must exercise a high degree of care on behalf of its passengers. As the proof does not show that due care would have prevented the accident, it does not support a verdict for the plaintiff."

A case illustrative of the same judicial spirit and attitude is *Palmer vs. Pennsylvania Company*, in the Court of Appeals of New York (111 N. Y., 488). It was held that a railroad corporation is not required to remove immediately and continuously snow and ice on the platforms of cars attached to a train traveling at night during a continuous storm, or to cover them with sand or ashes in such a manner that no slippery places shall be exposed. It can only be held responsible for dangers produced by the ele-

ments when they have assumed a dangerous form, and it has had an opportunity to remove their effects.

It appeared that plaintiff, while a passenger on defendant's road in the night time, slipped and fell from the platform of a car and was injured. In an action to recover damages there was evidence sufficient to justify a finding that there was a thin covering of snow upon the platform and some slight spots of ice around its edges, both of which had gathered during the trip. It had stormed during the night and the weather was cold and freezing. The platform was well constructed with proper and convenient steps and with hand rails on either side. It was held that the evidence failed to establish defendant's liability, and that a submission of the case to the jury was error. (See also *Kelly vs. Manhattan Railway Company*, 112 N. Y., 443.)

LIABILITY FOR NEGLIGENCE.

ALABAMA.—Street Railroads—Negligence—Crossing Accident—Collision with Hose Cart—Pleading—Complaint—Allegations of Negligence—Sufficiency—Jury Question—Contributory Negligence.

1. An allegation in a complaint in a street car crossing accident case that plaintiff suffered the alleged injuries as the proximate consequence of the negligence of defendant, through its employees, in the management and control of its cars, is a sufficient allegation of negligence.

2. An allegation in a complaint in a street car crossing accident case that defendant recklessly and wantonly or intentionally caused the alleged injuries, in that defendant, through its servants and agents, recklessly and wantonly or intentionally caused such collision, is a sufficient allegation that the injuries were wantonly, willfully, or intentionally inflicted.

3. Where the concurring negligence of the driver of a hose cart and employees in charge of a street car results in a collision, the negligence of the driver cannot be imputed to a fireman riding on the truck, but having nothing to do with the driving, who is injured in the collision, and it will not preclude him from recovering from the street car company.

4. A hose cart, going about as fast as the horses could run, and with the gong sounding, collided at a street crossing with a street car; and plaintiff, who was a fireman on the cart, was injured. Plaintiff's witnesses testified that the cart had stopped before attempting to cross the street on which the cart was approaching, and that the motorman started his car without warning when the cart was only 18 ft. or 20 ft. from the intersection of the streets, and made no attempt thereafter to stop the car. One witness testified that the motorman was looking ahead when he started the car, and another that he was looking back through the car. Defendant's witnesses testified that the car did not start after it had stopped, and that the cart ran into it. Held, that the question whether the motorman saw or heard the approaching cart when he started the car, if he did start it, and willfully or wantonly, or with reckless indifference to consequences, failed to exercise proper care to prevent the collision, was for the jury.

5. The question whether a fireman, who has no time to put on his coat before responding to a fire alarm, and who is allowed to do so while on the cart on the way to the fire, is negligent in so doing, is a question for the jury, in an action for injuries received in a collision with a street car, in which the defendant contends that the fireman's negligence in attempting to put on his coat on the moving cart contributed to the injury.—(*Birmingham Ry. & Electric Co. vs. Baker*, 31 Southern Rep., 618.)

ALABAMA.—Carriers—Street Railroads—Action for Injuries—Railroad Crossings—Collision with Locomotive—Negligence of Driver—Violation of City Ordinance—Failure to Look and Listen—Real and Apparent Danger—Contributory Negligence—Leaving Moving Car—Instructions—Evidence—Proof of Ordinance—Record Copy.

1. A passenger who was injured by jumping from a moving street car which was about to be run over by a locomotive was under no duty to notify the driver that she wished to alight.

2. The violation by a street car driver of a city ordinance providing that street cars shall come to a complete stop before going onto railroad crossings is negligence.

3. It is negligence for a street car driver to drive his car onto a railroad crossing without first stopping and looking and listening for trains.

4. A complaint in an action for damages against a street railway company which averred that the car on which plaintiff was a passenger was "about to collide with" a locomotive sufficiently alleged that a collision was imminent.

5. A complaint in an action for injuries alleged that, just as defendant's street car on which plaintiff was a passenger went onto a railroad crossing, the driver turned to plaintiff and exclaimed, "The train is right on us!" whereupon plaintiff looked and saw an engine coming at a high rate of speed, and, it appearing that a collision was imminent, she attempted to jump off, and was injured by falling. There was in fact no collision. Held, that the complaint made a sufficient case of apparent necessity for plaintiff to leave the moving car.

6. Where the negligence of a street car driver in driving onto a railroad crossing without stopping to look for trains seemed about to result in a collision, and a passenger, in endeavoring to escape from the car, was injured by a fall, the driver's negligence was the proximate of the injury.

7. Where a passenger was injured while attempting to leave a moving street car which apparently was about to collide with a locomotive, the fact that the danger was only apparent did not make her action in leaving the car amount to contributory negligence.

8. The record of a city ordinance is admissible to prove the contents of the original.

9. The fact that the signatures of the Mayor and clerk to the record copy of an ordinance are not in their handwriting does not impugn the integrity of the record.

10. In an action for injuries received by a passenger while attempting to leave a moving street car which apparently was about to collide with a locomotive, the refusal to give an instruction that if plaintiff acted contrary to the way an ordinarily prudent person would have acted, and this conduct contributed to the injury, she could not recover, was error, where the subject of such instruction was not covered by any other instruction in the case.—(Selma Street & Suburban Ry. Co. vs. Owen, 31 Southern Rep., 598.)

ILLINOIS.—Elevated Road—Damages to Abutting Property.

Where an elevated electric railroad is constructed and operated on its own land, except where it crosses streets under license from the city, and is so constructed and operated carefully and without unnecessary obstruction, noise, jar, or disturbance, the fact that it crosses a street within 31 ft. of an expensive apartment house, and obstructs the view and passage to the premises, and that the noise destroys the peace and quiet of the premises, is not a taking or damage of such private property for public use, within the meaning of Const. art. 2, Sec. 13, which prohibits such taking without just compensation, and the owner of such house cannot recover damages therefor.—(Aldrich vs. Metropolitan W. S. El. R. Co.)

ILLINOIS.—Street Railroads—Injuries to Passenger—Instructions—Improper Modification—Harmless Error.

In an action against a street railway company for personal injuries, an improper modification of a requested instruction that, while the jury were the judges of the credibility of witnesses, they could not disregard the evidence of an unimpeached witness simply because he was an employee of defendant, but they must determine the credibility of such employee by the same tests applicable to other witnesses, by adding, "in the employ of an individual litigant," was not misleading, when the court gave a correct instruction for determining the credibility of witnesses, by stating that the jury, from the testimony in the case, were to decide the weight to be given to each witness.—(Cicero & P. St. Ry. Co. vs. Rollins, 63 N. E. Rep., 98.)

ILLINOIS.—Street Railroads—Action for Injuries—Persons Crossing Track—Instructions—Questions Left to Jury—Charges in Declaration—Materiality of Allegations—Burden of Proof—Damages—Specification of Limit—Modification—Change of Phraseology.

1. In an action against a street railway company for injuries received by plaintiff while crossing defendant's track, an instruction that if the jury believed from the evidence that defendant was guilty, etc., "as alleged in the declaration, or some count thereof," they should find for plaintiff, was not improper, in referring to the jury to the declaration to determine what the specific charges of negligence were, since, having the declaration before them, they could have no difficulty in ascertaining what the charges were.

2. The objection to the use of the word "should" in the instruction, as being in the nature of a command, was without merit.

3. The instruction was not improper as leaving the jury to determine whether the facts proved constituted the negligence sued for, since the instruction did not refer the question of materiality of the allegations to the jury, but simply directed them to look to the declaration to see what such allegations were.

4. Failure to refer in instructions given for plaintiff in an action for injuries to the burden on plaintiff to establish his case by a pre-

ponderance of the evidence was not error, where such question was properly presented to the jury in instructions give for defendant.

5. An instruction in an action for injuries that the jury should assess the plaintiff's damages, if any, in such amount as they might believe, from the evidence, he had sustained, "not exceeding" a certain sum, which was the amount claimed in the declaration, but was not so referred to in the instruction, was not erroneous, as tending to lead the jury to understand that they ought to allow the full amount so claimed.

6. Where an instruction in an action for injuries referred to the declaration, which was in several counts, as "the declaration," a modification by the court by adding "or some count thereof" was proper.—(Central Ry. Co. vs. Bannister, 62 N. E. Rep., 864.)

ILLINOIS.—Street Railroads—Negligence—Injuries to Passengers—Evidence—Admissibility—Sufficiency.

1. Where plaintiff in an action for injuries sustained while attempting to alight from a street car at a certain street testified on direct examination that the car stopped on both sides of the street to let off passengers long enough for him to have alighted, and testified on cross-examination that he gave no signal to the conductor in charge of the car that he wanted to get off, and that the conductor, so far as he knew, did not know of his intentions, it was not error to refuse to allow him to state on redirect examination his recollection as to how long the car stopped at the crossing.

2. Plaintiff, while attempting to alight from a northbound street car at a street crossing, fell and was injured by a southbound car. The northbound car stopped at both crossings of the street to let off passengers a sufficient length of time to have enabled plaintiff to have alighted. He gave no signal to the conductor of his intention to alight, and there was nothing to show that the conductor knew of his intention. After the car had started up after the second stop, he fell from the footboard where he was standing while the car crossed the street. There was no evidence that the car's motion after leaving the street was increased by any sudden or violent jerk. Held, that the evidence, though considered most favorably for the plaintiff, was insufficient to show that the car from which he fell was operated in a negligent manner, and hence it was not error for the trial court to direct a verdict for defendant.

3. Plaintiff, while attempting to alight from a northbound street car at a street car crossing, fell and was injured by a southbound car on the adjoining track. The northbound car stopped at both crossings of a street where plaintiff intended to alight, and then started up again, when plaintiff, while attempting to alight, fell from the footboard where he had been standing while the car was crossing the street, and was struck by the southbound car. The southbound car was traveling at the rate of about 12 miles an hour when passing the northbound car, which had then attained about half its usual speed. The rules of the company required car operators, when passing a car which is stopped or running slowly, to slacken speed and be able to stop the car immediately. Held, that the evidence was insufficient to show that the southbound car was operated negligently; its motorman rightly presuming that all passengers intending to alight from the northbound car had done so at the crossing at which it stopped.—(Ackerstadt vs. Chicago City Ry. Co., 62 N. E. Rep., 884.)

INDIANA.—Street Railroads—Willful Injury—Restricting Speed—Change of Motive Power—Ordinances—Application—Appeal.

1. In an action against a street car company for willfully injuring a deaf mute thirteen years of age on a street crossing, that the street was dark, and the headlight, which obscured the view of the street except directly in front of the cars, made it difficult for the motorman to see a person near the side of the street; that the gong was sounded; and as soon as the motorman perceived the boy, when about 20 ft. from the street intersection, he was skipping toward the track; and that the car was reversed, and the gong sounded louder—is sufficient to justify a finding for defendant.

2. An assignment that the court erred in sustaining defendant's motion for an order directing verdict cannot be considered where neither the motion nor ruling thereon was incorporated in a bill of exceptions nor otherwise made a part of the record.

3. City ordinances adopted in 1864 and 1876, granting franchises to a horse-power street railway company, and restricting speed of cars, are not applicable to a successor of such company, operating its cars by electricity, though it accepted the franchises of its predecessor subject to all obligations imposed on it.—(Bonham vs. Citizens' St. R. Co., 62 N. E. Rep., 996.)

KENTUCKY.—Carriers—Street Railroads—Discharging Passenger at Dangerous Place—Liability.

1. While a street railway company is not bound to furnish safe places for depositing its passengers, yet where the dangerous condition of a street at the place of discharging a passenger is known, or is such as must be known, to the carrier, and is unknown to the passenger—as where, because of the darkness, he cannot see it—the

carrier is bound to warn him of the danger, or to assist him in safely alighting.

2. Whether a hole in the street at the place of discharging a passenger was the cause of the passenger's injury, and was such a defective place for discharging passengers as to render it obviously unsafe, were questions of fact for the jury.—(Sweet vs. Louisville Ry. Co., 67 S. W. Rep., 4.)

KENTUCKY.—Action—Dismissal for Want of Prosecution—Refusal to Reinstate.

Where an action to recover damages for a personal injury was brought December 3, 1895, an answer pleading contributory negligence was filed in January, 1896, an order filing away for want of prosecution was entered in January, 1898, case was redocketed in March, 1898, by consent, and in January, 1900, was again filed away for want of prosecution, the court did not abuse its discretion in refusing to again redocket; no reply to the plea of contributory negligence having been filed, and none being even tendered with the motion to redocket, and no excuse being given for the delay, except that counsel for plaintiff had been engaged in a political campaign.—(Beckwith vs. South Covington & C. St. Ry., 675 W. Rep., 18.)

KENTUCKY.—Master and Servant—Assumption of Risk—Contributory Negligence.

1. A bridge builder engaged in repairing a bridge assumed the risk of the danger necessarily incident to such work.

2. Where plaintiff, who was one of a crew of four men engaged in removing ties from a railroad bridge for the purpose of putting in new ties, placed his hand on the end of a tie in guiding it so that his hand struck a girder, causing him to faint, and fall into the river below, the fact that the foreman, whose duties called him to another part of the bridge, did not call some one to take his place for the purpose of giving the word to heave or launch the ties did not render the master liable, as one of the crew gave the word, as has been the custom in the foreman's absence, and plaintiff, with knowledge of that method of working, had made no complaint, thereby assuming the risk.

3. As the proximate cause of the injury was plaintiff's negligence in placing his hand upon the end of the tie, where, if the tie struck a girder, it was certain to be injured, a peremptory instruction for defendant was also proper on that ground; a servant having no right to look to the master for damages for negligence if, by the exercise of ordinary care, he could have avoided injury.—(Daniels vs. Covington & C. El. R. & Transfer & Bridge Co. et al., 66 L. W. Rep., 188.)

LOUISIANA.—Street Railroads—Injury to Passenger.

Where the motoneer of a street car, in answer to a signal, is slowing down his car in order to stop it with the rear platform over the proper crossing, and a passenger has taken his position on the lower step of the platform, preparatory to getting off, the fact that the passenger loses his balance, and falls to the ground, it being claimed that such fall resulted from the sudden jerking of the car and from the passenger catching his shoe in a defective step, will not justify the conclusion that such fall should be attributed to the negligence of the carrier, when it appears that the irregularity of motion complained of was not greater than is usual in the stopping of street cars, and that the step was of an approved pattern, and without discoverable defects.—(Phillips vs. St. Charles St. Ry. Co., 31 Southern Reps., 135.)

MARYLAND.—Railways—Passenger—Payment of Fare—Detached Coupon—Expulsion.

The plaintiff's wife purchased a coupon book from defendant, good for twenty rides between specified stations. It was stipulated on the coupons that they would not be good unless detached by the conductor. Plaintiff tore out of the book a coupon, leaving the book with his wife, and presented the coupon to the conductor, who rang up a fare, and then demanded that the book be shown him. Plaintiff said he could not show it. After the demand was repeated several times, the conductor said he would have to put plaintiff off if the book was not shown, to which plaintiff replied, "You can put me off the car, I suppose, but I cannot show you the book," and, when asked to walk off, said he would have to be put off. The conductor then took hold of plaintiff and put him off. The conductor did not demand a cash fare, nor did plaintiff tender any payment, except such coupon. Held, that plaintiff was not entitled to recover damages for such expulsion.—(United Rys. & Electric Co. vs. Hardesty, 51 Atlantic Rep., 406.)

MARYLAND.—Railways—Electric—Collision—Contributory Negligence—Directing Verdict.

1. Plaintiff, while driving in the country across an electric railway, collided with a car. As she drove on to the tracks, she saw no car on the first track. Just before driving on to the second track, she looked in the other direction, and saw a car within 40 ft., coming at the rate of twenty miles to twenty-five miles an hour. Instead of stopping, she applied the whip, and crossed the

track, the car striking the rear wheels of the buggy, throwing her out. She testified on cross-examination that the mare she was driving was not at all afraid of the cars, and that there was nothing, so far as the mare's nervousness was concerned, which would prevent letting the car pass in front, only that she never backed if she could go forward. It was admitted that the motorman was negligent in not ringing the bell. Held, that plaintiff's own negligence was the proximate cause of the injury.

2. There is no such difference between an electric railway in the country and a steam railway as to render what would be contributory negligence as respects crossing a steam railway due care as respects crossing an electric railway.

3. Where the contributory negligence of plaintiff was later in time than the negligence of the electric railway, the rule that, though plaintiff was guilty of negligence, she could recover if the company's servants were blamable for making no effort to avoid the consequence of her negligence, does not apply.—(McNab et al. vs. United Rys. & Electric Co., of Baltimore City, 51 Atlantic Rep., 421.)

MASSACHUSETTS.—Master and Servant—Injury to Servant—Obvious Danger—Assumption of Risk—Contributory Negligence.

1. Plaintiff, engaged in learning the duties of conductor on defendant's street car, while standing on the running board of a moving car along the track on the side of a road, was struck by a trolley post and injured. He was an experienced man, and familiar with the duties of a conductor. He knew that it was common to have the tracks on one side of a street, and knew that in such cases there would be trolley posts. He was sent out on this part of the road to learn the conditions of its operation, and had made two trips before the accident. He failed to observe whether the car was in the center or on the side of the road, and paid no attention to trolley posts, and when stepping down on the running board to perform certain duties as conductor he did not look to see if there were obstructions. The running board on the opposite side of the car could have been used with safety. Defendant's tracks had been in the same position for several years, and the condition of the track and trolley posts was not unusual. Held, that the plaintiff assumed the risk, the danger being obvious.

2. In such a case, where plaintiff had been sent out to learn the conditions attending the operation of a street car, he was guilty of negligence in stepping down to the running board without looking to see whether it was safe so to do.—(Ladd vs. Brockton St. Ry. Co., 62 N. E. Rep., 730.)

NEW YORK.—Street Railways—Personal Injuries—Pedestrians—Question for Jury.

Plaintiff and her son, walking in the direction in which an approaching car was going, and wishing to board such car, started diagonally across the street to the corner where the car could be stopped. When on the first track, and when the car was about 100 ft. distant, plaintiff saw her son signal it to stop, and she continued across without looking around; but the motorman disregarded the signal, and did not decrease the speed or ring the bell, in consequence of which the plaintiff was struck as she was stepping from the track. Held, that the question of contributory negligence was for the jury.—(Copeland vs. Metropolitan St. Ry. Co., 73 N. Y. Suppl., 856.)

NEW YORK.—Judgment—Conclusiveness Against Corporation Merging Defendant Company—Corporations—Jurisdiction—Affidavit of Service.

1. A judgment obtained in an action commenced against a corporation after it had merged into another corporation is not binding on the latter, as at the time of suit commenced the first corporation had ceased to exist, and, though the debt on which the judgment is based may be valid against the consolidated company, it is entitled to its day in court.

2. An affidavit of service of summons on a corporation to the effect that the person making the service knew the person served "to have been" the president of the corporation does not confer jurisdiction over the corporation, as the service must be made on one who "is" an officer of the corporation, and not on one who "has been."—(Cameron vs. United Traction Co., 73 N. Y. Suppl., 981.)

NEW YORK.—Street Railway—Personal Injury—Evidence—Charge.

Plaintiff was injured by falling between the platform and a train from which he had just alighted. He claimed that he was caught by the train closing the gate before he could get out of the way. The conductor testified that the gate was closed before plaintiff fell, and that the gate of the next car was closed before he got off. A witness testified that he heard the "slam" as the gate closed, and saw plaintiff fall afterward. The court instructed the jury that if they believed this witness they should find for defendant. Held, error, as resting the case solely on the testimony of

this witness, and excluding from the jury the question of the credibility of the conductor.—(Fox vs. Manhattan Ry. Co., 73 N. Y. Suppl., 896.)

NEW YORK.—Street Railways—Injury at Crossing—Instructions—Imputed Negligence—Subsequent Instruction—Cure of Error.

1. In an action against a street car company for negligently injuring a child non sui juris in the custody of his father at the time of the accident, a charge that, if plaintiff could have crossed the street and avoided the car but for the carelessness of defendant's driver and his impetuous driving, they must find for the plaintiff, was erroneous, because eliminating the question of the contributory negligence of the father.

2. A subsequent instruction, at defendant's request, that plaintiff could not recover if his father was negligent, did not cure the error.—(Lifschitz vs. Dry Dock, E. B. & B. R. Co., 73 N. Y. Suppl., 888.)

NEW YORK.—Street Railway—Injury to Passenger—Dismissal of Complaint.

In a suit by a passenger against a street railway company for personal injuries, where plaintiff testified that the car came to a stop, and that while he was attempting to alight it started, suddenly throwing him to the ground, it was error to dismiss the complaint, notwithstanding that five of defendant's employees and three apparently disinterested passengers testified that he attempted to alight before the car came to a stop, the case being for the jury.—(Steinle vs. Metropolitan St. Ry. Co., 74 N. Y. Suppl., 482.)

NEW YORK.—Personal Injuries—Complaint—Nature of Injuries—Evidence—Cumulative Evidence.

1. Where a complaint in an action for personal injuries alleged that plaintiff was generally bruised, battered, and injured, from the top of her head to the soles of her feet, and that her nervous system was permanently and severely shocked and impaired, evidence that plaintiff suffered from mental paresis, muscular paralysis and trouble with the stomach, liver, arteries and other internal organs, was not admissible.

2. Plaintiff testified concerning the personal injuries which she received, and as to intestinal and liver difficulties resulting therefrom; and her physician testified to the derangement of her digestive tract, the condition of her lungs and heart, and that he prescribed for neurasthenia. Some of this evidence was inadmissible under the allegations of the complaint, but was not objected to. Held, that further evidence concerning plaintiff's neurasthenic condition, and of the existence of paresis, paralysis and disease of the liver, was not cumulative of the incompetent evidence admitted without objection, and its admission was error, as being outside the issues.—(Reed vs. Metropolitan St. Ry. Co., N. Y. Suppl., 573.)

NEW YORK.—Appeal—Review—Ruling on Motion for New Trial—Competency of Witness—Information Acquired by Physician—Waiver of Privilege.

1. The question whether a verdict was excessive is one of fact, which cannot be reviewed on a writ of error.

2. Under the provisions of Code Civ. Proc. N. Y., Sec. 834, which makes incompetent the testimony of a physician as to information acquired while attending a patient, and of section 836, which permits such information to be disclosed only when the provisions of section 834 "are expressly waived upon the trial * * * by the patient," as such provisions have been construed by the Supreme Court of the State, the fact that a plaintiff in an action for personal injuries introduces the testimony of physicians who attended him, in respect to the nature and extent of such injuries, does not operate as a waiver of the right to object to the testimony of another physician, called by defendant, who had attended him for the same injuries, but at a different time.—(Metropolitan St. Ry. Co. vs. Jacobi, 112 Fed. Rep., 924.)

NEW YORK.—Street Railroads—Injury to Person on Track.

A complaint in an action against a street railroad company alleged that defendant operated its car without a fender, contrary to the city ordinance, which also prohibited the use of any fender until it was approved by the Common Council. The day after the adoption of the report approving specified fenders, the fenders were ordered, but were not received until after the accident. Held, that it was error to fail to charge at defendant's request that it was not bound to have the fenders at the time of the accident, and to instruct the jury to determine whether the defendant had used reasonable care to procure fenders after the approval of the Common Council.—(Platt vs. Albany Ry., 62 N. E. Rep., 1071.)

NEW YORK.—Corporations—Trial—Parties—Corporate Capacity—Necessity of Proof.

Under Code Civ. Proc. Sec. 1776, providing that the plaintiff in an action against a corporation need not prove its corporate existence unless the answer contains an affirmative allegation that

it is not a corporation, the plaintiff in an action in the municipal court against a corporation in which the pleadings are oral and the answer merely a general denial is not required to prove the corporate existence of the defendant.—(Riley vs. Metropolitan St. Ry. Co., 74 N. Y. Suppl., 873.)

NEW YORK.—Street Railways—Collisions—Travelers—Contributory Negligence.

A traveler in an unlighted wagon drove on to the downtown track of a street railway, when both the downtown and uptown cars were each about half a block away, and waited until the uptown car passed him, but before he could cross the uptown track, and as he was starting to do so, the rapidly running downtown car struck his wagon. Held, that he was guilty of contributory negligence in waiting on the track, warranting the granting of a non-suit.—(Vogts vs. Metropolitan St. Ry. Co., 74 N. Y. Suppl., 844.)

NEW YORK.—Street Railways—Collision—Contributory Negligence—Dismissal.

In an action against a street railway company for damages caused by collision between plaintiff's wagon and a car, it appeared that plaintiff's driver saw the car approaching very fast on the further of the double tracks, and about 20 ft. away, as his horse reached the outside rail of the nearer track, when, in attempting to pass in front of such car, it struck the rear wheel of the wagon. Held, error to refuse defendant's motion to dismiss the complaint.—(Manhattan Pie Baking Co. vs. Metropolitan St. Ry. Co., 74 N. Y. Suppl., 928.)

NEW YORK.—Street Railways—Injury to Person Near Track—Evidence—Sufficiency—Contributory Negligence—Appeal—Examination of Opinion of Lower Court.

1. Plaintiff was stopped in his endeavor to cross by a blockade of carriages about a foot from defendant's track, and was struck by a car. Plaintiff and his companion both testified that the gong was not rung and that the car was going at full speed, while defendant's witnesses stated that the gong was rung and that the car was moving slowly. Held, sufficient to authorize a submission to the jury on the question of whether notice of the approach of the car was given.

2. A person standing in the street near a street railway track because of a temporary blockade of the street by wagons is, as a matter of law, not guilty of contributory negligence, if struck by a car on such track.

3. On an appeal from a judgment of the general term of the City Court of New York reversing a judgment of the special term, the appellate division of the Supreme Court will not look at the opinion of the general term for the grounds of the reversal.—(Hernandez vs. Metropolitan St. Ry. Co., 74 N. Y. Suppl., 898.)

NEW YORK.—Street Railroads—Injuries—Person Crossing Track—Contributory Negligence—Sufficiency of Evidence—Instructions.

Plaintiff was injured while crossing a street in the middle of a block. Her own evidence indicated that she was struck by defendant's car because she stopped, turned around, and attempted to go back; and she herself testified that she was almost across the track before she started to go back. It appeared further that she was struck by the corner of the dashboard on the side from which she started to cross, and the testimony of other witnesses called by her tended to show that she attempted to cross in front of the car when it was so near that it was inevitable that she would be hit. Held, that plaintiff was not in the exercise of that degree of care incumbent upon pedestrians crossing streets traversed by street cars, especially in the middle of a block.

2. It appearing that plaintiff was crossing the track from the south side, and was struck by the south side of the car, it was error to refuse to instruct the jury that, if they did not believe plaintiff's version of the case, they must find for the defendant, since, if her version were not true, she must have attempted to cross when so near that the attempt itself indicated negligence on her part.—(Lawson vs. Metropolitan St. Ry. Co., 74 N. Y. Suppl., 885.)

PENNSYLVANIA.—Action for Death—Element of Damages.

In an action for death, evidence as to profits of deceased in a partnership business, and that he furnished money in considerable amounts to his family, is not admissible as bearing on the damages they sustained by his death.—(McCracken vs. Consolidated Traction Co., 50 Atlantic Rep., 832.)

PENNSYLVANIA.—Street Railways—Negligence—Evidence.

Where a child two years old walking on a street car track towards a car approaching on an adjoining track, and crossed over onto such track about two car lengths in front of the car, and was run down, there being nothing to obstruct the view of the motorman, a finding that he was negligent is justified.—(Jones et al vs. United Traction Co., 50 Atlantic Rep., 826.)

FINANCIAL INTELLIGENCE

THE MARKETS

WALL STREET, JUNE 18, 1902.

The Money Market

The outlook for the local money market has further improved with Saturday's unexpected gain in bank reserves. During the preceding three years June has been a month of declining cash holdings and falling surplus reserve. Last year the cash decreased \$8,000,000 and in 1899 no less than \$25,000,000. The legal surplus dwindled \$13,000,000 in the month a year ago and \$20,000,000 three years ago. This year, however, no such decrease has occurred, but, on the contrary, cash supplies have just about held their own, while the surplus has risen \$1,400,000. Consequently the latter item stands now \$4,500,000 higher than it did a year ago and only \$4,000,000 below where it did in 1900. This comparison, when contrasted with the exceedingly poor relative showing even as late as two weeks ago, is decidedly encouraging for the future. Everything depends for the rest of the current month upon the movement of loans. Currency is coming in fast enough from the interior to offset the drafts of the Treasury, and although sterling exchange continues very firm there is no immediate prospect of gold exports. It rests with the uncertain causes which govern the rise and fall of loans to determine how surplus reserve will move for the next fortnight. After that time it becomes plainer sailing. The government revenue reduction will then be in force, and together with the inward flow from the other domestic centers should leave no doubt about the banks being able to gain materially both in their cash and surplus reserves up to the time when the crop-moving demands set in. Then the situation will grow more uncertain, but the main assurance lies in the probability that by that time the local institutions will have been able to raise their resources up to a normal or average level.

Money on short time is in good demand at $4\frac{1}{4}$ @ $4\frac{1}{2}$ per cent from borrowers who have commitments to meet on the first-of-July settlements. Otherwise the loan market is rather quiet, with an abundance of call money at 3 per cent.

The Stock Market

Last week's extreme inertia on the Stock Exchange has been partially broken during the last seven days. Speculative interests in a number of stocks have become more aggressive, and while the public is doing nothing and investors are confining their purchases mainly to good railway bonds, prices have moved forward in a few directions quite sharply. The satisfactory progress of the staple crops has been the main incentive to renewing the speculative operations. Although the government report issued on the tenth of the month failed to show the improvement expected in winter wheat condition, while it showed a surprisingly large shrinkage in the area seeded to spring wheat, importance was attached chiefly to the fact that the estimates for the combined yield were considerably above the average for the last 10 years. No figures will be given out in corn until next month, but all unofficial advices agree that an enormous increase has occurred in acreage and that the plant is doing very well in its growth for this season of the year. On the strength of the favorable showing in corn the Southwestern railway shares have been bought rather freely, Missouri Pacific and the Atchisons in particular, while the excellent condition of spring wheat has made St. Paul a favorite. In other parts of the list the movement has been more varied. The coal strike, although on the surface scarcely any nearer a settlement than it was a week ago, is regarded by competent Wall Street observers as having turned during that period more and more against the chances of the miners. The anthracite coal-carrying shares, in consequence, have been buoyant, with the Readings the leaders. It begins to look as if the market as a whole was gradually hardening, and that with further signs of yielding on the part of the strikers, and with a continuance of good reports from the crop regions, an active forward movement may be witnessed.

The local traction shares have occupied a subordinate place in the week's trading. This is due apparently to the circumstance that such limited buying interest as there is in the general market is attracted more immediately by the prospects for some of the railroad stocks. Nevertheless, the buying in the traction group is plainly better than the selling. Metropolitan, particularly, has been persistently absorbed during the week. Unquestionably Wall Street sentiment has become more favorable toward the property since the handsome gain in earnings was reported for the March quarter. Metropolitan Securities trust certificates have advanced along with the older shares. Brooklyn Rapid Transit has acted

somewhat heavy since the summons to the company to put part of its wires underground, and the legal proceedings against Manhattan in the matter of soft coal burning, have had a similar effect upon that stock. But in neither case has there been liquidation of any consequence.

Philadelphia

The week's traction share dealings in Philadelphia have developed nothing of any importance. Union Traction has barely varied more than a half point in price, moving between $43\frac{3}{4}$ and $43\frac{1}{4}$, and the warrants or rights to subscribe to the stock of the new lessor company have ranged between 4 and $4\frac{1}{2}$. The inside interests are apparently ready to give support freely on any decline, but are not trying to put up the price. Philadelphia Traction has been taken in small lots by investors at an advance from 97 to 98. A few hundred shares of Consolidated Traction of New Jersey sold at $69\frac{3}{4}$ and $69\frac{1}{2}$, and a hundred shares of Camden & Trenton, which is the connecting link in the New York-Philadelphia system of trolley lines, sold at 4. For the first time in several weeks a sale of a hundred Reading Traction was reported at $32\frac{5}{8}$, an advance of $\frac{5}{8}$ from the last previous sale. The only other transactions were small lots of Railways General at 5 and $4\frac{3}{8}$, and American Railways at 46. In bonds Electric-People's Traction 4s were fairly active at a decline from $99\frac{1}{2}$ to 99. Indianapolis 4s sold at $88\frac{1}{2}$. Citizens' Passenger of Indianapolis 5s at $110\frac{1}{4}$, United Traction of Reading 5s at $103\frac{1}{2}$, United Traction of Pittsburgh 5s at $117\frac{1}{2}$, Syracuse Rapid Transit 5s at $103\frac{1}{2}$, and United Railways gold 4s at 87.

Chicago

Dealings in the Chicago market for traction securities have amounted to almost nothing during the week. Union Traction common, after being rather heavy and selling down to 18, rallied to $18\frac{1}{2}$. The preferred was steady around $53\frac{1}{2}$. A few scattered lots of City Railway sold at 210 and $207\frac{3}{4}$. It is announced that this company will deal in the franchise matter with the transportation committee of the City Council. Elevated stocks have been duller even than those of the surface lines. Lake Street fell off under speculative pressure from 13 to 12. The final decree in the case involving the exchange of Lake Street debenture bonds for its first mortgage bonds, has been entered. Decision, it will be remembered, was given some months ago, but in order to allow proper time for discussion over the form of the decree, the final order was delayed. Metropolitan Elevated preferred, after changing hands at $90\frac{1}{2}$, dropped to 90. A hundred shares of Northwestern preferred sold at $84\frac{1}{2}$, a decline of a point from the last previous sale of a full lot. The deal between the Northwestern and the St. Paul Railroad regarding an interchange of traffic on the Evanston branch, is off for the present. The Metropolitan has sold \$1,500,000 bonds to the First National Bank of Chicago to finance the building of its new terminal. There is another movement on foot to have the Union Loop extended south from Van Buren to Polk Street.

Other Traction Securities

It has been a very quiet week in the Boston traction dealings. Massachusetts common sold down from $44\frac{1}{8}$ to $43\frac{1}{8}$, but the selling was too light to have much significance. Massachusetts preferred was steady at $98\frac{1}{2}$, Elevated at 166, and West End preferred at $116\frac{1}{2}$. In Baltimore active dealings were reported in Lexington Railway 5s, which advanced from $102\frac{1}{4}$ to 104, and Charleston Consolidated Electric, which rose from 90 to 93. United Railway of Baltimore securities were higher, the income bonds going up from $69\frac{3}{8}$ to $69\frac{3}{4}$, the general 4s from 96 to $96\frac{3}{4}$, and the stock from $15\frac{5}{8}$ to 16. A more confident feeling prevails than heretofore, as to the ability of the company to maintain its interest payments on the income bonds. Norfolk Street Railway shares, after selling up to 14, reacted to $13\frac{1}{2}$. The other sales for the week included Knoxville Traction 5s at 98, Pittsburgh Traction 5s at 117, Charleston Street Railway 5s at 107, City and Suburban (Washington) 5s at $94\frac{3}{4}$, and City and Suburban (Baltimore) 5s at 114. Rochester Railway preferred has sold at $101\frac{1}{2}$, which is the highest point on the current advance. No transactions are recorded in Louisville Street Railway. New Orleans City Railroad shares on small transactions rose to 34 for the common, and $111\frac{1}{2}$ for the preferred. Dealings have begun in the securities of the new New Orleans company, which lately acquired control of all the traction and lighting properties of that city. The common is quoted around $12\frac{1}{2}$, and the preferred stock around 52. Columbus Street Railway is up a point on the week at $52\frac{1}{2}$. San Francisco securities have been less active, and last sales on the New York curb show little change from a week ago. The subscription privileges sold yester-

day at 101 $\frac{7}{8}$ and 102 $\frac{1}{8}$, and 300 shares of the preferred stock at 63 $\frac{5}{8}$. The new stock of the Toledo Street Railway Company was dealt in for the first time on the local curb last Friday. It opened at 28 $\frac{1}{2}$ and sold up to 31 $\frac{1}{2}$ on Monday.

Another notable week on the Cleveland Stock Exchange, although not as heavy as the week previous. Still it was significant of what is in store for the future, as the bull movement was the strongest experienced in a long time, all traction stocks advancing materially. The important events in Everett-Moore affairs attendant with the sale of large blocks of Detroit United, Toledo Railways & Light and Northern Ohio Traction caused activity in these stocks. Sales in Detroit United numbered 932 shares, the bulk being sold at between 78 $\frac{1}{2}$ and 79, with a small block as high as 81. Holders of this stock believe it will go to 85. Northern Ohio common sold to the extent of 675 shares, 37 $\frac{1}{2}$ being the prevailing figure. Toledo Railways & Light was held down to 420 shares, on fluctuations between 25 and 29 $\frac{1}{2}$. Southern Ohio Traction went up a point to 67 $\frac{1}{2}$. There is little of this stock on the market, as the consolidation offer is very promising. Western Ohio was strong, a total of 460 shares being sold at between 20 and 20 $\frac{1}{2}$. This new property is making a magnificent showing. Elgin, Aurora & Southern advanced to 44, 330 shares selling. The stock is hard to buy at this price. Monday there was a remarkable boom in Toledo Railways & Light, 2180 shares selling at between 30 $\frac{3}{4}$ and 32, the latter the closing figure. Northern Ohio Traction common advanced to 40 for a small block; a short time ago this stock sold at 25.

Security Quotations

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

	Closing Bid	
	June 10	June 17
American Railways Company.....	*45 $\frac{1}{4}$	45 $\frac{1}{2}$
Boston Elevated	165	166
Brooklyn R. T.....	67 $\frac{1}{4}$	67
Chicago City	208	206
Chicago Union Tr. (common).....	18 $\frac{1}{4}$	18
Chicago Union Tr. (preferred).....	52 $\frac{1}{2}$	54
Cleveland & Eastern	a33	31
Cleveland Electric	81	81 $\frac{1}{2}$
Columbus (common)	51	52 $\frac{1}{2}$
Columbus (preferred).....	107	107 $\frac{1}{4}$
Consolidated Traction of N. J.	69	69 $\frac{1}{2}$
Consolidated Traction of N. J. 5s.....	112 $\frac{1}{2}$	112 $\frac{1}{2}$
Detroit United	78 $\frac{1}{8}$	78 $\frac{1}{8}$
Electric-People's Traction (Philadelphia) 4s.....	99 $\frac{1}{4}$	99
Elgin, Aurora & Southern.....	42 $\frac{1}{2}$	44
Indianapolis Street Railway 4s.....	88	88 $\frac{1}{2}$
Lake Street Elevated	12 $\frac{1}{2}$	11 $\frac{3}{4}$
Manhattan Ry.	131 $\frac{1}{2}$	131
Massachusetts Elec. Cos. (common).....	43 $\frac{3}{4}$	43 $\frac{3}{4}$
Massachusetts Elec. Cos. (preferred).....	97	98
Metropolitan Elevated, Chicago (common).....	38	38
Metropolitan Elevated, Chicago.....	90 $\frac{1}{4}$	90
Metropolitan Street	149	151 $\frac{1}{8}$
New Orleans (common).....	33 $\frac{1}{4}$	34
New Orleans (preferred).....	111	111 $\frac{1}{2}$
North American	121	121
Northern Ohio Traction (common)	33 $\frac{1}{4}$	37 $\frac{1}{2}$
Northern Ohio Traction (preferred).....	a84	84
North Jersey	29 $\frac{1}{2}$	29 $\frac{1}{2}$
Northwestern Elevated, Chicago (common).....	37 $\frac{1}{2}$	37
Northwestern Elevated, Chicago (preferred).....	..	84 $\frac{1}{2}$
Philadelphia Traction	97	98 $\frac{3}{4}$
St. Louis Transit Co. (common).....	31 $\frac{1}{4}$	30 $\frac{3}{4}$
South Side Elevated (Chicago).....	110	112
Southern Ohio Traction	66 $\frac{1}{2}$	67 $\frac{1}{4}$
Syracuse (common)	22	22
Syracuse (preferred)	64	64
Third Avenue	130	130
Toledo Railway & Light	20	29 $\frac{1}{8}$
Twin City, Minneapolis (common).....	119 $\frac{1}{2}$	119
United Railways, St. Louis (preferred).....	83	83 $\frac{3}{4}$
United Railways, St. Louis, 4s.....	87 $\frac{1}{2}$	87 $\frac{1}{2}$
Union Traction (Philadelphia)	43 $\frac{1}{2}$	43 $\frac{1}{2}$
Western Ohio Ry.	17 $\frac{3}{4}$	20 $\frac{1}{2}$

* Ex-dividend. † Last sale. (a) Asked. (b) Ex-rights.

Iron and Steel

The only incident of importance during the week in iron and steel, was the regular estimates of production submitted by the Iron Age. These show that the capacity of the blast furnaces on June 1 was only 337,492 tons, as compared with 345,627 on May 1. This reduction was due mainly, however, to the temporary banking of furnaces in the Mahoning and Shenango Valleys, the greater part of which have now resumed. Consequently, while the

output of the current month will probably fall short of May, it will not be an important decrease.

Prices are \$21.50 for Bessemer pig, \$33 for steel billets, and \$28 for steel rails.

Metal

Quotations are: Copper 12 $\frac{3}{8}$ cents, tin 30 cents, lead 4 $\frac{1}{8}$ cents, spelter 4 $\frac{7}{8}$ cents.

CHICAGO, ILL.—The directors of the Metropolitan Elevated have sold to the First National Bank \$1,500,000 4 per cent extension bonds. The issue is being put out to meet the cost of construction of branches.

DAVENPORT, IA.—The Davenport & Suburban Railway Company has decided to increase its capital stock from \$500,000 to \$1,500,000, in view of the extensive plans now laid by the company for a line between here and Muscatine, and from Buffalo north to Walcott, and thence to West Liberty.

ST. LOUIS, MO.—A statement of the total earnings of the St. Louis Transit Company for the month of May, issued recently, shows a gain of \$59,125 over the same month in 1901. The earnings this year were \$567,614, as against \$508,419.68 for May, 1901. These figures represent the gross earnings from all sources. According to the figures previously reported for the earnings of the company this year, the total up to May 1 is \$2,457,474, as against \$2,276,197 in 1901, a gain of \$181,277. Moreover, the prospects for future earnings are admitted to be more favorable than at any time in the history of the company. Improvements in machinery, general equipment and rolling stock last year are beginning to show in the earnings. New cars are being put on nearly every division of the system, and every effort is being made to improve the service. It is thought that the earnings for the present month will be the largest in the history of the system.

ST. LOUIS, MO.—A meeting of the directors of the St. Louis & Suburban Railroad was called June 10 to ratify the plan to refund the bonded indebtedness of the road, as recently published. Owing to the absence from the city of several members of the board, it was impossible to secure a quorum, and the meeting was adjourned without any action being taken. The report that Samuel M. Kennard would be the new president of the road was affirmed, and it was stated that Julius Walsh and Breckenridge Jones, of the Mississippi Valley Trust Company, would become members of the board of directors when that body was reorganized. It is impossible to learn the names of the other new members of the board. The date of the election has not been set. Officials of the company state that the report to the effect that the Rock Island Railroad might secure the use of its right of way for an elevated road was without foundation. No negotiations of any kind, it was said, are on between the two companies. M. A. Low, attorney of the Rock Island, who was here, stated that he has never heard of any such scheme.

DETROIT, MICH.—The regular quarterly dividend of 1 per cent on the stock of the Detroit United Railway Company is payable July 1.

MINNEAPOLIS, MINN.—The directors of the Twin City Rapid Transit have declared a quarterly dividend of 1 $\frac{3}{4}$ per cent on the preferred stock, payable July 1.

AKRON, OHIO.—The Northern Ohio Traction Company has declared the regular semi-annual dividend of 2 $\frac{1}{2}$ per cent, payable July 1.

CLEVELAND, OHIO.—The Cleveland, Elyria & Western Railway Company will allot pro rata among present stockholders \$100,000 worth of stock, which has been held in the treasury. The stock will be offered at \$50, although at present the Cleveland, Elyria & Western Railway stock is selling at \$80. The stock was issued some time ago at the time the bonded indebtedness was increased to \$1,500,000, in accordance with the Ohio law that the capital stock must be equal to or greater than the bonded indebtedness.

AUSTIN, TEX.—The Austin Dam & Suburban Railway has been sold at receiver's sale. The property has been bought in by the First National Bank, of Austin, for \$33,400.

HALIFAX, N. S.—The deal for the purchase of the property and franchise of the People's Heat & Light Company by the Halifax Electric Tramway Company has been ratified, thus centralizing in one corporation the electric light and gas interests of this city. The People's Heat & Light Company for some time has been in the hands of the Eastern Trust Company, as liquidators. The terms of the sale are that the receivers of the People's Heat & Light Company shall be given for the property 3500 shares of a new issue of stock of the Halifax Electric Tramway Company. The capital of the Tramway Company is \$1,000,000, out of which \$800,000 has been issued, and the par value of the stock is \$100 per share. At the last session of the Legislature the company was given power to increase its capital to \$1,500,000. At the present time the directors, to pay for the newly acquired property and to defray the cost of a new power house and station, have issued 5500 shares of new stock. Of this 3500 shares go to the People's Heat & Light Company, and 2000 shares will be used for the work that is being done in building a power station, improving the plant and putting the company in a better position generally.

NIAGARA FALLS, ONT.—A special meeting of the stockholders of the Niagara Falls Park & River Railway has been called for June 23 for the purpose of ratifying the sale of the company's property to the International Railway Company, of Buffalo. At the same time and place the sale of the Queenston Suspension Bridge Company, the Queenston Heights Bridge Company and the Clifton Suspension Bridge Company to the International Railway Company will be ratified.

BRANTFORD, ONT.—The "Von Echa" Company, of which Dr. Ritter Ickes, of Ithaca, N. Y., is the head, has obtained an option on the entire plant and franchises of the Brantford Street Railway Company, subject to the ratification of the City Council.

TABLE OF OPERATING STATISTICS

Notice.—These statistics will be carefully revised from month to month, upon information received from the companies direct, or from official sources. The table should be used in connection with our Financial Supplement "American Street Railway Investments," which contains the annual operating reports to the ends of the various financial years. Similar statistics in regard to roads not reporting are solicited by the editors. * Including taxes. † Deficit.

Table with multiple columns: COMPANY, Period, Total Gross Earnings, Operating Expenses, Net Earnings, Deductions From Income, Net Income, Amount Available for Dividends. Rows include companies like AKRON, O., ALBANY, N. Y., BINGHAMTON, N. Y., BOSTON, MASS., BROOKLYN, N. Y., BUFFALO, N. Y., CHICAGO, ILL., CLEVELAND, O., CLEVELAND, ELYRIA & WESTERN, CLEVELAND, PAINESVILLE & EASTERN, DENVER, COL., DETROIT, MICH., DULUTH, MINN., ELGIN, ILL., HAMILTON, O., LONDON, ONT., MILWAUKEE, WIS., MINNEAPOLIS, MINN., MONTREAL, CAN., NEW YORK CITY, OLEAN, N. Y., PHILADELPHIA, PA., RICHMOND, VA., ROCHESTER, N. Y., SCHENECTADY, N. Y., SYRACUSE, N. Y., TOLEDO, O., and W. NEW BRIGHTON, S. I.