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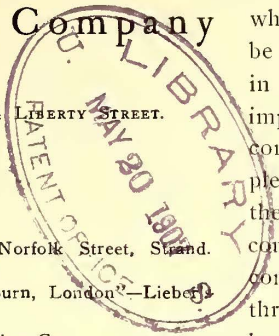
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DATE ON WRAPPER shows the month at the end of which the subscription expires. The sending of remittances for renewal prior to that date will be much appreciated by the publishers.

Of this issue of the Street Railway Journal, 8200 copies are printed. Total circulation for 1907 to date, 163,550 copies, an average of 8177 copies per week.

A Sound Decision

In our last issue we gave brief notice of a very important decision given by the Railroad Commissioners of Ohio, bearing upon the question of fair competition between steam and electric roads. It is so far-reaching in possible effect as to be worth some further consideration. In effect, it held that a railroad could not crush out electric road competition by cutting rates merely where it touched such competition. The same sort of question arises in connection with many commercial monopolies in which local rate-cutting is a very common method of destroying competitors,

but in this railroad case there was fortunately a statute which bore so directly upon the situation that it could not be dodged, and the rights of the public were protected. For in the last resort the public interests were those chiefly imperiled. We have often of late dwelt upon the real community of interest between street railways and the people they serve, and this example is much to the point. Had the railroad been allowed to cut rates locally against its competitor one of two things must have happened. Either competition would have wrecked the electric road and thrown it into the hands of its adversary, or there would have been a long and dubious struggle.

If the first condition had occurred it is pretty certain that both steam and electric fares would have been raised and the last state of that people would have been worse than the first. In the second case, unrestrained by the present salutary decision, there would have been nothing to prevent a rise in railroad fares all along the line to compensate for the losses in competition, thus forcing the public to pay for the stick made ready for their backs. As the decision actually stands, a common carrier in Ohio cannot discriminate in rates to meet local competition. If it wants to cut rates it must cut them generally. We hope this decision will carry weight elsewhere, for it may rescue more than one hard-pressed electric road from unjust methods of attack. There could be no clearer indication of the real scope and value of electric traction than this, that an electric road can live and flourish on rates that drive a steam road to desperate and illegal scalping. These rates are of direct importance to the community, and they can be preserved only so long as the community stands by to prevent methods that imply the destruction of the electric road and of competition. If means would be found to insure fair play in all cases for the electric road, as well as illegal reduction of local fares, the public would very soon find out the difference in improved facilities and bettered service.

We have yet to hear of an electric line which has taken advantage of its patrons by unreasonable fares. They uniformly give the public the square deal, and they deserve a square deal in return. This Ohio decision tends to that very end. A scalping match between common carriers is of permanent benefit to nobody, for it tends to troubles later; but fair competition at fair prices tends to benefit all parties concerned in the long run, for it builds up business, which droops under the conditions fostered by the destruction of competition.

Certain portions of our country are well known to suffer acutely from the policy of exclusion adopted in the past against electric railway construction. Such a policy is detrimental to the suburban and country resident and so indirectly is injurious to the steam line, as the main province of the electric road is usually to act as a feeder to its steam

neighbor. It can open up territory into which the steam line would find it financially unprofitable to build. As the leader in our legal department this week shows, it supplies a local passenger service which a parallel line built under steam road conditions cannot furnish, even if equipped with electric power. Moreover, the electric line can flourish without much assistance from freight, which steam railroad magnates are wont to say is the only paying part of their traffic. It is satisfactory to know that certain States which have heretofore been the most backward in their grant of rights for electric railway construction are now realizing these facts and are removing some of the most burdensome restrictions under which the electric road has suffered.

Concentrated vs. Distributed Traffic

One of the most important results of the development of rapid transit facilities in large cities is the concentration of traffic at the terminals of high-speed routes. Enlarged opportunities for travel stimulate the movement of passengers all along the line, and in the business districts outlets must be provided for the increasing streams of traffic which reach their daily maximum values in the morning and evening rush hours. In a general way, the street railway companies are obliged to carry the public as nearly as is possible to the most favored points on their systems, but this frequently leads to excessive crowding at individual terminal stations. Lateral distribution of traffic en route between the outskirts of the business districts and these terminal stations is becoming more and more essential to the smooth handling of a densely populated territory.

A typical case of this kind is apparent at the present time in Boston. Only a few weeks ago, in response to a strong public sentiment in favor of such action, the Boston Transit Commission decided to terminate the Boston end of the Cambridge subway at Park Street, instead of at Scollay Square as at first contemplated. These two points are within 5 minutes' walking distance of each other, but there was no mistaking the popular desire to be delivered at the present Park Street subway station, which is, in most respects, the heart of the Boston Elevated system. The decision was undoubtedly a wise one, but in view of the growing tendency of subway and elevated train traffic to converge upon Park Street station, it is beginning to be clear that some plan is desirable to effect a wider distribution of passengers in the shopping district. The proposition to build a cross-town tunnel between Park Street and the South station offers a natural means of lateral relief, for such a route would enable a large part of the passenger traffic at Park Street to be delivered at points in the shopping or wholesale districts much closer to the desired destination than is now the case.

Such a tunnel, with suitable stations en route, would tie the present subway, the new Washington Street tunnel, the projected East Side subway for surface cars, and the Atlantic Avenue elevated line together, and tend to relieve excessive concentration of traffic at single stations in the business district. The enlargement of the Park Street station by one-third at its entrances and exits can scarcely provide for the increase of travel which is sure to follow the opening of new routes between the western suburbs of

Boston and the city proper. The diversion of the present elevated train traffic from the Tremont Street subway to the Washington Street tunnel when the latter is completed is calculated, with the operation of the Cambridge subway, to reduce the present delays due to slow movement of cars in the Back Bay district, but there is little question that these changes in routes will be of slight avail in lessening the burdens placed upon Park Street station.

These questions are of more than local interest, because they emphasize the importance of developing rapid transit lines in a homogeneous way, and they show that in street railway work the distribution of passengers throughout a district is preferable to their concentration for entrance and exit at a single point. This is the reason why many companies operate through-cars from one side of a city to another, even though the communities served may have little social or commercial intercourse. A surface line of cars can collect and distribute passengers along its route with the maximum degree of flexibility, although it has to be done in many cases at a sacrifice of running time. Distribution between parallel trunk-line subways can be accomplished by suitable laterals, and if these laterals can be made containing tracks of other radial high-speed routes, the situation becomes relatively simple to handle. In steam railroad practice the whole tendency of the times is toward the union of terminals in urban territory, but the volume of passenger traffic in steam railroad service is relatively small in comparison with the ebb and flow of patrons on a large street railway system. It has been well said that a street railway cannot expect to do for 5 cents what a hack or a cab will do for ten times that sum—pick up a passenger at any point in a city and carry him to any other designated place in the 50-cent zone. Yet, this is the ideal which transit facilities tend toward in cities where the inter-relationship of new routes is considered in planning costly avenues of speedy travel. The day is far distant when congestion will not occur at important stations, no matter what the service may be elsewhere, but each year of operating experience points the way toward smoother solutions of the main problems of urban rapid transit through the distribution of abnormal conditions over wider areas.

Overhead Construction

The general form of overhead construction for the ordinary direct-current interurban railway has become almost standard. Poles carrying transmission lines at the top are placed at about 100-ft. intervals at one side of the track, and carry the trolley wire on brackets, with direct-current feeder, telephone and signal wires on cross-arms below the transmission lines and at about the height of the trolley. Except that there has been some disposition to adopt a catenary construction in the hanging of the trolley wire, the arrangement outlined has been followed by most of the interurban roads now in operation. There seems to be no good reason for departing from the general arrangement, although more attention to the design of the details of the construction would, in many cases, result in making the lines much more reliable in their operation and more economical in their maintenance.

As we do not for the moment wish to be speculative, but rather to deal with the materials available to the en-

gineer who may be planning construction at the present, no discussion will be made of the possibility of the future general use of concrete or steel or concrete-steel for poles. Wood is still the pole material most feasible for the ordinary interurban line construction; whether it is cedar, pine or chestnut of course depends upon the relative location of the points of shipment and of use. The size and length of the poles, and the method and location of setting, however, admit of considerable variation, and should be carefully considered. With transmission lines on the same pole line, the poles should be long enough to allow plenty of free space between the transmission lines and other wires. The cost of an additional 5 ft. in the length of the poles is small compared with the gain in reliability and safety to workmen. The side spacing of poles, or the distance from the center of the track, is an important point, as an increase in this distance means longer trolley brackets and an addition in the side strain on the pole, due to the weight of the trolley hanging further away from the pole, although it also means greater safety in operation, and these matters should be carefully weighed against each other. On a single-track road, the possibility of double-tracking in the near future may determine on which side of the track the pole line should be located; but at long, easy curves it may well pay to cross over in order to place the poles on the outside of such curves. There are two advantages in this: the pole line is guyed much more easily when located on the outside of the curve; also, when so located, it does not prevent a clear view of the track ahead, as is the case when located inside. The setting of poles should receive especial care, if economical maintenance is sought for, and although not many interurban lines are so constructed, in many parts of the country the soil is of such a nature that the setting of all poles in concrete would undoubtedly be wise.

There is a splendid opportunity for the exercise of good judgment in the location of the various wires on the pole line. In the majority of cases, five sets of wires are to be carried—transmission lines, trolley, direct-current feeder, signal and telephone wires. The location of trolley and transmission wires are fixed when their heights and the side spacing of the poles are determined, but considerable variation may be made in the placing of the other wires. With the trolley on brackets, the side pull due to its weight may be balanced to a greater or less extent by hanging the direct-current feeder on the opposite side of the pole. In a case we have in mind, the wires were so placed on the pole that with the sizes used and average height of a 40-ft. cedar pole the center of gravity of the entire construction fell well within the base of the pole when set with an 8-in. rake away from the track, although a No. 000 trolley was carried on 8-ft. brackets.

Care should be used in the placing of telephone and signal wires that there is little opportunity for them to short-circuit with one another or with the direct-current feeder, although if the spacing is right all may be safely carried on one cross-arm. Wires strung tight on poles well guyed wherever the direction of line changes in the slightest is, of course, the best protection against these accidental short-circuits.

The form of trolley bracket most generally and properly

used is that from which the trolley is flexibly suspended from a steel stranded wire instead of directly from the rigid arm of the bracket. The bracket should be made long enough, however, to extend enough beyond the trolley to provide this flexibility. An extra 6 ins. of trolley bracket will cost a few dollars per mile in the first place, but will prove to be a very good investment in trolley maintenance. Catenary construction, of course, provides this flexibility in a different manner, and may prove to be the most economical in the long run, even with ordinary voltage direct-current work. But experience has proved that rightly designed construction of the older type is fairly satisfactory, and undoubtedly most of the mileage constructed will be of this older design for several years to come, or until the advantages of the catenary type have been clearly proved by experience.

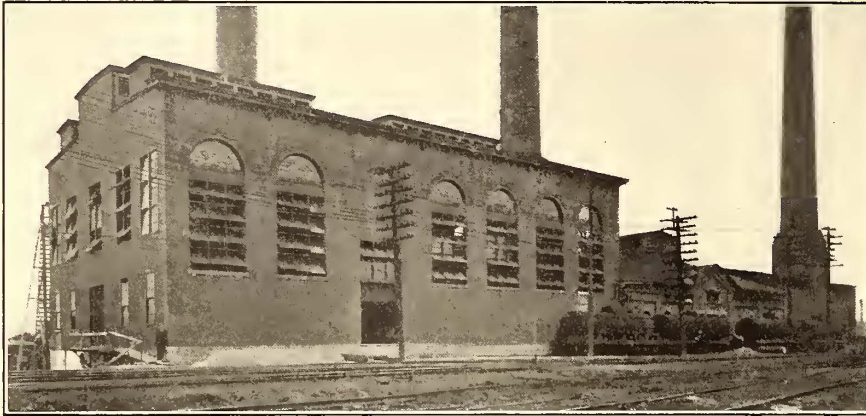
If continuity of service is at all important, a duplication of transmission lines will prove advisable. Even with the two transmission lines carried on the same pole line, the troubles most frequently encountered will only affect one circuit. A bad insulator, a burnt cross-arm, a broken wire, or a short-circuit caused by a foreign wire or branch of a tree may put one of the circuits out of commission, but in most cases will leave the other entirely clear. The point that one circuit cannot with safety be repaired while the other on the same pole line is in operation is well taken. In general, such attempt should not be allowed, but the advantage of supplying power with the good circuit during the time occupied in getting men to the scene of the trouble has been gained, and in most cases the time spent in locating such trouble and getting men to it is longer than that spent in actual repairs. The cost of construction is, of course, increased by the use of two circuits, due to practically doubling the number of cross-arms, pins and insulators; but the investment is generally worth while in the additional safety against interruption of service. A further point in favor of two circuits is that, with the same weight of copper as in a single circuit, and the same power, the voltage drop is less, due to the lower impedance of the smaller wire.

A method of transmission line construction on railway poles which has been suggested, and which has much to recommend it, may be mentioned here. The railway poles are necessarily set at intervals of about 100 ft., a longer spacing not being possible on account of the weight of trolley and feeder wires. The transmission wires, however, being, as a rule, small, can safely be carried in spans of 200 ft. Short poles, of only sufficient length to carry the trolley, feeder and telephone wires, are alternated between longer ones carrying the transmission lines in addition several feet above the others, these longer poles being about 200 ft. apart. As by far the greater part of transmission line troubles come from insulator failures, these troubles are at once reduced one-half, and may be still further reduced by putting a part of the money saved in less cost of poles into better high-tension insulators, pins and cross-arms. On curves, poles of sufficient length to carry the transmission lines should be set at closer intervals, but on straight line construction the 200-ft. span is perfectly safe for the sizes of wire most generally used for railway transmission lines.

THE NEW TURBINE POWER STATION OF THE DALLAS ELECTRIC CORPORATION

In line with the general policy of improving the property of the Dallas Electric Corporation, Dallas, Tex., a new turbine power station has been erected in Dallas. The new station is built contiguous to the old one, and is used in conjunction with it to furnish power for both the railway

directly over the central firing alley in the boiler room and in the central portion of the engine room roof. In addition small monitors are located over the boilers. The boilers now installed are served by two stacks, an old one of brick which serves the old boilers and a new steel, self-supporting one 11 ft. in diameter at the base and 150 ft. high which rests on a steel framing about 40 ft. above the basement floor and immediately over the feed-water heaters and boiler service pumps. The steel framing of the building is designed for the ultimate erection of a similar steel stack directly across the firing alley, to take the place of the present brick one.



BOILER ROOM OF NEW PLANT WITH THE OLD PLANT TO THE RIGHT; ILLUSTRATING ALSO THE FACILITIES FOR VENTILATION

and the lighting systems of Dallas. At present the new plant contains two 1500-kw, two-phase, 60-cycle Curtis steam turbines, but provision has been made in the construction of the building and in the arrangement of the piping for future extension as the growth of the system requires.

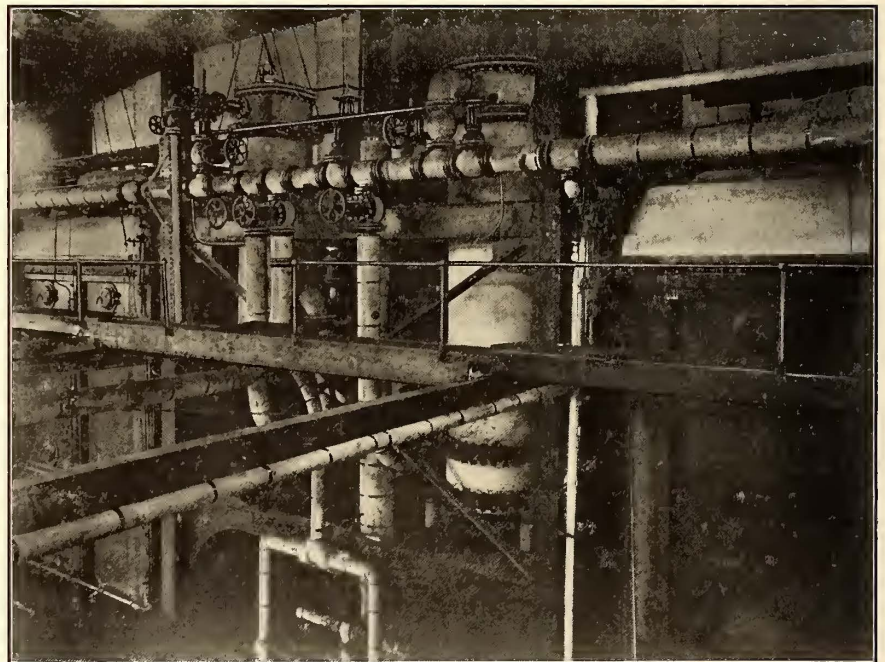
The station is located in the north-western portion of the city between the yards of the Missouri, Kansas & Texas Railroad and the line of the Cotton Belt and Rock Island Railroads, and about one-half mile from the Trinity River. It is housed in a structure consisting of a steel framework with brick curtain walls built in and with concrete roof and floors. Both engine and boiler rooms have basements under them, and the engine room contains a switchboard gallery running the full length of the building. A portion of the concrete foundation rests on bed rock, while that nearest the river is on piles. The building is, in fact, built over what was formerly a rock bluff about 50 ft. or 60 ft. high. Near the division wall between the boiler and turbine rooms this bluff sheers off abruptly, so that while it was necessary to excavate the rock for some of the footings under the columns in the boiler room basement, others 10 ft. distant are supported on piles. Two of the piers under the new stack rest on piles, while the other two are on rock. The division wall and all of the turbine room foundations rest on 40-ft to 50-ft. piles, which are cut off below the low-water mark and are capped with concrete piers.

The climatic conditions of Dallas resulted in unusual provisions for ventilating the building, and in addition to the numerous windows in the walls the roof contains several monitors or lanterns provided with ventilating windows. Monitors running the full length of the building are located

and re-erected a few feet from their original position and at the higher elevation of the new boiler room floor. On account of the heavy load, the operating force could only spare one of these boilers at a time, and it was necessary to get one into service before disconnecting the next.

BOILERS

The boilers of the old plant were installed in two boiler rooms, one at the north of the engine room containing four 500-hp Altman-Taylor water-tube boilers, while the other one was south of the old engine room and occupied a portion of the space now covered by the boiler room of the new plant. This contained three 500-hp Altman Taylor water-tube boilers of the B. & W. type. These boilers were dismantled, turned around



FEED-WATER HEATERS UNDER NEW STACK

On account of the poor foundations originally under these boilers, one end resting on a rock and the other on mud, very little excavation could be done in the vicinity of the boilers until they were all changed. These three boilers are now located on the east side of the main firing alley and are served by the old brick stack. They supply saturated low-pressure steam to the old plant only. On the opposite side of the firing alley are six new 500-hp Stirling water-tube boilers provided with superheaters of

sufficient capacity to give 150 degs. superheat, and installed in three separate batteries. Between two of the batteries and under the base of the stack are located the hot well, feed pumps and feed-water heaters.

Oil is at present burned in the furnaces, but in view of the possible use of coal the boiler furnaces are built so that automatic stokers can be installed. When coal is used, the ashes and screenings will drop down into metal hoppers in the basement and will be discharged into ash cars running on tracks extending the full length of the boiler room.

COAL-HANDLING APPARATUS

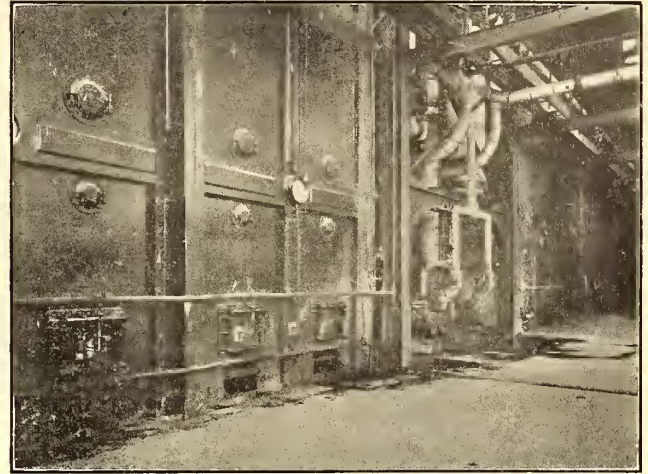
On account of the increasing price of oil the company is making arrangements to install coal-handling apparatus consisting of a Berquist bunker extending the length of the boiler room over the firing alley and suspended from girders which were installed when the steel was erected. This bunker will be supplied by a Hunt conveyor which will take coal from a hopper to be erected in the yard south of the station. This hopper will be served by a locomotive crane with clam-shell bucket. The crane will take the coal either from the cars or the storage pile. The bunker will be supplied with chutes which will connect with the furnaces through weighing hoppers.

BOILER FEED

The condensed steam from the turbines is returned to an 8200-gal. hot well located on the boiler room floor near the boiler feed pumps. The make-up water is supplied either from the city water supply through a 6-in. pipe which was installed independent of the 4-in. supply to the old station

auxiliary feed line, is carried along the rear of the Stirling boilers, and is connected to these boilers only. The old boilers are generally fed by a separate 4-in. line, either from the old station or from an old 10-in. x 6-in. x 12-in. duplex Blake piston pump located near the large pumps.

No economizers are installed. Flue gases pass directly



FRONT OF BOILERS, SHOWING FUEL OIL PIPES AND FEED PUMPS

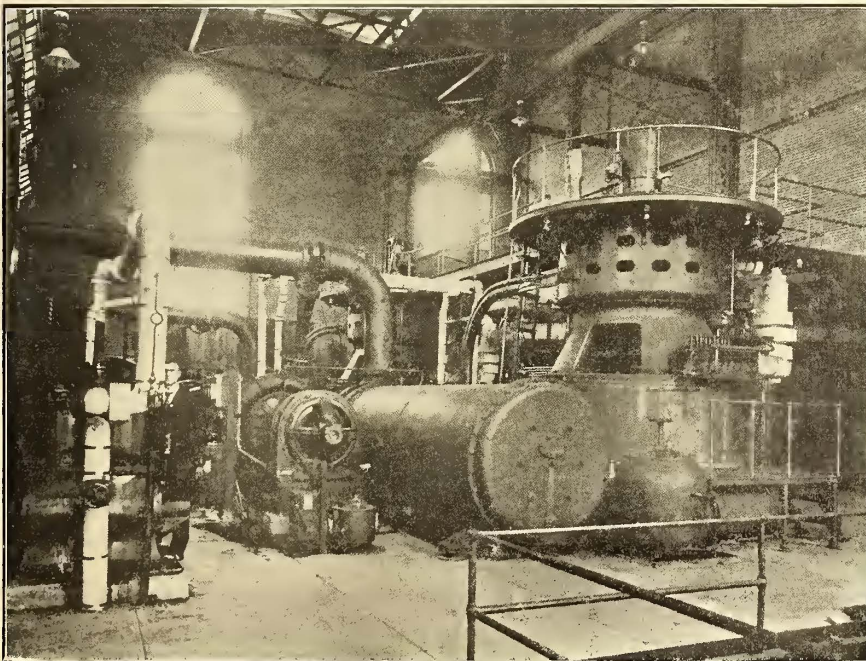
upward from the rear of the boilers into riveted steel flues suspended from the roof trusses directly over the rear of the boilers. On account of the great heat in the long summer these flues are covered with magnesia and asbestos.

STEAM MAINS

The Stirling boilers are connected to a short 10-in. pipe over each battery by 180-deg. 6-in. bends through automatic non-return or reverse-current Davis valves, which, by the way, have worked nicely on several occasions. In addition to these valves regular stop valves are provided. The 10-in. line from each boiler connects through long bends to a 12-in. header located in an alley back of the boilers. This header is provided with tees, with one end blanked to connect to batteries which may be erected on the opposite side of the firing alley.

The header is supported on roller brackets fastened to the columns in the division wall, and is about 6 ft. above the floor. At the south end this main connects to the steam piping of the old station through a 12-in. reducing valve, and at the opposite end it is capped with a blank flange. Where it passes under the steel stack it is carried upward and

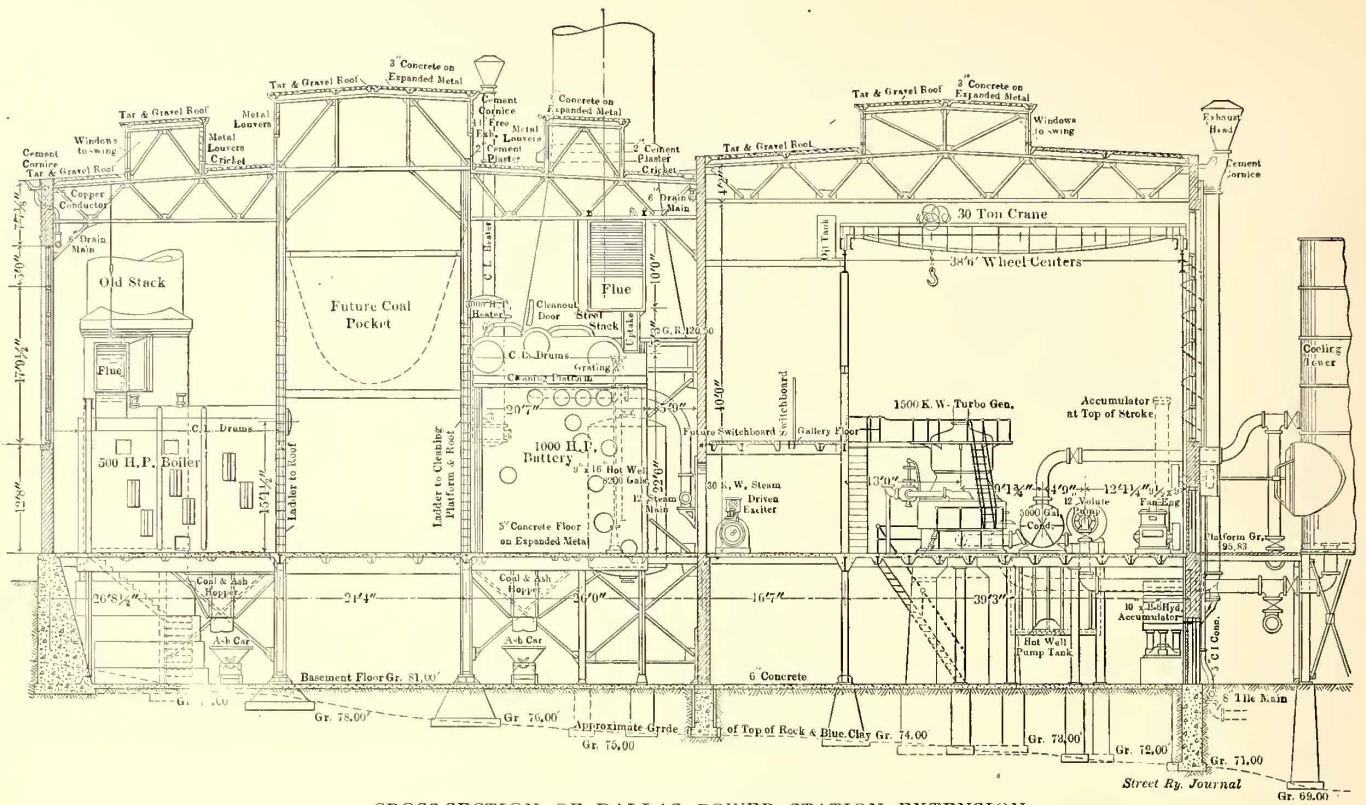
around the hot well already referred to. Between each battery of boilers the main contains a sectionalizing valve, and behind each battery it is cross-connected to a 6-in. main carried back of the boilers which supplies steam to the auxiliary apparatus in the boiler room. Both the 12-in. main and that for the auxiliary apparatus are drained into a 2½-in. drip main which discharges into a receiver located in the basement. From this receiver a small duplex pump forces the drip into the boiler-feed mains. A 10-in. line is carried from the main steam header to each of the two turbines.



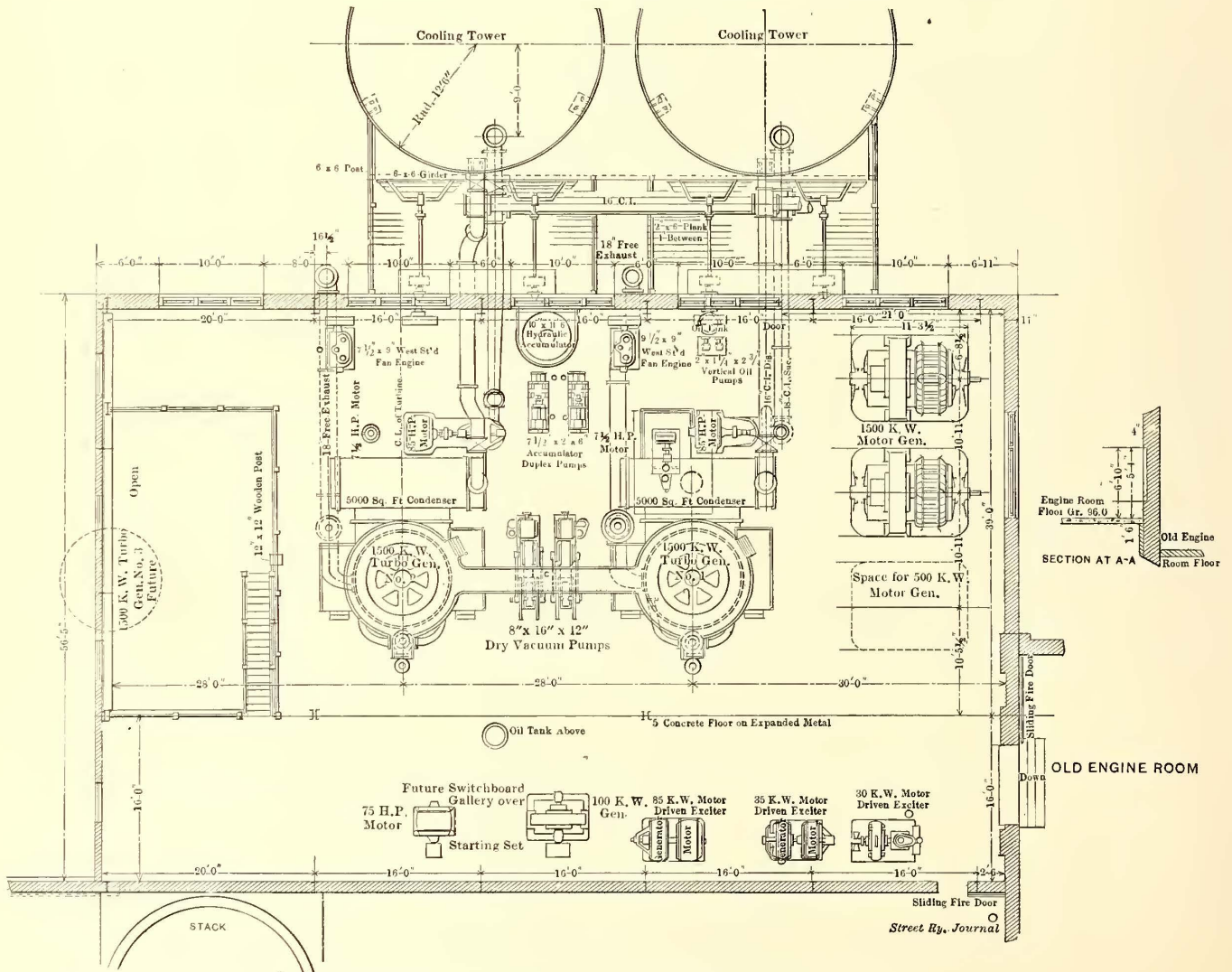
INTERIOR OF TURBINE ROOM, SHOWING TURBINE, CONDENSER, VOLUTE PUMP AND PIPING

or from artesian wells located on the premises. This water is stored in a steel storage tank of 50,000 gals. capacity connected with the station through 8-in. and 10-in. pipes.

The make-up into the hot-well tank is regulated by a float feed valve. Two Blake 14-in. x 9½-in. x 12-in. duplex plunger feed pumps are connected through two Goubert feed-water heaters of 3000 and 2000-hp capacity, respectively, to two 6-in. feed lines. One of these passes along in front of all the boilers and is cross-connected at each end of the room so as to completely encircle the firing alley, and has connections to the low-pressure boilers. The other, a 6-in.



CROSS-SECTION OF DALLAS POWER STATION EXTENSION



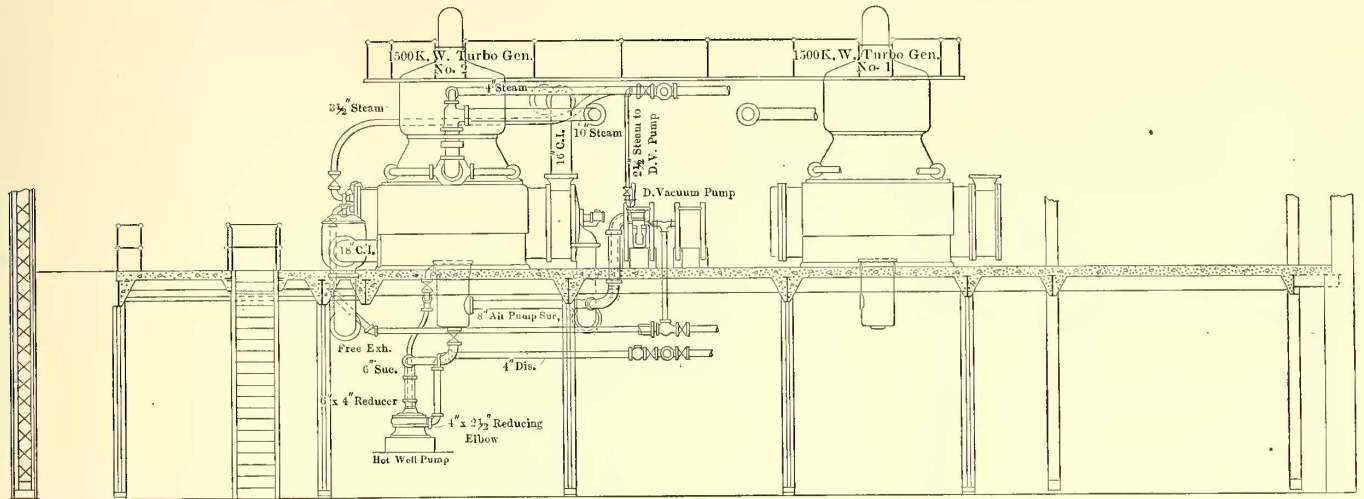
FLOOR PLAN OF ENGINE ROOM, POWER STATION EXTENSION

One turbine lead is controlled by a hydraulically-operated valve, the other by a hand-operated valve, both being operated in the alley back of the boilers. The hand-operated battery stop valves are controlled from the turbine room by extension valve stems extending through the division wall.

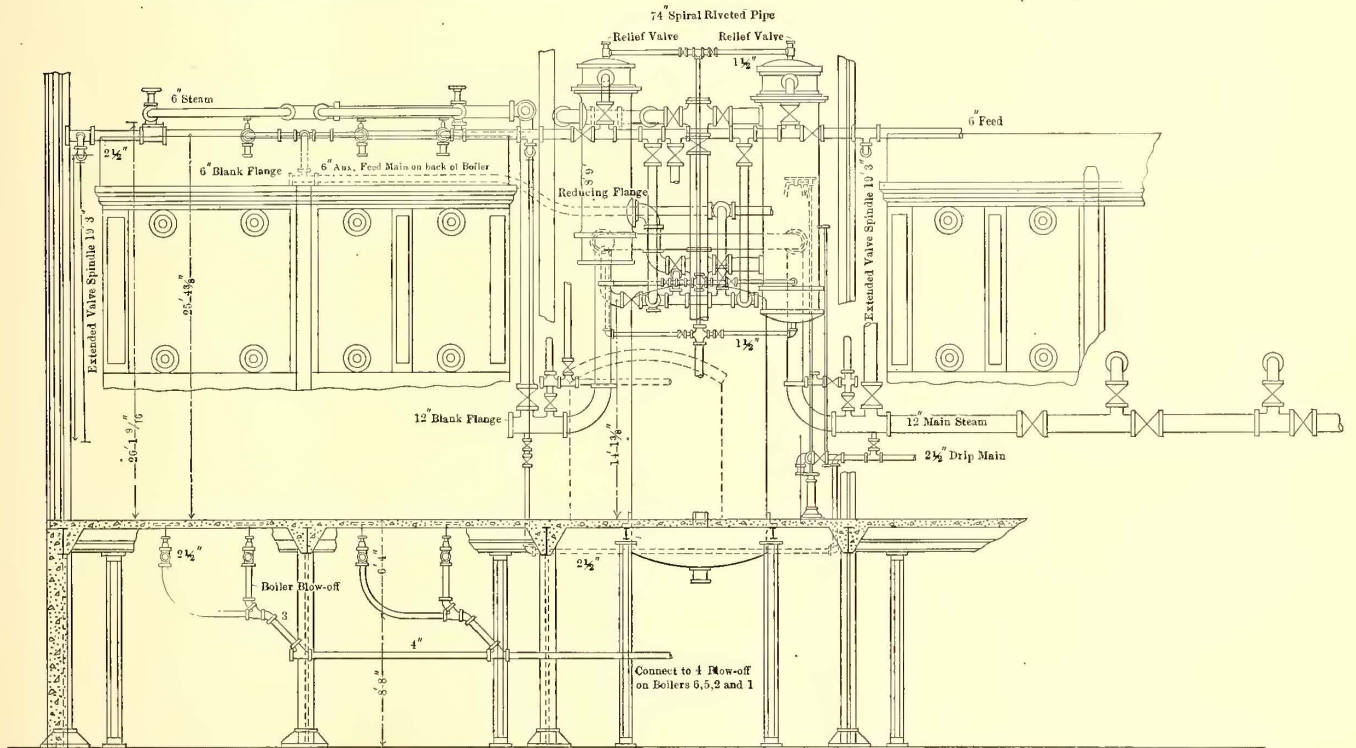
THE STEAM TURBINES

One accumulator and one set of accumulator pumps serve both turbines, but with this exception each turbine is sup-

The two cooling towers for the new plant are each 25 ft. in diameter and 36 ft. high. The water which is sprayed into them at the top by revolving arms is cooled as it falls through the tower by an opposing current of air produced by fans which are belt-driven from 9½-in. x 9-in. Westinghouse vertical engines located near the west wall of the turbine room. The piping of all three cooling towers, which includes one for the old plant, is interconnected so that they may be operated either separately or in multiple.



LONGITUDINAL SECTION THROUGH ENGINE ROOM LOOKING WEST, SHOWING STEAM, AUXILIARY AND EXHAUST PIPING



LONGITUDINAL SECTION THROUGH BOILER ROOM LOOKING WEST, SHOWING STEAM, AUXILIARY AND EXHAUST PIPING

plied with independent auxiliary apparatus, all of which is placed close around each machine.

The condenser for each machine is of the Worthington type and is installed at the base of its respective machine. Adjacent to it is a 12-in. motor-driven volute pump for supplying the condensing water.

COOLING TOWERS

An 18-in. suction and a 16-in. discharge from each pump are connected to cooling towers just west of the building.

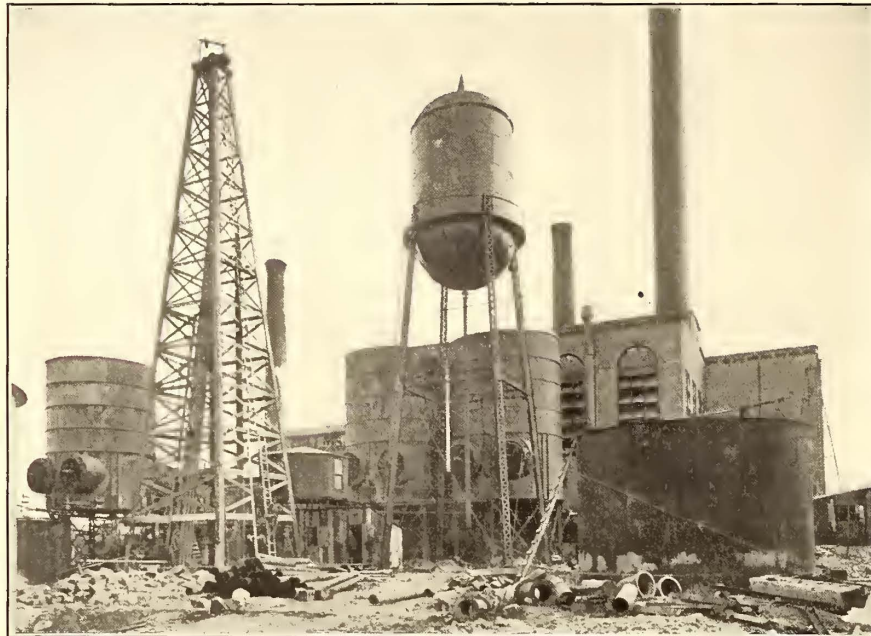
The make-up water is supplied from the water system through float valves, while an electric alarm on each tower gives warning if the water level drops. The overflow from the towers is returned to a pump tank.

HOT-WELL PUMPS

Connected to the hot well of the condenser of No. 1 turbine is a horizontal motor-driven 2½-in. volute pump. This is installed directly under the condenser at the level of the basement floor. Because of the possibility of floods due

to high water in the river the pump set was installed in a steel water-tight pit having walls extending up to the floor above. The hot-well pump for the other condenser is of the

pumps and into the bottom of the hot well. A 6-in. main connects each condenser to an 8-in. x 16-in. x 12-in. Worthington dry vacuum pump, both pumps being located on the main floor between the two turbines.

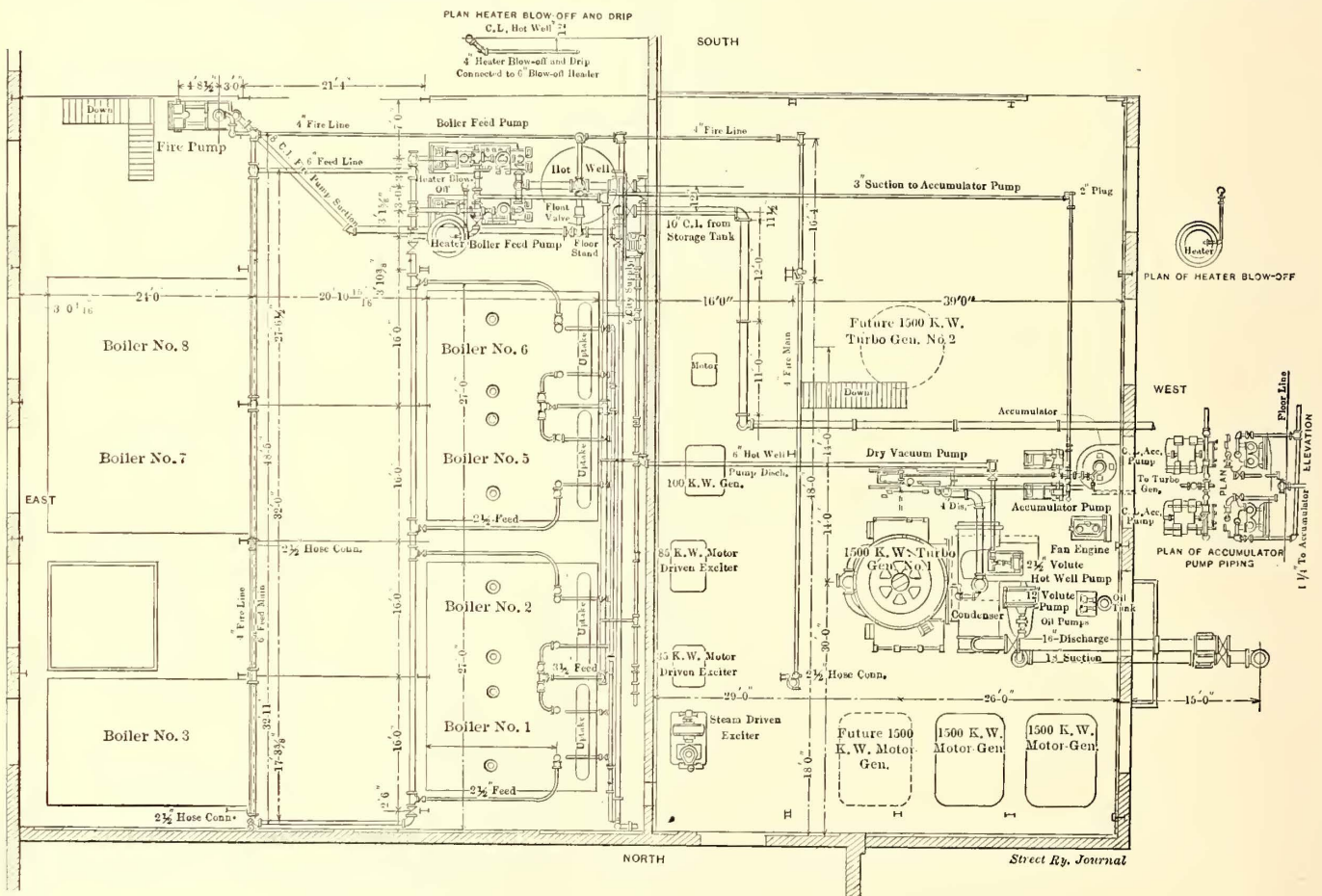


PLAN OF DALLAS STATION, SHOWING THE THREE COOLING TOWERS, ELEVATED TANK, PUMP HOUSE OVER WELLS AND DERRICK USED IN DRILLING A NEW WELL

Near the west wall of the turbine room and midway between the two turbines is a 10-in. x 11-ft. 6-in. hydraulic accumulator for maintaining an even pressure on the step bearings of the turbines. The foundation of the accumulator is on the basement floor, but the apparatus extends when at the top of its stroke several feet above the main floor. A pressure of 425 lbs. is maintained in the accumulator by either of two 7½-in. x 3-in. Worthington duplex accumulator pumps, which have their suction pipe connected both to the suction of the boiler feed pumps and to a tank which is supplied with filtered water.

OILING SYSTEM

The two turbines are oiled by means of a gravity oiling system, all the piping of which is of brass. Two Blake duplex 3-in. x 2-in. x 3-in oil pumps elevate the oil into a tank located just under the roof trusses and from which a pip-



PLAN OF AUXILIARY PIPING IN DALLAS POWER STATION EXTENSION

vertical type with the motor installed on the main floor. This latter arrangement obviated the necessity of a water-tight compartment. Both hot-well pumps discharge through a common 6-in. main into the suction of the boiler feed

ing system branches to all the bearings of both machines.

EXCITATION OF THE TURBINES

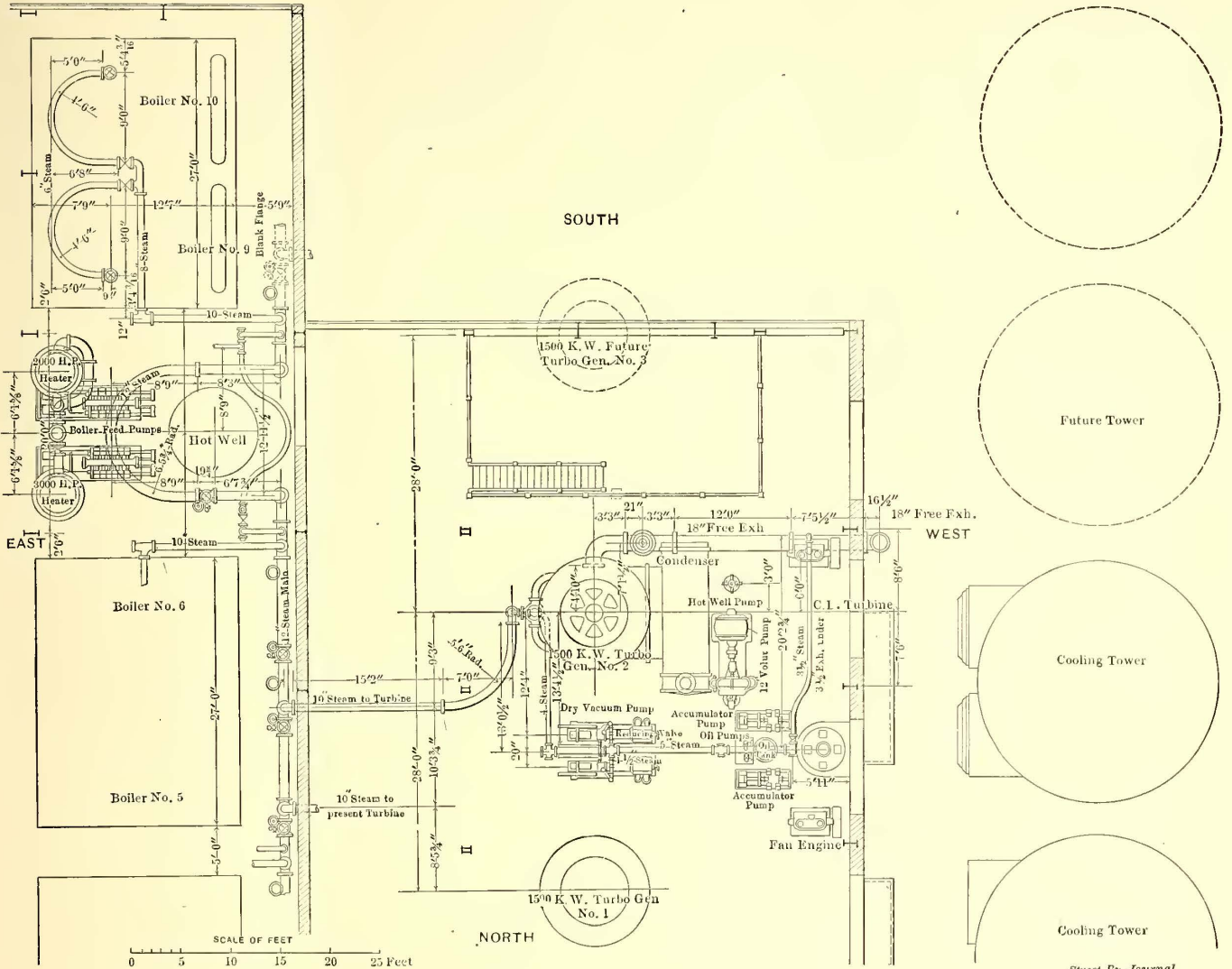
In starting the plant a 30-kw steam-driven exciter set

consisting of a vertical engine and a generator mounted on one base is used. For continuous use there are two motor-driven exciters, one of 35-kw and another of 85-kw capacity. Two 500-kw motor-generator sets installed in the north end of the generator room supply direct current to the street railway system, and provision has been made for a third machine.

At the present time all of the current generated in the plant is distributed from temporary panels through the switchboard of the old plant. Work is under way, how-

pressure sufficient to give 50 lbs. at the ground level, it was decided to sink a large well having a 10-in. casing, for a depth of about 500 ft., reducing to 8 ins. for the balance of the distance to the strata, and this work is well under way.

This well when completed is expected to supply all the water required for years to come. At present the deficiency is made up by water from the city mains. The water from the wells is discharged into an underground tank 16 ft. in diameter and 13 ft. deep. In the bottom of this tank are two 4-in. vertical centrifugal pumps driven by vertical mo-



PLAN OF STEAM AND EXHAUST PIPING IN THE DALLAS STATION

ever, to erect a permanent switchboard of the latest design on the gallery in the turbine room. The direct-current feeders and the alternating-current mains will leave the station in underground conduits which will continue under the adjacent yards of the Missouri, Kansas & Texas Railroad to a cable house from which the cables will be carried up to a pole line.

WATER SYSTEM

The water supply for the old station was obtained from two 4-in. artesian wells, each about 800 ft. deep, reaching to the lower Woodvine strata. In order to raise this water to the surface, air lifts were used, requiring the use of air compressors and the consequent expenditure of considerable energy. As there is an abundance of good water in another strata 700 ft. lower, known as the Paluxy, which is under

tors, located in a motor house high above the highest flood level, or at the grade of the new station floor.

The water from the pumps is delivered into an underground piping system which is connected with the 50,000-gal. storage tank already mentioned. This tank is erected just west of the building on a structure 80 ft. in height. The piping system is also connected to the tanks of the old station.

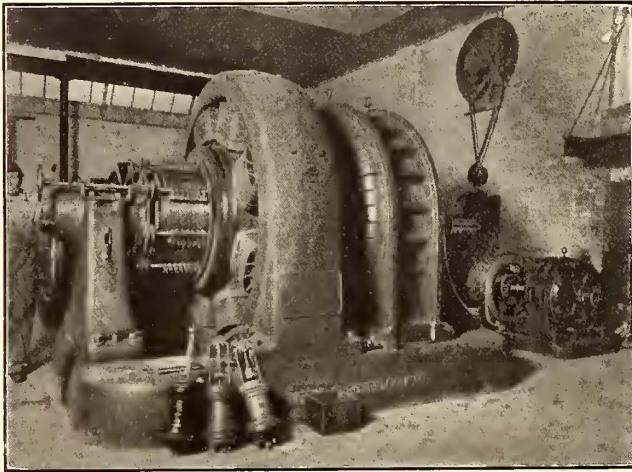
FIRE PROTECTION

From the water system an 8-in. main leads to a 14-in. x 7½-in. x 12-in. fire pump located in the boiler room. This pump discharges into 4-in. fire mains which extend under the main floor the full length of both the boiler and turbine rooms. Two risers in each room are fitted with fire hose. In the event of failure of either the

well system or the city water, by closing one valve and opening another the fire pump and the boiler feed pumps as well may be fed from either system.

GENERAL

In addition to the work done upon the main station, the construction company has installed in a sub-station located in the center of the business district of the city a 500-kw motor generator. The installation of this machine necessitated the enlargement of the building. The station was formerly used only for lighting service and contained two



500-KW MOTOR-GENERATOR IN THE DALLAS SUB-STATION

325-kw double motor generators connected to a 250-volt, three-wire system. The same company also made several structural improvements in the old power station.

The Dallas Electric Corporation is managed by Stone & Webster, for whom M. M. Phinney is district manager in Texas. E. T. Moore is manager of the railway and lighting properties in Dallas. The station was begun by the Columbia Improvement Company, who subsequently sublet its completion to the Stone & Webster Engineering Corporation, constructing engineers.

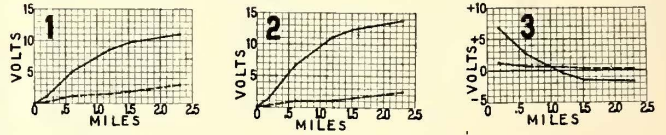
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THE EFFECT OF THREE-WIRE OPERATION ON ELECTROLYSIS IN BOSTON

The publication of the April number of the Proceedings of the American Institute of Electrical Engineers has released the interesting data on Boston electrical conditions presented during the Institute discussion on electrolysis at the March 1 meeting by Paul Winsor, chief engineer of motive power and rolling stock, and John W. Corning, electrical engineer, of the Boston Elevated Railway Company.

They said that while the company has a well-bonded system, electrolysis had taken place near the Harvard power station, where there is a marsh of salt water, and beyond which, about a mile away, is the first car track in that direction. Numerous water mains are located nearby, but a careful study of the situation has reduced the trouble materially. The local telephone company takes great pains to survey its cables, and when it finds a place where it thinks there is danger of electrolysis, it consults with the Boston Elevated Railway Company's engineers, who put in either a negative feeder or a connection to the rail to remove the trouble. On its own cables, the Boston Elevated Railway has cut the lead in many places and made special connections to avoid electrolysis. Similarly, in another case where the Metropolitan Water and Sewerage Board has some large

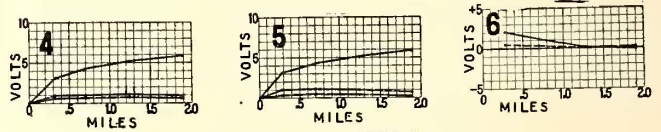
pipes running into Boston, it was found advisable to put eleven insulating joints in them. Some of the joints are of rubber and some of wood, ordinary bell and spigot joints, with 5/8 in to 3/4 in. pine calking. Some time ago some experiments were made in operating certain portions of the road on the three-wire system. As the practical difficulties of operating stations on a three-wire system are thoroughly appreciated, the results are not offered as a panacea for the cure of electrolytic troubles nor even as a practical method of operating, but merely as being of general interest.

The Boston Elevated Railway Company's distributing system is supplied with power from ten stations and is divided



FIGS. 1, 2 AND 3

into upward of seventy feeder sections. To explain the results of the three-wire trials more intelligently, attention is directed to Figs. 14 and 15, showing nine of the feeder sections fed by the Harvard power station. The dash lines on these maps indicate the boundaries of the feeder sec-



FIGS. 4, 5 AND 6

tions, the numbers of which appear, and the heavy lines indicate tracks. Passing through this district from one side to the other will be seen depicted some 48-in. water mains. The power station location is indicated by the star.

The company operates on the two-wire, single-trolley grounded-return system. Fig. 14 represents the ordinary relation between feeder sections with this system. Referring now to Fig. 15, it will be noted that certain of the feeder sections have been shaded. In the experiments referred to these sections were supplied from this power station by current from

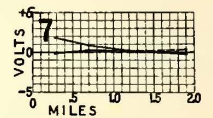
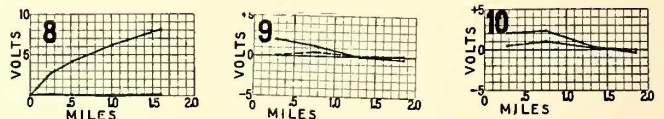


FIG. 7



FIGS. 8, 9 AND 10

a generator connected in three-wire relation with the rest of the station. No line change was made in the feeder sections beyond installing an additional set of insulating joints in the trolley wire at the points of intersection of positive and negative sections. For the purpose of the investigations, test-wires were run from the power station in three directions for a distance of from 1.5 to 2.5 miles, and simultaneous readings taken at several points along the line under both two-wire and three-wire operation. The observations of interest in connection with the subject of electrolysis were the return drop, potential difference between pipe and rail, and the current flowing on pipe.

The observations under two-wire and three-wire opera-

tion were taken about two hours apart for a period of one-half hour each, the endeavor being to have the loads on the individual feeder sections as nearly as possible the same throughout both sets of observations.

Fig. 1 shows the return drop to the power station from a point about 2.25 miles distant under two-wire and three-

SECTION.	TABLE I. Average Load on Section.		TABLE II. Average Load on Section.		TABLE III. Average Load on Section.		TABLE IV. Average Load on Section.	
	Two-wire.	Three-wire.	Two-wire.	Three-wire.	Two-wire.	Three-wire.	Two-wire.	Three-wire.
70.....	246.0	222.0	278.3	305.2	245.2	266.6	215	208
71.....	183.6	133.2	196.9	303.2	145.2	189.2	136	149
73.....	263.6	251.9	272.6	275.0	231.0	295.2	241	262
97.....	413.0	411.0	488.0	516.0	524.0	527.0	480	454
91.....	271.0	249.0	325.0	339.0	378.0	329.0	266	300
Totals..	1377.2	1267.1	1560.8	1738.4	1523.4	1607.0	1338	1373

wire operation. As before stated, the results are averages of readings taken at intervals of ten seconds throughout a period of thirty minutes. The load on the shaded sections of Fig. 15 under two-wire and three-wire operation are as shown in Table I.

From this table it will be seen that the conditions with respect to load are almost identical in both cases. The re-

SECTION.	TABLE V. Average Load on Section.		TABLE VI. Average Load on Section.		TABLE VII. Average Load on Section.		TABLE VIII. Average Load on Section.	
	Two-wire.	Three-wire.	Two-wire.	Three-wire.	Two-wire.	Three-wire.	Two-wire.	Three-wire.
70.....	224.6	181.9	234	199	205	267	286	321
71.....	152.6	134.6	113	111	190	199	170.6	199
73.....	232.4	232.6	284	285	301	235	280	236
90.....	455.6	464.0	445	404	488	536	627	600
91.....	264.0	302.0	249	277	384	370	372	380
Totals..	1329.2	1315.1	1325	1276	1568	1607	1735.6	1736

turn drop under two-wire operation, represented by the full line, was reduced 83 per cent by three-wire operation as shown by the dash line.

Fig. 2 gives the similar results of a test which was repeated on another day. Table II. gives the loads in the several feeder sections.

Fig. 3 gives the potential relation between pipe and rail along the line of the first test-wire. The full line repre-

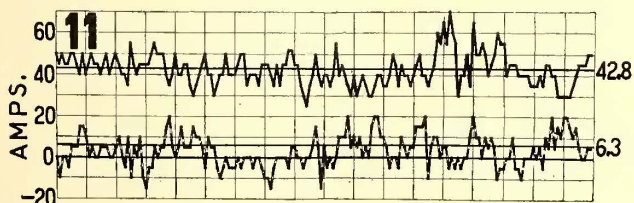


FIG. 11

sents the relation under two-wire operation, and the dash line that under three-wire operation, the values above the zero line referring to positive condition of the pipes and those below the line to negative condition of the pipes. It will be seen that the high reading obtained near the power station has been reduced very materially, although at the same time the pipe has been rendered positive throughout the whole length under consideration by a gradually decreasing amount. The loads in the several shaded feeder sections under two-wire and three-wire operation while the above test was being made are shown in Table III.

Figs. 4, 5, 6 and 7 give results obtained along the second test-wire. Figs. 4 and 5 show return-drop relations on two-

different days. The current relations in the several shaded feeder sections for Figs. 4 and 5 are shown in Tables IV. and V.

Attention is called to two sets of results, in each case under three-wire operation. While the upper set of observations was being taken, section 70 was feeding in the usual manner; whereas, while the lower set of observations was being taken it was fed from the other side of the three-wire system.

Figs. 6 and 7 show the potential relations on the pipe along the line of the second test-wire under two-wire and three-wire operation, and it is clearly seen that in these cases the potential differences between pipe and rail have been almost eliminated. The load relations of the sections while these observations were being taken are shown in Tables VI. and VII.

Fig. 8 gives the return drop along the line of the third test-wire. While the three-wire system was in operation section 70 was fed part of the time from one side and the rest of the time from the other. The results are as shown. It will be seen that the return drop in this case was practically wiped out, the three-wire potential curve practically coinciding with the zero line. The effect of reversing section 70 in this case was not as great as it was in the last instance, but is just as noticeable. The load on the several sections while these results were being taken is shown in Table VIII.

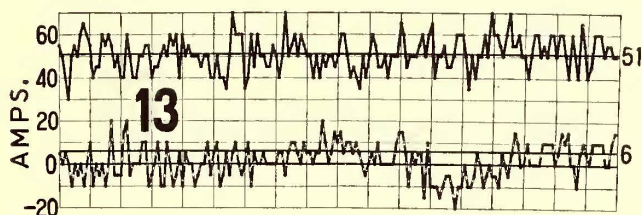


FIG. 13

Figs. 9 and 10 show the effect on the pipe potential in this district of three-wire operation as compared with two-wire operation, and similar relations of potentials are observed as in the previous cases.

Figs. 11, 12 and 13 show readings of current under two-wire and three-wire operation flowing on the large mains which traverse the district in question. These readings

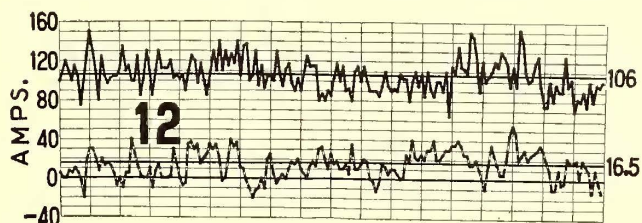


FIG. 12

were taken for a period of thirty minutes at intervals of ten seconds. It will be seen in Fig. 11 that under two-wire operation the average current flowing on the pipe was 42.8 amps., with a maximum of 70 amps. Under three-wire operation this current was reduced to an average of 6.3 amps. and a maximum of 20 amps. On Fig. 12 an average current of 106 amps., with a maximum of 155 amps., is reduced by three-wire operation to an average of 16.5 amps. and a maximum of 55 amps. In Fig. 13 an average current of 51 amps., with a maximum of 70 amps. under two-wire operation, is reduced by three-wire operation to an average of 6 amps. and a maximum of 20 amps. The results in each one of these last three figures were taken at a dif-

ferent point on these pipes, the current being calculated from the resistance of the pipe, and the potential drop along a single length, not including joints. In the case of the

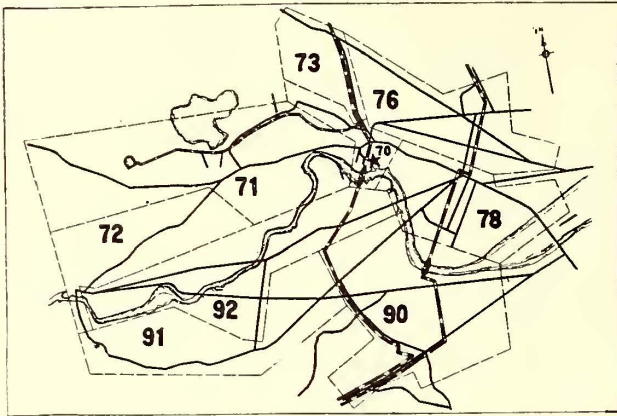


FIG. 14

three-wire operation the averages given are averages of all observations, those below the line being taken with a posi-

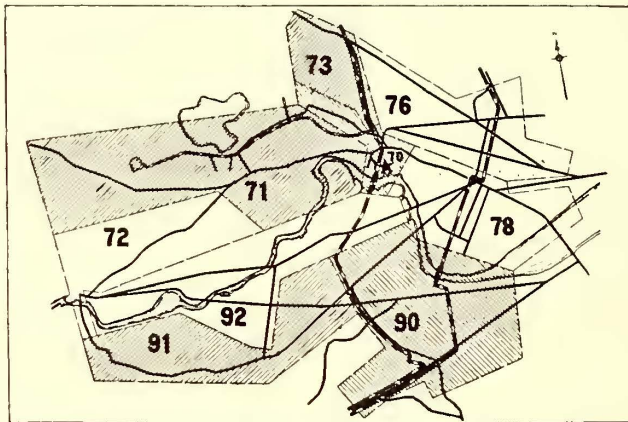


FIG. 15

tive sign. In these three cases the three-wire operation shows a reduction in current flowing on the pipe of 85, 85 and 88 per cent, respectively.

ELECTRIC POWER FOR WESTERN PACIFIC

Reports continue to be circulated throughout California to the effect that the Western Pacific Railway will be operated by electric power. The source of supply will be the works of the Great Western Power Company, with head works in Lassen County. This company is said to be controlled by the same Gould interests which control the Western Pacific. The Great Western Power Company's plant will supply 50,000 hp. With this it is anticipated that the whole Western Pacific road from San Francisco to a point near the middle of the State of Nevada can be supplied with ample power. In Salt Lake another electric supply system will be installed to handle the line from that point to a connection with the Nevada point. The main works in California are to be at Big Bend. The Western Power Company has bought the whole of Big Meadows in Lassen County. The north fork of the Feather is being dammed, and at Plattville the mountain is being tunneled into Butte Valley, where will be the vast reservoir in which will be stored the water that will supply the fall and power necessary in the dry season. A supplementary station will be established in Nevada.

RAIL CORRUGATIONS IN PHILADELPHIA.

As readers of this paper know, the wide prevalence of rail corrugations has brought out many diverse theories to account for their origin. The latest European contribution on this subject was furnished by Joseph A. Panton in a paper presented in London before the Institution of Electrical Engineers, Mar. 21, 1907, and printed in the April 13 issue of this publication. As Mr. Panton dealt only with corrugation as manifested under British operating conditions it should be of interest to present a case in this country where corrugations have occurred under circumstances that have led to the theory that this trouble is the result of a vibrating rail.

It will be noted from a study of Mr. Panton's paper that he believes rail corrugations primarily are due to trucks out of square and the unequal distribution of driving power on the axles inherent in the common method of electric-car propulsion. In the case of Philadelphia, the American city chosen for comparison, the corrugations have occurred under such circumstances that H. B. Nichols, engineer of maintenance of way of the Philadelphia Rapid Transit Company, believes that they are really caused by vibrating rails.

Before attempting to describe the Philadelphia situation in detail it may be well to point out some of the important respects in which English and American street railway practice differ, especially as rail corrugations appear to occur more frequently abroad, so it is possible that some difference in track construction or car operation is responsible for its greater frequency. Instead of the tie construction so common in this country many English city lines have the rails laid on concrete stringers 9 ins. to 12 ins. deep and 8 ins. wide, a form of construction which on poor foundations soon causes the rail to move up and down over considerable distances. The second difference lies in the width of the grooves of rails, as the British Board of Trade regulations do, or did, not usually permit a wider groove than $1\frac{1}{8}$ ins. on straight track and $1\frac{1}{4}$ ins. on curved track. This explains why flange breakage is more frequent than here, because a $\frac{3}{4}$ -in. wheel flange is often obliged to run in a groove only half an inch wider, which causes binding on sharp curves and may encourage corrugation, as an extra strain is put on the track at such places. Another difference which may have some bearing on the increased corrugation is the British use of double-deck cars, which, naturally, gives a greater load per wheel.

In at least one important point, Messrs. Nichols and Panton are thoroughly agreed, namely, that corrugations are not due to any inherent defects in the rails. Mr. Nichols has found that even a manganese steel switch has become corrugated, a discovery which would seem to weaken greatly the theory that this phenomenon originates from soft spots.

As to the statement made by Mr. Panton that corrugations do not occur on steam railroads, it is, of course, impossible for those familiar with American conditions only to criticise his statement with reference to English steam lines. As a matter of fact, corrugations have appeared on the tracks in the Philadelphia yards of one of the large steam railroads where the amount of wheel movement is comparable to that on a street railway. It would seem, therefore, that the mere fact of operation by electricity does not imply corrugation, but that the wheel movement must be an important factor. So far as known, no interurban electric railway—which, of course, does not run cars on fre-

quent headway—yet has been troubled with corrugation. Another explanation of the rarity of this appearance, from the standpoint of the vibration theory, is that on steam railroads or interurban electric railways the track is always exposed and open to inspection, so any sinking of the roadbed or looseness of joints can be repaired without trouble. Even when the track is loose on a steam railroad the corrugations are less because the rail is forced ahead in a long wave by the weight of the locomotive and there is very little slipping of the trail car wheels.

In Philadelphia trouble with corrugated rails first occurred about six years ago. A later instance appeared one year after the company laid 2000 ft. of 9-in., 90-lb. girder rail on wood ties. When the excavation was made the earth was found to consist of a spongy mixture of clay and water-bearing gravel. The excavation, therefore, was carried 7 ins. below the ties and the space filled with concrete to a point 1 in. below the grade of the bottom of the ties. The rails were then tamped with a mixture of fine concrete and the space between them filled to the base of the rail, which was also tamped. An additional 2 ins. of concrete formed the foundation for the paving. It was found on this line that the corrugations extended over practically the entire

standard four-motor double-truck type weighing 37,000 lbs. without passengers.

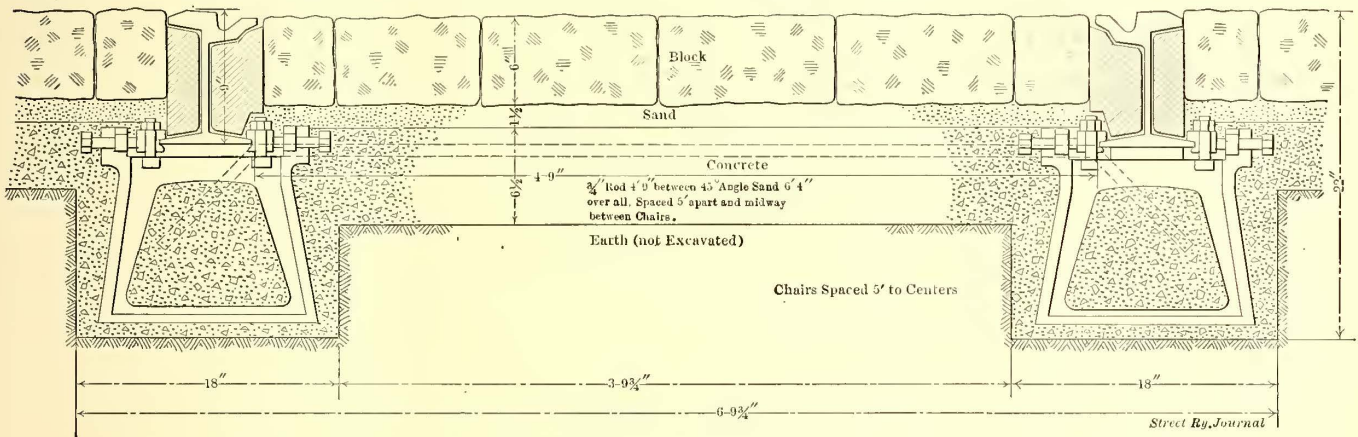
No. 1—Woodland Avenue: On slightly decayed ties in a dirt roadbed with stone block paving; the rails have fishplate joints.

No. 2—Chestnut Street, east of Sixteenth Street: Roadbed like No. 1, but with riveted joints.

No. 3—Tenth Street: South of Glenwood Avenue: Roadbed and joints like No. 2.

No. 4—Chestnut Street, east of Bridge: Resembles No. 2, but is on a down grade. This line is on a good foundation, but the web of the rail was found vibrating owing to heavy braking and the nearness of the track to the Baltimore & Ohio Railroad station. The wheels on this line are frequently skidded. This is very interesting, as in the discussion on Mr. Panton's paper one of the speakers asserted that he had found corrugations on a line where there was heavy braking. Of course, it can not be denied that braking imposes an additional strain upon the rails and may cause them to vibrate.

No. 5—Chestnut Street, west of Bridge: Although laid on wood ties in a concrete foundation the track was found to be slightly loose after only one year's service. Exam-



SECTION ILLUSTRATING LATEST TYPE OF SURFACE TRACK CONSTRUCTION IN PHILADELPHIA

length at intervals of 1 in. to 1½ ins. and for about two-thirds of the width of the head from the gage line. To ascertain the cause of the corrugations the pavement and concrete above the ties and around the rails were removed and measurements made to learn if there had been a lateral bending or vibration of the rail. The latter was found to be the case and eventually the trouble was corrected by stiffening the web of the rail with outside braces at alternate ties.

The accompanying table has been prepared to show the extent of rail corrugations in Philadelphia and the conditions under which they have occurred. The routes are numbered for convenient reference.

Line.	AGE AND CONDITION OF RAIL.	Lorain Section.	Length of Average.	CORRUGATIONS IN INS.		Depth of Corrugation in 64ths of an Inch.
				Min.	Max.	
1	Old, very loose.....	2-90	3½	3	5	1¼ to 4
2	6 years, slightly loose.....	137-371	5	..	..	1
3	2 years, loose.....	93-206	3½	3	6	1½ to 2
4	5½ years, slightly loose.....	93-206	3	..	..	1 and less
5	1 year, very slightly loose.....	93-206	3	..	..	1 and less
6	2 years, slightly loose.....	137	3½	..	..	1 and less
7	2 years.....	6 ins.	1½	1	2	1 to 2

Most of the cars on all the foregoing lines except No. 3, on which single-truck cars are run, are of the company's

ination showed that proper allowance had not been made for shrinkage of the concrete after installation, hence vibration of the rail was set up because it did not have a continuous support.

No. 6—Thirteenth Street, north of Indiana Avenue: This track is built on a firm gravel foundation, but it was found that the ½-in. web of the section used was vibrating. This section was replaced by a 141-lb. rail with a web 9/16 ins. thick and no further corrugations appeared.

No. 7—Spring Garden Street Bridge: As this line is on a bridge the appearance of corrugation was of particular interest. The section is 1500 ft. long, laid on a curve of about 100 ft. radius. Oak planks were used for ties and, with the rails, are embedded in concrete. The investigation made after corrugations began to appear showed that there was no bending in the web and, in fact, no movement of either the rails or ties could be detected in the concrete. As the corrugations appeared only on the slightly elevated outer rail which took the greater part of the car thrust, further investigation was given to the support on that side and it was finally discovered that the trouble was due to the vibration of the buckle-plates of the bridge floor under the outer rail. This case is worth noting, inasmuch as Mr. Panton stated that he had never found corrugations on bridges despite the obvious vibration of the track.

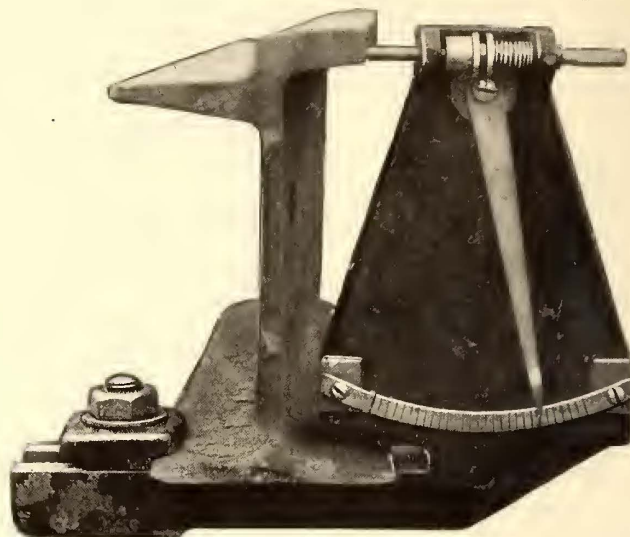
At this point attention should be called to the fact that

all of the heavily traveled streets in the down-town section of Philadelphia are laid with 141-lb. rail on concrete stringers after the manner described in the Sept. 23, 1905, souvenir issue of the STREET RAILWAY JOURNAL; that is, in this type of construction no wood is used, and provision is made for taking up the shrinkage of concrete when drying and setting by temporary shims introduced between rail and iron yoke. This type of construction has been in use between four and five years, and wherever laid the company has experienced no trouble whatever from corrugated rails.

In all cases that have come under the observation of Mr. Nichols it appears that corrugations have never occurred on any line except those where the rail was under vibration, due either to loosened track or bad roadbed. Where the foundation is poor, grinding down the head of the rail or even tightening the spikes and retamping the ties affords only temporary relief. Corrugations in rails too light for the service, where the corrugations extend on the inner side of the head, may be remedied by filing them off and setting the track to a slightly wider gage. This change prevents the wedging action of the wheels against the gage line and permits the outer portion of the head to take the load. In other instances the rail with the 8/16-in. web has been replaced by one with a 9/16-in. web, and in every case where this has been done corrugations have ceased because the track had been strengthened enough to resist the tendency to vibrate or bend under the loads imposed.

While at first sight the rail vibration theory does not

might assume that the same period could be required to loosen the rail from its foundations sufficiently to cause trouble. Mr. Nichols has found that corrugations can be produced on a new but vibrating track in from ten to



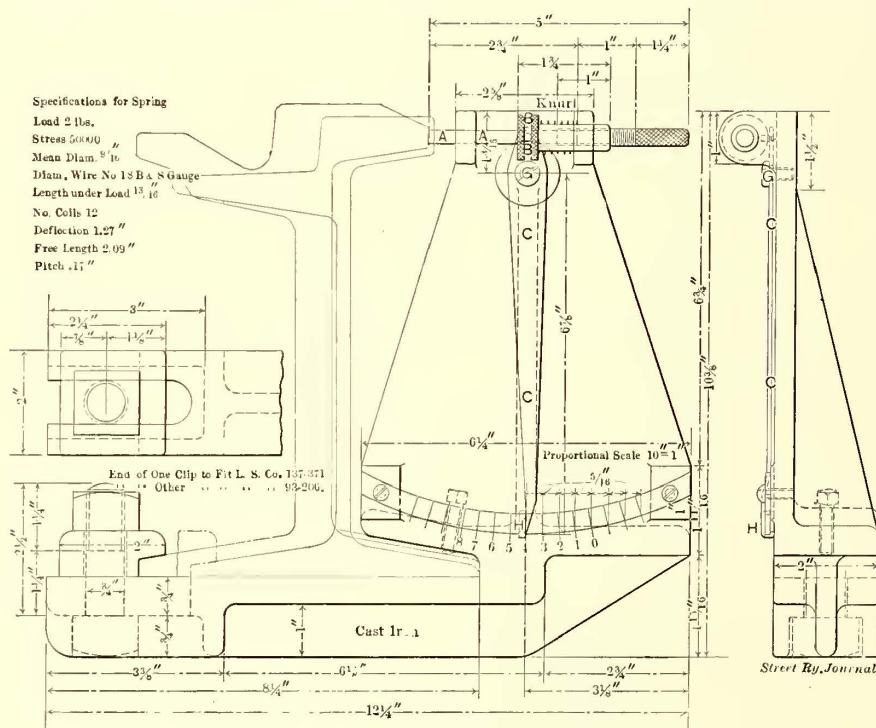
TEST GAGE FOR RAIL VIBRATION USED IN PHILADELPHIA

twelve months, while the adjoining rigid track under the same traffic was unaffected.

To prove whether or not the corrugations were due to a lateral bending or vibration of the rail, Mr. Nichols devised the instrument shown in the accompanying cuts. It will be noted that the frame may be rigidly clamped to the base of the rail, and that the vertical arm is provided with a piston *A* carrying a nut *B*, the piston being forced against the head of the rail by a spring behind the nut. A hand or pointer *C* is pivoted at *G*, the upper end of this hand engaging the nut, the other end resting on a graduated arc. The lengths of the upper and lower arms of the hand or pointer are in the ratio of 10 to 1, each graduation representing 1/64 of an inch. In using this machine it is only necessary to clamp to the base of the rail and set the lower end of the hand at zero, which can be done by turning the piston in the nut. The amount of lateral motion in the head of the rail, due to bending or buckling of the web, will then be indicated by the marker *H*, which is placed against the hand before a car is allowed to run over the rail. In many cases a movement of 3/32 in. has been noted.

For measuring the depths of corrugations, Mr. Nichols uses a flat wedge graduated in sixty-fourths of an inch. The depth is measured by setting this wedge between the bottom of the corrugation and a straight edge resting on the summits.

Under the recently amended Park Board law all the money received by the city of Indianapolis from the local street railway company and the interurban lines entering the city as a franchise tax goes to the Park Board for improving and beautifying the numerous parks of the city.



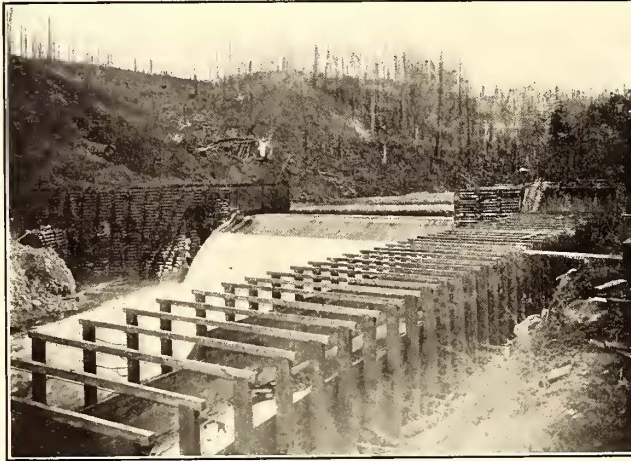
CONSTRUCTION DETAILS OF TEST GAGE FOR RAIL VIBRATION

harmonize with that offered by Mr. Panton, it would seem that the unequal drive of the axles on an unsymmetrical truck must impose a greater load on the track and thus set up vibrations which would not occur on the same track if the rolling stock was properly designed or the foundations rigid enough.

Mr. Panton also says that it takes on an average three years to develop corrugations on a new system, that being the usual period elapsing before the rolling stock has become badly out of square. Looked at in another way, one

POWER GENERATION AND TRANSMISSION IN PORTLAND, ORE.

That the rapid, healthy growth of the Northwestern States during the last decade has been fully shared by the city of Portland, Ore., is evident from the equally remarkable increase in the electrical power requirements for the city's railway, lighting and industrial purposes. The latest



VIEW OF CAZADERO DAM, SHOWING A PORTION OF THE FLUME

acquisition to the power equipment of the Portland Railway, Light & Power Company is the Cazadero hydro-electric station, which is now furnishing 15,000 hp but ultimately will give 25,000 hp. As even this plant will not satisfy the later power demands, work has been begun on a plant of equal size a few miles up the Clackamas River.

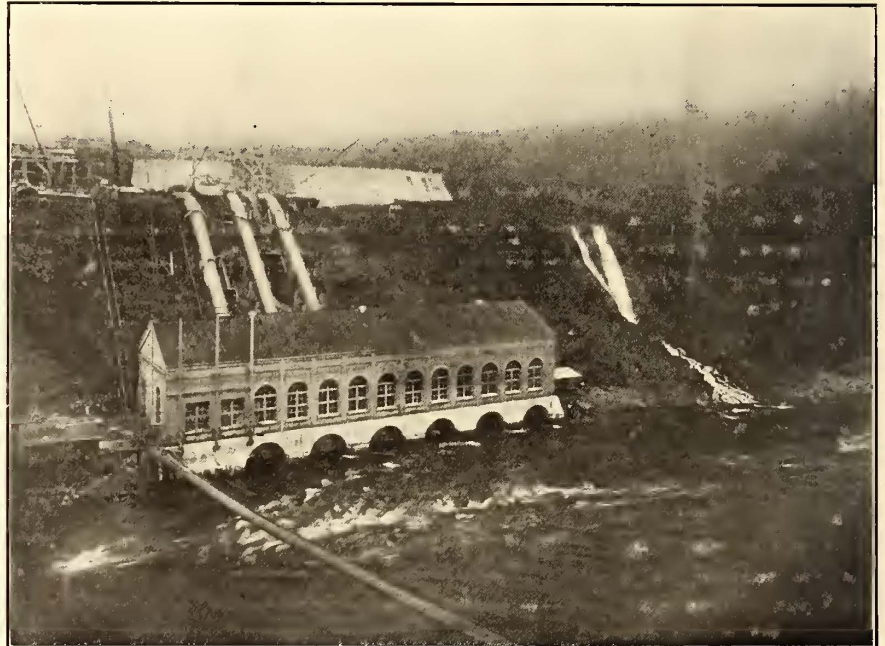
THE CAZADERO PLANT

The Cazadero station is the largest electric plant in the State, was four years building and cost upward of \$1,000,000. It is situated 37 miles from the city of Portland, on the Clackamas River, and has a present output of 15,000 hp, which will be increased shortly to 25,000 hp with the addition of two more generating units as originally planned. About a mile above the power house is the dam proper, which is 176 ft. wide and 130 ft. long at the base, and whose total length at the top is 400 ft. Here the water is taken from the Clackamas River through a bulkhead 17 ft. x 25 ft. and into a flume 2622 ft. long. This flume, which follows the contour of the hillside, discharges into a canal 2898 ft. long, 35 ft. wide at the bottom, 20 ft. deep and 75 ft. wide at the top, which in turn empties into the main reservoir or lake. The reservoir, which covers 50 acres when filled to an average depth of 20 ft., has a capacity of 326,480,000 gals. When filled to this level the reservoir will supply power sufficient to run the wheels of the power plant below for six hours after the gates at the dam have been closed. The forebay gates are located at the lower end of the reservoir and set in massive concrete walls built on the top edge of the river bluff. This wall, of steel and concrete construction, is 8 ft. thick at the top and 20 ft. thick at the bottom,

built on foundations of sandstone bed rock. The water is led from the forebay gates to the power house, 138 ft. below, in tubes 8 ft. in diameter, inclined at an angle of 45 degs. and lying along the hillside. The power house is of concrete construction, 180 ft. long x 54 ft. wide.

A 20-ton electric traveling crane, which can be run the full length of the building, facilitates any repair work that might be necessary. A railway spur terminates inside the power house so that any loading or unloading of heavy machinery can be done with this crane.

The power equipment is composed of three double 42-in. hydraulic Victor turbine wheels of the Francis type made by the Platt Iron Works, of Dayton, Ohio. A friction brake is provided on the end of the water-wheel shaft of sufficient capacity to stop the wheels when the gates are closed. Each unit is provided with a Lombard type N vertical governor. To these wheels are direct connected three Allis-Chalmers generators of the standard two-bearing water-wheel type with horizontal shaft and a normal rated output of 2500 kw each at a terminal pressure of 11,000 volts, three-phase. The revolving field has twelve poles and the speed is 330 r. p. m., thus giving a frequency of 33 cycles per second. Each alternator is equipped with a direct-connected exciter, the armature of which is mounted on the end of the alternator shaft; the exciter field yoke is carried on an extension of the bed of the alternator. The bearings are of the ring oiling self-aligning type, water-jacketed. The stator yoke is of unusually stiff construction, being provided with heavy end heads, which serve to clamp the laminations and at the same time reinforce the main



CAZADERO POWER HOUSE ON THE CLACKAMAS RIVER

part of the yoke. The laminations are of especially selected steel carefully varnished and assembled. The core is provided with numerous ventilating ducts through which a strong blast of air is forced by the revolving field. The armature coils are placed in open slots and can thus be easily replaced in case of damage. Tests on these machines showed that they were capable of carrying full load continuously with a rise in temperature less than 35 degs. C., thus giving them a liberal margin for overloads.

The current is conveyed from the generator to the type-H-3 motor-operated General Electric oil switches by

three-conductor, 15,000-volt cambric insulated cables.

A reinforced concrete structure consisting of a core wall flanked by wings and surmounted by a gallery upon which are located switch cells and a concrete bus-bar compartment forms the high-tension equipment of the station. On the main floor and immediately in front of this gallery is located the switchboard. This switchboard is composed of black Monson slate panels, there being a panel for each generator and a corresponding panel for each exciter, also a line totaling panel and a panel for the station lighting. The remote-control operating switches for the H-3 oil switches mentioned are located on this switchboard, as are also the usual instruments and the time-limit relays for operating the trips. Curve drawing indicating wattmeters of the General Electric make are used in connection with each generator.

A basement underneath the switchboard provides ample room for the location of the field rheostats for the generators. This basement is provided with a ventilating shaft reaching to the top of the building.

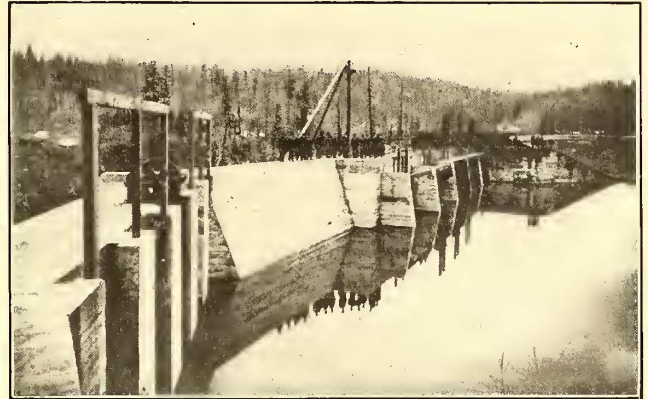
On leaving the power house the current passes directly over the Clackamas River to a transformer station located on the opposite bluff. This building consists of a series of cells for nine 850-kw oil water-cooled 11,000-33,000-volt transformers manufactured by the Stanley-G. I. Electric Manufacturing Company, and a switch room in which are located the outgoing line switches. These switches are of the Stanley 60,000-volt, three-pole, single-throw type and are solenoid-operated, the control switches being located on the main switchboard in the power house on the opposite side of the river.

The transformers are guaranteed to operate at 57,000

the General Electric make, are installed in the transformer station. A gallery for the convenient operation of the disconnecting switches is also provided.

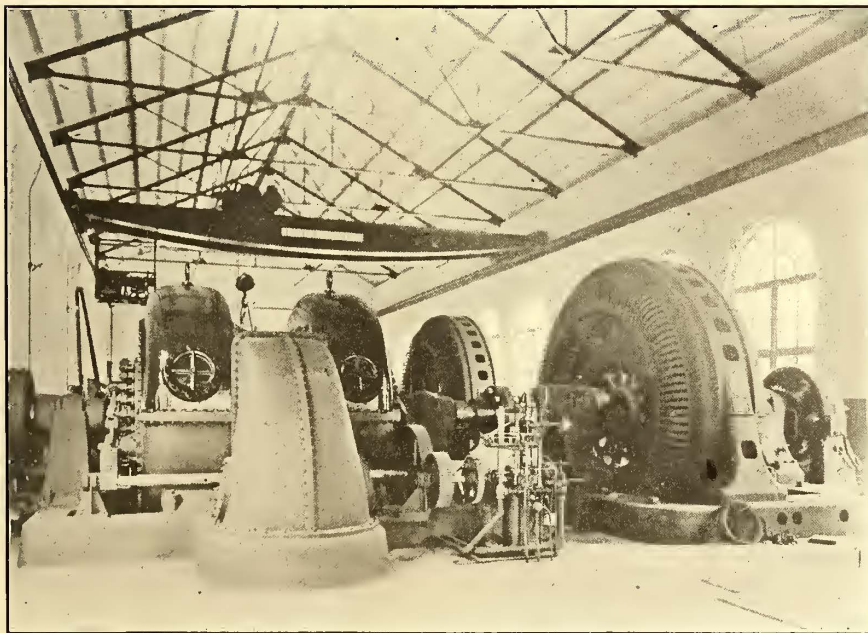
THE CAZADERO POWER TRANSMISSION

From the transformer station power is conducted at 30,000 volts to Portland, over a distance of 37 miles. Two separate and similar pole lines have been constructed



FOREBAY WALL, SHOWING INTAKE GATES TO THE PENSTOCKS

throughout the entire distance, each carrying a single three-phase circuit. These two lines, which are at a distance apart varying from 40 ft. to 90 ft., are constructed for 14 miles of the distance along the company's railway right of way. For 10 miles they follow the country road and purchased rights of way. At the Portland city limits the two lines separate, following different routes for 7 miles to a sub-station located in the heart of the city. The poles used are all of Oregon cedar, 50 ft. long for the lines to the city limits and 60 ft. within the limits. These poles are spaced on an average of 140 ft. apart, and the butts are painted with avenarius carbolineum to 1 ft. above the ground.



WATER-WHEEL AND GENERATOR INSTALLATION IN THE CAZADERO STATION

volts Y with grounded center, though at the present time the transmission voltage is 33,000. The design of the building is such as to provide ample space between all wires, and each wire is separated from its neighbor by a concrete barrier. Special attention has been given to the water-cooling equipment, an alarm being provided which will warn the attendant in the station across the river in the event of any interruption to the water.

Multiplex lightning arresters for 33,000 volts, three-phase,

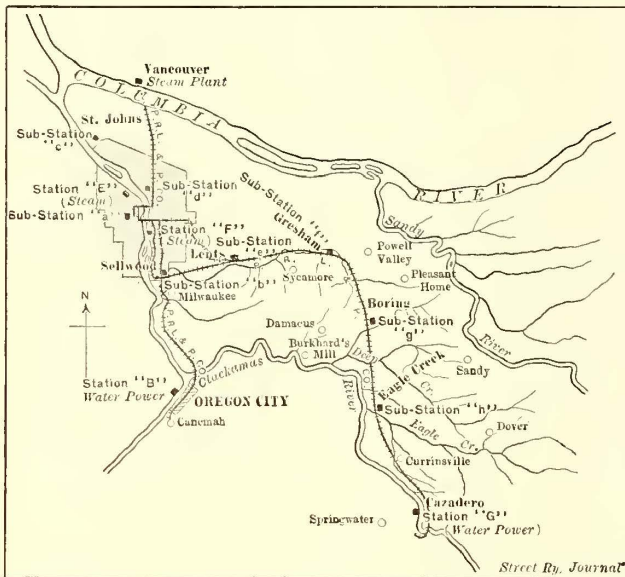
The conductors are placed in an equilateral triangle, with the apex at the top of the pole, and consist of a seven-strand cable, of 115,570 circ. mils. For the pole top construction a 6-in. x 6-in. x 18-in. arm is used, and fastened to the pole by means of a "U" strap, around the pole, and which terminates in $\frac{5}{8}$ -in. bolts, through the arm; the lower arm is 4 ins. x 6 ins. x 7 ins. long, and is so spaced as to give a 6-ft. side to the triangle. The lower arm is fastened with a through bolt and braced with $\frac{1}{4}$ -in. x $1\frac{1}{4}$ -in. x 24-in. iron braces. On all angles of over 15 degs. the poles are double-armed, using two insulators, per wire. All 90-deg. corners are turned on three insulators, so spaced as to divide equally the strain between the three. The pins are a malleable iron ribbed with through bolt, and are cemented into the insulators, which are a triple petticoat, $9\frac{3}{4}$ -in. diameter by $8\frac{1}{4}$ -in. height, and are rated at 37,500 volts. A telephone line consisting of a No. 9 galvanized-iron wire is strung on a special two-pin cross arm 10 ft. below the 30,000-volt line, and is transposed every ten poles.

Throughout the entire length of the line all trees have

been cut for a distance of 200 ft. on each side to avoid the possibility of a burn-down from this source.

THE OLD POWER STATIONS AND THE SUB-STATIONS

In addition to the water-power plant, at Cazadero, of 15,000-hp capacity, the system of the Portland Railway, Light



MAP SHOWING THE POWER STATIONS AND SUB-STATIONS OF THE PORTLAND RAILWAY, LIGHT & POWER COMPANY

& Power Company comprises generating stations and sub-stations as follows: A 12,000-hp water-power plant (B) at Oregon City, a 12,000-hp steam station (E) in North Portland, a 2500-hp steam station (F) in East Portland, and eight sub-stations, distributing throughout the system.

The two main sub-stations, "a" on the west side of the Willamette River and "d" on the east side, receive the bulk of the power generated, and are the distributing centers for approximately all of the light and power furnished to consumers throughout the city and suburbs. These two sub-stations also distribute to the railway system the greater portion of the power utilized by the city and suburban lines. The remaining sub-stations are equipped with rotary converters, and utilized solely for the feeding of the railway system of the company.

With regard to sub-station "a," it should be noted that the company is about to build a new sub-station in connection with its new combined office and railway station. At the present sub-station "a" there are installed four 1000-kw railway rotary converters, together with the necessary transformers and switchboards, also four 1000-kw lighting motor-generator sets, each consisting of a three-phase, 33-cycle, 10,000-volt synchronous motor, driving by direct connection a 60-cycle, three-phase, 2300-volt generator; also one 500-kw lighting motor-generator set, consisting of a three-phase, 33-cycle, 10,000-volt synchronous motor, driving by direct connection a 60-cycle, 2300-volt, three-phase generator. The company has also installed at this sub-station

a number of H-3 oil switches, used in connection with its various transmission lines, from station E, North Portland, station B, Oregon City, and sub-station "d," Albina, all of which center at this sub-station. The company also has installed at this sub-station ten 75-light magnetite arc sets, consisting of constant current transformers, switches and mercury rectifiers. All of this apparatus was furnished by the General Electric Company.

The power from the Cazadero plant is received in Portland at sub-station "d," on Knott Street in East Portland. This sub-station is approximately 140 ft. long, 46 ft. wide and 44 ft. high, and is built of brick with reinforced concrete bus-bar compartments and switch cells. There are installed here six 850-kw oil, water-cooled, 33,000-11,000-volt Stanley G. I. transformers, similar to those installed at Cazadero. The 30,000-volt current is stepped down to 10,000 volts and is used to furnish power to the various sub-stations in Portland, in multiple with station B, Oregon City, and station E, steam plant, in North Portland. The company has installed in this sub-station two 1000-kw G. E. six-phase rotary converters, and one 1000-kw G. E. motor generator set, which consists of a 10,000-volt, 33-cycle, three-phase synchronous motor, direct connected on the same shaft to a 2300-volt, three-phase, 60-cycle generator. There are also installed in this sub-station eleven magnetite arc sets with the necessary tub transformers and mercury rectifiers. A 20-ton traveling crane, made by Pawling & Harnischfeger, is also used in this sub-station.

Sub-station "b" is located at the junction, Sellwood, of two interurban lines, from Portland to Oregon City and from Portland to Cazadero, and feeds into the system at this point. Between Sellwood and Cazadero, a distance of 35 miles, there are four sub-stations, furnishing power to



A CORNER ON THE 30,000-VOLT TRANSMISSION LINE

this interurban line, as shown on the accompanying map. At St. Johns, a suburb to the north of Portland, there is a sub-station which at the present time is used solely for the purpose of furnishing power to the railway system in that vicinity, but will shortly have its capacity increased to take care of the light and power distribution to customers in the same territory.

The power furnished to the railway system throughout is at 550 volts, direct current, and is obtained through rotary

converters installed in the several sub-stations of the company and from 500-volt railway generators in the steam plants E and F.

HIGH-TENSION TIE LINES

As described heretofore, the output of the water-power plant, at Cazadero, is transmitted by duplicate 30,000-volt lines to sub-station "d," located in East Portland.

From the water-power plant (B) at Oregon City, power is transmitted to sub-station "a," in Portland, a distance of 15 miles, by duplicate three-phase, 10,000-volt circuits constructed along the west side of the river, and upon a single pole line, one circuit located on each side of the pole. The conductor is a 250,000-circ. mil cable. There is also a three-phase, 10,000-volt circuit of No. 1 copper from this station in Oregon City to sub-station "d," which is constructed along the east bank of the river.

Similarly, there are duplicate three-phase, 10,000-volt circuits, size No. 0, between steam station E, in North Portland, and sub-station "a," a distance of 2 miles; also duplicate lines of No. 1 copper, and for 10,000 volts between sub-station "a" on the west side and sub-station "d" on the east side, a distance of 2 miles.

These duplicate tie lines between the several stations give a most flexible system, and places available for use at any point desired the power generated in the several stations. They also permit the shut-down of any one station or of any particular line without impairing the efficiency or continuity of the service.

In addition to the system of high-tension lines between stations, as here described, the several railway sub-stations are tied together by a 10,000-volt three-phase circuit which is fed from station G at Cazadero, from station B at Oregon City, or by the tie lines it may be fed from the steam station E in North Portland. This 10,000-volt line loops into the several stations in such a way as to make it possible to cut out any section of the line without interfering with the operation of the several sub-stations upon the system.

RAILWAY DISTRIBUTION

For feeding the separate railway lines throughout the city, the area is divided into four districts, with the steam stations E and F and the sub-stations "a" and "d" respectively as centers of distribution of the separate districts. The trolley wires in each district are sectionalized, each section being fed by a separate feeder. By this means trouble in any part of the system affects only a small area. The high-tension transmission system is at a frequency of 33 cycles. With the exception of a few large power customers supplied at this frequency, all current is furnished at 60 cycles to customers throughout the city and suburbs for light, and power is approximately 25,000 hp; of this about 8000 kw sets, installed in sub-stations "a" and "d" for the city and in station B for feeding Oregon City.

The present demand upon the company's system for light and power is approximately 25,000 hp; of this about 8000 kw is utilized in the operation of its railway system, and the balance to supply the demand by its customers for, light, heat and power.

MANAGEMENT

The officers of the Portland Railway, Light & Power Company are as follows: President, C. M. Clark; vice-president, in charge of railway department, F. I. Fuller; general manager, in charge of light and power department, F. G. Sykes; secretary, C. N. Huggins; treasurer, S. G. Reed; and general superintendent of railways, C. J. Franklin. The construction work in connection with the Caza-

dero plant was completed under the jurisdiction of the light and power department, and the following engineers of this department had immediate charge of the various branches of the work: T. W. Sullivan, hydraulic engineer, of the construction work upon the dam, flume, reservoir, and all hydraulic work in connection with the plant; O. B. Coldwell of the electrical construction work and operation; and H. S. Sladen of the construction of the 30,000-volt transmission line.

COMBINED TELEGRAPH AND TELEPHONE SYSTEM USED BY THE INTER-URBAN RAILWAY, DES MOINES

BY E. R. CUNNINGHAM, Electrical Superintendent

The Inter-Urban Railway, of Des Moines, Ia., has worked out for itself a composite telegraph and telephone system which differs very materially from any other in general use, and has many features to recommend it especially for interurban dispatching lines. The following description may be of interest to those who have occasion to operate dispatching lines under similar conditions.

The system originally installed was intended for the telephone dispatching of the cars on the Beaver Valley Division of the Inter-Urban Railway. It consisted of two No. 9 BB galvanized iron wires from Des Moines to Moran Junction, where the line branches, the branch line running 4 miles to Woodward and the main line 12 miles to Perry. The Perry end of the main line is 36 miles from Des Moines and the Woodward end of the branch line 28 miles from Des Moines. The telephone system was carried on standard cross-arms on the same pole and below the high-tension transmission line, and was transposed every ten poles by a transposition pin and insulator designed especially for this use. The telephones were of standard make and bridged on to the line in the usual manner, one being used at each station and passing point on the line. In all, there were fourteen telephones bridged onto the line. The dispatching switchboard is located at the Des Moines end of the line, and is a fifty-line central energy board with ten lines now wired up, one of which is the Beaver Valley dispatching line. Besides being used for dispatching purposes, the latter line was also used for transmitting messages arising from freight, express, passenger and other departmental business. It was found necessary, therefore, either to build another telephone line for the commercial business or equip the present line with telegraph instruments to make a dual use of the one line. The latter plan was found to be much the cheaper, as it involved but a nominal expense for the telegraph instruments, and was adopted not only for that reason, but because it was thought to give a more extended and reliable service than two separate telephone lines. It would have been quite natural in adopting the telegraph system on this line to fall into the well-beaten path of American telegraph practice of connecting the telegraph instruments in series. To do this, however, necessitated the use of at least eight condensers cut in the telephone line.

Fig. 1 illustrates the usual method of connecting telegraph instruments in series on a composite telephone and telegraph line. Since both sides of the telephone line are used as one side of the telegraph line, it is necessary, at each intermediate telegraph station, to cut in a condenser in each side of the telephone line to open the line to the

d. c. telegraph current and cause it to flow through the telegraph key and relay.

In using the telephone it is necessary to signal and talk through these condensers, and while they do not interfere with the small undulating voice currents used in talking, they do seriously interfere with the signaling current, especially where there is a large number of telephone instruments bridged onto the line. Condensers are very delicate, and are an expensive fixture on a long dispatching telephone line, especially where it parallels and is in close proximity to high-tension and power lines. They are so sensitive that they are continually being knocked out by lightning, induced static charges or stray currents from other lines. If this occurs and the condensers are not kept in proper order the telegraph current will interfere with the telephone service. To avoid the use of these expensive

The sounder is connected in the usual manner, either with a local battery, which in this case can be ordinary dry cells, as the sounder is on open circuit when not in use, or by shunting the ground light in a series of five incandescent lights in the same manner as power is obtained on the line.

All telegraph instruments on the line, when connected in multiple, are, of course, connected up exactly alike, and require but one impedance coil to each telegraph station and no condensers. They are all independent of each other, and any one of them can be cut on or off the line at any time by opening the double-pole knife switch, indicated in Fig. 2.

Another advantage of the multiple system is that it is impossible for the operator to go away and leave the line open by leaving his key open. If the series system were

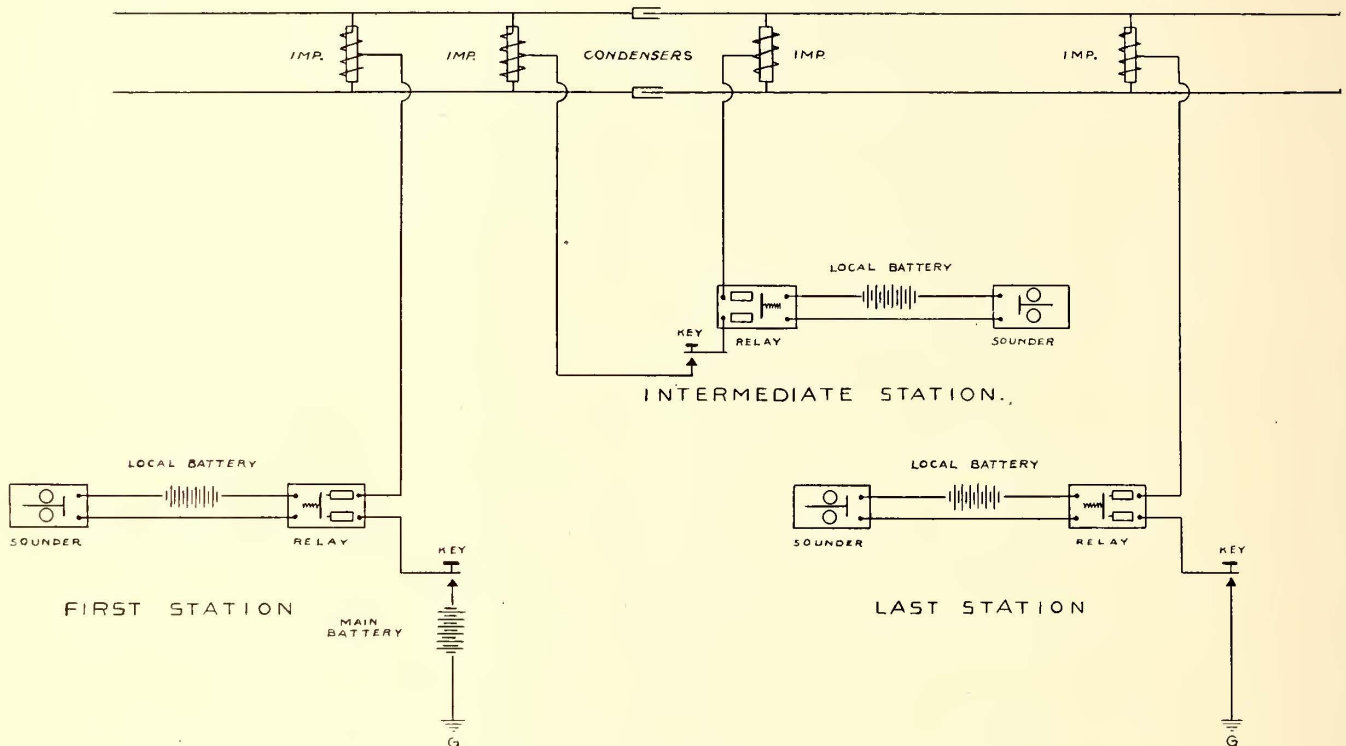


FIG. 1.—TELEGRAPH INSTRUMENTS IN SERIES

and troublesome condensers and to secure other very desirable results that will appear later, we decided to connect the telegraph instruments in multiple, more after the Continental or European telegraph practice than the American, the telegraph relay being cut in, as illustrated in Fig. 2, between the neutral point of a suitably wound impedance coil, bridged across the telephone line and grounded through about 1000 ohms resistance.

The telegraph key, which is of the open-circuit type (key without a lever switch), is cut in from some source of energy in multiple with the relay. As we have the 500-volt d. c. railway circuit at each telegraph station, we connect the key between the fourth and fifth lamps in a series of five 16-cp lamps, as illustrated in Fig. 2, to obtain about 100 volts on the telegraph line. For the fifth or ground lamp we used four 16-cp lamps in series multiple, as illustrated in Fig. 2, which have the same resistance as one lamp; but, being in multiple, there is no danger of the ground side of the series opening and thus throwing full potential on to the telegraph line.

used it would require two impedance coils at each intermediate telegraph station and two condensers, as illustrated in Fig. 1. Another very important feature of the multiple system is that the neutral point of every impedance coil is connected to ground through the relay and about 1000 ohms of non-inductive resistance. This on lines paralleling high-tension lines serves to carry off the static charges which otherwise would accumulate on the telephone line.

It is a well known fact that both sides of the telephone line sometimes act as secondaries to the high-tension line and that a high and dangerous accumulation of static electricity is induced on the telephone line. These impedance coils are so wound and connected that they act as impedance to the undulating voice and a. c. telephone signaling current flowing from one side of the telephone line to the other, but do not act as impedance to current flowing from both sides of the telephone line to the ground. Therefore, the static or other stray currents of small volume but high potential can pass unimpeded from both sides of the telephone line to the ground.

On account of the sensitiveness of the telephone receivers to even a slight flow of current, they are very seriously affected by small induced currents from other lines which parallel the telephone line, especially from lighting, power and high-tension lines. It is important, therefore, to have a well-constructed telephone line. It must be perfectly balanced as regards resistance, impedance, inductance and capacity; that is, it must have the same resistance, impedance, inductance and capacity in each side of the circuit. Not only must each side total the same, but it must have the same amount between each talking station. The line must be so transposed that each leg of the circuit shall occupy and travel in the same zone or position relative to other parallel lines and conductors half of the distance between each talking station. The line must be properly insulated, not only from all other lines, but from the ground and all other objects having capacity which would unbalance the circuit by adding capacity to one side or the other.

The greatest source of trouble, and the one most difficult to overcome on telephone dispatching lines, arises from

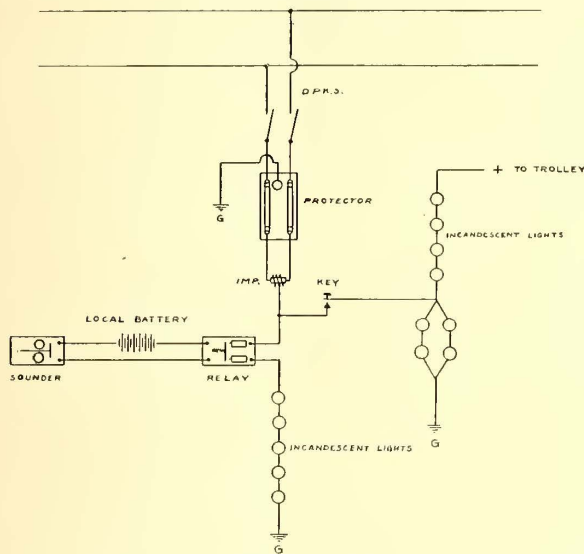


FIG. 2.—TELEGRAPH INSTRUMENTS IN MULTIPLE (ALL STATIONS ALIKE)

two opposite and opposing conditions, both of which seem to be necessary—one for the operation of the line and the other for the protection of the same—from a dangerous difference of potential between both sides of the telephone line and the ground likely to be induced from the high-tension lines. A difference of potential of 300 to 400 volts will discharge across the protectors usually employed on the line, leaving the line safe, but not very serviceable, as the capacity of the grounded side is increased so as to unbalance the circuit and cause a continuous flow of current through the receivers on the line from one side of the circuit to the other, making the line so noisy that it is practically inoperative. These protectors or ground devices are usually carbon plates separated about 1/100 in. by perforated mica or celluloid, one being connected to one side of the telephone circuit and the other to the ground. When a discharge takes place from one carbon plate to the other it usually blisters it and leaves the line permanently grounded, and it is then necessary to go over the line and clean the protectors. Dust and dirt is also likely to collect in these protectors and ground the line with the same result.

Thus you are between the "Devil and the deep, blue sea"

all the time. You must not let your line touch the ground yet you must keep it within 1/100 in. of the ground in many places. It is from these two opposite and opposing conditions that nearly all the trouble on telephone lines paralleling a high-tension line arises.

Since the installation of the telegraph instruments on the Beaver Valley dispatching line, most of the above troubles have disappeared on account of the neutral point of the impedance coils being grounded and carrying off the static and other stray electricity which otherwise would accumulate, discharge across the protectors and blister them.

Since it is necessary to have a well-balanced line to prevent disturbances to the telephone from high-tension and other parallel lines, the use of the telegraph on the same line as the telephone does not necessitate any further care than would be necessary for any satisfactory operating telephone line.

A composite system not only doubles the amount of business that can be handled over a single line, but is much more reliable and convenient than either a telephone or telegraph line alone, because the telegraph and telephone service are not both subject to the same troubles. Although the telephone is more sensitive both to atmospheric disturbances and to induced currents from other lines, and consequently is less reliable than the telegraph, yet it is more convenient than the latter for handling a certain class of business, such as reporting cars at passing points and places where there are no operators, for reporting break-downs, interruptions to service and all other kinds of business where it is necessary to get in close touch with the party addressed. In many cases quick action and an immediate response is required; nor does one wish to talk through a second party—the operator—when it is possible to communicate personally with the person wanted. There is sometimes a great deal of satisfaction in talking direct to the train crews, sub-station attendants, and other employees. For such work the telephone is most desirable, and for other cases where one does not care for a personal interview a telegraph line has its advantages.

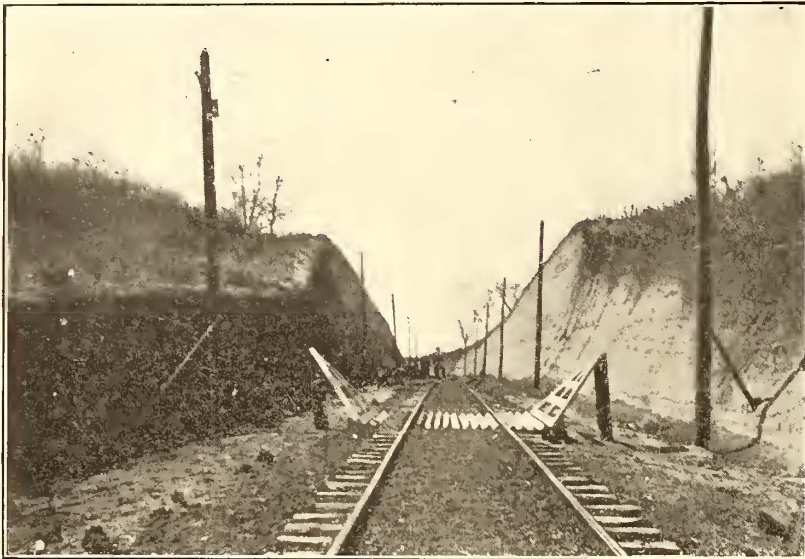
The great trouble with the telephone for dispatching purposes is that the currents used are so small the lines will easily pick up foreign and induced currents from parallel circuits. Consequently the instruments are very noisy unless the line can be built to remain unaffected. Telephone transmitters usually operate on from two to four volts, and, as their resistance is from ten to twenty ohms, they will not transmit over about one watt. If a transmitter could be designed to handle, say, one hundred watts, then the receivers could be made less sensitive to currents from foreign lines, and they would not be so affected by atmospheric conditions.

The composite system has all the advantages of both systems, with very little additional expense. It introduces no new troubles or complications and greatly diminishes the likelihood of a total interruption.

It is reported that contracts have been signed between the Pacific Express Company and the Toledo, Urban & Interurban, the Western Ohio, and the Dayton & Troy, and that through-express cars will be operated over the lines the same as the fast passenger trains. It is also said that the express company has made a contract with the Springfield, Troy & Piqua to operate over its line. The express business is growing to be an important feature on the electric roads.

THE OMAHA AND SOUTHERN INTERURBAN RAILWAY

The recently completed line of the Omaha & Southern Interurban Railway Company, which extends from South Omaha, Neb., to Bellevue College and Fort Crook, 6 miles south, is particularly noteworthy because of the amount of grading required. For the entire length of the line cuts averaged about 40,000 cu. yds. per mile, and for several miles



A 48-FT. CUT ON THE OMAHA & SOUTHERN INTERURBAN RAILWAY, SHOWING THE STEEP BANKS

the road is a succession of cuts and fills. The deepest cut is midway of the line and is 48 ft. deep. Owing to the peculiar holding qualities of the clay in which the cuts are made the slope of the banks is made $\frac{1}{4}$ to 1, which is quite in contrast to the practice of $1\frac{1}{2}$ to 1 elsewhere.

The line will probably be extended to Plattsmouth, about 10 miles south of Fort Crook, the present southern terminus. This fort is a government post, and usually four or five companies are stationed at it. The line is built on private right of way 100 ft. wide. Fills for single track are 22 ft. wide at the tops and cuts are 37 ft. wide at the bottom. Oak ties and 70-lb. rails were used. Span trolley construction is employed. The poles, which are of cedar, are spaced 100 ft. apart, and those on one side of the track are high enough to carry high-tension cross-arms. The butts are treated with a tar compound, the bi-product obtained in the manufacture of artificial gas. A lightning arrester is installed every quarter mile.

At present power is obtained direct from the direct-current power house of the Omaha & Council Bluffs Street Railway Company. As the terminus of the line is 12 miles from the power house, a booster is employed which raises the voltage at the power house to 825 volts. The booster set consists of two 100-kw Edison bi-polar generators. The winding of the one serving as a motor is unchanged. The voltage of the other has been halved and the amperage doubled by connecting the armature leads so as to give two independent circuits paralleled by the brushes. Future plans contemplate a sub-station in South Omaha for the city lines and power for the interurban line will then be obtained from this.

An hourly service is ordinarily maintained by one car, but during the summer season three will be operated. The cars used are 30 ft. long, seat forty-four people, and are equipped with four G. E. 67 motors. They are maintained in the shops of the Omaha & Council Bluffs Street Railway.

R. N. Towl, of Omaha, had charge of the construction.

CORRESPONDENCE

INCREASE IN CANADIAN SUBSCRIPTION PRICE

MONTREAL, May 13, 1907.

Editors STREET RAILWAY JOURNAL:

I notice, with interest, your announcement of the annulment of the postal arrangement for newspapers between the United States and Canada and the increase in your charge to subscribers in Canada. Viewing the matter from the Canadian standpoint, I cannot but feel that while the new regulations will cause us to pay more for our American periodicals, they are only just to this country. I understand that there are 20 lbs. of newspapers shipped from the United States into Canada for every pound shipped from Canada into the United States, so that the Canadian Post Office Department would be expected to do twenty times as much work as the United States Post Office Department, but get the revenue only on the Canadian magazines. On reading your article, however, I could not but feel that it was a pity that the responsibility for the short notice given to American publishers was not placed where it belongs, with the United States postal authorities, and not with those of Canada. As I understand it, the latter suggested a postponement of the date upon which the agreement should go into effect, but the former refused consent. I should be glad to have the facts stated prominently in your journal, as I do not like to have my country blamed for an act of apparent injustice when the blame does not attach to it.

CANADIAN SUBSCRIBER.

MOTOR BUCKING AND FLASHING OVER

PITTSBURG, PA., April 29, 1907.

Editors STREET RAILWAY JOURNAL:

I have read with interest the discussion in your issue of April 6 upon motors flashing over and bucking at high speed and the performance of cars on down grades. I have noticed that some of our cars will run slower on a down grade with power on than with power off, and attribute it to the motors binding on the axle. When the power is on the motor rises up or down on the axle bearings, and with the lost motion in the journal boxes and truck frame exerts a binding effect on the axle, causing the car to run a trifle slower. When the power is off the motor rides free.

Flashing over may occur from about twenty different causes. One common reason is that the brush-holder springs are weak, so that the brushes have poor contact, thereby causing flashing. Another reason is high mica in the commutator, causing the brushes to jump up and down. Another cause is an open coil in the armature, causing a ball of fire to fly around the commutator, or a loose, bare coil which strikes the pole pieces as the armature revolves. A flat commutator is still another cause. A bent armature shaft will run all right if the brush-holder springs are kept tight, but if they are loose the motor will flash and buck as soon as it gains speed. Tight gearing also will make a perfect armature buck. These are only a few of the most common causes for motors bucking.

R. W. P.

A NEW BALL-BEARING LIFTING JACK.

A new ball-bearing lifting jack, which embodies a number of new ideas and improvements and which will be manufactured in connection with the Duff roller bearing screw jacks, is being placed on the market by the Duff Manufacturing Company, of Pittsburg, Pa., the sole manufacturers of Barrett ratchet jacks. The bearings of the new jack, it is said, cannot wear unevenly, and the balls are made larger than in other jacks, insuring easier operation. This also gives greater capacity and obviates any liability of their being crushed. Another important feature is the fact that the gears cannot come out of mesh. This is most important, as any trouble of this kind would tend to derange the load and destroy the jack. Each of these new jacks has an additional bearing on the level pinion, insuring ease of operation. Duff ball-bearing screw jacks are made interchangeable with the well-known roller bearing jacks which this company has been building for several years, so that it is possible to use roller bearings in place of ball bearings when desired.



BALL-BEARING JACK

A NEW WATER-TUBE CLEANER PLANT

The recent completion of the new plant of the Lagonda Manufacturing Company, of Springfield, Ohio, marked an interesting epoch in the history of the company. Twenty years ago, when water-tube boilers first began to be introduced, a man named Weinland invented a machine for cleaning scale from the tubes. It was of the type now known as the "turbine." When these cleaners were put on the market, the business was carried on in a 10-ft. by 12-ft. room, the cleaners being made outside. The cleaners came into favor so rapidly, however, that machinery for their manufacture was purchased and installed in a room 24 ft. by 24 ft., and the company then began to take contracts to clean boilers. Again the quarters became too small. This time the plant was moved into a 28-ft. by 70-ft. two-story building. As water-tube boiler plants became larger and larger and the scale problem assumed more importance, the Lagonda Manufacturing Company got out its Weinland mechanical boiler tube cleaner.

From time to time the company has added other specialties, and from the modest beginning before mentioned the business has grown so that the new plant consists of a two-story 50-ft. by 200-ft. building located on two acres of ground, which will be available for future extensions. The walls and floors of the new building are of artificial stone. Every machine tool is driven by an individual motor receiving power from a gas engine-driven generating plant. All the lathes and automatic machines are made with special attachments for turning out the peculiar bearings, water-wheels, arms and other small parts accurately and in great quantities. The equipment includes furnaces for heating oil, lead baths for tempering and an elaborate testing bay for trying out each finished cleaner before allowing it to leave the factory. This testing department contains tanks, pumps and gages of proper size to subject every cleaner to actual working conditions. The cut-off valve department is devoted to the manufacture of a device placed in the steam connections of boilers for automatically stopping the passage of steam in either direction in case a steam main bursts or a boiler tube gives way.

VERTICAL CROSS COMPOUND ENGINE FOR THE BRISTOL TRAMWAYS, BRISTOL, ENGLAND

The Bristol Tramways & Carriage Company, Limited, of London, operating the tramways of the city of Bristol, recently purchased, through its manager, Sir J. Clifton Robinson, an Allis-Chalmers vertical cross compound Reynolds-Corliss engine with cylinders 26 in. and 56 in. x 48 in. stroke. This unit will be installed in the central power station at Bristol to drive a 1000-kw, direct-coupled, direct-current generator. The engine, operating under 140 lbs. steam pressure, will develop approximately 1700 ihp. The fly-wheel to be provided will have a diameter of 20 ft. and weigh approximately 93,000 lbs. The Bristol station now contains four Allis-Chalmers vertical, cross compound engines, which are somewhat smaller than the new unit just purchased. They have cylinders 22 in. and 44 in. x 42 in., and are used to drive 550-kw generators. The engines now in the British station have been in continuous operation for eight years. Sir J. Clifton Robinson is also manager of the London United Tramways station, which contains three 22-in. and 44-in. x 42-in. vertical engines of the same size as those installed in the Bristol station, and two larger units with cylinders 26 ins. and 54 ins. x 48 ins., or about the same size as the new engine purchased for Bristol.

NEW ROLLING STOCK FOR NORTHERN TEXAS TRACTION COMPANY

The Northern Texas Traction Company, which owns all the present lines operated in Fort Worth in addition to the interurban line between Dallas and Fort Worth, recently placed an order, through Stone & Webster, general managers of the road, for ten grooveless post semi-convertible cars. These cars were delivered a few weeks ago by the



SEMI-CONVERTIBLE CAR FOR TEXAS

G. C. Kuhlman Car Company, and were built under Brill patents. The majority of these semi-convertibles will run over the 5 miles of new track which was opened a short time ago in Fort Worth. The total mileage of the system is now 72 miles, over which about one hundred cars are run.

The illustration shows one of the new cars when operated as an entirely closed car. The principal dimensions of the car are: Length over end panels, 21 ft., and over vestibules, 30 ft. 5 ins.; width over sills, including plates, 7 ft. 8½ ins.; over posts at belt, 8 ft.; height from floor to ceiling, 8 ft. 4¾ ins.; from track to under side of sills, 2 ft. 2¾ ins.; size of side sills, 3¾ ins. x 5 ins.; end sills, 3½ ins. x 8¾ ins.; sill plates, 15 ins. x ¾ in. The car bodies are carried on the No. 21-E truck with 7-ft. 6-in. wheel base; two motors, of 40-hp capacity each, were installed on each car. The interiors, which are of cherry, contain transverse seats of rattan, and numerous specialties of the same builder are incorporated in the equipment.

DETAILS OF THE ELECTRIC EQUIPMENT OF THE DETROIT RIVER TUNNEL

Six 100-ton direct-current locomotives of the swivel truck type, with two 280-hp geared motors to each truck, will comprise the initial equipment for hauling both freight and passenger trains through the tunnel being built under the Detroit River between the United States and Canada on the Michigan Central Railroad. The Sprague-General Electric multiple unit control system will be furnished and current taken from the third rail. Each locomotive will be capable of hauling a 900-ton train up a 2 per cent grade at a speed of 10 miles per hour. Automatic, high-speed air brakes will form a part of the equipment. The electrical equipment for the locomotives, as well as for the tunnel in general, will be furnished by the General Electric Company.

Power for operating the system will be purchased from the Detroit Edison Company and will be delivered to a sub-station at Detroit at a potential of 4400 volts and at a frequency of 60 cycles. At the sub-station two 1000-kw synchronous motor-generator sets will be installed for supplying direct current to the third rail. Each of these sets will consist of a 1000-kw, 4400-volt, three-phase, synchronous motor direct connected on a common base to a 1000-kw, 650-volt, compound wound, direct-current generator. A 15-kw, 125-volt exciter for the synchronous motor will be mounted on a shaft extension of each of the motor-generator sets.

A very complete electric lighting and electric pumping equipment forms a part of the project. The yards and approaches to the tunnel will be lighted by arc lamps, while the tunnel itself will be illuminated by incandescent lamps arranged on duplicate circuits. Alternating current from the main power supply at a frequency of 60 cycles will be used on the lighting circuits. To insure an uninterrupted lighting service the lighting circuits in the tunnels are so arranged that half the lamps in both tunnels will burn if, by chance, either of the lighting circuits in the tunnels should be broken. A single three-phase distributing circuit will run through each tunnel and from these circuits suitable connections will be made to step-down transformers. The secondaries of the step-down transformers will be interconnected with duplicate circuits for half the lamps in each of the tunnels.

No less interesting will be the equipment for keeping the tunnel dry. Five pumps will be provided in the tunnel, each pump drained by induction motor centrifugal pumps arranged in duplicate. The motors on the pumps will operate directly at 4400 volts, and the controlling circuits with compensators will be centralized in the sub-station. For indicating the amount of water in each pump, a float system will be provided having both visible and audible indicating devices.

At the sub-station a regulating storage battery will be provided to carry the fluctuations of the load. If the main power supply from the Detroit Edison mains should be interrupted, this storage battery will have sufficient capacity to operate the entire system for half an hour. In such an

emergency, the lighting and pumping alternating-current equipment will be energized by 60-cycle alternating current from a 50-kw motor-generator set, the driving motor being supplied with current from the storage battery. Flexible switching arrangements will be installed to enable this interchange of power supply to be easily and quickly made.

The tunnel will replace the present ferry service between Detroit on the American side and Windsor on the Canadian side of the river. Two tracks will be laid in separate iron tubes 65 ft. beneath the surface of the river. The tubes will rest on beds of concrete, and will be planked by concrete walls. The electrified zone will be 3.6 miles in length and will comprise, with the yards, some 15 miles of single track.

PROGRESS ON THE ST. CLAIR TUNNEL ELECTRIFICATION

The tunnel under the St. Clair River between Sarnia, Ont., and Port Huron, Mich., owned by the Grand Trunk Railroad through the St. Clair Tunnel Company, will soon receive its electrical equipment, which will consist of six single-phase Westinghouse locomotives. The overhead system will be used, the transmission and service wires to be carried on bridge work supported by towers with concrete foundations, braced by steel rods imbedded in concrete, as shown in the accompanying illustration. The tunnel, which has been used for steam traction for many years, will be cleansed, the interior painted white and well lighted by electricity. A power house is being built on the St. Clair River, which will contain two turbo-generators of 2000 hp capacity.

Briefly, the tunnel consists of an approach on the American side some 2500 ft. long, the tunnel proper about 6000 ft. and the approach on the Canadian side, which is 3100 ft.



THE TERMINAL YARD, SHOWING BRIDGES FOR CARRYING POWER AND SERVICE WIRES

long. Five steam locomotives of special design are now employed to handle freight and passenger trains in the tunnel, and daily they haul from 800 to 1600 cars.

On the afternoon of Saturday, May 25, the New York Electrical Society will visit the Port Morris power station of the New York Central & Hudson River Railroad Company. E. B. Katte, electrical engineer of the company, will address the party.

LEGAL DEPARTMENT*

STEAM RAILROADS AND STREET RAILWAYS

On various occasions attention has been called in this place to different tests of negligence as between steam railroads and street railway companies. There are two recent cases turning upon the difference in positive functions to be discharged by the agencies of transportation, respectively. In matter of Rochester, etc., Traction Co. (102 N. Y. Supp. 1112), the Fourth Appellate Division of the New York Supreme Court, overruling the action of the Railroad Commissioners, held that an application on the part of a trolley railroad company for a certificate that public convenience and necessity required the construction of a proposed trolley road should be granted, although it appeared that the new road would parallel an existing steam railroad and the roads of other trolley lines to a considerable extent, and that, if established, it would injuriously affect such other roads. It was shown that a considerable portion of the territory to be covered had practically no railroad facilities, and a large number of people residing near the proposed new route had testified that the operation of such road would amount to a great public convenience. Such opinions were founded upon consideration of the infrequency of trains upon the railroads and the long distance necessary to be traveled to reach stations. The court gave weight to the fact that no witness residing along 104 miles of the proposed route expressed any contrary opinion.

The action of the court in this case is entirely commendable. The opposition to the granting of the certificate was obviously inspired by interested motives of existing companies. The gist of the reasoning is contained in the following extract from the opinion:

The fact that the Erie Railroad Company proposes to electrify its road does not materially alter the proposition. That does not mean that it is to be converted into a street surface railroad, but, rather that the motive power for the transportation of passengers will be changed from steam to electricity. Regular trains, passenger and freight, will be run then, as now, but must be run on schedule time, and will only stop to take on or let off passengers at the regular stations. The passenger trains may run more frequently, but with all the changes suggested the people along the route will not have such facilities as is understood will be afforded by a street surface railroad.

This point brings out one of the essential differences between a steam railroad, even when electrified, and a street railway. The latter is supposed to accommodate casual passengers for short distances, stopping when and where the passenger pleases, and it would be highly unjust to ignore the necessity for this particular kind of public service, because, incidentally to affording it, a trolley road also carries passengers for longer distances, and thereby, to an extent, cuts into the business of a steam railroad company.

The other case above referred to was *Spalding v. Macomb*, in the Supreme Court of Illinois (80 N. E. 327), which also distinguishes the theoretical identity of steam railroads and street railways. The question was whether an additional and unauthorized servitude had been imposed upon a street, the fee of which, subject to the public easement, was owned by abutting owners, and as part of the reasoning against the defendant's contention that it was a street railway, and therefore that the construction of its roadbed did not constitute an additional servitude—as would concededly the construction of a steam railroad—the court said:

Street railroads are generally understood to be only such as are constructed and operated in the streets of a city for the purpose of conveying passengers, with ordinary hand luggage,

from one point to another along the line thereof. Whether the road be a street railroad or not will depend upon the character of its traffic. The bill alleges that this road is carrying not only passengers with ordinary hand luggage but practically freight of all kinds from one point to another on the street and from town to town along the entire line of the road. Under these allegations of the bill, admitted to be true by the demurrer, defendant in error cannot be held to be a street railway.

CHARTERS, ORDINANCES, FRANCHISES

CALIFORNIA.—Municipal Corporations—Streets—Rights of Abutting Property Owners—Injury to Right to Use for Travel—Private Easements—Street Railways—Franchises—Use of Streets—Signal Towers—Eminent Domain—Condemnation of Land—Appeal—Discretion—Temporary Injunction—Denial—Review—Injunction—Preliminary Injunction—Remedies—Monetary Damages.

1. An injury to an adjoining property owner's right to travel from place to place on a street in front of his lot or elsewhere being one which he enjoys in common with the public, he is not entitled to maintain an action for damages or for an injunction for an injury to such right.

2. An owner of a lot adjoining a street has certain private easements therein, consisting of the right of ingress and egress, the right to receive light and air from the space occupied by the street, and the right to have the street space kept open, so that signs or goods displayed in or upon the lot may be seen by passers in order that they may be attracted as customers, etc., for injury to which rights the property owner is entitled to sue regardless of the number of persons who may suffer a similar injury to similar private easements appurtenant to other lots fronting on the street.

3. The granting of a franchise to lay street car tracks in a street, and to run cars thereon by electricity, did not confer the right to erect a signal tower in the street, at least without a showing that it could not be made of practical use if located on private property.

4. Where a street railway company placed a signal tower at the intersection of certain streets, to the injury of the private easements of an adjoining property owner, it was no answer to the railroad company's obligation to condemn private property for the location of such tower that the expense of such proceedings would be great.

5. The denial of an application for a temporary injunction pendente lite will not be reversed on appeal, unless there appears to have been an abuse of the trial court's discretion.

6. Where the damage or injury threatened is of a character which may be easily remedied if a temporary injunction is refused, or where the damage is chiefly monetary and the defendant is solvent, the injunction pendente lite may be properly refused.

7. Where one or the other of the parties to a suit will suffer by the granting or refusing of an injunction pendente lite, the inconvenience likely to be incurred by each, from the action of the court in granting or refusing the injunction, should be balanced, and the injunction should be granted or withheld accordingly.

8. Defendant street railway company erected a signal tower in a street nine feet from the plaintiff's property. The post alone interfered slightly with plaintiff's right of ingress and egress. It did not appear that the defendant was insolvent, and that full damages could not be recovered in the action; the court under the prayer for general relief being authorized in the final judgment to restrain the use of the tower and command its removal, unless the damage was paid or the right to retain the tower was obtained by condemnation proceedings. Held, that the refusal of an injunction restraining the use of the tower pendente lite was not an abuse of discretion.—(*Williams vs. Los Angeles Railway Company* (L. A. 1,676), 89 Pac. Rep., 330.)

INDIANA. — Eminent Domain — Procedure — Remote Damages—Statutes Requiring Fencing.

1. Damages resulting from danger to the person or stock of the owner of land from the construction and operation of a trolley line are too remote, uncertain, and speculative to be considered by the jury in fixing the amount of the owner's compensation for lands taken and for the depreciation in the value of the lands which will be damaged, but not actually taken, by the construction and operation of the proposed road.

* Conducted by Wilbur Larremore, of the New York Bar, 32 Nassau Street, New York, to whom all correspondence concerning this department should be addressed.

2. Under acts 1903, p. 426, c. 227, interurban railroads are required to fence their right of way, and the danger to animals on the land adjoining, but not taken by them, will be only speculative, and should not be considered in determining the diminution of the market value of such land.—(Indianapolis & Cincinnati Traction Co. vs. Larrabee et al., 80 N. E. Rep., 413.)

ILLINOIS.—Eminent Domain—Damages—Injury to Property Not Taken—Evidence—Instructions.

1. Since the measure of damages to land not taken in proceedings to condemn land for an electric railroad right of way is the difference in the fair cash market value of the land before and after the construction of the road, the jury, in determining the amount of damages to land not taken, must deduct benefits actually enhancing the market value of the property, for such benefits are special and not general, though they are common to other property in the vicinity.

2. Where, in a proceeding by an electric railroad to condemn land for a right of way through a farm, the jury might find that the farm would be enhanced in value by reason of the operation of the railroad and that other farms in the vicinity would also be increased in value from the same cause, an instruction that the jury should not set off against damages to the land not taken any general benefits which the land would share in common with other land in the same vicinity, and that only such benefits as were special to the farm and not common to other farms in the vicinity could be thus set off was prejudicial to the railroad.—(Peoria, B. & C. Traction Co. vs. Vance et al., 80 N. E. Rep., 134.)

ILLINOIS.—Dedication—Statutory Dedication—Defective Acknowledgment—Equity—Pleading—Allegations as to Ownership of Fee in Street—Admissions by Demurrer—Street Railways—Commercial Railroads—Eminent Domain—Remedies of Landowners—Injunction—Laches—Equity—Pleading.

1. Law of Jan. 4, 1825, Sec. 3 (Rev. Laws III. 1828-29, p. 184), as to the making of town plats, required County Commissioners, before offering a plat for record, to acknowledge the same. Sec. 4 provided that, if a mistake were made in a plat of a town as to the acknowledgment, it should be the duty of the County Commissioners, or a majority of them, to correct the same. Held, that an acknowledgment of a town plat by two only of three County Commissioners was not a compliance with Sec. 3, and a plat so acknowledged did not convey the fee of the streets to the town.

2. A bill alleged that plaintiff was the owner of certain city property fronting on the street; that the original proprietors of the city caused plats of the same to be made; so that there was a common-law dedication of the streets marked on the plats, instead of a statutory dedication, and that thereby the fee in the streets remained in the original proprietors; that the city consented to the dedication; and that, by grants from the original proprietors, plaintiff had acquired title to the land in the street to its center. Held, that taking the allegations of the bill in connection with the plats and surveys, sufficient facts were set out so that a demurrer must be held to admit that plaintiff was the owner of the fee to the center of the street in front of his property.

3. Where a railway company did not limit its business to carrying passengers with ordinary hand luggage, but engaged in the transportation of practically all kinds of freight from one point to another on the street and from town to town along the entire line of its road, it was not a street railway.

4. Where a railway company constructs its road in a city street without first obtaining the consent of the owner of the fee, and without condemning such right of way, and operates its trains thereon, such use is an additional burden upon the owner of the fee, of which a court of equity, on a proper showing, can compel the removal of a mandatory injunction.

5. A railway company constructed its road in a city in December, 1903, without first obtaining the consent of the owner of the fee or condemning a right of way, but it did not appear when the road was first operated. In August, 1905, the owner commenced his suit to compel the removal of the railway from the street. Held, that plaintiff was not guilty of laches in not beginning suit at an earlier date.

6. The general rule is that the defense of laches to be available must be set up by plea of answer.—(Spalding vs. Macomb & W. I. Ry. Co., 80 N. E. Rep., 327.)

MASSACHUSETTS.—Street Railways—Remedy of Owners of Property Injured—Statutes—Construction—Eminent Domain—Taking Property—Streets—New Use—Validity.

1. A street railway company, changing the grade of a highway for the construction of its road in accordance with locations granted by the officers of a municipality, is not liable for damages to an abutting owner.

2. Rev. Laws, c. 48, Sec. 7, and chapter 51, Secs. 15 and 16 authorizing a person aggrieved by the relocation or alteration of a highway to petition for the assessment of his damages by a jury, etc., afford no relief to an abutting owner for injuries caused by a change of the grade of a highway made by street railway company for the construction of its road in accordance with locations granted by municipal officers.

3. A street railway, authorized by St. 1901, p. 388, c. 455, to construct its railway largely outside the limits of highways, which was empowered by the selectmen of a town to cross a highway below grade, without providing that abutting owners should be compensated for injuries sustained, is not liable to an abutting owner, either under St. 1906, p. 604, c. 463, pt. 3.

3. Sec. 47, relating to the liability of a street railway company crossing a public way, or under Rev. Laws, c. 112, Sec. 44, authorizing street railway companies, without payment of any fee, to open any road in which any part of its railway is located, etc.; the condition imposed on the company carrying the highway over its tracks on a bridge being reasonable and promoting the security of travelers on the highway.

4. The statute authorizing the selectmen of a town to permit a street railroad company, in the construction of its track, to change the grade of a street without making compensation to abutting owners injured thereby, is not unconstitutional, since such abutting owners, on the condemnation of their land for a public highway, received compensation for such injury, within Const. pt. 1, art. 10, providing that, when property is appropriated to public uses, the owner shall receive compensation therefor.—(Hyde vs. Boston & W. St. Ry. Co. et al., 80 N. E. Rep., 517.)

NEBRASKA.—Street Railways—Use of Streets—Permit—Conflict With Franchise.

An ordinance of a city, which requires street railway companies and other corporations holding franchises to use the streets of the city to file an application for a permit before entering upon and obstructing the streets, and which requires the applicant to file specifications of the manner in which the work is to be constructed and to fix the location thereof, and requires it to give bond to hold the city harmless for damages caused by the proposed work, and which gives the City Council power to grant or refuse such permit, is not invalid, as interfering with or violating the franchise rights of the company in the streets.

2. The court will not presume that under such an ordinance the city authorities will act arbitrarily or abuse their discretion, but will presume that the ordinance will be construed according to its legal effect, and that if the proper conditions are met the permit will not be refused.—(State ex rel. Lincoln Traction Co. vs. Frost, District Judge, 110 N. W. Rep., 986.)

NEW YORK.—Municipal Corporations—Use of Streets—Private Railway—Greater New York Charter—Board of Estimate and Apportionment—Powers—Obstruction of Street—Injunction—Right to Sue.

1. Laws 1891, p. 3, c. 4, as amended by Laws 1905, p. 1550, c. 631, to provide for rapid transit railways in cities of over 1,000,000 inhabitants, provided (Sec. 5) that consent of the Board of Estimate and Apportionment and the Mayor, without the consent of the Common Council, Board of Aldermen, or other board or officer of the city, should be the only consent of local authorities required for the establishment of a route chosen by the Rapid Transit Commissioners. Greater New York Charter, laws 1901, p. 107, c. 466, Sec. 242, as amended by laws 1905, p. 1545, c. 629, provided that the Board of Estimate and Apportionment should thereafter, except in cases where franchises, rights, or contracts should be granted or authorized pursuant to rapid transit act, Laws 1891, p. 3, c. 4, and the amendment thereof, have the exclusive power on behalf of the city to grant franchises or rights involving the occupation and use of the streets and other enumerated public places within or belonging to the city for railroads, pipe, or other conduits or ways or otherwise for the transportation of persons or property or the transmission of gas, electricity, steam, light, heat or power. Held, that the purposes so enumerated were for the benefit of and in the interest of the public at large, and that the board had

no power to grant the owners of a department store a personal privilege to construct and operate a spur track in the street, to connect its store with a street railway, to be used exclusively for the transportation of its goods.

2. The owner of property adjoining such department store and abutting the street at the point where such spur track was intended to be constructed, whose means of ingress and egress would be seriously interfered with thereby, had sufficient capacity to sue to restrain the construction of such track.—(Hatfield et al. vs. Strauss et al., 102 N. Y. Sup., 934.)

NEW YORK.—Street Railways—Organization—Validation of Organization—Alteration of Route—Extension of Street Railway—Injunction.

1. Laws 1860, p. 16, c. 10, Sec. 1, provides that it shall not be lawful to lay or operate a railroad on any of the streets in the city of New York except under the regulations and restrictions which the Legislature may thereafter provide. Held, that after the passage of such act a corporation could not be organized under the general railroad law of 1850, and its amendments to operate a street railroad in the city of New York, nor could it be formed under the law without specifying in its articles the route of its projected road.

2. Where, after the passage of Laws 1860, p. 16, Sec. 10, relating to the incorporation of street railroads, an attempt was made to organize under the general railroad law of 1850, such organization could not be validated, nor could the corporation acquire a franchise to build a street railway in New York by an assignment to the corporation of a franchise given by Laws 1873, p. 1238, c. 825, nor could such railroad alter or change its route; the franchise being in the hands of the assignee subject to all the restrictions imposed on it by the act which granted it.

3. A change or alteration of route of a street railway is only permitted by general railroad law 1850 for the improvement of the lines, and not to extend it for the purpose of increasing revenues or to change its direction.

4. An abutting owner can maintain an action to restrain a street railway corporation from constructing an extension of its road in front of his premises on the ground that the corporation has not acquired the right to construct the same.—Webb vs. Forty-second Street, Manhattanville & St. Nicholas Avenue Railway Company, 102 N. Y. Sup., 762.)

NEW YORK.—Street Railways—Pavement—Duty to Construct.

Laws 1890, p. 1112, c. 565, Sec. 98, as amended by Laws 1892, p. 1404, c. 676, provides that every street surface railroad corporation shall keep in repair that portion of the street between its tracks, and two feet in width outside thereof, under the supervision of proper local authorities. Held, that such section imposes on a street railway company the duty to keep in permanent repair the pavement of such portions of the streets occupied by them irrespective of any request or demand on the part of the local authorities.—(Schuster vs. Forty-second Street, Manhattanville & St. Nicholas Avenue Railway Company, 102 N. Y. Sup., 1054.)

NEW YORK.—Pleading—Supplemental Complaint—Appeal—Reversal—Law of Case—Street Railways—Grant of Franchise—Conditions—Filing Bond—Failure to File Bond—Right to Equitable Relief.

1. Where, at the commencement of a suit by a street railroad company to restrain a town from granting to another company the right to use its streets, the company seeking the injunction had no cause of action because of its failure to file a bond required by the consents or franchises granted it by the town, plaintiff could not thereafter file such bond for the purpose of showing that at the commencement of the action it had a cause of action, and hence would not be permitted to plead the subsequent filing of such bond by supplemental pleading.

2. Under Code Civ. Proc., Sec. 603, providing that, when the right to an injunction depends on the nature of the action, it may be granted on a complaint showing plaintiff entitled to a judgment, an injunction may be granted only upon complaint, and, where a decree granting an injunction upon facts presented by the original complaint was reversed on appeal and remanded, and there was no supplemental complaint before the court, the injunction will be denied.

3. Where the consent granted by a town to a street railroad company to use its streets required the company to give a bond to be approved by the highway commissioners or trustees, the company was not entitled to an injunction to restrain the granting of such right to another company, unless the allegations of

its complaint showed that the bond was given as required by the consent, and, where no time was stated therein for such filing, it will be presumed that the parties to the contract contemplated that they should be filed within a reasonable time, which, at the most, would not exceed the time within which the railroad was to be built by the terms and conditions of the consent.

4. Where a street railroad company to whom a town granted the right to use its streets on certain conditions had not, in fact, so constructed the road, the company was not entitled to the aid of equity to specifically enforce by injunction an implied negative provision in the consents denying the town the right to grant to another street railway company the right to use its streets.—(South Shore Traction Company vs. Town of Brookhaven et al. (two cases); Same vs. Village of Patchogue et al. (two cases), 102 N. Y. Sup., 1074.)

NEW YORK.—Corporations—Consolidation of Street Railways—Effect on Contract Exemption From Paving Obligations—Conditions of Incorporation—Effect on Exemptions Enjoyed by Predecessor in Title—Dissolution—Sale of Capital Stock.

1. A contract exemption of a street railway company from paving obligations is not a "privilege" within the meaning of N. Y. Laws 1867, chap. 254, as amended by Laws 1879, chap. 503, empowering a railway company, being the lessee of the property of another railway company, to acquire the whole of the latter's capital stock, in which case its "estate, property, rights, privileges, and franchises" shall vest in and be held and enjoyed by the purchasing corporation "fully and entirely, and without change or diminution."

2. A street railway company incorporated under N. Y. Laws 1884, chap. 252, which imposed upon it the duty of paving a portion of the street, cannot claim the benefit of a contract exemption from paving obligations enjoyed by a predecessor in title.

3. A street railway company whose capital stock has been wholly acquired by a lessee corporation, pursuant to N. Y. Laws 1867, chap. 254, which, as amended by Laws 1879, chap. 503, provides that in such case the estate, property, rights, privileges, and franchises of the selling corporation shall vest in the purchasing corporation, to be thereafter controlled by the latter in its own name, cannot be regarded as still having a corporate existence which will enable the purchasing corporation to claim and enjoy, on behalf of the selling corporation, a contract exemption from paving obligations which the latter corporation enjoyed.—(Rochester Railway Company, Plaintiff in Error, vs. City of Rochester, 427 Sup. St. Rep., 469.)

OHIO.—Street Railways—Railroad and Highway Crossing.

An interurban railroad for the operation of cars by electricity and by the tractive friction resulting from their own weight is not within the act of April 25, 1901 (97 Ohio Laws, p. 546), "to provide how railroad and highway crossings may be constructed."—(Commissioners of Ross County vs. Scioto Valley Traction Company, 80 N. E. Rep., 176.)

MISCELLANEOUS

ALABAMA. — Pleading — Amendments — Declaration — Carriers—Ejection of Passenger—Complaint—Sufficiency—Election of Remedies—Designation of Conductor—Evidence—Res Gestæ.

1. Under the statute of amendments, any amendment which does not make an entire change of parties or an entirely new cause of action may be allowed.

2. A complaint in an action against a street railway by a passenger, alleging that plaintiff was wrongfully ejected from defendant's street car by defendant's conductor, motorman, etc., was properly amended by adding a count alleging that, while a passenger on one of defendant's cars, plaintiff applied to defendant's conductor for a transfer to another car, and was given a transfer so negligently torn off that it could not be used, and that by reason thereof the conductor of the other car ejected plaintiff therefrom.

3. The complaint as amended was not demurrable, since plaintiff, while not entitled to recover on the ground of a wrongful ejection, had a right of action for the breach of the contract to carry, or for defendant's negligence in not issuing a proper transfer.

4. Where plaintiff was ejected from defendant's street car, while a passenger thereon, because the transfer tendered by him to defendant's conductor had been so negligently issued by the conductor of one of defendant's other cars as to be worthless,

the fact that plaintiff might have sued for a breach of the contract of carriage did not deprive him of the right to sue in case for the negligence.

5. A complaint alleging that, owing to the negligence of one of defendant's conductors in issuing a worthless transfer, plaintiff, a passenger, was ejected from another of defendant's cars by the conductor thereof on tendering to the latter such transfer, sufficiently designated the conductor, without naming him.

6. Where, in an action against a street railway for negligently issuing to plaintiff a torn transfer ticket, on tendering which plaintiff was ejected from another of defendant's cars, one of defendant's witnesses testified that the transfers were cut by a mechanical appliance, which always cut a straight edge, a transfer issued simultaneously to plaintiff's companion, plaintiff having paid for both tickets at the same time, was competent in evidence, as a part of the *res gestæ*, to show how the ticket would have appeared if properly cut, and to aid in determining how it was torn.—(Montgomery Traction Company vs. Fitzpatrick, 43 S. Rep., 136.)

MISSOURI.—Street Railroads—Leases—Ordinances—Contracts Between Companies—Construction—Creation of Principal and Agent—Creation of Partnership—Operation—Companies and Persons Liable for Injuries.

1. A municipal ordinance authorizing enumerated street railway companies and their successors and assigns to severally sell, convey or lease their property rights, privileges, and franchises to any of the companies enumerated, or to a company designated its successors and assigns, and authorizing the company acquiring the property rights and franchises of the enumerated companies to hold the same during the term of the ordinance, authorizes a purchaser of the property and franchises of the enumerated companies to lease the same to the designated company without the special consent of the municipality, notwithstanding Const. art. 12, Sec. 20 (Ann. St. 1906, p. 309), forbidding a street railway transferring its franchise without first obtaining the consent of the municipality.

2. A street railroad company entered into a contract with another street railroad company, which recited that the former, in consideration of the covenants of the latter, leased its railways, etc. The contract divested the former company of the possession and use of its properties for 40 years in consideration of a specific rent to be paid by the latter company and the performance of other duties in the nature of rent, and provided for the restoration of the property to the former at the end of that term and for re-entry if the latter defaulted in the performance of its covenants during the term. The contract did not provide that the latter should conduct the business in the name or for the benefit of the former, except as in so far as the former was benefited by the consideration to be paid by the latter. Held not to establish an agency, whereby the former company was principal and the latter agent.

3. The contract did not make the two companies partners.

4. The contract was a lease.

5. A contract entered into by one street railway company with another street railway company provided that in consideration of the covenants made by the latter company the former leased its railway to the latter. The latter company agreed to pay an annual rental, to operate the railway of the former at its own expense and make the necessary repairs, to pay all the floating debts of the former, together with assessments of all kinds, and to apply all money not needed for current liabilities or interest turned over to it by the former, or on hand at the date of the lease, or received by the former thereafter from the rent of useless property to the improvement of the demised property. Held, that the former company was not bound to turn over to the latter company any money received by the former from any source, so that whatever rent the latter paid would not be repaid to it.

6. Since Rev. St. 1899, Sec. 1187 (Ann. St. 1906, p. 1001), expressly authorizes a street railway company to lease its property, and since section 4106 (Ann. St. 1906, p. 2252), provides that when technical words having a peculiar meaning are used in a statute they shall be understood according to their technical import, a street railroad company leasing its property and franchises to another street railroad company is not liable for an injury to a passenger resulting from the negligence of the employees of the latter company; the word "lease" importing a contract by which one person divests himself and another person takes possession of property for a term.—Moorshead vs. United Railways Company of St. Louis et al., 100 S. W. Rep., 612.)

NEW JERSEY.—Master and Servant—Torts of Servant—Assault and Battery—Scope of Employment.

In a suit brought against a construction company for assaults committed by its employees upon the plaintiff, upon whose lands, fronting a city street, the company was engaged in erecting, without her consent, a trolley pole for a street railway then in course of construction, it appeared at the trial that the erection of such pole upon plaintiff's premises was an illegal act, and that the employees of defendant company, while so engaged, under the direction of its engineer, formed a circle about the place where the pole was to be set up to protect those engaged in the excavation; and that when plaintiff attempted to go through the circle, in order to prevent the digging and tearing up of her pavement, she was resisted by the men in line, who struck, pushed, or jostled her in such a way as to cause hurts and bruises upon her person. The trial judge charged, among other things: That the placing of the pole on plaintiff's land was an illegal act; that plaintiff did what she had a right to do, if she saw fit, to try to use sufficient physical force to prevent the trespass; that the mere placing of hands upon plaintiff gave her a right to a verdict for nominal damages merely, if no injuries resulted. Upon review, held:

(1) That under the evidence the defendant company was liable for these acts of its employees, as being within the scope of their employment.

(2) That this result was not defeated, because it was testified by one of the employees that, in laying his hands upon the plaintiff, it was done with humane purpose only to save her from impending danger; the principle being that what is essentially a trespass cannot become lawful because having been done with good intent.—(Moore et al. vs. Camden & T. Railway Company et al., 65 Atl. Rep., 102.)

NEW YORK.—Railroads—Construction—Requisites to Exercise of Powers—Application for Certificate of Necessity.

1. Railroad Law, Laws 1892, p. 1395, c. 676, as amended by Laws 1895, p. 317, c. 545, paragraph 59, provides that no railroad company shall begin the construction of its road until the board of railroad commissioners shall have certified that public convenience and necessity require the construction of the road as proposed in its articles of association, and that after the refusal of such a certificate the directors of the applicant may present the application to a term of the Supreme Court, which shall have power in its discretion to order the board to issue the certificate. Held that, on an application to the court under the statute, the burden is not upon the applicant to show affirmatively that the commissioners committed error in their determination, but the matter comes before the court as an original application to be determined on the record made before the board of commissioners, if the parties so elect, or upon such further evidence as the court may deem essential.

2. On an application to the court under the statute, great weight should be given to the decision reached by the board of commissioners.

3. An application to the court, under the statute by a corporation organized to construct a trolley road, should not be denied, though the proposed road will parallel constructed steam railroads and reduce their earnings.

4. Where, on an application to the court under the statute, it appeared that the proposed trolley road practically paralleled a steam railroad, and the roads of other trolley companies to a considerable extent, and that if established it would injuriously affect such other roads, but it was shown that considerable portions of the territory in question had practically no railroad facilities, and a large number of people residing in close proximity to the route of the proposed road testified unqualifiedly that the operation of the road was a public convenience and necessity, and it was shown that such opinions had foundation in the infrequency of trains upon the railroads, and the long distances which it was necessary to travel to reach stations on such roads, and that no witness residing along 104 miles of the proposed route expressed any contrary opinion, notwithstanding that certain experts testified to the contrary, the facts called for the granting of a certificate.—(In re Rochester C. E. Traction Company, 102 N. Y. Supp., p. 1112.)

NEW YORK.—Carriers—Carriage of Passengers—Ejection From Car.

Though the statute imposes a penalty on any carrier failing to give a passenger a transfer to which he is entitled, where a passenger received a transfer which showed that it had then expired, but on calling the conductor's attention to the fact he

was assured that it was all right, but the second conductor refused to take it, and on the passenger's refusal to pay fare ejected him from the car, plaintiff was not entitled to recover for the ejection.—(Nicholson vs. Brooklyn Heights Railroad Company, 103 N. Y. Supp., 310.)

NEW YORK.—Carriers—Transportation of Passengers—Transfers—Publication of Rules.

1. Under Railroad Law, Sec. 105 (Laws 1890, p. 1114, c. 565), imposing a penalty for failure of street railroad companies to give transfers, a regulation fixing one point in each trip at which a passenger wishing a transfer must demand it is reasonable and valid.

2. Where a city railroad company gives transfers good at any transfer point, or permitting the passenger to continue to the end of the line without paying an additional fare, a regulation requiring a passenger to demand his transfer at the time of paying fare is reasonable and valid.

3. Where a city railroad company posted conspicuously, and advertised in such a manner as to bring to the notice of the public generally, a rule requiring passengers to demand transfers at the time of paying fare, it is immaterial whether a particular passenger had knowledge of the rule.—(Ketchum vs. New York City Railway Company, 103 N. Y. Sup., 486.)

NEW YORK.—Carriers—Street Railroads—Transfers—Long and Short Service Cars.

Under Railroad Law, Laws 1892, p. 1406, c. 676, Sec. 104, requiring a street railroad company to give a passenger a transfer entitling him to a continuous trip to any point of any road in its system, where it runs short-service and long-service cars over the same line, it must give a passenger on a short-service car a transfer entitling him to a ride over the remainder of same line on a long-service car from the terminal point of the short-service cars.—(Baron vs. New York City Railway Company.)

RHODE ISLAND.—Carriers—Ejection of Passengers—Transfers—Rules of Company—Damages.

1. Where a passenger on a street car line presented a valid transfer, which the conductor refused to honor, and, as the passenger refused to pay fare, ejected him from the car, he was entitled to recover damages for the ejection; it not being necessary for him to pay his fare, and then resort to an action to recover it back.

2. Where a street car company, according to its rules, issues transfers from and to certain lines, and the passenger presents a transfer which is not honored by the conductor, and the passenger is ejected, it is no defense to an action for the ejection that the statute does not require the issuance of a transfer between the particular lines in question.

3. In an action by a passenger against a street car company for ejection from a car after presentation of a proper transfer, it appeared that a rule of the company required the giving of transfers between the two lines in question, but that when the rule was made the cars on the two lines ran in such directions that the point of intersection was other than the intersecting point at the time of the ejection, but it appeared that transfers had been habitually given at the new intersection. Held, that a contention that, under the circumstances, the rule was not applicable, and no transfer required, was without merit.

4. Where, in an action for the ejection of a passenger from a street car after he had presented a valid transfer, it appeared that plaintiff had previously had trouble in regard to transfers at the point in question, and had been assured by the officers of the carrier that he was right in his demands, and that transfers should be honored, a verdict for \$175 was not excessive.—(Arnold vs. Rhode Island Company, 66 Atl. Rep., 60.)

LIABILITY FOR NEGLIGENCE

CONNECTICUT.—Carriers—Street Railroads—Loss of Baggage—Liability—Actions—Evidence—Sufficiency.

1. A street car passenger, to recover for the loss of her baggage, must show either that the carrier accepted the baggage under a contract express or implied, to carry and deliver it as a carrier, or that the loss was due to its negligence.

2. In the absence of a special agreement, a street railroad company does not assume control of such baggage as its passengers may bring with them into its cars.

3. Where a carrier does not take full possession of the baggage of a passenger, but the same remains under his control, the carrier, in the absence of a special agreement, does not assume the carrier's liability of an insurer, but becomes responsible only

for failing to exercise reasonable care to protect the same from loss or injury.

4. In an action against a street railway for the loss of a passenger's baggage, there was no evidence that the railroad held itself out as undertaking to assume the control of baggage. The conductor was not requested to take the passenger's baggage into his charge, and he took it when it was handed to him, and placed it in the car within sight and control of the passenger, while assisting her. Held insufficient to justify a finding that the conductor assumed the custody of the baggage so as to render the railroad liable for its loss.

5. In an action against a street railroad for the loss of a passenger's baggage, it appeared that the first conductor in charge of the car assisted the passenger and carried her baggage into the car, and deposited it in a place where the passenger could see it. Nothing was said or done which led the conductor to believe that the baggage was intrusted to his care. The first conductor did not notify the second conductor that the baggage belonged to the passenger, and the second conductor observed the baggage, and a fellow passenger sitting near it, and he, on leaving the car, took it. Held insufficient to support a finding that the railroad was negligent in permitting the fellow passenger to take the baggage.—(Sperry et ux. vs. Consolidated Railway Company et al., 65 Atl. Rep., 962.)

INDIANA.—Appeal—Presentation of Objections in Trial Court—Pleading—Complaint—Designation of Parties—Negligence—Trial—Directing Verdict—Street Railways—Injuries to Person on Track—Action—Instructions.

1. Where a complaint stated facts sufficient, so that a judgment rendered thereon would bar a second suit for the same cause, an objection to the complaint for the first time on appeal because it did not name defendants in the body of the complaint, though they were properly named in the caption, was unavailable.

2. Under Burns' Ann. St. 1901, Sec. 359a, making contributory negligence an affirmative defense, a peremptory instruction on contributory negligence can only be given in favor of plaintiff.

3. In an action against a street railroad for injuries sustained by plaintiff in a collision between his vehicle and a car, an instruction on contributory negligence, that if defendant suddenly and without warning increased the speed of its car, so that plaintiff could not by ordinary care avoid being struck by it, and that if the collision was wholly because of such increase of speed, plaintiff could not be guilty of contributory negligence, was proper, though the instruction did not state why the car started, nor include other circumstances which might have existed, nor was the instruction objectionable as a peremptory one.—(Indianapolis Street Railway Company vs. Coyner (No. 5,624), 80 N. E. Rep., 168.)

INDIANA.—Master and Servant—Injuries to Servant—Defective Appliances—Pleading—Negligence of Master.

1. It is the duty of the master to exercise ordinary care to furnish or provide machinery and appliances reasonably safe and suitable for his employees, and to exercise a reasonable supervision in keeping them in a reasonably safe condition for use.

2. In an action for personal injuries while employed as a motorman, the first paragraph of the complaint alleged that it was necessary for the safe operation of the car and the safety of the employees in charge that the brake rod should be sound and in good condition; that at the time of the injury said brake rod was in a dangerous and defective condition, which was unknown to plaintiff, but was well known to defendant. The second paragraph was the same as the first, except that it stated that it was necessary that the brake rod should be of sufficient size and to stand the pressure of the brakes, and that said rod was defective, in that it was too small and insufficient to stand such pressure, which was unknown to plaintiff, but was well known to defendant, or could have been known by it by reasonable diligence. There was no charge that the rod was in a defective condition when placed in the car, but the theory was that it became defective by wear. Held, that no actionable negligence was alleged; it not being charged that defendant had knowledge of the defect a sufficient length of time to have repaired it.—(Kentucky & Indiana Bridge & Railroad Company vs. Moran (No. 20,946), 80 N. E., 536.)

INDIANA.—Appeal—Former Decision—Law of the Case—Disposition of Cause—Successful Reversals—Trial—Special Interrogatories—Conflict—Uncertain Verdict—Trial de Novo—Prejudice—Evidence—Weight and Sufficiency—Street Railways—Crossing Accident—Care Required—

Headlight—Contributory Negligence—Hearing—Instructions—Refusal Prejudice—Injuries to Travelers—Interrogatories—Answers—Harmless Error.

1. The decision of the Supreme Court in a given case becomes the law in the case in so far as it declares the law, but not as to matters not presented or decided.

2. The fact that a judgment in favor of plaintiff has been twice reversed on appeal will not prevent subsequent reversals, if it appears that defendant has been denied a fair trial and a correct application of the law to the facts.

3. In an action for injuries in a collision with a street car, an answer to an interrogatory, that defendant's motorman, because of a deliberate and willful purpose on his part, ran the car against the plaintiff, was in irreconcilable conflict with the answer to another interrogatory, that the motorman did not see plaintiff as he was about to cross the track.

4. Where a complaint for injuries in a street car collision contained two paragraphs based on simple negligence and one on an alleged willful injury, and it could not be determined from the answers to the interrogatories on what paragraph the general verdict was based, the answers to the interrogatories not being inconsistent with the general verdict on the first two paragraphs, defendant's motion for judgment on such paragraphs was properly denied.

5. Where there was no uncertainty or inconsistency in the verdict, a motion for a venire de novo was properly denied.

6. Where all of the paragraphs of a complaint were for the same injury, defendant was not harmed by the overruling of its motion to modify the judgment by indicating the paragraph on which the judgment was rendered.

7. Where plaintiff was injured in a collision with a street car which approached a street crossing at night at a high rate of speed without any headlight, plaintiff's positive testimony that he looked for the car as he approached the crossing, and did not see it, was not so unreliable as to require its rejection, though a number of other witnesses for both parties testified that they were able to see the car some distance away.

8. Where plaintiff approached a street railway crossing at night on a bicycle, he was not bound as a matter of law to stop, alight from his wheel, and look intently for cars before attempting to cross in order to relieve himself of the charge of contributory negligence.

9. A pedestrian crossing a street railway track at night is entitled to assume that the street cars would not be run at a reckless rate of speed over street crossings, and without any headlight.

10. The same degree of care is not required of persons crossing a street railway track as is required by travelers crossing steam railroads at crossings.

11. Plaintiff, as he approached a street railway crossing at night on a bicycle, saw a car pass in one direction and looked in the opposite direction for the approach of a car by which he was struck. He did not see such car, which was without a headlight, and endeavored to cross, believing that the noise that he heard emanated from the car he had seen pass the crossing. Held, that plaintiff was not negligent as a matter of law in failing to hear the noise of the car by which he was struck.

12. Where, in an action for injuries, the jury were properly instructed as to what proof was necessary to make out a case of negligent injury and also to make out a case of willful injury, defendant was not prejudiced by the refusal of an instruction that willfulness could not exist if negligence existed.

13. Where plaintiff was struck at night by a street car as he was crossing a street, proof that the motorman stood in the front vestibule of the car, where he could see in front thereof, and that there was no headlight on the car, was sufficient to show that the motorman had knowledge that the headlight was not burning.

MICHIGAN.—Street Railroads—Operation—Injuries to Person on Track—Contributory Negligence.

1. Whether plaintiff's decedent, who was struck by a car, was guilty of contributory negligence in going upon the track, held on the facts to be a question for the jury.

2. Even though one could see an approaching car, if in the exercise of common prudence he may reasonably think there is time to cross safely, he is not chargeable with negligence in attempting to do so.—(McQuisten vs. Detroit Citizens' St. Ry. Co., 110 N. W. Rep., 118.)

MISSOURI.—Street Railways—Injuries to Pedestrians—Negligence—Speed—Trial—Signals—Issue of Fact—Contribu-

tory Negligence—Last Clear Chance—Burden of Proof—Evidence.

1. Where, in an action for injuries to a pedestrian in a collision with a street car, all the witnesses agreed that the car was moving at about half speed, owing to the presence of numerous workmen on or near the track, and plaintiff contended that the car could have been stopped within 10 or 12 ft., a charge of negligence with respect to the rate of speed at which the car was running was not sustained.

2. Where, in an action for injuries to a pedestrian by being struck by a street car, all of the witnesses who were listening testified that the bell was rung prior to the accident, the statement of plaintiff, who was partially deaf, and was not listening, that he did not hear the bell, was no evidence on which to raise an issue of fact as to whether the bell was rung.

3. Plaintiff, a man 75 years old, and partially deaf, had knowledge that, owing to repairs on a street car track, cars going in both directions used the same track. Plaintiff approached the track several minutes before he was struck and stopped to watch the men at work. He stood on or near the track in which cars were being run, with his back to the south, until he was struck by a car approaching from that direction. Plaintiff neither looked nor listened for cars approaching from the south, and, if he had looked, he could have seen for a distance of five or six blocks. Held, that plaintiff was negligent as a matter of law.

4. Where plaintiff was clearly negligent in failing to observe an approaching car by which he was struck, the burden was on him, in order to recover, to show that the motorman was negligently indifferent to plaintiff's safety and failed to exercise the care of an ordinarily careful person in his situation, mere proof that the motorman committed an error of judgment being insufficient.

5. Where the motorman of a street car by which plaintiff was struck had no knowledge that plaintiff was deaf, and did not hear warning signals given, and would not step from the track until the car was only 6 or 8 ft. away from him, when the motorman, being then unable to stop the car, redoubled his efforts to warn plaintiff by vigorously clanging the bell, the motorman was not negligent, either in failing sooner to discover plaintiff's peril, or in the effort made after he realized it to avoid injuring him.—(Bennett vs. Metropolitan St. Ry. Co., 99 S. W. Rep., 480.)

MISSOURI.—Carriers—Passengers—Trespassers—Duty Toward Trespassers—Negligence—Damages—Loss of Services—Injuries to Minor Child—Instructions—Trial—Applicability to Evidence—Damages—Injuries to Child—Expenses for Nursing.

1. A boy boarding a street car with the consent of the gripman in charge thereof, who had no authority to grant the boy permission to ride on the car, is a trespasser, and not a passenger.

2. A street railway company owes to a trespasser on a car the duty of exercising ordinary care to prevent injury to him while removing him from the car.

3. A boy twelve years old recklessly boarded a street car, while in motion, with the permission of the gripman. The conductor, while the car was in motion, ordered the boy to leave the car, and seized a broom and advanced toward him in a threatening manner, repeating the order to leave. The boy dodged, lost his equilibrium, and fell from the car. Held, that the company was liable for the injuries received; the act of the conductor being in disregard of the rule requiring him to exercise ordinary care to prevent injury to the boy.

4. Where, in an action by a parent for injuries to a minor child, the evidence showed the boy's age, that he lived at home, and the extent of his injuries, an instruction authorizing a finding for the value of the loss of the child's services was not erroneous.

5. A boy twelve years old boarded a street car with the permission of the gripman, who had no authority to permit him to do so. The conductor, while the car was in motion, ordered the boy to leave, and seized a broom and advanced toward him in a threatening manner, repeating the order. The boy dodged, lost his equilibrium, fell from the car, and was injured. Held, that the court properly refused to charge that, as the boy was not a passenger, it was the duty of the conductor to prohibit him from riding, and, if the boy stepped from the car at the command of the conductor, there could be no recovery, for the act of the conductor was in violation of the rule requiring him

to exercise ordinary care to prevent injury to the boy, though he was a trespasser.

6. The instruction was properly refused, because of want of evidence to support it.

7. A parent, suing for injuries to a minor child, is entitled to recover for the services of himself and family in nursing the child, though there is no evidence of the value of such services; the presumption being that the jury are reasonably familiar with the value thereof.—(Drogmund vs. Metropolitan St. Ry. Co., 98 S. W. Rep., 1091.)

NEW YORK.—Carriers—Injuries to Passenger—Evidence—Sufficiency—Municipal Corporations—Defects in Street—Injuries—Appeal—Review—Questions of Fact—Findings by Court—Injuries to Passenger—Evidence—Admissibility.

1. In an action against a street railway for injuries to a passenger owing to her having stepped into a hole in a street when alighting from a car, the facts held to sustain a finding that defendant was negligent.

2. In an action against a city for injuries to one who stepped into a hole in a street, evidence held to sustain a finding that defendant was negligent.

3. Where, in a cause tried to the court without a jury evidence was heard on behalf of both parties, though it appeared by the return on appeal that the court rendered a judgment of "non-suit," it must be treated on appeal as a judgment on both the law and the facts, as if rendered on the verdict of a jury.

4. In an action against a city and a street railway company for injuries sustained by plaintiff owing to her having stepped into a hole in the street on alighting from a car, it was not error to exclude the testimony of a witness that conductors on former occasions had warned her to look out for the hole.—(Miller vs. International Ry. Co. et al., 102 N. Y. Sup., 254.)

NEW YORK.—Master and Servant—Injuries to Servant—Safe Appliances—Street Railways.

In an action for injuries to a motorman, it appeared that plaintiff's car had been equipped with a new plow, a device passing through the slot rail to take up the electric current, that his car was a light one, and that it stopped suddenly, whereby he was injured, but that he succeeded in starting the car, and on a subsequent trip, discovered that at the point where the car stopped the slot rail was closed up for about 2 feet, so that the opening was about a half an inch wide, whereas, elsewhere it was about three-fourths of an inch. It was shown that the plow was half an inch wide, and that, if the car had been a heavy one, or if the plow had been worn slightly, there would have been no trouble. It did not appear that plaintiff had any difficulty at such point thereafter. There was some evidence that an inspector had stated that there was a defect in the slot rail in the vicinity of the accident. Held, that the evidence showed no negligence.—(McCann vs. Interurban St. Ry. Co., 102 N. Y. Sup., 296.)

NEW YORK.—Trial—Course and Conduct of—Remarks of Judge—Instructions Involving Province of Jury.

1. Where plaintiff's physician, on cross-examination in a personal injury case, said that he hoped plaintiff would in time be able to walk without a cane, a remark of the judge: "You expect what is probable. Your hope may be very improbable"—was not error, on the ground that it showed bias for plaintiff.

2. Where plaintiff was injured in attempting to get on a street car, and the evidence was conflicting as to whether or not the car was moving, and, if so, whether slowly or at the rate of 3 or 4 miles an hour, it was error for the court to instruct that the jury must either find that the car was not moving or was moving at the rate of 3 or 4 miles an hour.—(Devlin vs. New York City Ry. Co., 102 N. Y. Sup., 430.)

PENNSYLVANIA.—Carriers—Injury to Passenger—Pleading and Proof—Variance—Appeal—Assignment of Error—Sufficiency.

1. Plaintiff alleged in her statement of claim that, while a passenger in a street car in passing down the aisle, she fell into an opening in the floor of the car, and testified that her movement was affected by the sudden starting of the car. The statement of claim did not allege any negligence in that respect. Held, that there was not sufficient variance between the statement and the proof to defeat the action.

2. An assignment of error to the admission of evidence will not be reviewed where the page of the paper book where the matter may be found is not referred to.—(Cameron et al. vs. Citizens' Traction Co., 65 Atl. Rep., 534.)

TEXAS.—Street Railroads—Action for Injuries—Sufficiency of Evidence—Operation—Injuries to Persons on Track—Duty on Seeing Person on Track—Damages—Permanent Injuries and Future Expenses—Pleading—Amendment—Right to Amend—Discretion of Court—Injuries to the Wife—Loss of Society—Measure.

1. In an action for injuries sustained by reason of plaintiff's wife being struck by an interurban car, evidence examined, and held to sustain a judgment for plaintiff.

2. A motorman upon discovering the perilous position of a person upon a trestle must use every means then reasonably within his power, consistent with safety to himself and others on the car, to avoid running such person down.

3. If a motorman, upon discovering the perilous position of a pedestrian upon a trestle, could not, in the exercise of ordinary care, have foreseen or anticipated that the pedestrian would not probably leave the track in time to avoid injury, the railway company is not liable for injuries sustained by the pedestrian in being run down.

4. Where, in an action for injuries received by being run down by interurban car, it appears that the plaintiff, having been permanently injured, will necessarily have to expend money for medical or surgical treatment in the future, this fact may be considered together with the other circumstances in estimating damages.

5. It is within the discretion of the court to permit a petition to be amended where it will not occasion surprise to the other party.

6. Where a husband sues to recover for the loss of society of his wife caused by her injuries received through defendant's negligence, specific proof of the value of her society is not necessary, but, the loss of her society being established, the assessment of damages is within the sound discretion of the jury.—(Northern Texas Traction Co. vs. Mullins, 99 S. W. Rep., 433.)

TEXAS.—Trial—Instructions—Necessity for Request—Further Instructions—Damages—Personal Injuries—Negligence—Injuries—Contributory Negligence—Instructions—Carriers—Injury to Passenger—Evidence—Evidence at Former Hearing—Absent Witness—Preliminary Proof—Sufficiency.

1. In an action by a mother for injuries to her minor son, an instruction authorizing the allowance to plaintiff of such damages as would constitute reasonable compensation for the boy's services, if any, which plaintiff would probably be deprived of by reason of the boy's inability to labor for her prior to his majority was not erroneous for failure to authorize a deduction of a fair discount because of a present payment for such loss of service, in the absence of a request for further instruction as to the right to such deduction.

2. In an action for injuries to a child, the court charged that the burden of proof was on the plaintiff to establish by a preponderance of the evidence that the alleged accident, if any, was caused by defendant's negligence as alleged by plaintiff, and that, if that had been done, the burden shifted to defendant to show that the accident was caused by the contributory negligence of plaintiff's son. Held that such instruction was not objectionable as requiring defendant to prove that the accident was not caused by its negligence, nor as requiring defendant to show, by a preponderance of the evidence, that it was caused by the contributory negligence of the son.

3. In an action against a street car company for injuries to plaintiff's son, defendant alleged that he was injured by his own negligence in that he negligently hung his foot down from the running board whereupon it was caught by the wheel of the car, or that he recklessly and negligently jumped from the running board and back to the running board while the car was in motion, and in so jumping threw his foot in front of the wheel and in some manner it was injured. Held that an instruction that if the boy's negligence caused or contributed so directly and proximately to the accident as alleged by defendant in its answer, and that but for his own negligence he would not have been injured, defendant was not liable, etc., was not objectionable as imposing too great a burden on defendant.

4. Where the transcript of the testimony of a witness, who was beyond the jurisdiction of the court, was offered and excluded, but the bill of exceptions did not show that any offer was made to prove the correctness of the transcript by the testimony of the stenographer who took it down, no error was disclosed.—(El Paso Electric Ry. Co. vs. Kitt, 99 S. W. Rep., 587.)

FINANCIAL INTELLIGENCE

WALL STREET, May 15, 1907.

The Money Market

The feature of the money market during the past week has been the increasing demands for fresh capital on the part of railroads and other corporations. Following the decision of the Atchison directors to issue about \$26,000,000 5 per cent convertible bonds, comes the announcement that the Southern Pacific Company will issue \$36,000,000 new preferred stock, and that the Union Pacific will issue \$75,000,000 4 per cent bonds, the latter being convertible into common stock at 175 at any time within three to five years. In addition to the above several other flotations were announced during the week but the amounts were comparatively small. As yet these borrowings have not been reflected in any decided hardening of money rates, but the point is made that the bulk of the payments for the Harriman issues will fall due at a time when the outflow of money to the interior for crop-moving purposes will be well under way, and which may result in more or less disturbance in the money market at that time.

The market during the week has been somewhat firmer in tone, rates for time loans ruling about $\frac{1}{4}$ per cent above those prevailing at the close of last week. The firmer tendency was due largely to an increased demand from stock houses and to the reports that the Secretary of the Treasury would call in part of the \$30,000,000 special deposits made with the banks last winter. Although no definite information has been received regarding the Secretary's intention, it is believed in banking circles that part of this money will probably be called in should the present easy conditions of the market continue. Other factors working in favor of higher rates were the reports of further heavy borrowings by corporations in the near future. Since the beginning of the week the banks have gained about \$300,000 from the Sub-Treasury as compared with a loss of \$500,000 in the corresponding period of last week. Government disbursements for pensions, etc., will be larger from now on, and will undoubtedly be reflected in the cash holdings of the New York banks. A favorable development has been the weakness in sterling exchange, rates for prime demand bills declining sharply to a point which eliminate all possibilities of exports of gold to Europe. Money on call has loaned at 3 and at 2 per cent, the average rate for the week being slightly in excess of $2\frac{1}{2}$ per cent. Time money, as stated above, has ruled slightly firmer; sixty-day money, which a week ago was available at $3\frac{3}{4}$ per cent, now commands 4 per cent, while four and six months money has loaned at $4\frac{1}{2}$ and $4\frac{3}{4}$ per cent, respectively. The European money markets remained easy. The Bank of France continues to draw gold from London, and it is not likely that the Bank of England or the Bank of France will reduce the official rates of discount until the latter institution has recovered all of the gold sent to London earlier in the season.

The bank statement published last Saturday was rather favorable, inasmuch as loans decreased more than \$14,000,000, and deposits fell off \$16,180,800. Cash decreased \$2,383,600, but as the reserve required was \$4,045,200 less than last week the surplus reserve of the banks was increased by \$1,661,600. The surplus now stands at \$8,486,225, as against \$12,894,600 in the corresponding week of last year, \$12,712,575 in 1905, \$12,827,250 in 1904, \$8,992,625 in 1903, \$8,346,525 in 1902, \$8,127,475 in 1901 and \$15,332,725 in 1900.

The Stock Market

There has been no decided change in the stock market during the past week. Trading was upon a somewhat smaller scale and prices moved with considerable irregularity. Speculation continued largely professional, the volume of commission house business indicating a very small public interest in the market. During the first half of the week prices yielded rather sharply, but the early depression was followed by sharp recoveries from the low levels, due chiefly to the coverings by shorts. The principal influences were the unfavorable crop reports and apprehension regarding the immediate future of the money market.

The private reports of damage to the winter wheat crop received early last week were fully confirmed by the Government report made public on the 10th. According to the Government figures the area of winter wheat remaining in cultivation on May 1 was about 28,132,000 acres. This is 11.2 per cent, or about 3,533,000 acres less than the area sown last autumn, and 5 per cent, or about 1,468,000 acres less than the area of winter wheat reported as harvested last year. The average condition of the growing winter wheat crop on May 1 was 82.9, as compared with 89.9 on April 1 last, 90.9 on May 1 last year, and 92.5 on May 1 two years ago. The publication of the report was followed by a violent rise in wheat prices for the nearby options advancing to the highest prices in two years. Sentiment was chilled also by the heavy demands for fresh capital by corporations, but as yet their borrowings have not been reflected in any decided hardening in the rates for money. Underlying conditions, however, continue sound. Business all over the country is active. The traffic managers of the Eastern and Western lines report a heavy movement of freight; railway traffic returns are good, those for the first week of May coming to hand showing gratifying increases over the corresponding period of last year. Activity in the iron and steel trade continues, the sales of iron the last week for December during the last half being more numerous than in any week during the year.

The local traction stocks moved in sympathy with the general market. Early weakness was followed by sharp recoveries in prices, due to short covering on the belief that the early passage of the utilities bill had been pretty well discounted.

Philadelphia

Very little interest was manifest in the local traction issues during the past week. Dealings were upon a reduced scale, but apart from Philadelphia Rapid Transit, which was again under pressure, the general tone of the market was firm. Philadelphia Rapid Transit was again the prominent feature of the trading, both as regards activity and price movements. During the early part of the week it displayed firmness, advancing to $25\frac{5}{8}$ on purchases by commission houses, but subsequently selling developed which carried the price off $1\frac{3}{8}$ to $24\frac{1}{4}$. In all about 7500 shares were traded in. In some of the less active issues, however, pronounced strength was displayed. Consolidated Traction of New Jersey advanced to 74 on light purchases, and Union Traction, after selling at $59\frac{5}{8}$ rose to 60. Philadelphia Company common advanced from $43\frac{1}{2}$ to 44. Other transactions included Philadelphia Traction at 94 and $93\frac{1}{4}$, American Railways at $49\frac{1}{2}$, United Companies of New Jersey at 250, Interstate Railways at 136, and Lehigh Valley Transportation preferred at 23.

Chicago

There were no important developments in the local traction situation during the past week. While the deposits of stock of the Chicago Union Traction Company have been rather light thus far, there is no doubt that the required two-thirds of the capital stock of the company will be deposited before the time expires this week. Transactions during the week included City Railway at $107\frac{1}{4}$ to 108, Chicago Union Traction common at $4\frac{3}{4}$ and $2\frac{7}{8}$ Metropolitan Elevated preferred at $77\frac{1}{4}$, and Northwestern Elevated at 23.

Other Traction Securities

Increased dullness was the principal feature of the traction issues at Baltimore. United Railway securities, which have figured prominently in the trading for some weeks past, were quiet. The 4 per cent bonds changed hands at $87\frac{3}{4}$ and $87\frac{1}{2}$, while the incomes, after an early rise to 55, reacted to $54\frac{1}{4}$ on transactions aggregating about \$50,000 bonds. The refunding 5s sold at $82\frac{1}{2}$ and $82\frac{1}{4}$. The stocks were entirely neglected. Macon Railway & Light 5s sold at $94\frac{1}{2}$, Knoxville Traction 5s at 105, and City & Suburban 5s at 109. In the Boston market prices continued to move with considerable irregularity. Boston Elevated broke from $137\frac{1}{2}$ to 135, but subsequently recovered a point. Massa-

chusetts Electric common sold at 16 and 16½, but the preferred fell from 57½ to 56¼. Boston & Worcester ran off from 26½ to 26, but at the close it advanced to 26¾, and the preferred brought 72. West End common sold at 88 and 87½, and the preferred, after early weakness with sales as low as 103½, rose sharply to 105.

Security Quotations

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

	May 8	May 15
American Railways	49¼	49½
Boston Elevated	a138	136
Brooklyn Rapid Transit	60¾	60
Chicago City	180	180
Chicago Union Traction (common)	4½	3
Chicago Union Traction (preferred)	14½	13½
Cleveland Electric	51½	50
Consolidated Traction of New Jersey	74	74
Dévoit United	70	70
Interborough-Metropolitan	24½	22½
Interborough-Metropolitan (preferred)	58½	56¾
International Traction (common)	—	50
International Traction (preferred), 4s	—	71¾
Manhattan Railway	138½	138½
Massachusetts Elec. Cos. (common)	16	17
Massachusetts Elec. Cos. (preferred)	57	57½
Metropolitan Elevated, Chicago (common)	a26	23
Metropolitan Elevated, Chicago (preferred)	a65	63
Metropolitan Street	92½	—
North American	72½	72½
North Jersey Street Railway	40	40
Philadelphia Company (common)	44	43½
Philadelphia Rapid Transit	†25¼	24¼
Philadelphia Traction	94	93½
Public Service Corporation certificates	61	64
Public Service Corporation 5 per cent notes	92	94
South Side Elevated (Chicago)	81	83
Third Avenue	108	109
Twin City, Minneapolis (common)	94	94
Union Traction (Philadelphia)	59¼	59¼

a Asked. † Assessment paid.

Metals

According to the "Iron Age," Eastern steel makers have been heavy buyers of basic pig iron during the last two weeks, and sales during the movement thus far aggregate close to 100,000 tons. The market has hardened and some of the sales were made on the basis of \$23 at furnace. There has been some lively buying in the Eastern territory of foundry iron, mostly in fair sized lots, which has strengthened the market and checked the downward tendency. Steel orders for 1908, already booked, foot up to 500,000 tons, and negotiations are under way for 100,000 tons additional.

Copper metal continues active and strong. Prices are unchanged at 25½c. for Lake, 25¼c. for electrolytic.

PAPER ON HEAVY ELECTRIC RAILROADING BEFORE THE INSTITUTE

At the annual meeting of the American Institute of Electrical Engineers to be held in the auditorium of the Engineers' Building, 33 West Thirty-Ninth Street, New York, on Tuesday, May 21, at 8:15 p. m., the following paper will be presented: "Some Facts and Problems Bearing on Electrical Trunk Line Operation," by Frank J. Sprague.

ANNUAL MEETING OF THE STREET RAILWAY ASSOCIATION OF THE STATE OF NEW YORK

J. H. Pardee, secretary of the New York State Street Railway Association, says that the details of the twenty-fifth annual convention of the association to be held at Hotel Champlain, Lake Champlain, June 25 and 26, 1907, are now being arranged, and that about June 1 full information will be available about the program, hotel accommodations, railroad rates and other matters of interest.

INTERBOROUGH RAPID TRANSIT EARNINGS FOR QUARTER ENDED MARCH 31

The income account of the Interborough Rapid Transit system as reported to the Railroad Commissioners (including both subway and Manhattan divisions) for the quarter and nine months ended March 31, 1907, compares as follows:

Jan. 1 to March 31:	1907.	1906.
Gross receipts	\$6,931,899	\$5,318,729
Operating expenses	2,496,657	2,171,396
Net earnings	\$3,535,242	\$3,147,333
Other income	233,711	206,786
Total income	\$3,768,953	\$3,354,119
Fixed charges	2,514,677	2,244,980
Surplus	\$1,254,276	\$1,109,139

July 1 to March 31:
Gross receipts \$16,339,151
Operating expenses 6,994,121
Net earnings \$9,345,030
Other income 577,439
Total income \$9,922,469
Fixed charges 7,218,791
Surplus \$2,703,678

The separate income accounts of the subway and Manhattan divisions for the quarter and nine months ended March 31, 1907, compare as follows:

Manhattan Division.		
Jan. 1 to March 31:	1907,	1906.
Gross receipts	\$3,622,978	\$3,266,088
Operating expenses	1,472,932	1,398,635
Net earnings	\$2,150,046	1,867,453
Other income	117,953	98,691
Total income	\$2,267,999	\$1,966,144
Fixed charges	1,831,744	1,741,401
Surplus	\$436,255	\$224,743

Subway Division.		
Jan. 1 to March 31:	1907.	1906.
Gross receipts	\$2,408,921	\$2,052,641
Operating expenses	1,023,725	772,762
Net earnings	\$1,385,196	\$1,279,879
Other income	115,759	108,096
Total income	\$1,500,955	\$1,387,975
†Fixed charges	682,936	503,580
Surplus	\$818,019	\$884,395

July 1 to March 31:
Gross receipts \$5,089,069
Operating expenses 2,801,915
Net earnings \$3,187,154
Other income 270,208
Total income \$3,457,362
†Fixed charges 1,829,110
Surplus \$1,628,252

†Includes rentals due city, which are measured by interest and sinking fund on city bonds issued for construction of Rapid Transit system.

RAPID TRANSIT MATTERS IN NEW YORK

The chief engineer of the New York Rapid Transit Commission has laid before that body a scheme for a tri-borough elevated and subway line from Pelham Bay Park to Fortieth Street in South Brooklyn, with possible extensions to Coney Island and Fort Hamilton, crossing the East River by the Manhattan Bridge, yet to be built, with projected spurs forming a loop to Brooklyn Bridge. It would be an elevated structure from Pelham Bay to 138th Street in the Bronx, and thence proceed under the Harlem and through a subway in Third Avenue and the Bowery, to emerge in crossing the bridge and continue underground on the other side. It would at first have only two tracks from One Hundredth Street to Twenty-Third Street, under Third Avenue and without sundry extensions and spurs contemplated for the future. The engineer's estimate is that it would cost \$40,000,000 for construction in the course of three years, and when the whole project was completed the cost would reach \$60,000,000. The report has been turned over to the committee on plans for consideration.

The Rapid Transit Commission has practically told Mr. Behr, who proposes to build a monorail system from the Atlantic Avenue Ferry, Brooklyn, to Coney Island, to prepare a proposal to the city for a franchise. Mr. Behr will have to satisfy the city with reference to his financial responsibility and give a guarantee as an evidence of good faith before bids will be asked for by the Commission. At the meeting of the Rapid Transit Commission the special committee reported on the application of Mr. Behr and his associates. The committee recites the application of Mr. Behr for the right to build a line to Coney Island from the foot of Atlantic Avenue, and thence through Rogers and Nostrand Avenues, Brooklyn, and points out that under the law no franchise can be given, but that it is possible to frame a route and general plan of construction and operation which would give Mr. Behr, in competition with others, an opportunity to offer for construction a road built according to his system.

Theodore P. Shonts, as president of the Interborough Company, refuses to make any concessions from what he wrote to the Rapid Transit Commission as to the terms on which the company is willing to undertake the construction of new subways, and in a letter sent Monday, April 13, to the president of the Commission, Alexander E. Orr, he reiterates these conditions in part, and intimates that the company is not willing even to consider the proposition to build subway extensions with its own money in return for franchises for additional tracks on the East Side elevated lines, as suggested by John H. Starin. In addition to writing to Mr. Orr, Mr. Shonts sent a letter to Edward P. Hatch, of the Retail Dry Goods Association, inviting that organization to make a thorough examination of the Interborough's books, with a view to learning whether or not the estimates submitted by the company to the Commission as to the cost of the existing subway and the estimated cost of new subways are correct. With Mr. Shonts maintaining the attitude assumed when the bids for new subways were to be submitted, and with the Commission unwilling to accept the offer made them, the transit situation is absolutely deadlocked, and will remain so until the new Public Utilities Commission comes into being, unless the present board makes some arrangement for the construction of the so-called tri-borough route, or at least part of it, as proposed by Chief Engineer Rice at the meeting last Thursday. Bids were opened Tuesday, May 14, in the office of the Rapid Transit Commission for the second section of the so-called bridge loop subway which is to connect the bridges crossing the East River. The city is to pay for the construction of the line and will lease it to an operating company on completion. Only two bids were received for this section of the work, which extends from Canal Street to Broome Street, under Centre. The bids were from the Cranford Company, of Brooklyn, and the Degnon Construction Company. The former concern's bid for the construction of the railroad was \$2,150,000, and for the pipe galleries \$60,000 additional. The Degnon Company bid \$2,800,000 for the railroad and \$75,000 for the construction of the pipe galleries. As in the case of the first section, extending from Pearl and Canal Street, for the construction of which the Degnon Company got the contract, the bids are somewhat higher than the estimates of the cost prepared by Chief Engineer George S. Rice. If the Cranford Company is awarded the contract for the second section the total cost of the two sections will be a trifle more than \$5,000,000.

THE SITUATION IN CLEVELAND

Aside from the trial involving consents in Quincy Street and Central Avenue, nothing of very great interest has developed in the situation at Cleveland the past week. In Judge Phillips' court the attorneys for the Cleveland Electric stated that the claim was made that the Forest City Traction Company had the consents of a majority of the property owners on those two streets when its franchise was granted. The same thing is claimed by the Low Fare Railway Company. If the Forest City did have the consents, then there is no possibility of the Low Fare Railway Company having a majority. Either the Forest City Traction Company must be declared an illegal corporation, or the Low Fare Company must be admitted to be without the necessary consents to give it a franchise. The decision of the court on this matter will go far toward the settlement of the final question as to the matter of consents, and will decide whether the Forest City Traction Company has any rights at all where grants have been made.

The Low Fare Railway Company, in an answer filed to the Isom injunction suit, states that there was an agreement between the property owners on Central Avenue and Quincy Street and the Forest City Railway Company that the consents could not be revoked, because a valuable consideration had been given for them. If the court should uphold this contention, the ruling might be against the Cleveland Electric, but it would place the Low Fare Company in a predicament as long as the Forest City Railway Company is in litigation on the allegation that the Mayor is financially interested in it, and this has practically been admitted. If, on the other hand, the court should not uphold the contention, then the work of securing consents would have to be repeated by the Cleveland Electric, as it followed the rule of agreeing to pay a certain sum per front foot for the consents, with the condition that it be given power of attorney for six years. Such a decision would leave the matter open for a new fight, it would seem.

Attorneys are of the opinion that the grants made to the Low Fare Company on the West Side last week are invalid, because that company did not have the proper consents. On the other hand, City Solicitor Maker has stated that the consents are not needed.

The work of tearing up the tracks on the two streets has proceeded rapidly the past week. It is said that President W. B. Colver, of the Low Fare Railway Company, has been negotiating with the officers of the Cleveland Electric for the joint use of the tracks, and in some places, separate use. While there may be something in the stories, they have not been confirmed at all. It is supposed that if the two companies can not agree upon a price for this use of tracks, the matter will be submitted to an arbitration committee of either one or three men.

The meeting arranged by Councilmen favorable to a settlement with the Cleveland Electric on Central Avenue and Quincy Street last Wednesday evening was broken up by a crowd, which, it is said, was made up of city employees. After the speakers had been howled down, one of the Mayor's henchmen took possession of the hall and conducted the meeting. The Councilmen had paid for the room to have a meeting at which they expected to get an expression from their constituents.

In Judge Phillips' court Monday, City Solicitor Newton D. Baker admitted that, if the Cleveland Electric has the consents of a majority of the property owners on Central Avenue and Quincy Street, the franchise of the Low Fare Company is not valid under the present construction of the law, but argued that the Supreme Court ought to review this law again. Power of attorney for six years goes with the consents the company secured and for this reason the Low Fare Company would be barred from the streets that length of time, should the court decide in its favor. The matter now hinges on the question as to whether the old company has sufficient consents to establish its claim. The Low Fare Company then sent a communication to the Council, proposing to rebuild the track on the two streets and operate 3-cent cars over the lines until the legal fight is ended. In return for the use of the tracks belonging to the Cleveland Electric, the company offers to pay 6 per cent interest on the value of the property, and, after deducting 6 per cent from the gross receipts for its own investment, turn the remainder over to the city, the portion of the tracks restored to go to the Cleveland Electric at actual cost if it wins

the suit. Or, the Low Fare Company agrees to restore the tracks and allow the Cleveland Electric to operate cars over the two lines at any fare it sees fit until the cases in court are settled free of charge. The tracks restored are to be sold to the Cleveland Electric or any other company declared to have the franchise on these streets.

The Council passed ordinances giving the Low Fare Railway Company joint use of the Forest City tracks on Fulton Road and Denison Avenue, and of the Cleveland Electric tracks around the Public Square.

On Wednesday, May 15, the Cleveland electric offered to rebuild the tracks on the abandoned streets and operate over them, pending the decision of the courts. If granted the franchise, seven tickets for a quarter will be given. The company further agrees to sell the equipment at cost if courts decide franchises of other companies are valid.

AFFAIRS IN CHICAGO

The estimate given the Chicago City Railway Company by the board of supervising engineers calls for the expenditure by the company of \$16,000,000 to carry out the rehabilitation of its lines during the next three years. It is estimated that it will cost the Union Traction Company \$24,000,000 to rehabilitate the service on the north and west sides. The board made its estimate for the South Side Company in response to the inquiry of President Thomas E. Mitten. The engineers reserved the right to call for the \$16,000,000 as rapidly as the progress of the work warrants. It is considered likely that improvements costing between \$4,000,000 and \$5,000,000 will be completed within the next year. Bonds will be issued to cover the amount needed.

Dissatisfied with the refusal of the Chicago City Railway Company to grant their wage demands, a committee of car employees will call on President T. E. Mitten with a new petition. They will ask that a "specific" answer to each point in their demands be given by the company. President Mitten would not indicate whether he will consent to further negotiations with the employees. It is thought he will receive the committee and listen again to its arguments, but it is said that the probability of the company making any additional concessions beyond the 7 per cent increase already proposed is slight. In case President Mitten declines to treat with these employees, it is said, they will proceed under a clause in the existing agreement which binds both sides to submit differences to arbitration when they cannot be settled otherwise.

President F. H. Rawson, of the Union Trust Company, says regarding the traction situation: "We are getting the deposits as rapidly as I expected and I may say that I am satisfied with the results so far."

A call for the \$624,900 of stocks of the Chicago West Division Street Railway Company guaranteed 35 per cent dividends by the lease between that corporation and the West Chicago Street Railway Company, has been issued by a committee of the following stockholders: Cyrus H. McCormick, Thomas Templeton, Charles W. Ware and John F. Bass. It is required that the Merchants' Loan & Trust Company be authorized to deposit shares of the company with the Chicago Title & Trust Company, as directed by the traction settlement ordinance and upon the approval of Chauncey Keep and Byron L. Smith.

The Northwestern Elevated's Ravenswood extension, to be opened the end of this month, is 3½ miles long and has eight stations. Work was begun last fall. The cost is \$2,500,000. Loans were secured by the company's bonds. The Fortieth Street extension of South Side Elevated was begun nearly three years ago and is far from completion. This project, however, was handicapped badly by labor troubles.

Notice has been served on all the elevated road companies, except the south side line, that the employees will demand an increase in wages within the next thirty days. The Northwestern, Oak Park, and Metropolitan roads had agreements with the union, which expired May 1, and the men are working under a tentative arrangement until June 1. No fears of a strike are entertained, since the agreements in each case provide for arbitration.

The traction board has organized its work into various branches, as follows:

Division of trackage and roadbed, to carry out the recon-

struction of the tracks under the direction of an assistant engineer.

Division of electrical power, to work out the problem of the distribution of the power required for the new system under the direction of an electrical engineer.

Division of power house construction, to supervise the building of new power houses if it is decided to manufacture instead of purchase current.

Division of cars and operation, to supervise the rehabilitation of all rolling stock and put into effect through routes and other service regulations.

Division of subways, to have charge of the construction of the underground street railway system as soon as authorized by the City Council, and in the meantime to supervise the rebuilding of the river tunnels in conformity with that plan.

Division of accounting and auditing, to have charge of all bookkeeping, including the division of receipts between the city and the company.

MEETING OF THE CENTRAL ELECTRIC RAILWAY ASSOCIATION

The following program has been adopted for the May meeting of the Central Electric Railway Association, to be held at Indianapolis, May 23:

10:30 a. m. Call to order.

11:30 a. m. The Issuing of Supplies. How to Prevent Leaks. Paper by S. R. Dunbar, purchasing agent Indiana Union Traction Company, Anderson, Ind.

AFTERNOON SESSION

2:00 p. m. Modern Train Dispatching. Paper by J. K. Gray, trainmaster Western Ohio Railway Company, Lima, Ohio. Paper by M. C. Stern, General Systems Company, Dayton, Ohio. Paper by J. B. Crawford, superintendent transportation, Fort Wayne & Wabash Valley Traction Company, Fort Wayne, Ind. Demonstration, Chauncey P. Button, general manager Telegraph Signal Company, Rochester, N. Y.

3:30 p. m. Report of committee on standardization. Report of committee on express contracts. General discussion.

CARS RUN IN SAN FRANCISCO

Cars are being run with increasing regularity in San Francisco. The early attempts made by the United Railways to resume operation were recorded last week. They were followed on Saturday by a service open to the public, which was quite liberal, considering the threatening attitude of the labor element and their sympathizers. On Saturday Governor Gillette came to San Francisco to investigate the strike situation and determine whether the calling out of the militia was required. The Governor held a conference with Mayor Schmitz and others, and received signed statements from President Calhoun, of the United Railroads, and President Cornelius, of the Car Men's Union, setting forth their respective sides of the controversy. Subsequently, the Governor and Mr. Calhoun had a private conference which lasted over an hour. As a result of this conference the Governor announced that he would judge the San Francisco situation by the acts of the people and would not hesitate a moment to call out the militia if rioting should be continued, had a sobering effect. Five hundred police guard the streets through which the cars run, but they have little to do. Isolated instances of misconduct are reported, but on the whole, the situation is quiet.

NEW YORK ASSEMBLY PASSES UTILITY BILL

By the unanimous vote of the members in attendance the Assembly, Wednesday, May 15, after a 3-hour debate, passed the public utilities bill in the form approved by Governor Hughes. The Democrats in the lower House made a general attack on certain features of the bill, and offered a dozen or more amendments, which were defeated by a strict party vote of 98 to 51. On the final roll call, however, they all fell in line with the Republicans and voted for the bill.

SURVEYS COMPLETED FOR BALTIMORE, FREDERICK & HAGERSTOWN LINE

Surveys for the line of the Baltimore, Frederick & Hagerstown Electric Railway, which have been in progress for several months, under the direction of Westinghouse, Church, Kerr & Company, of New York, are about completed. The line will be 52 miles long and will connect with the system of the United Railways & Electric Company, in Baltimore. The company was chartered several years ago with a capital stock of \$15,000,000, and has a like amount of first mortgage 5 per cent bonds authorized. It is understood to be the intention of the company to issue only about \$10,000,000 of its bonds at this time. The officers of the company are: James E. Ingram, Jr., Baltimore, president; J. Roger McSherry, Frederick, vice-president; Henry Coblentz, Frederick, secretary; Thomas H. Howard, Frederick, treasurer; Robert P. Graham, Baltimore, counsel; James E. Ingram, Sr., James E. Ingram, Jr., Thomas H. Haller, John C. Beasman, Frank H. Callaway, J. Roger McSherry, E. L. Coblentz and Robert P. Graham, directors.

The route from Baltimore to Hagerstown will be about 78 miles, and the original plans called for two tunnels—one at Braddock Heights, about 5 miles from Frederick, 4000 ft. long, and the other at South Mountain, about 6000 ft. long.

It is the intention of the company to move freight as well as passengers. The surveys which have been made between Baltimore and Hagerstown call for a low-grade line, and for this reason the impression has prevailed in some quarters that perhaps steam might be used as the motive power. President Ingram, however, says that these reports are not correct, and that the road will be operated entirely by electricity, and that freight as well as passengers will be carried.

The route surveyed between Baltimore and Frederick passes through a country, of which a considerable portion is at present without transportation facilities. This belt has on its south side the Baltimore & Ohio, and on its north side the Western Maryland. Its widest span between these two railroads is about 17 miles. The details of the route have not been announced, but it is said that the road will pass through several towns and villages, and that both private rights of way and turnpikes will be used between Baltimore and Frederick.

A deed of trust from the Washington, Frederick & Gettysburg Railroad Company to the Baltimore Trust & Guarantee Company to cover an issue of \$400,000 worth of bonds on the Thurmont line was filed in Frederick recently.

The road has entered into a traffic arrangement with the Western Maryland whereby the latter's cars will be hauled from Thurmont to Frederick and return. This will enable the Western Maryland to get into Frederick and compete with the Baltimore & Ohio and Pennsylvania for local business.

THE TRAFFIC SQUAD IN STREET RAILWAY WORK IN NEW YORK

President Shonts, of the Interborough-Metropolitan Company, of New York, is an enthusiastic believer in the efficiency of the police traffic squad in helping in the handling of street railway traffic. Several times recently has he acknowledged the work these men are doing in the streets, and at the dinner of the men at the Waldorf on Saturday, again publicly commended them. Mr. Shonts asked for the continued co-operation of the men in working with the transit companies for the betterment of the service. The street car men are working along lines, with reasonable prospect of success, he said, which, when operative, would put them in a position to serve the public with greater safety and comfort than at present. He pleaded for the reasonable use of the surface car tracks by the company that owned them. He said that at present too many vehicles which are waiting, like Micawber, for something to turn up, are allowed to clutter the main streets, and that in many of the side streets long lines of trucks are allowed to back up against the curbs and to stop almost all sorts of traffic until their drivers got ready to get them out of the way. No matter how many subways may be built, he went on, the surface car lines will always have to take care of local and short-distance travel, and this traffic, he maintained, was entitled to every possible consideration, not so much for the transit companies, but for the general public.

PURCHASE OF TROLLEY LINES BY D. & H. CRITICISED

At the annual meeting of the Delaware & Hudson Railroad Company, held in New York May 14, several stockholders criticised the action of the company in purchasing the Hudson Valley Railway Company. It was said that the receivers of the line had valued the securities at \$1,600,000, whereas the railroad company has paid \$5,000,000 for the control of the property. President Loree, in reply, explained that the purchase had been made previous to his election to the presidency, and doubted the advisability of imparting detailed information until the whole transaction was closed up. He said, however, that the Company has acquired practically all the securities of that company and not merely of a controlling interest in them. He also said that such purchases had been forced upon the steam railroads as a matter of self-protection. When the New Haven began to acquire trolley lines, he pointed out, the New York Central regarded such acquisitions unnecessary in its own territory, yet was obliged a little later to do as the New Haven had done. The Delaware & Hudson pursued the same policy, he said, as it seemed the best way of protecting the road from costly competition, in addition to which the electric lines can serve as valuable feeders for the steam line.

CHANGES IN THE LANCASTER COMPANY

On May 6, as briefly noted in the last issue of the STREET RAILWAY JOURNAL, a number of important changes were made in the management of the Lancaster County Railway & Light Company and constituent companies, the outcome of the purchase of the common stock by Bertron, Storrs & Griscom. George Bullock, president of the United Gas & Electric Company, of New York, succeeds W. W. Griest as president; R. E. Griscom, of Philadelphia, takes the place of Charles B. Keller as vice-president, and M. E. Dodge, of the firm of Bertron, Storrs & Griscom, was made secretary and treasurer in place of John S. Grabill, Jr. C. Edgar Fitzel, who has been superintendent, has been made manager and will have charge of all the lines. Mr. Bullock will visit Lancaster once a month to look after the company's interests.

At the annual meeting of the Conestoga Traction Company Mr. Keller presented his resignation as vice-president and also resigned the same office in the Lancaster Gas Light & Fuel Company, the Edison Electric Illuminating Company and the Columbia Electric Light, Heat & Power Company. Mr. Bullock was elected his successor in each company. Mr. Griest still retains the presidency of all these companies and the boards of directors all remain the same.

Mr. Keller's resignations were tendered on account of ill health, and the following resolution presented by P. B. Shaw was adopted:

"Whereas, Charles B. Keller announces his retirement as vice-president of the Lancaster County Railway & Light Company, the Conestoga Traction, the Edison Electric Illuminating Company, the Lancaster Gas Light & Fuel Company, and the Columbia Electric Light, Heat & Power Company,

"Therefore, Be it resolved by the respective boards of directors of these corporations, that a minute be made of the faithfulness, sterling integrity and great ability with which Mr. Keller served these corporations during a very critical period of their history.

"In behalf of the stockholders and directors, we extend to him the assurance of sincere appreciation for the manner in which his arduous duties have been discharged."

President Griest, on behalf of a large number of stockholders of the Lancaster County Railway & Light Company, then presented Mr. Keller with a costly and handsome Swiss gold watch of the latest pattern, which was inscribed as follows:

"To Charles B. Keller, from many friends, for faithful services. May, 1907."

The directors of the Conestoga Traction Company, which operates all the trolley lines, were as follows: Geo. Bullock, New York; R. E. Griscom, Philadelphia; J. C. Storrs, New Jersey; David A. Howe, P. B. Shaw, Williamsport; W. W. Griest, Charles B. Keller, Dr. T. C. Detwiler, R. H. Brubaker, P. E. Slaymaker, John Hertzler, J. Fred Sener, Dr. E. S. Snyder, J. W. B. Bausman, Lancaster, and H. C. Schock, Mount Joy.

LEGISLATION IN PENNSYLVANIA

All the efforts of the opposition to the State Railroad Commission and trolley eminent domain bills, prior to final adjournment of the Legislature, May 16, were confined to the members of the Senate, who will be compelled to bear the responsibility for any failure to fulfil the promises made in the Republican State platform last fall with respect to these two measures. When the Homsher eminent domain bill came up in the Senate on second reading, May 8, Senator Roberts, of Montgomery, offered several amendments, which were adopted without opposition. They provide that trolley companies before taking property for proposed lines must file two separate bonds as surety for damages. The original bill provides only one.

The following amendment offered by Walton was finally adopted and the bill passed on second reading:

Whenever the right of way of any street railway company authorized to exercise the right of eminent domain under this act shall cross private lands, the Court of Common Pleas of the county in which such lands are situated may upon petition of the owner of such lands, and proof of the necessity thereof, order and decide that said railway company shall properly fence in the right of way of said company and erect gates at all private ways and farm crossings and keep said fences and gates in good order and repair and shall file a bond with surety to be approved by the court for its faithful compliance with said decree.

Mr. Dunsmore, the father of the State Railroad Commission bill will have difficulty in recognizing his offspring in the bill as reported from the Senate railroads committee last week. The Pennsylvania and Philadelphia & Reading Railroad Company are quite well satisfied with the measure in its present form, inasmuch as the Commission will have no power to enforce its demands, but simply to suggest and advise the railroads. As amended, the proposed Commission is to have no power to fix rates or routes. It will not be vested with inquisitorial powers to ascertain the truth or falsity of complaints filed against railroads. It will not have the right to supervise increases in the capital or indebtedness of railroads. It will not be burdened with the duty of compelling railroads to increase terminal facilities, improve train service, etc. The Commissioners will be empowered to receive \$8000 salary annually. This is not to be paid by the railroads as the bill originally provided. There are to be two Commissioners, in addition to the Secretary of Internal Affairs. There will be a secretary at \$4000. All the expense of the Commission, including salaries, is to be borne by the State.

Entire sections of the original bill have been eliminated and one new section substituted. It reads as follows:

No railroad, electric railway or street railway corporation hereafter formed under the laws of this State, shall exercise the powers conferred by law upon such corporations or begin the constructions of its road until the directors shall cause a copy of the articles of association to be published in one or more newspapers in each county in which the road is proposed to be located, at least once a week for three successive weeks, and shall file satisfactory proof thereof with the State Commerce Commission, nor until the said commission shall certify that the foregoing conditions have been complied with; and also that public convenience and necessity require the construction of said railroad, electric railway or street railway as proposed in said articles of association.

The foregoing certificate shall be applied for within six months after the completion of the three weeks' publication hereinbefore provided for. If a certificate is refused no further proceedings shall be had before said commission, but the application may be renewed after one year from the date of such refusal.

Prior to granting or refusing said certificate the said commission shall have a right to permit errors, omissions or defects to be supplied and corrected. After a refusal to grant such certificate the said commission shall certify a copy of all maps and papers on file in its office and of the findings of the said commission when so requested by the directors aforesaid. Such directors may thereupon present the same to the Superior Court of this Commonwealth and said court shall have power in its discretion, to order said commission for reasons stated to issue said certificate, and it shall be issued accordingly. Such certificate shall be filed in the office of the Secretary of the Commonwealth and a copy thereof, certified to be a copy by the Secretary of the Commonwealth of his deputy, shall be evidence of the facts therein stated. Nothing in this section shall prevent any such corporation from causing such examinations and surveys for its proposed line to be made as may be necessary to the selection of the most advantageous route and for such purpose by its officers or agents or servants, to enter upon the lands or water of any person, but subject to the responsibility for all damages which shall be done thereto.

The new section is practically the same proposition which

Senator Roberts tried to inject into the Homsher eminent domain bill. If it goes through in the Dunsmore bill, the Commerce Commission will have the right to determine whether trolley companies may have eminent domain.

Some Philadelphia Senators made an effort, but failed, to insert an amendment which would have exempted from the provisions of this bill the Philadelphia system, which is being established under the new trolley law. The Senate judiciary general committee negatively refuted the McCullagh initiative and referendum bill.

The Senate, on May 13, redeemed the Republican party pledge with respect to granting trolley companies the right of eminent domain by passing finally the Homsher bill practically as it left the House. The vote was 41 to 2. Attempts to amend the bill were defeated. On May 15 the House passed the bill without a dissenting vote. The bill is now ready for the Governor. That he will sign it is anticipated from his attitude toward the measure from the first.

The Governor, on May 13, had signed 153 bills and had several hundred others on his desk.

INDIANA VALUATIONS FIXED

The Indiana State Board of Tax Commissioners, having completed its preliminary hearing in the case of the public service corporations, has adjourned until July. The board will now fix valuations and notify the companies of its findings. At the next meeting the companies will be heard again, and then the final assessments will be fixed.

The following interesting excerpts are from the remarks made before the board by prominent traction and steam railroads:

Charles L. Henry, president of the Indianapolis & Cincinnati Traction Company: "The first expensive mistake the Indiana traction interests made was in constructing lines having in view the mere idea of transit between large cities and suburbs. It has been clearly shown that they are a means for through transit, and the old construction is not suitable for lines carrying long-distance traffic, and the companies are compelled to reconstruct their roadways. For this reason the taxes should not be so high as last year."

J. Levering Jones, representing the Ft. Wayne & Wabash Valley Traction Company: "Our lines showed a net increase in earnings of about 8 per cent, but that did not provide a surplus. If the net earnings of any of the roads should shrink 8 per cent it would mean receiverships. When a road shows a small increase it is not a sign of its prosperous condition. Wages have increased 5 per cent and material is much higher. The Indiana interurban roads are just now going through the transition from infancy to maturity, and the process is expensive. They were first built independently, each line with its own expensive management and individual power house. They are now being merged and the management simplified. This will prove their salvation and also a greater convenience to the public."

George F. McCulloch, representing the new line of the Muncie & Portland Traction Company, said the road had been constructed at a high cost. Poles that cost \$7.85 each last year are worth \$9.40; ties that were 56 cents are now 75 cents. Copper wire for the line would now cost the company \$30,000 in excess of the price last year. Labor is \$2 a day against \$1.25 to \$1.50 a year ago. For these reasons the line would not be extended to Celina, Ohio, he said. "The interurban people are living on hope," he continued. "Improvements and changes in the equipment of interurbans are coming so rapidly that a road can scarcely keep abreast of the times. Under such circumstances a road soon becomes antiquated and must be rebuilt and re-equipped at enormous cost."

W. D. Tucker, auditor of the Clover Leaf Steam line, said that the gross earnings of the road had decreased \$66,000 during the past year. This was due to the 2-cent rate and interurban competition.

W. H. McDoel, president of the Monon steam line, said that adverse legislation, 2-cent rate, increased cost of material and advance in wages and interurban competition were responsible for the decreased earnings of his road.

CALIFORNIA DEAL REPORTED

Richard Hotaling, W. M. Rank and their associates are said to have made a deal with a Baltimore syndicate by which a large electric railway system is to be built in Marin, Sonoma, Napa and Lake Counties, with ferryboat connection with San Francisco. The deal includes the purchase of the Petaluma & Santa Rosa Electric road. The proposed system will invade the territory of the Northwestern Pacific in Marin and Sonoma Counties and that of the Southern Pacific in Sonoma and Napa Counties. The undertaking involves an expenditure of between \$10,000,000 and \$15,000,000. Hotaling, Rank and their associates already have a terminal on Richardson's Bay, just across from Sausalito, and they have made surveys from it to San Rafael; thence to Novato and Napa, and thence to Lakeport. The proposed road will embrace an extension of the Petaluma line northward into the Healdsburg and Cloverdale country. Ultimately it will be extended over into Lake County, thus forming a double line covering a great sweep of country between Lake County and the Marin County bay shore.

COMBUSTION AND SMOKE CONSUMERS TO BE TESTED

With a view to studying coal combustion at several large plants in Indiana, and to experimenting with devices for consuming smoke, H. W. Weeks, an engineer connected with the coal testing plant at St. Louis, which was established by the United States Geological Survey, is in Indiana for an indefinite stay. Mr. Weeks has pursued his investigation in several American cities. He expects to be in Indianapolis and Indiana for some time and to visit many plants there. He is interested in the kind of coal burned, the character of the load, the percentage of horse-power developed, the draft carried and the kind of furnaces and boilers employed in the electric railway and other large power plants; also take particular note of the completeness of combustion, a thing in which the survey is especially interested.

For some time the Commercial Club has been urging the managers of the coal testing plant at St. Louis to locate it in Indianapolis. The plant was established at St. Louis during the Louisiana Purchase Exposition, and it was understood that a permanent location should be decided on at the close of the exposition. Mr. Weeks says that part of the plant is now at Denver and another part at the Jamestown Exposition, while the rest remains at St. Louis. At the close of the Jamestown Exposition a commission will visit a number of cities, Indianapolis among them, for the purpose of getting data to aid it in reaching a decision as to where the plant shall be permanently located.

EXTENSIVE WASHINGTON PROJECT

The announcement is made by P. P. Carroll, of Seattle, representing a syndicate, which, he says, has begun work on three lines, that about \$40,000,000 will be spent in building electric railways in Washington. The plan includes the completion of the proposed Puyallup Valley Northern Rapid Transit Railway at a cost of \$2,500,000, and the completion of the Snohomish Valley Railroad, upon which construction work has started. This line will cost \$3,000,000. A third line is the Seattle, Chelan & Spokane Railway, for which a company was recently chartered. The cost of this line is placed at \$7,500,000.

The Puyallup Valley Northern Rapid Transit Company has been incorporated nearly two years. Fred Chamberlain, of Puyallup, is its president, and John Mills is a prominent promoter of the line. A few months ago the incorporators of the company closed a deal with an Eastern firm of contractors whereby the line will be built in exchange for \$2,500,000 worth of stock in the enterprise. Under the present plan it is understood that when these independent lines are consolidated this \$2,500,000 in stock will be transferred to the consolidated company, and a like amount of the other company's stock issued to the railway builders.

The Puyallup Valley line will extend from Tacoma to Puyallup, Sumner, Renton and other towns. It will traverse the valley between Tacoma and Renton, but will be constructed along the foot hills, on an elevation high enough to remove the line from the flood district. The line will connect at Renton with the Snohomish Valley Railroad, which runs through Cherry Valley to Snohomish and north to Bellingham. The line passes through Monroe. It is being built by the same interests who have taken charge of the construction of the Puyallup Valley Railway, and construction work on the line is now in progress.

From the Sound, through Renton and east to Spokane, the Seattle, Chelan & Spokane Railway will be constructed. The application for a charter for this line was filed a few weeks ago. This is a sister proposition to the Puyallup and Snohomish Valley Railways.

REPORT OF CONSOLIDATED RAILWAY COMPANY

The report of the Consolidated Railway Company, of New Haven, Conn., and controlled lines for the eight months ended Feb. 28, 1907, shows as follows:

Gross earnings	\$4,027,135	
Operating expenses	2,516,371	
Net earnings	\$1,510,764	
Add income from other sources	682,828	
Total income	\$2,193,592	
Deductions from income:		
Taxes	\$236,264	
Rentals of leased lines	588,649	
Interest on current liabilities	76,588	
Interest on mortgage debt	312,431	
Interest on debentures	627,864	
Discount on debentures	9,037	
Guarantee N. E. I. & S. Co.	115,704	\$1,966,534
* Net income		\$227,058
* Against net income there was charged:		
Six months' dividend, paid Dec. 31, 1906..	\$200,000	
Accrued dividend for Jan. and Feb. 1907.	66,666	\$266,666
Consolidated Railway's general balance sheet as of Feb. 28, 1907, compares with that of Oct. 31, 1906, as follows:		
	Feb. 28, '07.	Oct. 31, '06.
Cost of road and equipment	\$35,044,129	\$30,261,058
Due from leased companies	589,074	.....
Miscellaneous investments	948,367	2,273,293
Water and supplies	545,673	235,141
Cash and current assets	13,391,800	12,765,100
Discount on debentures	654,900	657,805
International Trust Company, trustee.	22,132	19,132
Rhode Island Hospital Trust	5,000	.....
Imp. susp. account	1,011,140	454,339
Total	\$52,212,214	\$46,665,869

Liabilities.

Capital stock:		
Consolidated Railway	\$10,000,000	\$10,000,000
Leased and controlled lines	76,758	59,125
Mortgage debt	10,706,667	9,107,000
Consolidated Railway debentures	23,500,000	23,474,400
Hartford Street Railway debentures ..	310,000	310,000
Current liabilities	5,751,396	2,337,150
Accrued liabilities	697,741	760,778
Res. for disc. on lgt. accounts	25,189	.....
Accident and casualty fund	58,258	46,842
Skg. fd. Wor. & Web. bonds	22,132	19,132
Ct. Ry. & Lgt. Co. cont. liab.	262,747	.....
Profit on securities sold	71,012	71,012
Profit and loss surplus	730,314	480,431
Total	\$52,212,214	\$46,665,869

Of the item "cash and current assets," \$9,369,243 is a note of the New England Investment & Security Company, given in payment for securities of certain street railways in Massachusetts. The item also includes notes for advances made to controlled companies.

GENERAL ELECTRIC REPORT

The report of the General Electric Company for the year ending Jan. 31, 1907, was made public last week. It shows profits of \$8,427,842 (including \$329,702.55 from securities sold, \$675,000 increased value of security holding companies, and \$417,586.19 from royalties, dividends, sundry profits, etc.), after deducting all patent, general and miscellaneous expenses and allowances for depreciation and losses and writing off \$2,834,123.80 from factory plants. There was paid in dividends during the year \$4,344,342, and \$999,999 were written off the patents, franchises and good will account, which, on Jan. 31, 1897, stood on the books of the company at \$8,000,000, to reduce it to the nominal sum of \$1. The amount carried to surplus account was \$3,083,501.68, making the total surplus Jan. 31, 1907, \$15,110,796.

The total sales for the year, or amount billed to customers, were \$60,071,883. Last year they were \$43,146,902.

A considerable portion of the report is devoted to turbines and railway work. During the past year turbo-generators of an aggregate capacity of more than 350,000 hp. have been sold. An account is given of a test conducted on Jan. 29, 1907, by the engineers of the Boston Edison Company of one of the 5000-kw turbines of that station. Under the normal operating conditions the test showed a steam economy of 13.586 lbs. of steam per kilowatt-hour. On Feb. 25, 1907, one of four 8000-kw turbines in operation at the Fiske Street station of the Chicago Edison Company was unofficially tested under the regular operating conditions, and showed a steam economy of less than 13 lbs. of steam per kilowatt-hour, as well as less than 1 lb. steam consumption per kilowatt output between 5000 kw and 14,000 kw. The report also refers to the electrical equipment of the New York Central & Hudson River Railroad, and states that on April 1, 1907, there were 110 multiple-unit electric trains and thirty electric locomotives in daily service. The total daily multiple-unit train mileage at that time was 1250 miles, and the daily train mileage was 692 miles. The electrical equipment of

851,692. Automatic Block Signal System; Frank P. J. Pate-nall and George H. Dryden, Baltimore, Md. App. filed Dec. 4, 1906. Relates to that type of block signal system in which the track rails are energized by direct current of low voltage and circuits including relays for the operation of the signals are adapted to be short-circuited by the wheel axles of the trains.

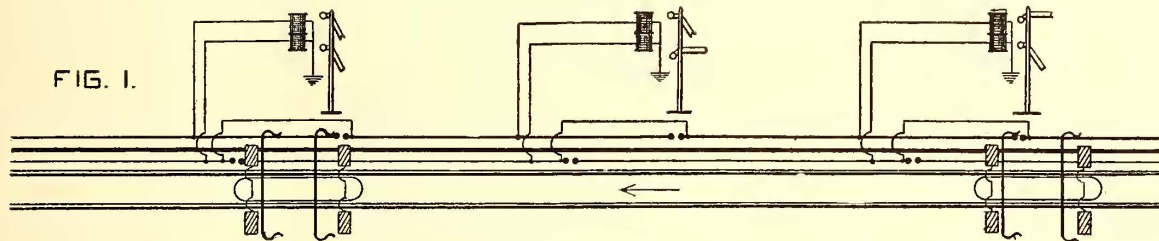
851,794. Method of Speed Regulation; Norman W. Storer, Pittsburg, Pa. App. filed July 24, 1905. Provides a system of control of electric vehicles having a plurality of motors by which efficient operation is secured at the low, as well as the high, speed.

851,776. Automatic Train Blocking System; Charles E. Roehl, Brooklyn, N. Y. App. filed Dec. 16, 1903. Details of construction of the trolley rails and insulators of a block signal system, designed to prevent collisions by shutting off the power and applying the brakes automatically on the engine.

851,799. Electric Traction System; Alexander Church-ward, Schenectady, N. Y. App. filed June 1, 1906. The invention relates to features of the trolley system in a trackless trolley in which the car runs part of the time from an over-head trolley and thereafter runs for short distances on branch roads from storage batteries.

851,800. Automatic Train Stop; Fred B. Corey, Schenectady, N. Y. App. filed Sept. 19, 1906. An automatic train-controlling device comprising a stop-arm on the roadway, a lever on the car possessing high inertia and adapted to be engaged by the stop-arm, and a controlling device on the car arranged to be operated by the movement of the lever beyond predetermined limits, whereby a slowly moving car may pass into the block, but a rapidly moving car arrested.

851,818. Air-Brake System and Engineer's Valve; George Macloskie, Schenectady, N. Y. App. filed Nov. 9, 1905. In order that the air brakes may be operated from either end of an electric locomotive or car, means are provided for auto-



PATENT NO. 851,776

the West Jersey & Sea Shore Railroad (Pennsylvania system) is also working very successfully.

In speaking of new work the third vice-president reports that in its high tension department the company is now building on order a number of transformers of 7500 kw capacity, for operation at 104,000 volts, and has designed and successfully tested a switching device for 100,000-volt operation. A reference is made to interpole motor design for railway work, and the report says that practical tests have shown these new motors to be superior to existing standards in economy, commutation and ability to operate at higher and more economical voltages. The company is also applying the vertical shaft design which has proved so successful in large turbines to the design of motor generators and rotary converters. This vertical arrangement effects a considerable saving of space and money, and is particularly desirable for use in sub-stations in large cities. The company has sold a number of such vertical sets for operation in Chicago and other places.

STREET RAILWAY PATENTS

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

UNITED STATES PATENTS ISSUED APRIL 30, 1907

851,665. System of Control; Ray P. Jackson, Wilkesburg, Pa. App. filed April 13, 1905. Means whereby a plurality of voltage regulators will operate synchronously so that all the regulators will supply approximately the same voltage to the motors or other translating devices.

851,839. Switch Mechanism; Theodore Rundorff, Burling-ton, Iowa. App. filed Aug. 23, 1906. A centrally pivoted lever has lugs at each end, adapted to be engaged by a projection on the car. At one end of the lever a rod is pivoted, which is in turn pivoted to the switch-point.

852,007. Air-Brake Apparatus; Robert J. Wilson, Pittsburg, Pa. App. filed Nov. 16, 1905. An automatically acting ball valve in the passage from the auxiliary reservoir to the brake cylinder, seating toward the brake cylinder, and being normally open and arranged to throttle said connection on an excess rush of air.

852,092. Electrically Controlled Semaphore Signal; Harry M. Abernethy, Cleveland, Ohio. App. filed Dec. 7, 1905. Relates to means for cushioning the shock or jar of semaphore mechanism of the type controlled by reduction gear connection from an electric motor.

852,093. Railway Semaphore Signal; Harry M. Abernethy, Cleveland, Ohio. App. filed Dec. 7, 1905. Relates to modifica-tions of the above.

852,094. Railway Semaphore Signal; Harry M. Abernethy, Cleveland, Ohio. App. filed Dec. 7, 1905. Further modifica-tions.

852,117. Pneumatic Appliance for Cars; George H. Hol-lingsworth, Belmont, Mass. App. filed Feb. 12, 1907. A pneu-matic emergency appliance for street cars adapted to drop the fender, set the brakes and raise the fender.

852,212. Switch Structure; Victor Angerer, Ridley Park, Pa.

App. filed Nov. 3, 1906. Relates to means for locking the switch in either of its positions by a weighted lever.

852,386. Hand-Operated Electric Circuit Controller; Ray P. Jackson, Wilkinsburg, Pa. App. filed Dec. 18, 1905. Means for automatically returning a control drum to a predetermined position and exerting a substantially constant return force whatever the angle or direction through which the drum is moved.

852,405. Railway Signaling Apparatus; Edson R. Wolcott, Golden, Col. App. filed Dec. 27. Signal apparatus in which electric impulses are transmitted between stations and trains by magnetic induction. The car has a transmission circuit normally open when the train is in motion and means for automatically and permanently closing the circuit when the train stops.

NEW PUBLICATION

"Manual of Examinations for Engineering Positions in the Service of the City of New York." By Myron H. Lewis and Milton Kempner. New York: Engineering News Publishing Company. 750 pages (approx). Price, \$5.00.

In this volume the compilers, both of whom are connected with engineering departments of New York City, have gathered together a number of examination papers actually used in civil service examinations in New York. The body of the book is divided into three parts, viz.: (1) Axeman, chairman and rodman, leveler, transitman and computer; (2) assistant engineer; (3) draftsman. In a number of cases the questions are accompanied by answers to give the reader an idea of the extent and character of the replies expected. Blank pages for notes are scattered through the book, and there is an introduction giving rules from the Municipal Civil Service Commission regarding the methods of conducting examinations and making appointments.

PERSONAL MENTION

MR. ALBERT THODE, of Albert Thode & Company, of Hamburg, who are well-known dealers in electrical supplies in Germany, is on a visit to this country to study the latest and most approved electric railway devices used here.

MR. E. R. KELSEY has been appointed publicity manager of the Toledo Railways & Light Company. His principal work will be in connection with Toledo Beach, which the company will endeavor to make a household word in Toledo. Mr. Kelsey, who is a newspaper man, was for a time manager of the Lyceum Theater in Toledo.

AT A MEETING of the stockholders of the General Electric Company, held Tuesday, May 14, Mr. Marsden J. Perry was elected a director to succeed the late Gen. Eugene Griffin, and Mr. S. L. Henderson to succeed Mr. T. K. Henderson, resigned. Subsequently at a meeting of the directors of the company, Mr. B. E. Sunny, of Chicago, and Mr. J. R. Lovejoy, of Schenectady, were elected vice-presidents of the company.

MR. ALEXANDER SHANE and MR. DAVID E. MATTHEWS, both experienced railroad men, have been appointed by the Railroad Commissioners of Indiana as inspectors under the provisions of the new law. It is the duty of inspectors to keep informed as to the condition of steam and interurban railways and the manner in which they are operated with reference to physical conditions, the adoption of lawful devices for the safety of the employees and the traveling public.

AT THE ANNUAL meeting of the stockholders of the Interborough Rapid Transit Company the four directors whose terms had expired were re-elected for three years. They are: Mr. Gardiner M. Lane, Mr. Alfred Skitt, Mr. George W. Young and Mr. John Pierce. Mr. Theodore P. Shonts, president of the Interborough-Metropolitan Company, has been elected a director of the New York City Interborough Railway Company, succeeding Mr. Arthur Turnbull.

MR. BENJAMIN F. TILTON, engineer of the Pennsylvania Company, in charge of the grade crossing work in Cleveland, has been chosen as engineer in charge of maintenance of way by the Cleveland Electric Railway Company, to succeed Mr. Charles H.

Clark, who recently resigned to take a similar position with the International Traction Company. Mr. Tilton will take up the work on May 20 and will work with Mr. Clark for ten days, the latter's resignation becoming effective on June 1. Mr. Tilton is a Cornell graduate, and has had an extended experience in the work he will undertake.

MR. C. E. FLYNN, vice-president and general manager of the Conneaut & Erie Traction Company, of Erie, Pa., has resigned, and will retire from the active management June 30. He has appointed Mr. B. E. Walker, his present superintendent, as manager, to take effect July 1. Mr. Flynn, who is a specialist in placing non-paying electric railway properties on a self-sustaining or dividend-paying basis is also a director and large stockholder in the Conneaut & Erie Traction Company and has consented to remain with the company in an advisory capacity and as consulting electrical engineer.

MR. C. J. HIXSON has returned to this country after spending some time abroad, and has joined the railway engineering department of the General Electric Company. He left the General Electric Company in 1901, to take the position of the engineer for controller and railway equipment work offered him by the Allgemeine Elektrizitäts Gesellschaft, of Berlin. During the three years that he remained with that company entirely new lines of apparatus were developed and placed upon the market in that department. Mr. Hixson was also closely identified with the experimental work in connection with the Berlin-Zossen high-speed tests conducted by the Allgemeine Elektrizitäts Gesellschaft and Siemens & Halske Company. He left the Allgemeine Elektrizitäts Gesellschaft in 1904 to organize the control division of the British Westinghouse Company, at Manchester, where, in addition to railway work, apparatus for the control and equipment of cranes, mines, rolling mills and general industrial purposes was designed and developed under his supervision. His work with the General Electric Company will be largely along the same line of work.

MR. CHAS. H. BIGELOW, superintendent of construction for the Stone & Webster Engineering Corporation, at Dallas, Tex., having completed the erection of the large power station in that city for the Dallas Electric Corporation, as described elsewhere in this issue, has resigned to accept a position with Mr. L. B. Stillwell, of New York.



CHAS. H. BIGELOW

Mr. Bigelow will be located for the present at Baltimore, as chief inspecting engineer on the extensive power station construction being carried on for the United Railways & Electric Company by Mr. Stillwell. Mr. Bigelow is a member of the American Society of Mechanical Engineers, the American Street Railway & Interurban Engineering Association, as well as several other engineering and fraternal societies. He has had an extended experience in electrical and mechanical work, both before and after graduating from the Massachusetts Institute of Technology in 1892, having been with the Bell Telephone Company, of Canada, for four years before entering the Institute. After graduation he entered the employ of Stone & Webster, of Boston, engaging in the installation of electrical plants, power stations, etc. He remained with them for about two years, when he resigned to go with the West End Street Railway Company of Boston, Mass., in 1894, as superintendent of construction of the East Boston power station. He remained with this company until 1905, holding the positions of inspector of power stations, inspecting engineer and chief mechanical draughtsman of the department of motive power and machines, resigning at that time to go again with Stone & Webster. He was sent by them to Dallas, Tex., to erect the power station which the Columbia Improvement Company, afterward succeeded by the Stone & Webster Engineering Corporation, had contracted to build for the Dallas Electric Corporation. Mr. Bigelow leaves a host of friends at Dallas, who wish him success in his new undertaking.