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Of this issue of the Street Railway Journal, 8000 copies are printed. Total circulation for 1906 to date, 155,300 copies, an average of 8174 copies per week.

Ventilation in Moderate Weather

We have had a good deal to say about car ventilation, and the importance of looking after windows and ventilators as a regular part of the operation of a road, but the conditions on many roads are so open to improvement in this matter that we cannot refrain from again entering an emphatic protest against the carelessness in car ventilation which so frequently exists, and which cannot but have an influence on the traffic in these days of moderate weather between winter and summer. While it is still cool enough so that walking is pleasant, yet is not so cold nor so warm that it is uncomfortable, is the very time when the street railway manager, especially in the smaller city, must make his cars thoroughly attractive to the riding public if he is to get the nickels. If the cars have a stale, never-ventilated odor when the passenger steps into them, he is likely to notice it, and to avoid riding whenever he can. The reason why a superintendent should be especially careful to secure good ventilation in the spring is that the weather is just cold enough so that the cars are shut up at night and in the early morning for warmth, and the difference between the inside and outside temperature of a car is not such as to give much natural ventilation when the rear door is open. In crisp, winter weather, when the heaters are going in the cars, there is always considerable change of air when a door is opened. In moderate weather the case is quite different. Then there is almost nothing to cause a change of air inside of a car unless the ventilators, and perhaps the sash as well, are open. There are thousands of cars in operation that never have the ventilators open from one year's end to another. It is not by any means true that a car, after a few years of operation, must necessarily acquire an unpleasant odor. If it does so, it is largely due to continued operation without ventilation, either on the road or in the yard or car house.

As we have previously pointed out, many complaints from lack of ventilation and stale odors in cars are due to the fact that they are shut up entirely from midnight until morning in a car house, thus giving all the odors of the day before a chance to "soak in." It is just as important to clean the bad air out of a car as it is to clean the dirt that accumulates during the day. There was once an idea that a hotel building which has been occupied a great many years acquires a "hotel odor" that can never be got rid of. The fact of the matter is, the hotel odor, or any odors acquired by old buildings, are due simply and solely to lack of ventilation from day to day, and can be gotten rid of in a very short time by proper ventilation, plus cleaning of carpets, etc. We have in mind a hotel which is not by any means new or elegant in its furnishings, but which is as free from stale odors as the newest and most modern hostelry. The reason simply is that the management takes pains to see that all opportunities for ventilation are not as religiously closed as is usual in buildings of this character.

Inspection and Care of Lightning Arresters

There is hardly an electric railway system, operating cars in the suburbs or in the open country, that does not experience considerable damage to equipment from lightning. The damage resulting on some systems is so severe that motormen are instructed to shut off the current during severe storms. The inefficiency of the prevailing types of lightning arresters

is usually blamed for all damage that is done. But the blame in many cases, we believe, could more correctly be laid to lack of inspection and care of arresters, and to improper methods of wiring.

No matter what type of arrester is employed, there is a possibility of it geting out of order. The arrester is usually installed under the car in some dark place, and frequently no thought is given to it after installation until the car comes in with an armature or field grounded by lightning. Often even this does not cause an examination of the arrester. A new armature is placed in the motor, the car is again put in operation, and the apparatus is again injured by the first thunderstorm that occurs. The fact that lightning goes through a car should immediately raise a question as to whether there is not something wrong with the arrester or the wiring, and the fault should be located and remedied before the car is permitted to leave the shop. Some types of arresters are supplied with short flexible leads, equivalent probably to a No. 14 wire. When attempting to locate a fault with such an arrester it is well to examine this lead closely, to see that it is not burned off. The writer has encountered several instances where the wire has been burned out of the insulation completely, yet the insulation held together, and gave every appearance of a good connection. This fault is of such frequent occurrence that it is a cause of wonder why leads of such small carrying capacity are employed. Probably they have been used to prevent a heavy short-circuit should the arrester itself break down. At any rate, it is well to be certain that connections are still intact before a car damaged by lightning is permitted to leave the shop.

Some of the arresters used on railway cars have an adjustable spark gap. Often this type of arrester has been installed without regard to the width of this gap, and we venture to say that many of them are put on cars by shop men who do not know what the length of the gap should be, its purpose, or even the general principle of the arrester. After being installed, the arresters often are never opened and examined. Lightning arresters should be inspected with as much care as any other part of the equipment. Of course, it is not necessary to make a thorough examination of them every day or two, but they should be given some attention at all times, and during the stormy periods of the year a very close watch should be kept on them.

The wiring of the arrester lead is often to blame for burnouts from lightning. It is of paramount importance that the lead from the trolley to the arrester, and the ground for the arrester should be run as straight as possible. Where bends are necessary they should have a very large radius. The wireman who prides himself on doing a neat job may object. Wires strung under a car look better when right-angle turns are made, and many wiremen, unless cautioned, will wire an arrester lead in this manner.

Of course, car lightning arresters alone should not be depended on for protection. In fact, they should be regarded simply as additional safeguards to the line arresters, which are not subject to jolt and jar, and can, consequently be kept in proper condition more easily than those on the cars. We feel that were lightning arresters given a proper amount of care and attention, thunderstorms would not be regarded with such dread by many superintendents, as they are at the present time, and the force in the winding room would not be compelled to work overtime after every storm.

The Incandescent Lamp Item in the Store Room Account

The reduction of operating expenses on a street railway system is a never-ending problem on account of the changing conditions which constantly confront the management. In these days there is a far wider appreciation than ever before that the small items, which seem insignificant in themselves, amount to surprising totals at the end of the year, so that economy is to be sought quite as much in the improvement of details as in the conduct of general policies.

The incandescent lamp itself is a case in point. We referred recently to possible improvements in lamps from the standpoint of their illuminating properties, but it seems also worth while to touch upon this item from the side of the store room account. Every large street railway is a wholesale user of incandescent lamps, yet, so variable are the conditions which determine the consumption of lamps, few companies really obtain the full value of the money expended annually for bulbs. On a large system, the incandescent lamp item may run as high as five or ten thousand dollars per year, or even higher, representing the total revenue of from one to two hundred thousand paying passengers. Any traffic manager will jump at the chance to add from ten to twenty thousand fares to the gross receipts of his system in a year's time, and certainly a saving of 10 per cent or 20 per cent in the lamp consumption is worth striving for, although the conditions must be pretty bad if there is room for attaining the latter figure.

Every street railway company operating in a large city uses immense quantities of supplies, and of these multitudinous items the incandescent lamp is, of course, but one. But the importance of keeping stock room records and receipts is more and more realized in these days, and the plan of requiring detailed statements of breakages, losses, and defective or worn out equipment is as desirable in the use of incandescent lamps as in other supply parts. In a good many cases lamps are stored at car houses in bins, where conductors and motormen have simply to help themselves in order to supply their cars, and no receipts are required. A better plan is to require the base of the old lamp to be given in exchange for the new one, or a definite report in case the lamps are stolen. It is a well-known fact that in some parts of the country an incandescent lamp is good for a drink at the nearest saloon, and as a result companies suffer numerous depredations from bibulously inclined passengers. Headlights are often vulnerable points of attack, and the plan of so locking the headlight case that it can only be opened by tools is a possible remedy in the tougher districts.

The gist of the whole matter lies in more complete records of the life of lamps. The condition of the trucks and track, amount of special work traversed, percentage of car mileage at night, constancy of the line voltage, candle-powers and number of lamps used per car, all have an influence upon the commercial life. The cost of lighting an ordinary car is a very small part of its operating expense, but the multiplication of even a minute item all over a large system is by no means negligible. Sporadic tests are doubtless useful in determining the relative usefulness of different kinds of lamps, but, in the long run, nothing can take the place of simple but regular stock room records. After all, the incandescent lamp is relatively expensive as a supply part, and probably two or three trips per year of each car are required as a fair average to pay for lamp renewals.

A Lesson in Construction

Terrible as were the results of the San Francisco earthquake it has given the world invaluable lessons in the construction of buildings and of permanent ways for transportation which it would be well to heed. There has been no other great earthquake which has given important information regarding the real usefulness of modern methods and materials. In fact, never before has an earthquake of destructive character visited a city typical of present conditions. In regions known to be exposed to severe seismic risks, buildings have been in recent years constructed with this possibility in view and high structures have been sedulously avoided, the usual plans being either to build low houses of extra heavy masonry, or very light buildings, as in Japan, capable of being considerably racked without giving way. But San Francisco, although in some cases, as in the destroyed City Hall, special ties were included in the masonry, was, as a whole, built much like the large cities of the East. Central California has long been known to be an earthquake region, in which perceptible shocks to the number of many hundred have been recorded in the last century. But of these less than 1 per cent have been severe enough to do any material damage whatever, and in only a single recorded instance was the force at all comparable with that indicated in the present catastrophe. It was a case of familiarity breeding contempt. Now, whenever small shocks are frequent, a big one may occur, and without in the least posing as alarmists, it may be pertinent for us to remark that a shock of considerable magnitude was reported from Central Connecticut during this week, that some five hundred shocks perceptible without instruments have been recorded in different parts of New England and the Middle States in the last century and a half or so, and that a few of them have been heavy enough to do some little damage. The number stated above is probably far below the whole truth, on account of scanty records, and it is not too much to say that symptoms of seismic activity are more numerous and consistent along the northern Atlantic coast than anywhere else in the country east of the Rocky Mountains.

Bearing this in mind, it will be instructive to look over the evidence from San Francisco as bearing on general problems of construction. It is too early yet to grasp the relations between the forces at work and the destruction wrought, but, as has been over and over noted in the papers, and is further evinced by the illustrations in this issue, the modern steel building came out of the shock pretty well, though injured by the fire. The same was true of certain low masonry and concrete buildings, while ordinary brick and frame buildings, the former especially, suffered severely from the earthquake. These facts are a capital illustration of the soundness of the judgments long since formed by the seismologists in Japan, Italy, and elsewhere. It has been consistently found by them that two classes of structures escape serious damage in earthquakes; first, those massive and rigid enough to move only as a whole; second, those light and flexible enough to stand considerable racking without going to pieces. Thus the standard Italian construction called for in dangerous districts is either extra heavy and well-bonded masonry on a rock or concrete platform foundation, limited in height and with light roof, or on the other hand, a construction of heavily-braced timber framing, merely filled in with light, hollow brick. The former is a forerunner of the reinforced concrete that did admirably in California, the latter of the modern steel building that did equally well. It should not be understood that steel buildings necessarily meet all the requirements. The aim should be, so far as resistence to racking goes, to make the filling of the walls as near to a weightless wind-break as possible. A heavy earthquake in New York, for instance, would be accompanied by enormous destruction of life, merely from the filling shaken out of the framing and bombarding the streets. The aim should be to load the stiff steel frame as lightly as possible, for the less the inertia of the filling the less likely it is to be thrown violently out.

To apply these principles to such construction as railway men have to deal with, power houses and car houses can be cheaply and safely built of steel or reinforced concrete. The roofs, being of rather wide span, are danger points, and the evidence now at hand indicates that a light, steel-truss roof with only moderately long spans is the best form available. Chimneys of every usual sort have proved to be sources of danger. The wreck of them on all sorts of buildings in the stricken region of California was no inconsiderable factor in the general destruction. Tall brick stacks may be counted on as pretty certain to go in a severe earthquake. Here again steel and reinforced concrete come into play. The former, of course, requires very careful bracing, and the latter should be, as far as practicable, lightened in the upper sections. In any case, there is considerable to be said for short stacks and induced draft. Most of the power stations around San Francisco came through in pretty fair shape, save for stacks, thanks to the fact that most of them were fairly well built and did not carry their weights too high. Some recent stations with heavy upper works would have had a bad time of it we fear, especially if built on made ground, which is particularly likely to yield in an earthquake.

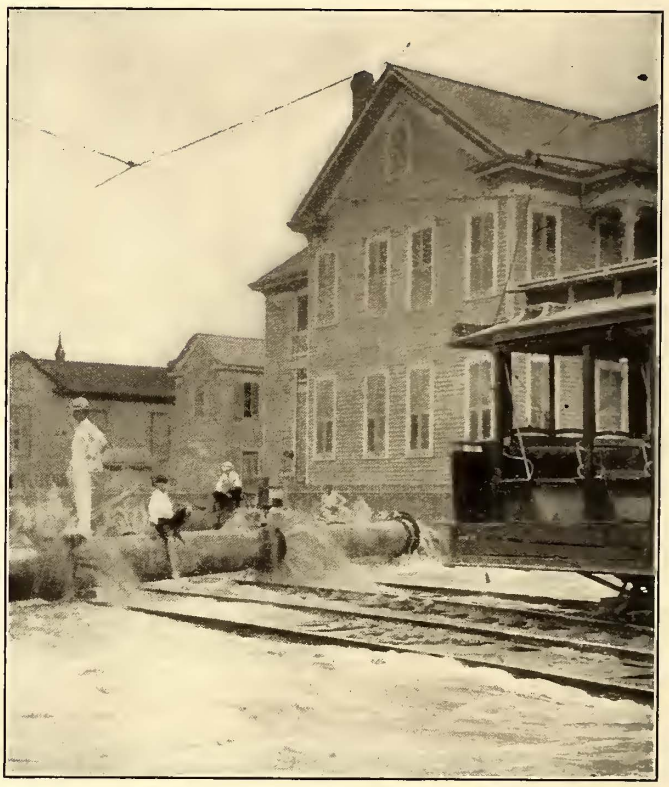
An interesting feature of the San Francisco situation is the value of the overhead trolley system in an emergency. It does not take much shaking or heat to put a slotted conduit out of business, while the old reliable trolley can stand almost anything, and if the wires come down they can be quickly replaced. As after-shocks are likely to follow up the San Francisco earthquake for some years to come in decreasing frequency and intensity, the city would do well to go very slow in the slotted conduit line for a long time to come. Indeed, it would be quite as well never to go back to it at all. Tracks suffered severely in certain localities, as is inevitably the case when there are considerable earth displacements. There seems, however, to have been nothing so severe in this line as was experienced in Japan when, after the great shock of fifteen years ago, it became necessary to resurvey certain districts for purposes of taxation. All in all, the San Francisco railways pulled through better than would have been expected, and have displayed splendid energy in getting into action again. The new San Francisco will rise in far better and more permanent construction than is to be found in any other American city. The lesson for the rest of us is to remember that Washington, Baltimore, Philadelphia, New York and Boston are in a little better shape to resist an earthquake, or to fight the resulting fire, than was San Francisco, and that it is the part of wisdom to bear such a contingency in mind. Charleston, up to the fatal 31st of Aug., 1886, had less reason to anticipate a disastrous shock than any of the cities just mentioned has to-day.

THE STORY OF THE GALVESTON GRADE RAISING—FROM THE STREET RAILWAY POINT OF VIEW

BY H. S. COOPER,
Manager Galveston Electric Company

To raise street-car tracks is not usually a serious undertaking, even if the raise is a heavy one, provided it can be done in long sections and with ample time, plenty of good ballast or filling, by daylight, with weather conditions favorable and not too much interruption from traffic. Lacking any of these favoring conditions the job becomes more difficult, and lacking all of them, and with absolutely unprecedented adverse conditions, it becomes a very difficult undertaking, especially when traffic is heavy and rush schedules have to be strictly maintained. This is the problem that confronted the Galveston Electric Company on about 12 miles of its tracks two years ago, when the city of Galveston proposed to raise the grade of more than half of the city anywhere from a few inches to 9 and 10 ft. In addition to this—in fact, in advance of it—the Electric Company had to face the preliminary adverse condition of having five of its ten lines cut in two by the digging across them of a canal reaching to the center of the city, up which canal the dredges would bring the sand filling dredged up in Galveston Bay. These lines cut by the canal were loop lines, comprising every north and south line running to the Beach—the place of popular resort in Galveston for seven months in the year. They were the lines of heaviest traffic during those months, and the cutting of the canal reduced them to stub-end lines, broke all inter-communication between them, rendered temporarily useless their downtown termini and transfer points, necessitated new, hurried and constantly changing schedules as the lines were cut, one by one, as the canal advanced. All this had to be done—not as a permanency—but with the knowledge that in two or three years, when the city had been raised and the canal refilled, all these lines would very probably be put back to their old routes and locations and termini, and with the further knowledge, that within those two or three years every one of those lines would, at unknown times, be unavoidably put out of service by the grade-raising operations for minutes, hours, days, weeks or even months.

Those were the traffic conditions—to have an uncrossable canal cut through the heart of the system; to have loop lines turned into stub-end lines which ended nowhere; to have fixed special work connections in the paved streets of the downtown loops and termini, which special work was wrong in all sorts of directions for the new routeing and might be worse when the foreseen holding up of traffic occurred on some of the lines, and still worse when unforeseen conditions arose. Had it been a permanency it would have been a comparatively simple—although superlatively costly—matter to have changed the special work and its connections and rebuilt and rerouted all lines. But to do that for only two or three years, to virtually scrap thousands of dollars' worth of costly special work, to buy and lay down in costly pavement more thousands of dollars' worth of new special work and—at the end of three years or less—repeat the process, was something which, from a financial standpoint, was not to be thought of—and it wasn't! When the grade-raising of the city was finally determined on, when the conditions were fixed for the next three or four years, the Galveston Electric Company took on itself its second heavy burden, the heaviest ever laid on a small street railway, and looking the future cheerfully in the face, said: "We'll do the best we can for the next three or four years with what we have. We'll keep up our schedule and our service despite canals and grade-raising, and sand and water and pipes and any other old thing that may be shoved on us. In fact, just to show what we are, and to join in with the spirit of our indomitable little city, we'll improve our track and our cars, and our service and our schedule, so there!" and it has done all it said it would.



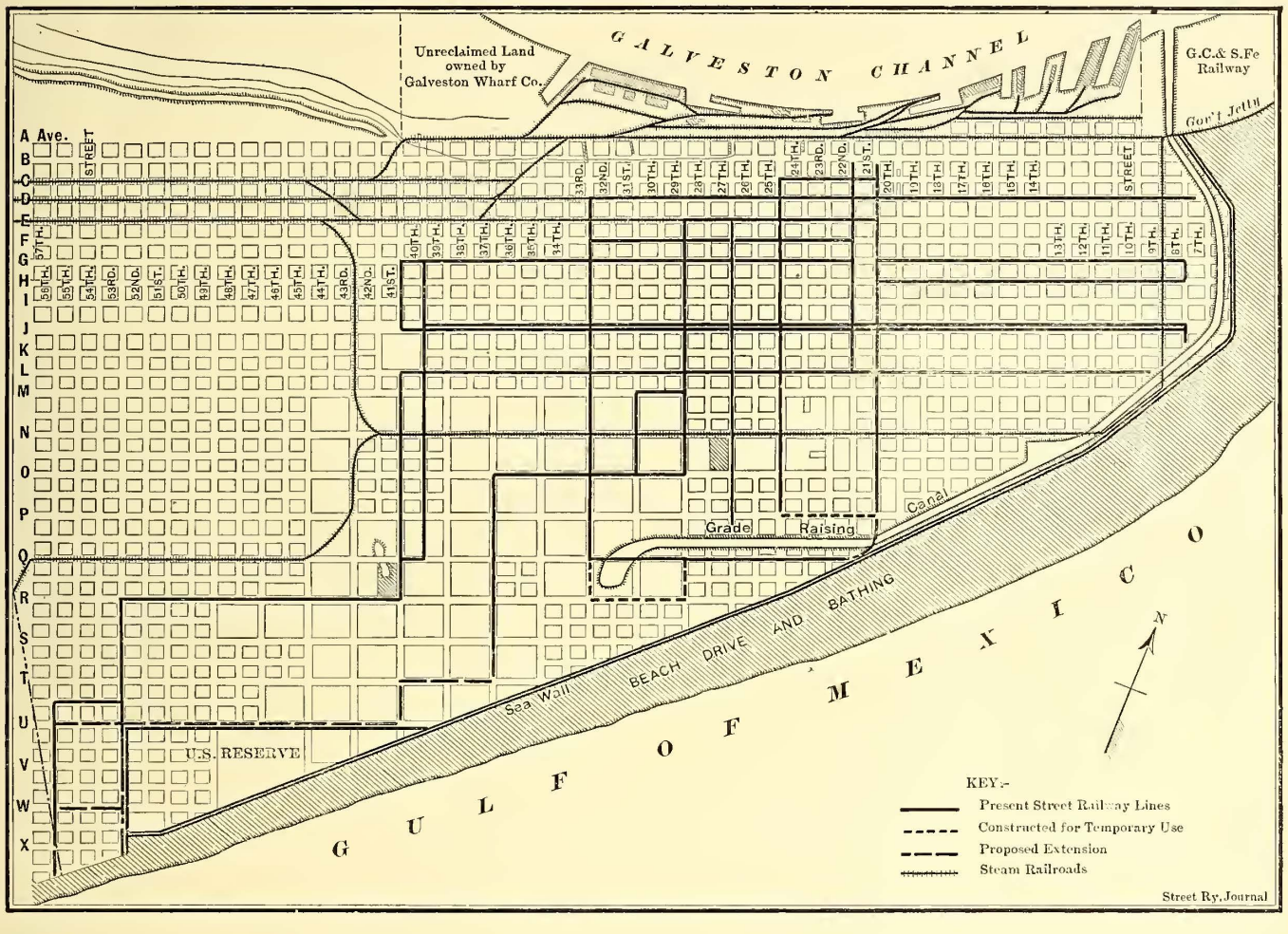
OPERATING UNDER DIFFICULTIES. THE VIEWS SHOW 42-IN. PIPES ACROSS THE TRACKS OF THE GALVESTON ELECTRIC COMPANY DURING THE GRADE-RAISING OPERATIONS

Track, poles and lines were hustled up just as they were about to cave into the advancing canal, and, if possible, were promptly temporarily rebuilt and relaid where they would be

of the most aid to the badly crippled lines; special work was changed, twisted and turned, and put in locations for which it was never intended, and which hurt its feelings. Day after day, as line after line was cut and changed, new routeing and schedules had to be figured out, checked up and the patrons informed of the changes, until the transportation department just "dreamed schedules." For it was the season of beach traffic, when all Galveston turned out of an evening to its beautiful salt-water pleasure ground, and when thousands of excursionists, not only from Texas, but from far-away Colorado and the Territories, came in train loads to the "finest beach on the Gulf." Consequently any line as yet untouched by the canal was used almost until the scoop of the advancing dredge commenced to gnaw into the roadbed and then—a hurried taking up and new routeing and new schedules. And all this was merely preliminary to the actual grade-raising.

Now, to understand the conditions of the grade-raising, we must go back a little. Galveston Island is a low sand island, 35 miles long, and from ¾ miles to 1½ miles wide. It lies east and west, paralleling the Texas mainland coast, and separated from that mainland by Galveston Bay, a salt-water estuary from 2 miles to 5 miles wide between the island and the mainland. The south coast of the island is bathed by the waters of the Gulf of Mexico and, if one could have the proper power of vision, he could stand on its broad and beautiful beach and look southward straight across the Gulf of Mexico to Yucatan. Warned by the storm of 1900, the city built around its gulf shore the most stupendous protective work of modern times—the great "Sea Wall." This is a solid mass of granite concrete 5 miles long, 16 ft. above high tide, with a base of 16 ft. width, anchored by piles to the clay bed 40 ft. below. Its base is protected by a rip-rap of granite blocks weighing tons apiece. That made the city safe from the gulf for all time, but it also made some new and unpleasant conditions. The city is on an island, and that island is a sand island, nothing but clear, pure, beach sand, and its highest point—its "ridge"—was only 8 ft. or 10 ft. above high tide. Consequently, to build a wall half way around it and 16 ft. high, rather hemmend it in and cut off its beautiful view, and its lovely soft south breezes and raised up all sorts of questions as to sewerage and drainage, etc.

Now, running through the center of the city, parallel with the gulf and the bay, is Broadway, a beautiful 150-ft. street, esplanaded through its entire center with magnificent palms and blooming leanders and, before the grade-raising, one of the loveliest streets in the world. The city called in the best engineering and contracting talent in the world. They considered and said: "We will fill in Broadway in all its dips and hollows until it is absolutely level and 10 ft. above high tide. Then we will take a slope from the top of that 10 ft. to nearly the top of the sea wall and we'll fill that in. Then you will have a city 16 ft. above the highest tide at the gulf, and sloping down to 8 ft. or 10 ft. at the bay!" "But how about the houses?" "Oh, the people will raise them up on timbers and we'll put the filling under them." "And the fences and the trees, and the gardens and the curbing, and the paving and the sidewalks?" "Oh, we'll lift them all up as we fill in." "But what about the street railway and its tracks, and its poles and lines?" "Oh, we guess they'll find a way out of it." So it was settled so far, but another thought arose. "Where can



MAP OF GALVESTON, TEX., SHOWING THE SYSTEM OF THE GALVESTON ELECTRIC COMPANY, THE NEW SEA WALL AND THE GRADE-RAISING CANAL

we get the stuff to fill with? It will take millions of cubic yards, and if there was a solid train of cars coming in every day, and all day, it would take ten years to fill, and cost twenty millions of dollars." Then arose a genius and said, "We will put dredges into the bay and we will cut a canal two miles long into the center of the city—just a safe distance away from the Sea Wall. We will temporarily move all the

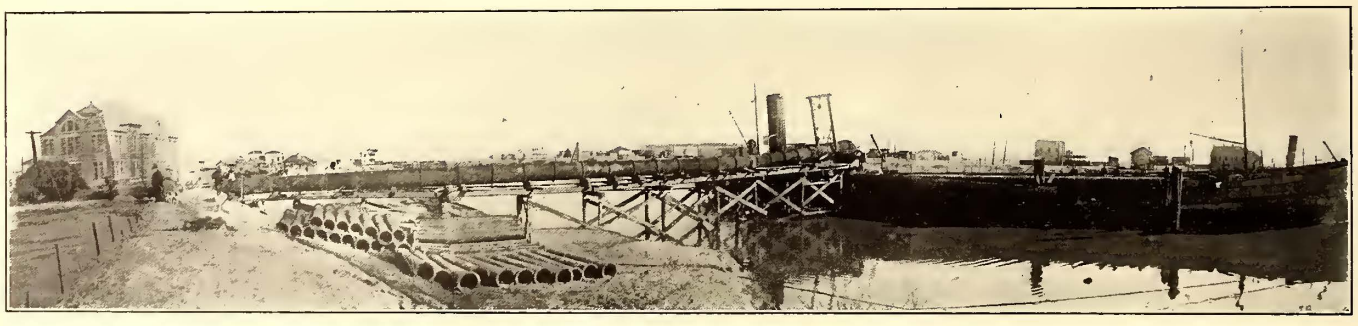
VIEW SHOWING END OF 42-IN. PIPE DISCHARGING SAND AND WATER IN THE GRADE-RAISING OPERATIONS AT GALVESTON

houses off where the canal will be. The street railway company will move its tracks and poles and lines away temporarily, and the stuff we dig out of the canal we will throw out on the sides against the Sea Wall. After the canal is dug, we will build big hopper dredges, which will go out into the bay and dig up the nice clean sand off the sand bars and fill their hoppers, and then will steam up the canal and pump that sand, mixed with water, out through big pipes over the area to be filled. The nice clean salt water will run off, and leave the nice clean sand filling distributed evenly on a nice clean sandy slope, from the Sea Wall to Broadway. When the grade-raising area is filled, we will commence to fill the canal the same way, backing out as we go, until we have filled it to its beginning. We will do it for a quarter of what it would cost you any other way." And the city said: "My! How nice and simple! We'll do it!" And they are doing it, but it is not as simple as it looks—especially to the street railway company.

Ordinarily it would seem simple enough—just raise the track a moderate height in long stretches ahead of the grade raising, using the dirt alongside as sub-fill and, when the grade reached the track, raise it again the same way, and so on ad finitum, but that is not the way it is done. First of all the grade is not raised gradually as a whole, but instead, sections of two blocks and three blocks wide, reaching from the canal to Broadway, are filled completely before the next section is touched at all. Levees, or banks of dirt, from 2 ft. to 10 ft. high, are thrown up all around the section to be filled, a drainage ditch is left open on the lower side for the filling water to run away and drain back into the canal or off down the island into a bayou and thence into the bay. Then the big pipes—21 ins., 33 ins., or 42 ins. in diameter—are stretched out from the dredge pumping stations in the canal and the dredges attached thereto, and pour out from their hoppers into these pipes a flood of water and sand, until the hoppers are empty. Then back they go into the bay, fill up hoppers, steam up the canal and empty, and so it goes on night and day, and holidays and parts of Sundays, an almost never-ending stream of water and sand flowing into the section, the sand settling and the water running off until the section is level with the top of the levee and up to grade.

These dredges force the water and sand mixture out of the pipes at a pressure of from 18 lbs. to 20 lbs. at the dredge. The idea is to keep the pressure at the discharge end at approximately zero, so that a full stream of the mixture will flow from the end of the pipe with as little washing effect as possible. The mixture contains from 20 per cent to 33 per cent of sand—averaging 25 per cent. With one or the other—and sometimes two and three of the pipes flowing streams at the same time, the amount delivered is enormous. Often in a day of 24 hours, from 12,500 to 15,000 cubic yards of sand, or the equivalent of 1000 railroad carloads, or a train seven miles long loaded full of sand, have been unloaded and placed in location.

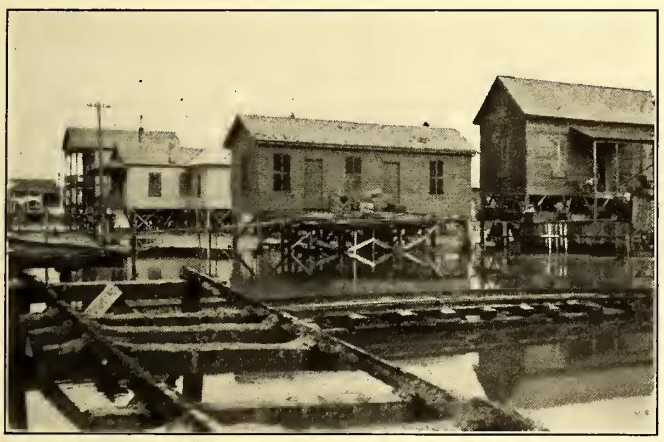
And down in the big basin formed by the levee is the poor street car track. It has been humped up in spots, to allow gas and water and sewer pipes to be raised up to the surface—waiting to be again covered to a normal depth. It has had to be raised up over the levee from 2 ft. to 6 ft., so that that levee may be intact all around, and with that and the little bumps over the water pipes, it looks like a drunken roller-coaster. It has had to cross drainage drains on quick-built trestles of old ties; it has been robbed of dirt alongside of it to form the levees until, in places, it stands up as if on an embankment. Robbed of its filling it is open to every change of temperature, and consequently "kinks" in all directions, until a rail fence is a straight line to it. Every joint is racked, bonds are broken, and it is a most disreputable looking affair,



THE GRADE RAISING AT GALVESTON. SAND IS BROUGHT IN ON SELF-PROPELLED SCOWS, AND IS PUMPED OUT THROUGH 42-IN. PIPES AND DISCHARGED OVER THE AREA TO BE RAISED

Still the cars run over it, serenely climbing up and down the bumps and weaving their way along the sinuous rails, while sand and salt water are flowing from 2 ins. to 6 ins. over the top of the track. For block after block the street car track is the only way available, sidewalks and streets, and yards and gardens are submerged under an almost never ceasing flood of salt water and sand, and to reach that track and the cars on it, platforms are built from houses and the passengers are received and landed as if from a steamboat. Ordinary stopping points are neglected and forgotten, and the motorman has to be able to gage his stop to a nicety for the landing, while the conductor, in long rubber boots, gets off into the stream and aids the ladies and children to embark and disembark.

And the track. The track is the next to the last thing to be raised—the poles and lines are the very last. The track cannot be raised ahead of the filling, for the flood of water and sand from the big pipes would wash away the roadbed in a minute, neither can it be raised on cribbing for the same reason. "Then how is it done?" Simply by letting the sand fill up the track until it is nearly or quite over the rails and then, with men and jacks in plenty, "jacking it up" a few inches and allowing the sand to settle under the ties, then repeating the operation whenever the flood is let loose upon the track.



VIEW IN GALVESTON, SHOWING HOUSES AND TRACKS ON STILTS, READY FOR THE GRADE TO BE RAISED

VIEW AT GALVESTON, SHOWING AREA SHORTLY AFTER IT HAD BEEN RAISED TO THE NEW GRADE

Again, it seems simple, doesn't it? But there are one, or two, or three—or fifty—difficulties. When a dredge starts pumping into its pipe, the first few minutes' flow—until the sand and water in its hoppers is well mixed—is nearly pure water, and washes everything before it as it comes from the pipe. Again, when a dredge has finished pumping out its hoppers, it always pumps a lot of pure water through the pipe until all sand in it has been washed out, otherwise the sand in the pipe, under the diminishing flow at the end of the pumping, would settle in the pipe itself and fill it full and choke it. So, it may happen that, in the beginning of a dredge's pumping, the pure water will wash out the filling under the track, the track will sink, the sand-charged water will follow in a few minutes, and, lo, the track is submerged, inches or feet. It cannot be raised until the dredge ceases pumping, and then it must be laboriously dug out of the clinging suction of the wet sand, jacked up and hastily tamped up on quicksand. In the meantime the schedule is interrupted, and the poor beleaguered householder is marooned on a car in sight of home. Again, when the dredge stops pumping, the torrent of pure water will often wash out all the sand for rail-length after rail-length, and when the water subsides the track lies out of sight in a pool of salt water a half-block long and from 1 in. to 6 ins. deep. This does not daunt the motorman; he is an adept at navigation-on-wheels, and the whole section is dependent on him and his car, so he "puts her to three points" and, with hand on brake, "listens" his way along over the unseen track.

Now to jack-up tracks is not hard if you have anything to hold up your jack, but when the whole thing is a quicksand under the influence of the flowing water, when the men are knee-deep in that quicksand and have to pull their feet out one by one with their hands when they wish to move, then is the time that the jacks sink 6 ins. every time they raise the track 1 in., the time when two men shove shovels under the rail from each side, a third quickly places the jack in position under the rail and on the shovels, and two others pump away at the jack-handle. While the jack and shovels sink fast, the track rises slowly, or not at all, and in a minute or two the jack is nearly submerged and it takes all that three men and two shovels can do to get it quickly out from the suction of the sand. Then do it all over again until the pumping ceases or the flow changes location—for that is another of the difficulties. Nothing can be told as to the direction of the mixed stream. The sand settles so rapidly as often to dam its own flow, and the stream will change its direction in a minute or two. Then all hands must hustle-up with jack and to a new location, 20 ft., 50 ft., 100 ft. away.

And this not for 8 hours or 10 hours a day and in broad daylight and nice weather. The dredges know no hours, no days, no seasons. Weather is nothing to them, nor daylight nor darkness. It is a "continuous performance," and the street railway must perform whenever the dredges pump. So, day and night, light or dark, hot or cold, in fair weather or in the most blinding rain storm, the track force must be out and about, or there will be track washed out or buried and traffic suspended or interrupted, and none of these must occur, for they cost money—and fares. And when at last the level is reached on a section; when everything is "up to grade"—a dozen feet higher than it was a few weeks ago—an ordinary track foreman would weep at the sight. Every joint is loose and strained and wide open, bolts are rusted to a "jam-fit" by the salt water, nearly every bond is gone, spikes are all loose and ties are all askew—many of them have been left 12 ft. under ground, held there by the suction of the wet sand. All the old roadbed and good ballast are a dozen feet under ground, and nothing is left to line and surface on but fine, loose, white sand that will take months to settle to place, and will shift under rain or with wind just like so much flour. Do you wonder the track foreman weeps—for the schedule and service must be maintained.

Later comes the time for the line foreman to weep. All

this time he has had to stand supine—or nearly so—and see the sand crawl up on the poles until they were 12 ft. to 18 ft. in the ground, for you cannot raise poles in a quicksand. He has raised the trolley wire when the rising track made the trolley base scrape the spans. He has put 2-in. x 4-in. scantling extensions on his poles and kept the live line wires from burning off the top of people's heads as they went under them, but that was all. He must wait one, perhaps two or three, months after the section is "up to grade" before he can start to raise the poles, for it takes that long for the sand under the surface to become stable, and when it is water soaked, as at first, it is a combination of consomme and mush, distinctly not good to work in.

When he has 2 ft. or 3 ft. of comparatively solid surface sand to work in, he gets two 30-ft. wooden levers, strongly braced with steel, a lot of 3-in. x 12-in. plank, an imposing array of guys and block-and-tackle, and from twelve to twenty men, and starts to pull poles—some of them 16 ft. to 18 ft. in the ground. He lays a foundation of plank on each side of the poles, piles up his "purchase" on them, drops heavy log chains as low on the base of the pole as he can, puts the hooks of his levers into a bight in the chain, and says, "Ready!" Then, with a "Ye-o!" twelve men leap on to the upraised end of the big levers, the plank and "purchase" sink down 2 ins. or 3 ins. in the soft sand and the pole comes up (sometimes) an inch. More plank, more "purchase-blocks," more "Ye-oing," and it comes up 3 ins.; next time it comes up 4-ins., and then 6 ins. "at a lift" until it is also "up to grade" and the broad, white ± grade mark on it, that was just peeping out of the ground when he started, is up in the air as many feet above grade as there have been feet of filling at that spot.

"A primitive and wasteful method!" you say? "Primitive" it is true, but "wasteful" it is not. Some time and money was lost in the beginning, because every one thought the same as you. Every sort of gin-pole and derrick and stump-puller idea was tried, and the ideas are now where the apparatus would have been—under the sand. Remember, that you are working on a crust of loose sand over a quicksand, a substance that when you dig down to it, flows and sticks like—or worse than—any semi-solid mass that you can think of, a substance that holds a pole down with 15 lbs. to the square inch plus the friction, a substance that yields like, warm molasses candy, to a steady weight or pressure. Dig down a couple of feet and you are at the limit of digging, for the stuff flows in as fast as you dig. Pull steadily on the top of the pole, beyond a certain strain, and the base of the pole will slowly move in an arc on the fulcrum of the 2 ft. of dry surface sand. So, when poles are "set with a rake," when they are corner-poles, or have any preponderating strain in one direction, they must be "guyed" and braced and stayed, and every time the pole is raised a few inches this guy must be slackened, that one tightened, a brace eased and a stay stiffened, for the pole must come up to the top in the same position and location and inclination in which it originally was, otherwise wires and cables are slackened or tightened too much, the poles will be all "out of line," the trolley wire a disgraceful "clothes line," and every frog and guy and crossing and bridle completely "out of whack."

But the line foreman has this consolation over the track foreman. When a pole is up to grade and a big "dead man" (an old cross tie) has been planted across it, a foot or two below the surface, to give it a bigger bearing surface against the loose surface sand; when guys have been run taut and the slack taken out of all slackened parts, then he knows that his grade-raising troubles on that section are pretty nearly over, for slowly but surely the water will drain away deeper and deeper, leaving good solid "dirt;" slowly each little particle of sand will "lock" into its neighbor's embrace, and his pole will finally stand better in the "filling" than it did in the old island sand.

But the track foreman and the line foreman are not the only weepers; the master mechanic has a few tears to shed also. The salt water pumped in by the dredges not only plays havoc with the insulation of the electric equipment, but it rusts everything iron and steel that it touches, and the fine sand gets into every crack and cranny, into the journals and bearings, into every working and wearing part, and also plays havoc with them. Wheels are content to live only four-fifths as long as they ought to under normal conditions; brake-shoes die in early youth; journals and bearings crave constant attention and perfect lubrication or they get hot in the collar, and every piece of steel and iron breaks out in a rash of rust if it is not constantly re-clothed in paint. As for insulation—salt water is a fair conductor, and when you run a car at a lively speed through some inches of it—it splashes and, being salt water, when it dries, it leaves the salt. When it gets damp this salt spreads and creeps into every tiny hole and crack, and when it gets near enough, the 500 waiting volts jump and "spit-crack-k-k"—a short circuit or a burn-out. "What is done to prevent?" Just make everything not only air proof and current proof, but salt-water proof, and keep it so. Do as is done in every department—invent things—and, if they fail, invent more things until you succeed. There is no precedent—make one, that's all! The cars must run and run on schedule, must run as regularly, as safely, as if conditions were normal, for in the grade-raising district the people rely on the cars. Without them they could hardly stay there.

"And do you keep up schedules and give good service?" Ask the people of Galveston, and to a person they will say "They not only do that, but on the track that the canal has left intact we have a better service than we ever had."

"And isn't your operating cost tremendous?" Not so very large, thank you! Quite some less than a good many other roads we could name that have not our abnormal conditions.

"And your earnings—haven't they fallen off greatly?" No indeed, they have steadily increased, not a big increase—just a nice steady little "move" that has pleased the company every month since the grade raising started.

"Well! How do you account for it?"

We don't. We simply know it's so and keep on working and trying, and inventing to make it all better.

"Well!!"

Yes. That's what everyone says when they come to Galveston—and our street railway visitors put it stronger!

DISPOSING OF ARTICLES LEFT ON INDIANAPOLIS INTERURBANS

The terminal station at Indianapolis is made the repository for articles left on the interurban cars by passengers, two rooms being set aside to receive the goods. The increase in the number of articles recently has been so great that a change of plan has been decided upon, and hereafter the articles will be disposed of after the expiration of a fixed period. Conductors will now turn in a description of the article left on their cars, and if it is not claimed by the owner it will be given to the conductor, if he desires the article. If not, it will be sold at auction to the benefit of the company.

THE NEW YORK CITY INTERBOROUGH RAILWAY

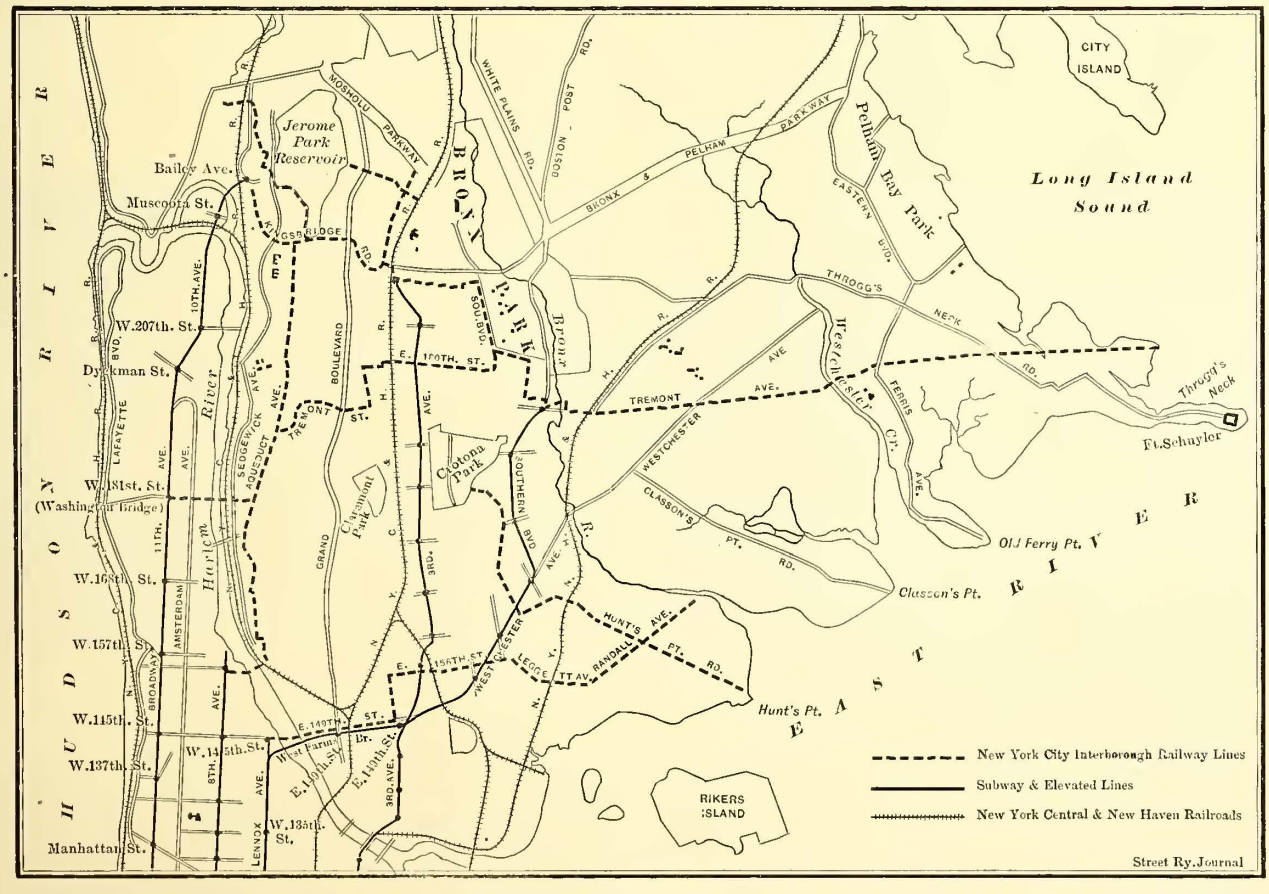
The operation of the complete overhead trolley lines of the New York City Interborough Railway Company will be commenced simultaneously with the opening of the subway passenger station at One Hundred and Eighty-First Street and St. Nicholas Avenue, on the upper West Side, in the Borough of Manhattan. Excellent transit facilities will then be given to sections of the Borough of the Bronx on the east, which have hitherto had inadequate service. Included in the routes to be operated are the Washington Bridge, Aqueduct Avenue line and across town to the Zoological Garden in Bronx Park, all of which have been difficult of access in the past.

Washington Bridge is regarded as one of the handsomest bridge structures in the world. Shortly after construction work was commenced, the mayor required that the company's plans for its overhead construction be submitted to the Art Commission. The members of the commission expressed their appreciation of the existing plan to erect poles and brackets which would be in harmony with the architecture of the bridge structure. In the preparation of the handsome designs for the brackets, which are constructed of T-iron and flats, the engineers had the assistance of George Nichols, architect. The poles and brackets were furnished by the Elmer P. Morris Company.

The track on the bridge is imbedded in 17 ins. of concrete, which rests on the buckle plate and which, with an asphalt covering, forms the roadway. Steel ties are used every 10 ft.

The rails used on all the other parts of the routes are 107-lb., 9-in. girder type, and are laid on yellow-pine ties at a distance of 30 ins. between center. The joints are bonded with soldered bonds under the splice bars. The Brill semi-convertible cars used have 28-ft. car bodies, and are 40 ft. in length over all. They are equipped with four 38-hp motors.

ARTISTIC OVERHEAD CONSTRUCTION ON WASHINGTON BRIDGE

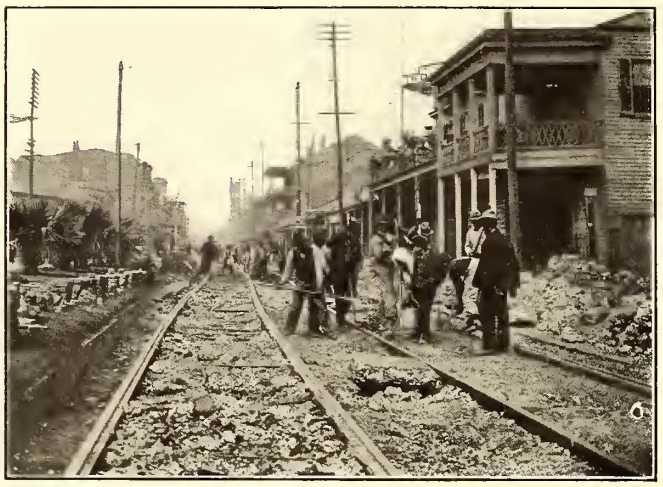


MAP OF BRONX BOROUGH, NEW YORK, SHOWING THE LINES OF THE NEW YORK CITY INTERBOROUGH RAILWAY

A. E. Kalbach was the engineer in charge of the construction and equipment of the road, and was assisted by C. W. Wilder and J. H. Barnard. Power for operating the lines will be secured from the Interborough Rapid Transit Company.

PLANKING UNDER TRACK IN NEW ORLEANS

As is generally known, all the land in and around the City of New Orleans has been formed by accumulated deposits of mud and silt left by the Mississippi River during the time when the river flowed unconfined over the site before the construction of the New Orleans levees. This mud, or more properly speaking, clay, makes a fairly reliable foundation when it is dry, but when it is moist, which is its usual condition, due either to seepage water or rainfalls, it becomes a



TEARING OUT OLD TRACK WORK IN ASPHALT STREET, NEW ORLEANS

thick sticky material which has many of the characteristics of quicksand and gives a treacherous, unreliable foundation for construction work of any kind, necessitating special precautions and special treatment in all engineering operations.

As can be readily imagined, the work of laying street railway tracks in the city and suburbs has been attended with

PUTTING IN CONCRETE IN TRACK WORK, NEW ORLEANS

considerable difficulty and has called for special engineering methods. It should be said, however, to the credit of the engineers who have been responsible for track construction in New Orleans that they have overcome these difficulties well, and the New Orleans Railways & Light Company is only now beginning to renew portions of its roadbed that have been down for eight or ten years and are still in fair condition. The difficulties have been increased by reason of the fact that in this portion of the country broken stone or gravel for ballast is very scarce and almost prohibitively expensive, and recourse has been had to clam and oyster shells as a substitute for stone or gravel for track ballasting purposes. Furnace slag has also been used to some extent.

The chief factor in solving the problem of securing a permanent track has been found in putting a layer of planking underneath the roadbed. The purpose of this planking is not, as might be supposed, so much to keep out water as it is to distribute the load evenly over a large area and to some extent to bridge over short sections of quicksand material that under concentrated loads might develop a tendency to sink or sag. This same idea has been adopted in other Southern cities where the soil is impregnated with moisture.

The accompanying drawings give the details for the latest standards in track construction adopted in New Orleans for paved streets and unpaved streets. In both classes of work, as soon as the excavation for the roadbed has been made, there is laid in the bottom of the trench a flooring, consisting of planking in strips 9 ins. to 12 ins. wide and 1½ ins. thick. The strips run longitudinally with the direction of the track, and although they are not tongued and grooved they are laid with their edges as close together as possible and form practically a waterproof bottom to the trench. The layer of planking is 9 ft. wide under each track and extends about 6 ins. beyond the ends of the ties at each side.

In ordinary work the construction after the planking has been laid is as follows:

Directly on the planking is placed 6 ins. of ballast. The material used for this purpose, as stated, is usually clam or oyster shells, although on some of the latest work on heavy lines broken stone is being used to some extent. The ties, the standard size of which is 6 ins. x 8 ft., are laid on the ballast on 2-ft. centers and the spaces between ties and to within ¼ in. of the head of the rail is tampered with earth filling.

In the streets that are paved with asphalt the foundation is the same except that for the earth filling is substituted a bed of concrete which rests upon the ballast foundation and extends up to within 3½ ins. of the surface of the street, to form

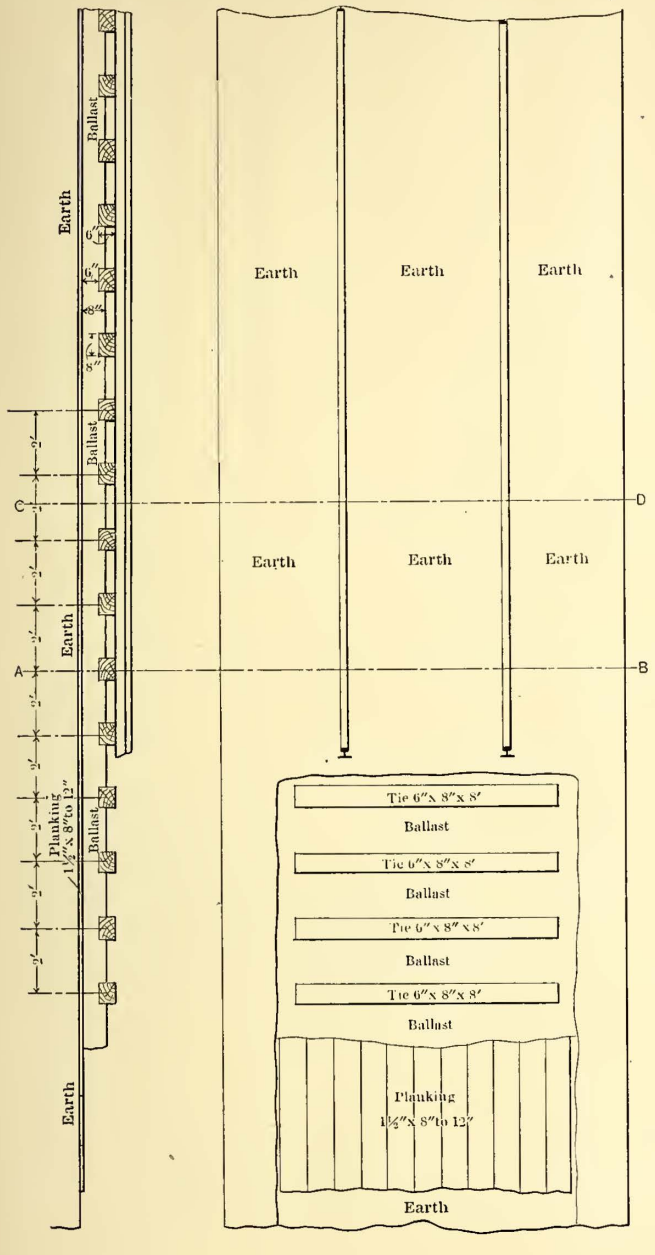
CONCRETED TRACK READY FOR PAVING, NEW ORLEANS

a foundation for the asphalt paving. In asphalt streets the tracks themselves are paved with belgian blocks, and it is the practice to place on either side of the web of the rail fillers consisting of creosoted timbers, the purpose of which is to prevent the belgian blocks from working in under the head of the rail. The concrete used in this work is a 1:2:4 mixture and the material is put into the roadbed quite dry. After it is in place the trench is flushed with water which flows down through the bed, completing the wetting process. The materials are then allowed to set. This procedure avoids the necessity for making the men work in the wet concrete mix-

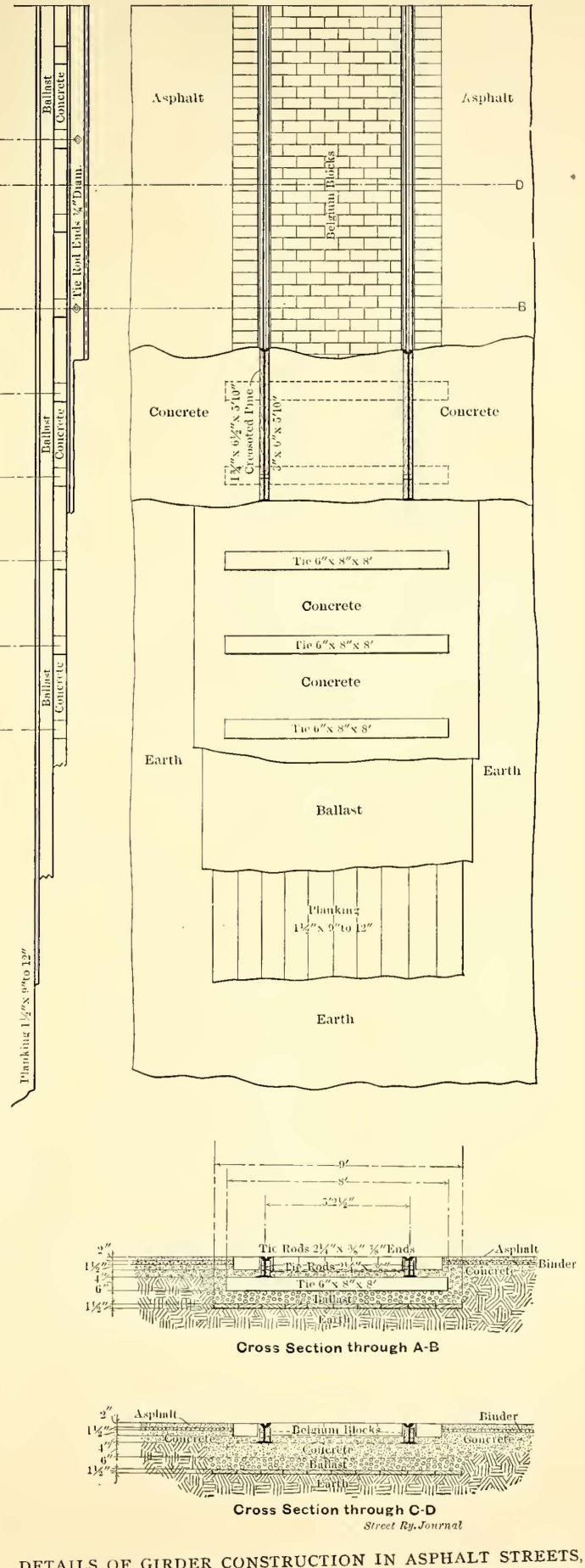
ture. The present management has lately rebuilt six miles of track with concrete foundations in this way.

The foregoing describes the latest standards that have been adopted by the New Orleans Railways, Light & Power Company, but inasmuch as many of the lines were built by several independent companies, all of which have been consolidated at different times into the present company, some of the older lines present considerable variety in track work.

The present operating company owns approximately 180 miles of track. Of this mileage 10 miles or 12 miles are built with 100-lb. T-rail, laid on 6 ins. of broken stone, which in turn is laid upon a 1½-in. plank flooring.



DETAILS OF T-RAIL CONSTRUCTION, WITH LAYER OF PLANKING UNDER TRACK, NEW ORLEANS



DETAILS OF GIRDER CONSTRUCTION IN ASPHALT STREETS, WITH LAYER OF PLANKING UNDER TRACK, NEW ORLEANS

There are about 22 miles of the system, laid originally with 60-lb. T-rail on earth ballast, and which is now being re-ballasted with 9 ins. of clam shells under the ties and up to the top of the ties. This track for the most part is located either on private right of way or in neutral ground. The neutral ground is perhaps peculiar to New Orleans, and comprises a raised section running through the center of some of the widest streets and given over exclusively to electric railway operation.

Another predominating type of track construction, amounting to 9 miles or 10 miles, is built with 80-lb. T-rail, either on slag or shell ballast. Where slag was put in it was laid to a depth of 6 ins. on 1½-in. planking, but where shell ballast was utilized the bed of shells was carried to a depth of 12 ins. and the planking was omitted.

The remaining mileage consists of 6-in. and 9-in. girder rails on 6 ins. of gravel ballast, with plank flooring in the bottom of the trench.

In further explanation of the use of the planking it should be said that inasmuch as the primary object of putting in the plank flooring is to distribute the load evenly, the planking is omitted whenever good ballast, such as gravel or broken stone, is put in to a depth of at least 12 ins. below the ties. The theory is that the load under each tie is distributed through a section of the ballast that may be described as a truncated wedge, which at the top is the same width as the tie. With ties 8 ins. wide and spaced 2 ft. on centers the angles of load distribution under adjacent ties will intersect at a point about 8 ins. or 9 ins. below the base of the ties. The object sought is to unite these successive load areas in a common base or foundation, so as to give even distribution of weight over the whole area of the roadbed. This object can of course be secured by putting in sufficient depth of ballast, which would be not less than 10 ins. or 12 ins., but in view of the scarcity of ballasting material in this locality the same object is accomplished at less expense by putting in the planking and using only 6 ins. of ballast.

FOUNDATIONS FOR CROSSINGS

The lack of stability in the soil has been made evident with especial force at locations where the street railway tracks cross steam railroads. There are a number of such crossings on the New Orleans system and their maintenance, especially on the lines where the traffic on both the steam and street railway tracks is heavy, has been a very serious problem. The present engineering department has been giving particular attention to this subject, and has recently developed a construction that gives promise of materially reducing the cost of keeping up crossings. The latest practice is to put concrete under the entire area occupied by the crossing. The excavation is first made and in the bottom is built up a crib work of old T-rails laid log cabin fashion. This is then filled in with mass concrete to a depth of 18 ins. to 20 ins., smoothed level on top. This gives a solid granolithic foundation, the crib of rails acting both as binder and re-enforcement for the concrete. On this foundation is laid 6 ins. of broken stone in which are embedded the ties. The crossing is bolted direct to the ties. Instead of paving the intersections in the usual way special corrugated iron plates made to fit the spaces between rails are used. These plates rest on lugs on the intersection castings and on wooden strips supported on the ties. These wooden strips serve to reduce the noise. Wharton solid manganese crossings have been adopted for all heavy traffic locations.

A number of locations have been installed, as outlined in the foregoing, and the results seem to justify the somewhat expensive construction. The bed of concrete appears to absorb the entire shock of the blows when cars or trains are passing and there is practically no vibration perceptible at any point within the crossing area, even under the impact of heavily loaded freight trains.

The wheels on the steam trains have wider treads than the electric railway wheels, and considerable trouble has been experienced, due to the overhang of the steam wheels striking the paving at crossings and intersections. To prevent this it is now the practice to put a special iron angle plate along the sides of the steam tracks and the paving is brought up against these angles instead of directly against the rail. All track and line work on the New Orleans system is in charge of A. L. Black, electrical engineer.

TROLLEY CARS FOR HOUSE MOVING

Since the view of a car moving a house in Atlantic City, N. J., was published in the Street Railway Journal of March 31, on page 501, E. R. McDowell, superintendent of the Ashtabula Rapid Transit Company, of Ashtabula, Ohio, has called attention to the like novel use of the rolling stock on his line, as shown in the accompanying illustration of a car moving a building. The company has been moving houses for the last six years, and even very large buildings have been taken quite a distance along the tracks. It might be added that the work is not done for the novelty or pleasure, but if it is found that the buildings to be moved are an obstruction, the company's purpose is to remove them as quickly as possible.

ONE OF THE ASHTABULA RAPID TRANSIT COMPANY'S CARS MOVING A HOUSE AT ASHTABULA, OHIO

STREET RAILWAY SITUATION IN SAN FRANCISCO

(From Our Regular Correspondent.)

It was an event of no small importance to San Francisco—the city devastated by the earthquake of April 18 and a five-days' fire—when car No. 1377 formally opened street railway traffic on the morning of April 27, the tenth day after the disaster. Mayor Schmitz operated the controller, and Superintendent David Young, Jr., the brakes, and the party included several prominent citizens, Vice-President and General Manager G. F. Chapman; assistant to the president, Thornwell Mullally, and other officials of the United Railroads. The car was operated from the car house at Turk and Fillmore Streets, out Fillmore to Broadway, then back over the entire length of Fillmore, and thence over Church and Sixteenth Streets, Mission Street and Fifth Street to Market, which was then the limit of operation.

This placed the system of the United Railroads in operation on a small scale, and the cars have since been run under as rapid a headway as possible. On April 28 the connecting curve from Fifth Street out Market was completed, and for the first time in the history of San Francisco an electric car was run down Market Street to the Ferry Building. The first car was manned by Thornwell Mullally, who was accompanied by several officials and citizens as guests. The Market Street line, from the ferry to Fifth Street, is now in regular operation, and is carrying large crowds. Other lines that have been placed in operation are the line from Mission and Sixteenth Streets to Onondaga Avenue, from Sixteenth and Bryant Streets to Kentucky and Twenty-Third, and some of the lines embraced in the Ellis and O'Farrell and the Turk and Eddy Street systems.

VIEW OF SUTTER STREET, SHOWING LINE OF RESCUED CARS WHICH WERE USED AS BED-ROOMS BY REFUGEES FOR SOME TIME AFTER THE FIRE

Up to Sunday, April 29, no fares were collected on the cars, but at a meeting of the general relief committee, Rudolph Spreckels suggested that, in spite of the magnanimous offer of the United Railroads to furnish free transportation on its cars, it ought to be allowed to collect fares. Mr. Mullally suggested that fares might be collected, but he offered to turn over all the company's receipts to the relief committee, to be used by it in relief work. This offer was greeted with enthusiastic applause and unanimously accepted.

The first day or two no fares were collected from women and children, but this order filled the cars with so many people, evidently sightseers and relic hunters, that the relief committee afterward decided regular fares should be collected from everyone. The receipts of the first day's collections amounted to $1,867, and this sum was turned over to the committee promptly. It was suggested that this donation of gross receipts should not continue indefinitely, as it would work an extreme hardship on the United Railroads. Mr. Mullally declared, however, that no request for a discontinuance of the arrangement would ever come from the United Railroads, and that it remained for the general committee to decide just how long it wanted the company to turn over its receipts.

Patrick Calhoun, president of the United Railroads, has announced the determination of his company and its officers and owners to do everything in their power to assist in the rebuilding of San Francisco on a larger, grander and more beautiful scale than ever. He declared that it was the general feeling throughout the East that the earthquake could not shake the confidence of the American people in the future of San Francisco, and that the energy and capacity displayed in the re-establishment of law and order would command the respect and admiration of mankind for all time to come. He states that he has placed large orders for cars and material, and that men and material are now on the way from the East. Mr. Calhoun's cheerful and courageous view of the situation and of the city's future has done much to raise the spirits and hopes of the people of San Francisco.

RUINS OF THE CITY HALL, SAN FRANCISCO

Officials of the United Railroads announce that they expect to enlarge the field of street railway operations throughout the burned and unburned sections of town almost immediately. The company's electric power plant at North Beach has been found to be practically uninjured, aside from the injury to the buildings, and fires were started under the boilers on April 30. The company hopes to have the power plant in full operation soon. This will greatly relieve the strain that has been placed on the Bryant Avenue power station, and will enable the company to operate electric cars quite generally throughout the city. All the lines now being operated, as well as the extension of the Ellis and Eddy Street lines to Market Street, will be given a better service than existed previous to the fire.

Although transportation facilities are now being furnished San Francisco quite generally through the unburned district by the trolley lines, as well as through the heart of the burned district, there seems to be no prospect of operating any of the cable roads inside of six months. In fact, it seems quite likely that some of the cable roads of the city will never again be operated as such, and that the earthquake

and fire will have the effect of hastening the conversion of many miles of cable roads into electric properties.

So far as the Sutter Street line is concerned, it seems to be generally conceded that its operation as a cable road is a thing of the past. The United Railroads will probably resume, in the near future, the work of standardizing the line, which was in progress at the time of the catastrophe, and which was described and illustrated in the last issue of the STREET RAILWAY JOURNAL. This involves the spreading of the tracks so as to obtain greater clearance between the inner

RUINS OF PALACE HOTEL AND CROCKER BUILDING IN DISTANCE. THE VIEW GIVES AN IDEA OF THE DEBRIS IN THE STREETS

rails, as well as the narrowing of the gage from a width of 4 ft. 11¼ ins. to 4 ft. 8½ ins.

The Sutter Street cable power house, in spite of the vigorous fight made by the company's men to save it, was completely destroyed by fire, and all that remains of the cable system is the roadbed and a lot of antiquated cars that were hauled to places of safety.

The Geary Street line, it is generally accepted, will never be again operated as a cable road. This is the municipal railway, and a contract has already been let for converting it into an underground conduit system.

The Union Street line may never again be operated as a cable road. The company's franchise has but six years to run, and it is not thought that the company would rebuild and equip the road except under a renewal of the franchise, in which event it is regarded as more than likely that the line would be converted into a modern electric road. The Union Street power house was completely wrecked by the earthquake, and, after that, was destroyed by fire. The roadbed on this line was badly twisted out of shape in places. On Union Street, between Steiner and Pierce, the roadbed was moved out of alignment fully 6 ft., and in other places the slot is closed.

As for the other cable roads of the United Railroads, all are in bad shape. The Valencia Street cable station, which operated the main Market Street line, the Valencia, Castro and Haight Street lines, was destroyed. The power houses of the Hayes and McAllister Street lines were not burned, but suffered by the earthquake. At the same time, the cable slots were more or less damaged, and to put them in shape for operation would require considerable time and expense. The Powell Street system, together with the lines on Sacramento, Clay, Washington and Jackson Streets, are also in bad shape, and it is the view of the officials of the United Railroads that the lines could not be put in shape to be operated inside of six months. The power house at Mason and Washington Streets was badly crippled by the earthquake, the high brick chimney that towered over the building doing much damage when it crashed through the roof. Later the power house was burned and the driving machinery ruined. A number of cable cars was burned at the same time.

Speaking of the damage caused by the earthquake and fire, Secretary Geo. B. Wilcutt and General Manager S. F. Chapman stated that the company lost four power houses and two sub-stations. The Bryant Street electric power house was saved by a 30-in. salt-water main, from which was pumped water for the protection of the property at that point. The company saved some of its records from its office in the Realty Building, and also from the offices at Market and Valencia, both of which places were burned. So far as known, not more than two or three of the company's employees were killed by the earthquake. Several of the officers were burned out of house and home, Mr. Handlon, assistant to Mr. Chapman, having a narrow escape from losing his life. The damage to the overhead work in the burned district is, of course, great, the wires being only good for scrap in most localities. In some places the track dropped 15 ft.; in others, the rails are badly warped by the heat. The cable roadbeds were thought at first to have stood the shock fairly well, but when succeeding tremblers closed up the cable slots in various places, the faith of the officials in cable roads was shaken also, and, of course, what would be detrimental to a cable slot would similarly damage an electric conduit roadbed. At present, it looks as if San Francisco will see nothing but trolley systems for some time, and it may be that the cable and conduit systems will entirely disappear.

In electrifying the Market Street cable road under the temporary franchise granted by the Mayor, iron tubular poles were placed 100 ft. apart next the curb throughout almost the entire length of this thoroughfare. The rails of the cable

LOOKING DOWN MISSION STREET, SAN FRANCISCO

tracks were bonded some years ago, and the work of getting the line ready for electric operation after the fire was greatly simplified. At the junction of Fifth and Market Streets a curve has been installed, so as to allow the cars on Mission Street to run up Fifth Street to Market, and then down Market to the Ferry.

One of the views on page 761 gives a good idea of Sutter Street on April 29, showing the stoves and improvised cooking utensils on the street and the cars saved from the Polk and Sutter Street car houses. All the cars in this car house might have been saved had there been any means of lowering the cars stored in the upper story. The electric elevator

used was rendered useless by the earthquake, and, as no other means could be devised in the short space of time before the place was swept by fire, these cars were left to their fate. Those on the ground floor, however, were hauled into the street, and, with assistance of several teams of horses, were pulled up the incline on Sutter Street as far as Octavia Street, where they were allowed to run down the other side of the hill to Filmore, as seen in the same view. This portion of the street presented a unique and somewhat ghostly appearance the night of Thursday, April 19, with the long line of cars, standing motionless and filled with people who had no other shelter, and sat huddled together on these cars getting what rest they could after the exertions of the eventful day.

The headquarters of the United Railroads, formerly in the Rialto Building, which, as mentioned, was gutted by the fire, are now in the car houses at Turk and Fillmore Streets. This location is now nearly in the business center of what remains of San Francisco, and Fillmore Street to-day presents as busy an appearance throughout its whole length as Kearney or Market Streets did before the fire.

Under date of May 6, President Calhoun, of the United Railroads, telegraphed New York as follows: "One hundred cars were in operation yesterday, and gross receipts for the day were $6,373. Water was extended to North Beach power station last night. Two hundred cars are in operation to-day, including line to San Mateo. All electric lines, except some of those in the burned district, will be in operation to-morrow. In addition, Market Street has been equipped throughout with the overhead trolley since the fire, and is

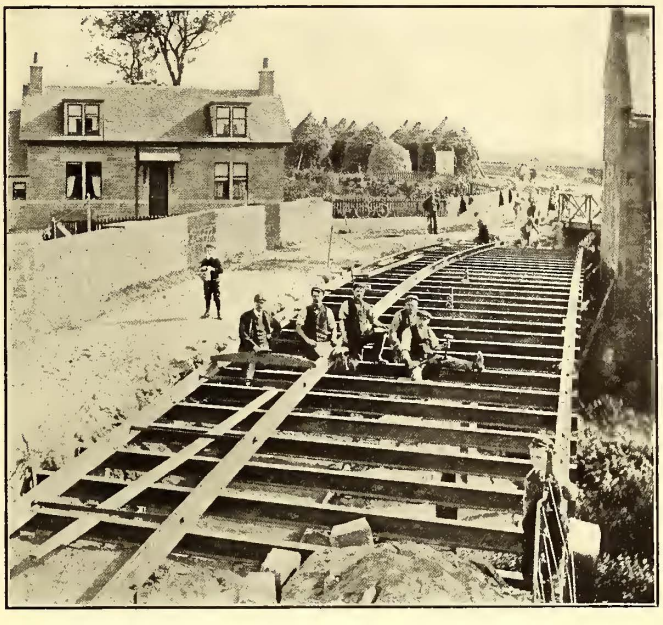
SECTION IN PRIVATE ROAD

now in full operation. We will start several additional electric lines in the burned district as soon as dangerous walls are removed. We will then give through electric service to all parts of the city. Normal conditions are being promptly restored, and the city will be rapidly rebuilt."

The Illinois Traction System has begun the distribution of about $100,000 under its profit-sharing plan, according to which each employee receives a cash present amounting to one-twentieth of his earnings for the year.

INTERURBAN LINE NEAR DUNDEE, SCOTLAND

The Dundee, Broughty Ferry & District Tramways, though short compared with many American systems, is interesting as being the latest British interurban railway. It connects Dundee, the third largest city in Scotland, with a population of 161,000, with Broughty Ferry, a residential town extending 3¼ miles along the seashore, and Monifieth. In 1901 the



WIDENING BRIDGE OVER DIGHTY WATER FOR ELECTRIC ROAD

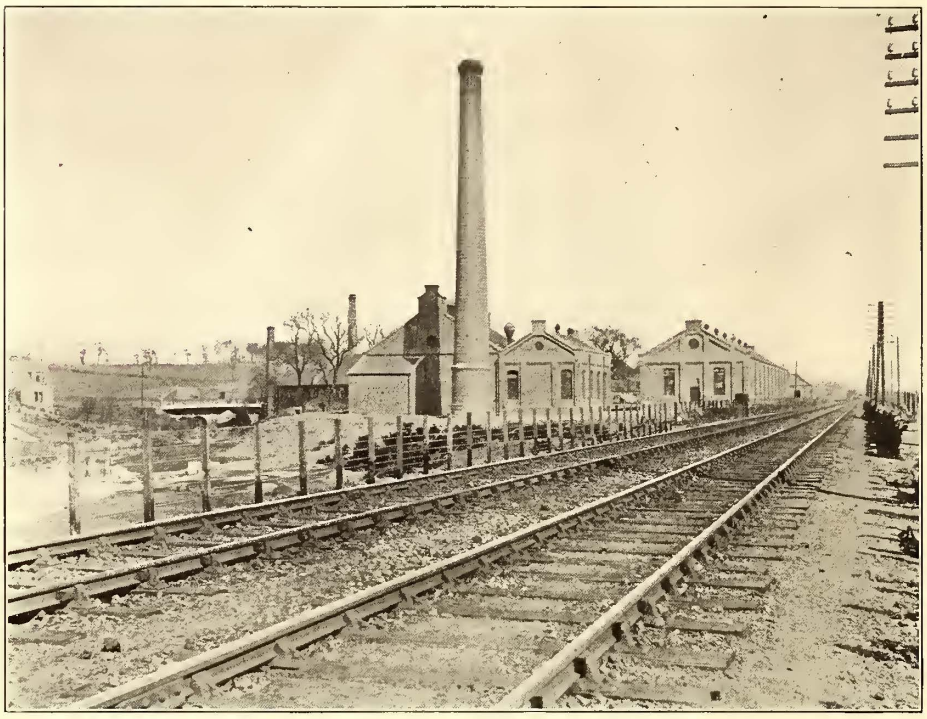
population of Broughty Ferry was 10,500, but this number is very largely increased during the summer months by the influx of visitors. Monifieth has a population of about 3000 and one of the finest golf courses to be found in Scotland, which during the summer draws large numbers of visitors.

Attempts have been made at joining up the above-mentioned places by means of tramways ever since 1872, and in 1899 Greenwood & Batley, Ltd., of Leeds, obtained an order under the light railways act to construct an electric railway over the route. The Board of Trade, however, refused to confirm the order, stating that it was convinced that a great deal of good would accrue from the building of the light railway, but it could not confirm the order on account of the material effect it would have on the existing railway companies, which were then serving the district in question. Finally, the existing bill, after favorable concessions had been obtained from the local authorities and land owners, was promoted in the spring of 1905 by George Balfour, and was duly passed and sanctioned in the same year.

The total length of route of the present system is about 5½ miles, 4¼ miles of which are double track, giving 9¾ miles of single track. It starts with a physical junction with the Dundee Corporation Tramways at the extreme eastern boundary of Dundee. For part of its length it runs along the country roads and highways, and for part over a private right of way to Monifieth. By an arrangement with the Dundee Corporation, the cars run over the Corporation lines to the center of the city.

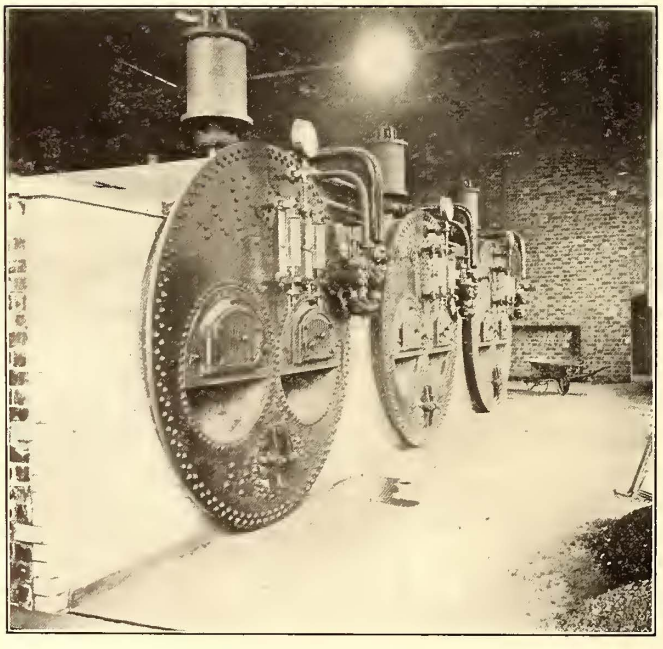
The rails are of No. 1 British standard grooved section throughout, weighing 90 lbs. to the yard, with 96-lb. rails on curves of short radius. The sharpest curve has a radius of 30 ft. At the joints, continuous-rail joints were employed in lieu of the more usual fish-plate; the rails are anchored every 22 ft. The bonding is double, with concealed bonds of 4/0 section. The special work was supplied by Edgar Allen &

Company, Sheffield; the switches are 11 ft. long, of cast steel. with a radius turnout of 100 ft. The private right of way above mentioned was made 50 ft. wide. This road is fenced on both sides, and the cars are allowed by the Board of Trade to run at a speed of 15 m. p. h. One bridge, where the road crosses the Dighty Water near Monifieth, was widened by passing steel girders under the track. These girders are embedded in concrete, and, acting as cantilevers, support the footpath on each side.



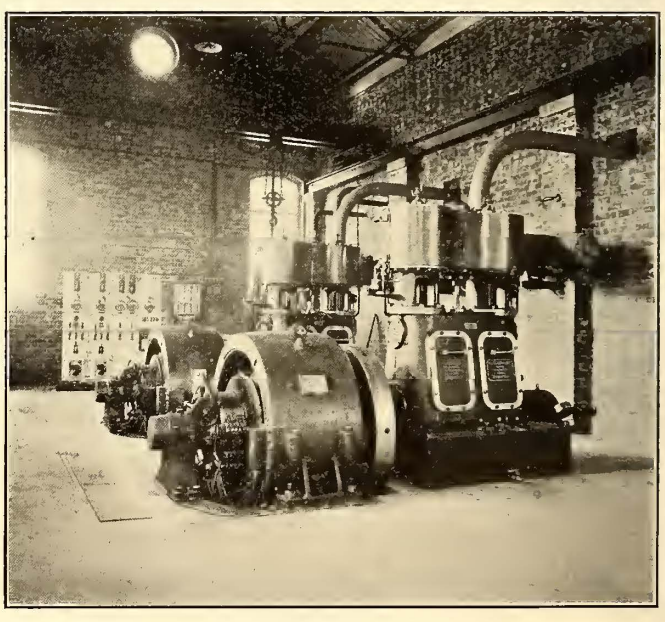
EXTERIOR OF POWER STATION AND CAR HOUSE, DUNDEE & MONIFIETH INTERURBAN RAILWAY

The overhead equipment is the standard side-running bracket-arm suspension, with double trolley wire and flexible suspension. The cables were supplied by Messrs. Henley, and are paper insulated, lead-covered, laid solid in wooden troughs.



BOILER ROOM

The power house is situated on the banks of the Dighty Water, from which the supply of condensing water is obtained. The feed-water is taken from the Dundee water supply. The building is of brick, with a slated steel roof, and has two bays. The dimensions of the engine room are 53 ft. x 25 ft., and of the boiler house 53 ft. x 49 ft., the latter being built with a monitor roof. At the rear of the power house is a coal store 21 ft. x 12 ft. The chimney is 110 ft. high, with an interior diameter of 5 ft. The flooring in both engine and boiler rooms is of concrete. There are three Lancashire boilers, 28 ft. long and 7 ft. 6 ins. in diameter. The working pressure is 160 lbs. per square inch, and each boiler is capable of evaporating 4600 lbs. of water per hour at normal rating. At the back of each boiler is a Sugden superheater, provided with a by-pass to allow of it being cut out if necessary. Each superheater has 190 sq. ft. of heating surface, and is capable of superheating 5000 lbs. of steam per hour 150 degs. F., at the boiler pressure of 160 lbs. There are two Worthington steam-driven feed pumps, each capable of delivering 1400 gals. of water per hour to the boilers. The feed-water heater was supplied by the Wheeler Condenser Company; it has 150 sq. ft. of heating surface, and, with the exhaust steam from the auxiliary plant, will heat 2000 gals. per hour from 70 degs. to 200 degs. F. The condenser is a surface condenser of the Worthington make, and is operated by a Blake-Knowles combined air and circulating pump. The condenser condenses 9000 lbs. of steam per hour, and will maintain a vacuum of 26 ins. with the barometer at 30 ins. The pipework was supplied by Babcock & Wilcox, Ltd.



ENGINE ROOM

The generating plant comprises two Belliss-Bruce Peebles 200-kw traction sets, running at 400 r. p. m. The Ferranti switchboard used consists of two generators, one feeder and one Board of Trade panel. The lighting can be taken from the switchboard or be supplied by a separate Willans' unit.

The car house, which is situated at Milton, about one-half mile from Monifieth and about 100 yds. from the main road, is a brick building with a slated steel roof. The length is 221 ft., and width 36 ft. One end of the car house is occupied by repair shop, paint shop, storeroom and smithy. There are three pits, two of which are 135 ft. long, and one 170 ft. in length; the three doors are fitted with Kinnear steel rolling shutters, with special trolley-wire attachment.

The cars, twelve in number, were supplied by the British Thomson-Houston Company, of Rugby. They are fitted with that company's electrical equipments, the two motors being each capable of giving 1300 lbs. draw-bar pull at a car speed of 10 miles per hour. The bodies and trucks are of the Brush Company's manufacture. All the cars are fitted with hand, electric and track slipper-brakes.

TRACKLESS TROLLEY BETWEEN SPEZIA AND PORTOVERE, ITALY

The Società per la Trazione Elettrica, of Milan, has recently constructed a trackless trolley line between Spezia and Portovere, a distance of about 2.3 miles. The road follows all the sinuosities of the coast and has curves with a minimum radius of 25 ft. and grades up to 6.8 per cent. The cars take current from two overhead wires of the ordinary type, which are suspended at a height of 5.50 meters (18 ft.) from the ground, and 35 cm. (14 ins.) apart. Both span and bracket construction are used. One of the overhead wires is grounded and is connected with all the metallic parts of the car, to avoid any danger to passengers. The current is supplied from the power station of the Spezia tramway lines at 500 volts d. c.

The cars are built like 'buses and, therefore, are light, weighing empty only 1500 kg. (3300 lbs.) Each has a seating capacity of fourteen persons. Two 4-hp motors are used and are geared to the rear wheels. The controller is arranged for four forward and two backward speeds as well as for electric braking. There is also a mechanical brake operated by the foot or hand. The cars are fitted with electric heaters and lamps.

The trolley, known as the Cantono type, has given satisfaction and has held to the trolley wires even when turning curves at the speed of 20-25 km (12-14 miles) per hour.

Two cars are run from 6 a. m. to 8 p. m., so that each car makes twenty round trips daily, or about 140 km, or 88 miles. The average power consumption is about 200 watt-hours per car km. (320 watt-hours per car mile.) It is understood that the Società per la Trazione Electtrica is building two other similar line installations, one at Pavia, the other at Siena, and will construct a line at the Milan Exposition.

TRACKLESS TROLLEY TRUCK CARRYING FREIGHT

ITALIAN TRACKLESS TROLLEY OMNIBUS IN SERVICE

NEW SCHEDULES ON INTERCONNECTING OHIO INTERURBANS

The Dayton & Troy Electric Railway, the Western Ohio Railway, and the Toledo Urban & Interurban Railway have announced the schedules for their interline limited service between Dayton & Toledo, which will go into effect May 15. There will be through cars every two hours, alternating with the local cars, which will be confined to the separate roads. They will cover the 162 miles in 5 hours and 30 minutes, making stops only at Tippecanoe, Troy, Piqua, Sidney, Wapakoneta, Lima, Bluffton, Findlay, Mortimer, North Baltimore, Cygnet, Bowling Green and Maumee. The cars will carry baggage, and no excess fares will be charged except for local rides on any one of the roads. The chair-seat idea has been given up, and the cars will be the standard passenger coaches with high back seats to secure the maximum seating capacity.

THERMIT RAIL-WELDING IN NEW YORK CITY

BY R. F. KELKER

During the season of 1905 about thirty different companies —scattered from Massachusetts to California—made use of the Thermit process for welding from a few hundred to three or four thousand joints each. The advantages of the Thermit welding system lie chiefly in the simplicity and elasticity of its application.

A most striking instance of these advantages is shown by the work done last fall for the New York City Railway Company, on its Grand Street reconstruction. Local conditions would have made the use of other processes extremely difficult—if not absolutely impossible. Traffic congestion on such a narrow street as Grand Street would not have permitted the use of a portable cupola without closing the street. As power was not available until the last few days of the work, the welding could not have been done electrically. Another element which would have militated against the use of other processes was the inability of the contractor to have a sufficient number of joints ready to permit the welding gang to work continuously. It was necessary to lay off the men several times during the construction, and one lay-off lasted about three weeks. As the men in the welding gang were returned to other gangs, no loss was caused by the stoppage of the work, as would have been the case had other processes been used. These few points show clearly the simplicity of the process, and how easily it may be adapted to the various exigencies of field work.

The welding gang was made up of five men, including the working foreman, and this small gang made, as a maximum, twenty-seven joints in nine hours. The track was put in service a few days before the welding was completed, and it was necessary to finish by night work, with cars on 10 minutes to 12 minutes' headway. The number of men already mentioned made twelve welds between 1 a. m. and 4 a. m., with little interference to the traffic.

The laborers on the welding gang, four in number, were Italians. Owing to the irregularity of the work, the foreman seldom has the same men for more than four or five days. This brings out a salient feature of the Thermit process—the work can be done by inexperienced men.

The molds were made in the old horse car barn near Corlear's Hook, dried in a light sheet-iron oven, and stored in the car house until required. The materials for molding were clean, coarse Long Island sand and a low-grade flour. A batch of molding material was made up, in the proportion of one shovel-full of flour to ten or eleven of sand. These materials were well mixed by hand and tempered with water. The actual amount of water required can only be determined by practice. The molds, when dried, were very hard, and well withstood transportation across the city. The time required to dry the molds was about three hours. The molds and appliances sufficient for a day's work were loaded on a truck each morning and delivered at the desired point on the track. Empty mold boxes were returned each evening for refilling during the coming day.

A Buckeye torch with extension burners, of the type used for sweating out hard centers in special work, was employed to heat the rails at the joint, so as to drive out any moisture. A torch of this character is most efficient, on account of the time saved in waiting for the rail to become properly heated.

The welding was done after the track was paved. Several courses of dry paving were left at the joints, so that the rail should be as near the normal in temperature as possible, considering the season. After the joints were welded, a couple of laborers and pavers followed up the gang and immediately closed up the welding holes.

To hasten the execution of the welding, the actual work was divided among the men, and each had certain assigned duties. One laborer cleaned the rails with a wire brush, and in case there was a heavy coating of rust, it was removed by using a hammer and chisel. This man saw that the joint, if open, was properly closed by "Dutchmen," or shimmed. The gasoline torch was kept one joint ahead of the welding gang, and the cleaner was kept one or two joints ahead of the torch. The man engaged in cleaning joints also carried sand molds from the truck to the joint ahead of the welders, and saw that the molds were ready for use. While the men were carrying the torch ahead to the next joint, the foreman saw that the joint which had just been heated was in proper shape—that is, that it was in perfect line and surface, and properly shimmed. He then gave it a final cleaning with a wire brush, and painted the head of the rail with clay, to protect it. He next examined the molds and took a hand in placing them in position, assisted by his men. After the molds were placed, the mold boxes were carefully luted with moist clay, where they joined each other and where the rail passed through them. This was done to prevent a leakage of liquid steel, in case of any inequalities in the mold. Earth was then banked about the molds and rammed hard against them by the laborers, who completed this work of preparation. In the mean time the foreman examined the condition of the crucible, replaced the thimble if necessary, opened the welding portion and prepared the plugging material. The crucible was then set over the running gate in the mold. After this was done, the crucible was properly plugged and the Thermit welding portion was emptied into it. A half teaspoonful of ignition powder was placed on top of the Thermit, ignited, and the crucible was then immediately covered. Upon the completion of the reaction (twenty to thirty seconds) the foreman waited a little for the slag and steel to separate, then tapped the crucible. When the pour was completed, a laborer threw a shovel-full of dry sand over the slag in the mold. The crucible was then lifted to the side, cleaned with a small iron rod, and the rough slag was chipped away from the nozzle to provide the proper seating of the plugging washers for the next joint. In the meantime the laborers removed the clamp and molds. After a few moments more—required for the slag to solidify—the slag block was knocked free from the head of the rail by a bar or spike-maul, and the head of the rail was hammered lightly to a proper surface, if a slight upset showed or the shims needed trimming. This work completed the weld, and the welding hole was then filled with concrete and paved.

The rail welded was Lorain Steel Company's "Section 109, No. 340-a 9" Trilby girder. The track was built on what are known as Third Avenue and Metropolitan construction plans. The former, having suspended joints, was welded, and the latter, being of the support-joint type, was plated up and bolted. The construction work was done under a contract held by Naughton & Company, of New York City, and the Goldschmidt Thermit Company placed a working foreman on the track to care for the welding and its details.

The chief features of the work were the flexibility of the Thermit process in overcoming delays without loss of time, its fixed economy in relation to any number of welds, its simplicity, which admits the employment of unskilled labor; the small amount of light, and easily handled, equipment involved, and the fact that its use renders unnecessary either outside fuel or electric power.

THE FIRE PROTECTION OF CAR HOUSES

The Committee on Car Houses of the National Fire Protection Association has prepared its report, which will be presented at the annual meeting of the association, to be held at Chicago, May 22, 23 and 24, 1906. Through the courtesy of C. H. Patton, chairman of the committee, the STREET RAILWAY JOURNAL is permitted to make an advance publication of the report. This is done with the thought that some street railway companies might wish to offer suggestions for improving the specifications and requirements before the meeting of the association in Chicago. Any such suggestions should be sent during the week ending May 19, to C. H. Patton, Park Building, Cleveland, Ohio.

REPORT OF COMMITTEE ON CAR HOUSES

In submitting to this association for approval the accompanying requirements for construction, and automatic sprinkler protection, for railway car storage houses, your attention is respectfully invited first to a few general remarks touching on the subject.

Regarding automatic sprinkler protection in this class of property, one of the features considered is the probable loss to any one car or car body that would result from a fire, even under the best possible protection that may be provided. Even with aisle sprinklers at either side of car, placed as close to car as clearance may permit, the actual fire tests already given have demonstrated that a loss from $300 to $500 may be looked for. Taking the average sized car, 8 ft. by 40 ft., leaves two unprotected surfaces of 320 sq. ft., or in all 640 sq. ft. of surface of each car not directly protected, and without the closest possible distribution of water available at either side of car to reach this surface, the extent of a probable loss is increased. With the end in view of recommending protection in car houses that may reduce the probable loss in any one car to the lowest minimum, the accompanying requirements have been drawn up.

During the past year automatic sprinkler equipments of the aisle and ceiling system type have been installed in railway car storage houses at Albany, Cleveland, Pittsburg, one or two Eastern cities, and at several points in the West and Northwest. The Cleveland equipments were the first installations, were put in during the summer of 1905, and close observation of these equipments up to the present time does not show that operating practices have been interfered with or inconvenienced, or that the sprinkler lines have received any mechanical injury in any manner. All systems have been in apparent operative condition at all times: In one instance, however, condensation formed at drain valves of aisle lines, freezing up valves, which would indicate that where feasible, it would be well to supply aisle lines from underneath, rather than from overhead drop method, account of drainage.

The subject of recommending sprinkler protection for open-car storage yards came before your committee, but at this time no recommendations appear to be in order, due to lack of investigation. One experiment was recently made at Cleveland along the line of placing aisle sprinklers between car tracks, the heads being arranged pendantly, and without fuse, the systems being under hand-valve control at an unexposed location.

Information obtained by your committee from railway companies at twenty of our large cities relating to storing cars in the open, indicate a divided opinion as to such practice, the experience at most of these places being that cars stored in the open are susceptible to more rapid deterioration than when stored under cover, and that the plan is not economical. At other places, however, advices show that this practice is followed, and that the railway companies there favor the plan.

So-called non-combustible and semi-non-combustible cars appear to be receiving favor by railway companies for subway use, and in one or two instances are in use on elevated roads. Due to numerous reasons presented, indications at this time are to the effect that this type of cars will not, for some time at least, be generally adopted for surface-line use.

It is the opinion of some of your members that a car house of a standard non-combustible character would permit of at least a modified ceiling automatic sprinkler equipment, in connection with aisle sprinklers. This would lessen the cost of sprinkler equipment therein, and absolutely eliminate any building exposure to the cars, which would prove particularly desirable in the event of storage therein of cars of non-combustible construction.

Railway companies generally are giving closer attention than formerly to the importance attached to erecting car houses of non-combustible, and slow burning, construction; also to the limitation of car values in any one fire division. Noticeable among the properties erected of late, are several of reinforced concrete type throughout, and others of brick and reinforced concrete, and tile roof construction. This type of construction seems to permit of the practice of eliminating interior columns, the width of building being such as to accommodate not more than three parallel tracks, with roof girders having as support the side walls only, the span not exceeding, say, 35 ft.

Your committee respectfully requests that this association adopts a standard for reinforced concrete construction for buildings, at this present meeting. This class of construction is in general use in many cities, and a guide as to what may constitute proper construction is greatly needed. Your committee on cement for concrete construction has been requested by this committee, through your secretary, to present a standard to the association.

The past year shows a falling off of car house fires from previous experience, which is no doubt largely accountable owing to the betterment of hazards, improved maintenance, construction of buildings, and a safer system of electric wiring in cars. Quite a few extensive losses, however, occurred in railway properties during this period.

Your committee held a joint meeting with the automatic sprinkler committee on March 12 and 13 last, and the requirements herewith submitted are the outcome of that conference. Slight changes have been made, however, in these requirements by the chairman in revising the latest draft, and time did not permit of furnishing all members the latest revision. At the meeting in question there was present a very good attendance of members of these two committees, although not all members were there.

REQUIREMENTS FOR CONSTRUCTION OF STANDARD RAILWAY CAR STORAGE HOUSES

A standard railway car storage house should be one of non-combustible, or slow-burning character, throughout, and be so constructed and protected that it may not contribute in any manner toward the spread of fire therein, and contribute only, in case of fire, not to exceed sectional losses of the structure. One single division should not exceed dimensions to expose to any one fire a greater number of cars therein than would represent a valuation of $200,000 of combustible rolling stock, or a total interior trackage of not more than 1200 ft.

(NOTE:—The following are recommendations from the standpoint of fire protection only, and are in no way intended as a detailed guide to architects or mill engineers with reference to the strength which any building may require due to size or occupancy.)

SECTION 1. WALLS:—(Approved concrete construction is not covered under this specification.) Walls to be of good, hard-burned brick, laid in best of lime and cement mortar.

(a) Outside Walls:—When of pier construction, piers to be not less than 20 ins. thick, the face of pier to measure not less than one-fourth as much as the space between centers of piers, and the wall between piers to be not less than 12 ins. thick. When without piers, to be not less than 16 ins. thick.

Where exposed, to be carried full thickness of wall, at least 5 ft. above roof, to be provided with durable and non-combustible coping. Where roof is of fire-resistive construction, walls to extend to roof. If exposed, walls to be solid, or any openings therein to be protected in a standard manner.

(b) Cut-Off or Division Walls of Fire Sections:—To be not less than 16 ins. thick, and when walls are over 60 ft. in length, to be not less than 20 ins. thick, or to be strengthened by equivalent piers or pilasters, spaced not over 20 ft. center to center, the walls between piers being not less than 16 ins. thick.

To be not less than 5 ft. parapet, carried full thickness of wall, projecting through and beyond cornice 8 ins., with durable and non-combustible coping. Where roof is of fire-resistive construction, parapet may be modified.

To be no openings in division walls separating car-storage sections, except that for every 100 ft. of length there may be one opening in wall, of an area not exceeding 21 sq. ft., the same to be protected with a standard automatic closing fire-door on each side of opening. End walls to have no openings within 5 ft. of division walls.

SECTION 2. HEIGHT:—One story, without basement or space below, except at pits. Height of walls not to exceed 20 ft. at eaves line, or 25 ft. at peak of roof above the floor level, the slope being from 1 in. to 1 in. per foot.

SECTION 3. AREA:—Sections between standard cut-off or division walls to contain not over 16,000 sq. ft. of floor area. Distance between centers of adjacent tracks not to be greater than 12 ft. or less than 11 ft.

SECTION 4. ROOF AND ROOF SUPPORTS:—

(a) Post or Column Covering (when of Fire-Resistive Type):—All vertical metal supports to be insulated by not less than 4 ins. of concrete, or of terra cotta, or of such other insulating material as may be approved by the National Board of Fire Underwriters, independent of any air space next to the metal. Well-laid brick is strongly preferred for column covering.

(b) Girder Covering (when of Fire-Resistive Type):—All metal girders shall be insulated throughout by not less than 4 ins. of concrete, or of terra cotta, or of such other insulating material as may be approved by the National Board of Fire Underwriters.

NOTE:—No plaster of paris or lime mortar shall be used for the purpose of insulating material, nor shall any plaster, whether or not on metal lathing, be considered a part of the covering required.

No single block or unit of insulating material used for column covering shall have a greater vertical dimension than 6 ins. when placed in position, nor shall the shells and web of hollow tile or terra cotta blocks be less than 1 in. in thickness, and these blocks shall be laid up with Portland cement mortar, and the said blocks be suitably tied or anchored together.

(c) Roof (when of Fire-Resistive Type):—To be of an approved system of brick, concrete or terra cotta, or other non-combustible material which may be approved by the National Board of Fire Underwriters for such purpose, with satisfactory insulation of special supports or tie-rods. Roof covering to be of gravel or approved composition.

(d) Roof and Roof Supports (When of Slow-Burning Type):—Roof timbers to be not less than 3-in. splined plank. To have timbers (preferably single stick) not less than 6 in. x 12 in., spaced not less than 6, nor more than 10 ft. on centers, supported by wooden posts, not less than 10 in. x 10 in., and without trusses. Where roof timbers enter walls at opposite sides, there to be at least 8 ins. of brickwork between ends of beams, which shall be self-releasing. To be without monitors. Roof covering to be of gravel or approved composition.

SECTION 5. SKYLIGHTS AND VENTILATORS:—Skylights to be of flat type, wire glass and metal frames, constructed in accordance with National Fire Protection Association standard. Ventilators, if any, to be of metal.

SECTION 6. CORNICE:—Cornice, if any, to be of non-combustible material and plain finish.

SECTION 7. FINISH:—If any, to be non-combustible, and without concealed spaces.

SECTION 8. FLOORS:—To be of brick, concrete, stone or earth.

SECTION 9. PITS:—To be constructed of non-combustible material throughout, including floors, steps and walls, and to have not more than two track sections communicating.

SECTION 10. TRACKS:—To run clear from building, without break or transfer table. To be terminated by suitable bumpers, so that there will be a clear space of not less than 3 ft. between bumpers and wall of building. Special track-work in front of building to be provided with guard rails where necessary.

SECTION 11. TRACK DOORS:—Track doors to be in pairs, to be arranged so that whether open or closed, any door of one pair will not interfere with the operation of any other pair. When within 10 ft. of cut-off walls, to be covered and hung as for a swinging standard fire-door. Approved metal roller doors may also be used.

SECTION 12. HAZARDS:—All electrical, heating, power and occupancy hazards to be installed and maintained, and where necessary to be cut off, in accordance with the rules and requirements of the National Board of Fire Underwriters, as published in specific pamphlets.

RULES AND REQUIREMENTS FOR INSTALLATION OF AUTOMATIC SPRINKLER EQUIPMENTS IN RAILWAY CAR STORAGE HOUSES

The rules and requirements of the National Board of Fire Underwriters for sprinkler equipments, automatic and open systems, as recommended by this association, in published edition of 1905, are to be observed in protecting this class of property, and in addition thereto the special features as herein recommended are to apply.

Attention is also called to the necessity of sub-dividing the areas of street railway property, so that an excessive amount of value shall not be exposed to any one fire.

SECTION 1. CEILING CURTAINS:—

Permanent ceiling curtains are recommended in buildings having a height of over 23 ft., from floor to ceiling. These curtains may be constructed of non-combustible material, or of not less than 1-in. tongued and grooved boards, coated on both sides with non-inflammable paint; curtains to sub-divide ceiling into pocket areas not exceeding 5000 sq. ft. each, and be of a depth from ceiling to trolley wire. Inspection departments having jurisdiction should be consulted as regards the specific location of these curtains.

SECTION 2. AISLE SPRINKLERS:—

(a) In addition to the regular ceiling installation, sprinklers to be placed on both sides of each track, in an upright position, on horizontal pipe lines parallel with tracks, and to be so located that water will spray directly into cars through side windows of car bodies; the sprinklers to be at such a height that their deflectors will be from 2 to 4 ins. below the upper sash-rail of car windows.

(b) Distance between sprinklers on aisle lines not to exceed 8 ft.

(c) The standard pipe schedule to govern installation of aisle lines, except that no pipe smaller than 1 in. to be used.

(d) When the distance between sides of cars on adjacent tracks does not exceed 4 ft., one line of sprinklers to be placed in the center of each aisle between tracks.

(e) When the distance between sides of cars on adjacent tracks exceeds 4 ft., two lines of sprinklers to be installed. Sprinklers to be placed not less than 6 ins. nor more than 12 ins. from the sides of cars to be protected.

NOTE:—When the distance between the sides of cars in adjacent tracks is less than 12 ins., or where aisle lines in accordance with this section may not be practicable, as at curves, switches, transfer tables, car elevators, repair and paint shops, special instructions from inspection departments having jurisdiction, should be obtained as regards installing raised or altered lines.

(f) Sprinklers to be placed between cars and partitions, division, or outer walls, not less than 6 ins. nor more than 12 ins. from the sides of cars to be protected.

(g) Sprinklers on all aisle lines to be staggered spaced.

SECTION 3. SUPPLY MAINS TO AISLE SPRINKLERS:—

(a) Aisle sprinklers to be supplied through independent connection from main risers, taken from above and close to dry pipe valves; shut-off valves to be provided for ceiling and aisle systems, so arranged that either can be controlled independently.

(b) Aisle lines not to be supported by nor connected to ceiling sprinklers. Special hangers or supports to be provided that aisle lines may be rigidly secure.

(c) Ceiling sprinkler lines to be protected against short circuit from contact with trolley poles.

SECTION 4. PITS AND UNDERFLOOR SPACE:—

Underfloor space where communicating with pits, to be sprinklered.

SECTION 5. HAND FIRE APPLIANCES:—

Auxiliary hand fire appliances are deemed essential, as fires within car bodies must not be expected to be extinguished minutely by sprinklers, and a full equipment of approved chemical extinguishers or hand-hose service to be supplied. (See Section S, Rule 10, N. F. P. A. Sprinkler Rules.)

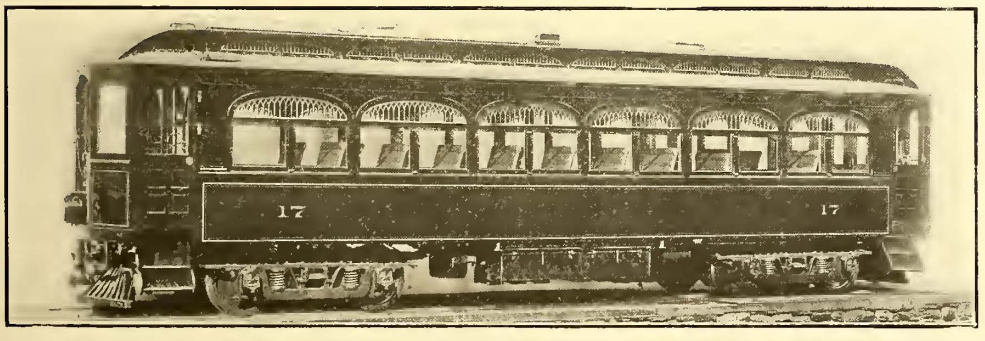
Motormen and conductors of the Stark Electric Railway, of Canton, Ohio, have been required to undergo an examination similar to that for employees of steam roads. A test for color blindness, hearing and sight and a physical examination were held. It was required that all employees, to retain their positions, must pass a satisfactory examination and secure a physician's certificate. With only one exception, all the crews passed the examination. This is one of the innovations instituted by General Manager F. L. Mowrey.

JOINT USE OF TRACK BY ELECTRIC AND STEAM ROADS IN ILLINOIS

The Warsaw Division, of the Keokuk & Western Illinois Electric Company, of Keokuk, Ia., is operated under rather unusual conditions. Warsaw lies across the Mississippi River and about five miles south of Keokuk, and in reaching it the electric line is operated over the tracks of three different companies, in addition to those of the operating company. The river is crossed on the railway bridge of the Keokuk & Hamilton Bridge Company. After leaving the bridge, the tracks of the Wabash Railroad are used for a distance of about 3000 ft. At this point a spur takes off a distance of about 1 mile to the city of Hamilton, but the main line continues down the river over the tracks of the Toledo, Peoria & Western Railway. When near Warsaw, a branch line constructed by the electric railway company leaves the steam road tracks and leads up the river banks into the town of Warsaw. The joint use of the tracks by the several companies necessitates particular attention being given that the electric cars are run on schedule time. All steam trains, when on schedule time, have the right of track over electric trains. When steam trains are late, however, conductors of the electric trains are instructed to obtain telegraphic train orders against the late trains from the despatcher's office at Peoria, Ill. Between Keokuk and Hamilton, the electric trains are governed by the rules of the Keokuk & Hamilton Bridge Company. A. D. Ayres, manager of the electric line, states that no difficulty whatever is experienced in the joint operation of electric and steam cars over the same track. An extension of the line of the Keokuk & Western Illinois Electric Company will be made to Carthage, Ill., during the coming year. The extension, which will be 12 miles long, will continue east from Hamilton and will pass through Elvaston, a town of about 500 inhabitants. Carthage has a population of 3500, and is the county seat of Hamilton County.

HANDSOME INTERURBAN CARS FOR PHILADELPHIA & WEST CHESTER TRACTION COMPANY

Seven fine interurban cars are now being placed on the lines of the Philadelphia & West Chester Traction Company, which connect the suburban towns of West Chester, Clifton, Garrettford, Llanerch and Ardmore with the surface, subway and elevated lines of the Philadelphia Rapid Transit system. The company has recently reconstructed its entire system to meet the demands of a rapidly increasing population to the west and northwest of the city.



A SIDE VIEW OF THE HANDSOME INTERURBAN CAR ADOPTED BY THE PHILADELPHIA & WEST CHESTER TRACTION COMPANY

The cars, which were built by the J. G. Brill Company, show very clearly that the policy of the railway is to provide its patrons with all the luxury, as well as comfort, possible to the most advanced forms of interurban equipment. As will be seen in the illustrations, graceful design is combined with powerful construction; but the cars themselves must be seen to have an adequate idea of their splendid appearance. The exteriors are painted a rich maroon with simple stripings in gold leaf. Below the windows the sides and vestibuled ends are sheated with steel. It is hard to conceive a more graceful arch than is embodied in the upper part of the twin windows and the ventilator sashes. The effect is heightened by the arched row of green art glass in small diamond sections, set in the leaded glass of the window heads, and the same kind of glass is entirely used for the ventilators. In the interiors a light-green tinted dome of empire style, decorated with gold festoons of ribbon, contrasts pleasantly with the rich dark red of vermilion wood, which constitutes the interior finish. The woodwork is richly and simply carved and inlaid, and the bronze trim substantially and well designed. Clusters of lights, shaded by frosted glass globes, are set at intervals in the dome, and single lights are placed along the lower ventilator rails. The window sashes are arranged to be raised to their full height, and have balance weights, to make their operation easy. Between the larger compartment and the smoking compartment is a partition of vermilion wood, with sliding door, glazed in the upper part, and with windows on either side and leaded glass transom above. The partition is arranged to be readily removed from the car if desired. Single sliding doors, at either end, and the vestibule doors are also of vermilion wood. High back seats of generous dimensions are upholstered in green leather. Interlocking rubber tiling covers the floor, and, altogether, the interior presents a most attractive appearance. The bottom framing is entirely of steel, and consists of angle-iron side sills with extra wide sill plates; these sill plates take the place of inside and under trusses. The intermediate members and crossings are also of angle iron, with large gusset plates over the needle beams. The flooring is composed of cement, laid on galvanized corrugated iron and covered with interlocking rubber tiling.

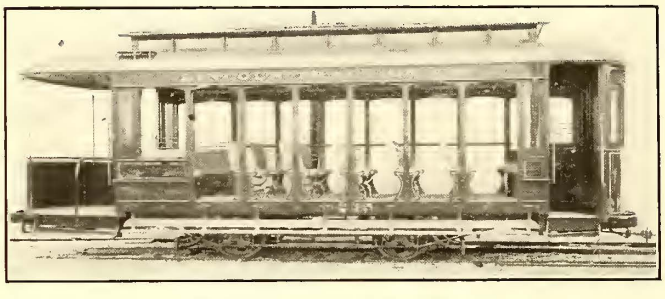
INTERIOR OF INTERURBAN CAR FOR THE PHILADELPHIA & WEST CHESTER TRACTION COMPANY

The general dimensions of the car are as follows: Length over the body, 36 ft.; length over the vestibules, 44 ft.; width over the sills, including the side sheathing, 8 ft. 6 ins.; height from the rail over the trolley, 12 ft. ⅜ ins.; distance between the centers of the side posts, 2 ft. 10 ins.; thickness of the corner posts, 3⅝ ins., and thickness of the side posts, 2½ ins. and 4¾ ins.

The cars are arranged for head-end train control, and have doors in the vestibule ends, to permit passing from one car to another. All of the cars are fitted with pilots at each end, as they are to be operated singly as well as in trains, and are to run in either direction.

CONVERTIBLE CARS FOR LINCOLN, NEB.

In 1891 the first electric cars were put in service in Lincoln, Neb., and the Lincoln Traction Company is now operating ninety cars over its 40 miles of tracks. In the paving of the roadbed the company has favored, to a large extent, the use of vitrified brick, which is manufactured near the city, and the manufacturing of this vitrified brick now forms one of the



CONVERTIBLE CAR, OPEN

city's chief industries. Lincoln is an important railroad city, on account of the presence of the State capitol, State institutions, several colleges and university, and the street railway company's tracks carry passengers direct from the Union Depot to these points of interest, which are mainly located in the suburbs, four or five miles distant. The stock yards and

SEATING ARRANGEMENT OF LINCOLN CAR

packing houses, located at West Lincoln, also create traffic on the lines which serve this district.

The latest addition to the rolling stock of the Lincoln Traction Company comprises four grooveless post convertible cars, built in St. Louis by the American Car Company, who also built four cars for this road of a similar character about a year ago; some of the first electric cars put in operation were the product of the John Stephenson Company. The new cars are particularly interesting on account of a motorman's compartment on the left side of the forward platform, having a diagonal partition, including a "semi-accelerator" swing door extending from vestibule corner post to inside post in body end. The rear platform is of the "Detroit" type, with a dividing railing extending three-quarters of the width of the platform. Another unusual feature consists of fixed panels between the double corner posts and side posts at the rear of the car, giving space for longitudinal seats at the rear corners, accommodating three passengers each, and at the same time increasing the standing space near the doors. These features were included in the cars furnished last year, and have successfully met the conditions in Lincoln. The cars seat twenty-eight passengers each and provide an unusually large amount of standing room. The interiors are handsomely finished in golden oak, with ceilings of birch veneer decorated. The sashes and panels are arranged to be raised into pockets in the side roofs. The seats are of Brill manufacture, having brackets between the posts and the backs, which not only strengthen the backs and enclose the space, but serve as grab handles. The flooring is double and the interspace filled with mineral wool.

The length of the cars over the end panels is 20 ft. 7 ins., and over the vestibules 30 ft. 7 ins.; width over the sills, including the sill plates, 7 ft. 6½ ins.; over the posts at the belt, 8 ft. 4½ ins.; sweep of the posts, 5 ins.; distance between the centers of the posts, 2 ft. 7 ins.; height from the floor to the ceiling, 8 ft. 7⅞ ins.; from the track to the under side of the sill, 2 ft. 5⅜ ins., and from the under side of the sills from the trolley board, 9 ft. 5⅞ ins.; from the track to the platform step, 14 ins., and from the track to the running board, 18 ins.; length of the seats, 33 ins.; width of the aisle, 24 ins. The cars are mounted on 21-E single trucks, having 8-ft. wheel base, 33-in. wheels and 4-in. axles. Two motors are used per car of 27-hp capacity each. The weight of a car and truck without the motors is 15,300 lbs.

PROPOSED INTERURBAN RAILWAY BETWEEN NORWALK, OHIO, AND BLUFFTON, IND.

The Riggs & Sherman Company, of Toledo, has been engaged to make preliminary surveys and estimates for a construction line from Norwalk, Ohio, to Bluffton, Ind., the route being practically an air line. The road would pass through every county seat between these terminals, viz: Tiffin, Findlay, Ottawa, Van Wert and Decatur. At Norwalk connection would be made for two lines for Cleveland, and at Bluffton there are two lines for Indianapolis, thus giving excellent opportunity for through traffic between these centers. An electric line is now building through Ottawa to Toledo, thus giving an outlet to that city. It is claimed that the route from Toledo to Indianapolis and from Cleveland to Indianapolis would be shorter than any of the existing steam lines, and much shorter than any probable electric lines. At a meeting, held at Van Wert last week, J. W. Miller, of Kalida, was chosen president, and W. B. Jones, of Van Wert, secretary. I. R. Tudor, of Van Wert, N. E. Mathews, of Ottawa, and Harry R. Moltz, of Decatur, Ind., were chosen a committee to effect corporate organization. F. L. Webster, of Van Wert, was elected treasurer, and L. E. Gleason, of Van Wert, Dr. C. F. Douglas, of Kalida, and John B. Houlthouse, of Decatur, were chosen trustees, in whose name the right-of-way will be taken. This is one of the longest electric lines projected in this district.

TESTS OF 500-KW STEAM TURBINE

At the convention of the Iowa Electrical Association, held recently at Des Moines, a report was made by Messrs. Austin Burt and Niels Christensen of some tests made by the Citizens Gas & Electric Company on a 500-kw Curtis steam turbine, installed in its station at Waterloo, Ia.

The turbine was of the four-stage type. Steam at 150 lbs. without superheat was used. Water for the step-bearing and oil for the middle and top bearings were supplied by duplex pumps. The air pump of the surface condenser, which was of the Edwards type, was driven by a 12-hp motor, while a 30-hp motor drove the circulating water pump. Current for exciting the fields of the generator was furnished by a 25-kw horizontal Curtis turbo-exciter. All determinations were made by weighing the condensed water. Steam from each of the auxiliaries was condensed by coils immersed in cold water.

The results of the tests are given in the following table:

TABLE I.

	A Length of Test Hours	B Average Load Kw	C Per Cent. of Capacity	D Steam Pressure Lbs.	E Vacuum in Inches	F Total Steam Used Lbs.	G Steam per Kw Hour Lbs.	H Builder's Guarantee Lbs per Kw Hour
1. Turbine ½ load.....	1	253	50.6	150	27.87	5487	21.67	23.5
2. Turbine variable load	8	366	73.2	149	26.91	63955	21.82	23.0
3. Turbine ful load ...	2	518	103.6	147	27.81	20370	19.61	21.
4. Turbine 50% overload	1	750	160.	144	28.02	14635	19.52	21.5

The water consumption of each of the auxiliary units, as well as the total consumption for auxiliaries and generator, is shown in Table 2.

TABLE II.

	Average Kw	Step and Oil Pumps Lbs.	Circulating and Air Pumps Lbs	Exciter Lbs.	Total Auxiliaries Lbs.	Generator Lbs.	Total Generator and Auxiliaries Lbs.	Total Coal per Kw Hour Lbs.
Turbine, ½ load.	253	.47	2.86	1.61	4.94	21.67	26.61	4.09
Turbine, variable load.....	366	.31	2.01	1.05	3.37	21.82	25.19	3.87
Turbine, full load.....	518	.24	1.28	.95	2.47	19.61	22.08	3.27
Turbine, 50% overload.....	750	.18	.88	.65	1.71	19.52	21.23	3.34

STARTING UP OF AN ALLIS-CHALMERS STEAM TURBINE

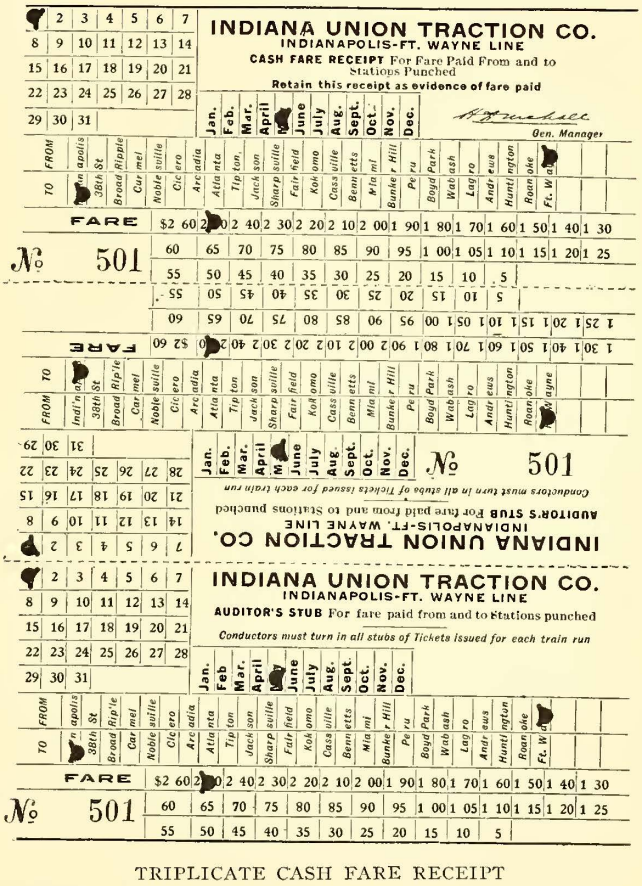
A large steam turbo-alternator built by the Allis-Chalmers Company has recently been started up under such circumstances as to deserve chronicling. The turbine referred to is one of 5500-kw rated capacity, installed in the Kent Avenue power house of the Brooklyn Rapid Transit Company. The turbine and its direct-connected alternator were ready for operation on Feb. 1, but the boilers, condensing apparatus, piping, etc., were not completed until late in March. While lying idle for nearly two months in an uncompleted station, the insulation of the generator windings naturally became damp, and therefore, as soon as steam was available for running the turbine, it was started up at part speed to dry out the generator. This drying-out process was going on when, on the morning of March 27 a mishap at another power house left the railway company short of power and it was decided to put the new turbine in operation. The turbine was run slowly until 12 o'clock to dry out the generator. Insulation tests were then conducted and the load was then gradually put on the turbine, until at 3:05 the turbine was carrying a little over 3000 kw, which was all that the railway company needed at that time. At 3:45 p. m. the unit was carrying over 4000 kw. On the following day the load ran up to over 5000 kw, and on the succeeding day it reached 7000 kw, the turbine taking heavy loads during the morning and afternoon peaks, and running until late each night.

On March 30, the other apparatus of the transit company being again in working order, an opportunity was given to lay off the turbine. It was started again, however, on April 1, and has been in continuous operation ever since.

TRIPLICATE FARE RECEIPT FOR INDIANA THROUGH INTERURBAN RIDING

For the through service between Fort Wayne and Indianapolis inaugurated on May 1 by the Indiana Union Traction Company and the Wabash Valley Traction Company, a new triplicate cash fare receipt has been devised by William H. Forse, Jr., auditor of the former company. It was realized that a passenger who overlooks buying a ticket does not wish to be bothered by several fare collections during his journey, and therefore a receipt had to be invented to meet the peculiar conditions arising from through service over the lines of two companies.

The receipts are made up in pads of fifty, and the three parts are so folded that the conductor can punch like sections simultaneously. The passenger's portion of the receipt



TRIPLICATE CASH FARE RECEIPT

is not only indicated by the different text in the upper right-hand corner, but by the red printing in addition. The two audit stubs, which are exactly alike, are turned over by the conductor to the auditor's office of the road upon which he ends his day's run. In this office the clerks separate the two stubs to send one to the auditor of the connecting line that he may calculate the number of passengers carried, earnings, etc. It will be noted that the conductor must make five perforations in all—two for the date, two for the starting and stopping points, and one for the amount paid.

FINANCIAL INTELLIGENCE

Wall Street, May 9, 1906.

The Money Market

There has been very pronounced relaxation in the money market during the week, and it now looks as if we had seen the end of any tight money. Call loans were made as low as 2½ per cent, and time money was offered at 5¼ per cent, with borrowers not disposed to pay over 5 per cent for any period. This change is the natural result of the cessation of shipments of money to the Pacific Coast. Since the movement began on April 18, the city banks have transferred a total of $34,468,000 through the Sub-Treasury and by mail and express. Some additional small amounts may be sent, but these will represent merely transfers of relief money. The ease in money is due to the large gold movement and the Treasury policy of advances against actual engagements. Since May 1 the engagements amount to $15,500,000, and the arrivals of gold to only $6,000,000. Since the beginning of the import movement on April 12 the engagements aggregate $48,370,000, the arrivals $19,362,600, and the amount due to come $29,007,400. It is expected that the Bank of England directors will advance the official discount rate on Thursday, but the Bank of France has adopted a liberal policy, and will release gold for New York. It is said that the French bank will release $5,000,000 each week until the American demand has been filled. There is nothing in the domestic situation other than trade activity, that would make for firm money, and the outlook is encouraging.

The sterling exchange market has developed a decidedly firmer tone, and rates are fully ½ cent higher, the advance having been due to purchases against gold imports, an inquiry for remittances and the inactivity of loan bills. Until grain and cotton moves out more freely the market will be governed by bankers' requirements.

The Stock Market

The past week has been an eventful one in Wall Street, and the developments having direct relation to the securities market have been of more than ordinary importance. The Garfield report on the Standard Oil Company, which President Roosevelt submitted to Congress on Friday, had been anticipated with some apprehension, but it contained some very favorable suggestions regarding the railroads, and really proved the influence which turned the stock market. From the date of the San Francisco disaster the market underwent liquidation on a large scale, and prices declined in a semi-panicky manner. Weak holders were shaken out, and several plungers were compelled to throw over a big line of stocks. Following the Garfield report came the news that the miners convention had decided to accept the terms of the 1903 agreement for a period of three years, thereby removing all labor troubles in the anthracite trade. The practical suspension of currency shipments to the Pacific Coast was another favorable influence, and the result was a sensational recovery in the whole market, under the lead of Reading, which advanced nearly 20 points from the low level of last week. The improvement was largely the result of short covering, assisted by some "bargain" buying, but the market was heavily oversold, and the recovery was only a natural one, although it has run further than expected. We have had all the liquidation possible, and with easier money, good crop prospects and activity in trade the outlook is more promising for a better market.

The local traction shares were strong, and Brooklyn Rapid Transit was prominent in the recovery, the improvement in it having been based on large earnings.

Philadelphia

Very little activity developed in the local traction shares during the past week, and although prices displayed some irregularity, the general tread of values was upward. At the beginning of the week the liquidation in the general securities market was reflected in lower prices for the street railway shares, but toward the close there was some good buying, which lifted prices for several issues substantially above those prevailing at the close of the previous week. Philadelphia Company common, after selling at 49¾ at the opening, advanced to 51, and closed within ⅛ of the highest, on transactions amounting to upward of 6000 shares. Sales of the preferred stock were made at 48¾ and 49, while the unstamped receipts, representing about 2500 shares of stock, sold at 34. Philadelphia Rapid Transit also recovered from the recent depression, about 4000 shares changing hands at from 25⅞ to 27. Philadelphia Traction was unusually active, upwards of 700 shares selling at 98¼ and 98½. Union Traction, after selling at 62, jumped to 63, on the purchase of about 700 shares. Consolidated Traction of New Jersey eased off from 79 to 78⅛, but later recovered to the opening figure. Second & Third Street Passenger stock sold at 29½ for a small lot, representing a loss of about 7 points. Other transactions included United Companies of New Jersey at 262½, American Railways at 51½ and 51¾, and Railways General at 67⅛.

Chicago

The market for tractions at Chicago has been very quiet, trading for the most part being limited to odd lots. Prices, however, ruled firm. North Chicago, after selling at 35, broke to 32, but subsequently recovered to the former figure, while West Chicago rose from 26 to 29 on the exchange of 25 shares. Chicago Union common sold at 5⅞ and 6 for 200 shares, and 100 preferred brought 17. Chicago & Oak Park Elevated sold at 6 for 300 shares, and South Side Elevated moved up to 90. A small lot of Metropolitan Elevated brought 26½, and 125 shares of Northwestern sold at 24.

Other Traction Securities

Trading in the Baltimore tractions was confined almost entirely to the United Railway issues, about all of which recovered part of the recent losses. The free stock sold from 15 to 15⅝ for about 600 shares, while the pooled advanced from 15½ to 16⅜, about 2500 shares changing hands. The free incomes rose from 68⅞ to 69¾, on the exchange of about $75,000 bonds, and the certificates representing bonds deposited brought prices ranging from 67½ to 68½. The 4 per cent bonds were quiet but steady, upwards of $50,000 changing hands at 92. Macon Railway & Light 5s sold at 100, and $10,000 Norfolk Railway & Light 5s brought 99¾. The Boston market was dull and irregular. At the beginning of the week Boston Elevated dropped a point to 153, but subsequently recovered all of the loss. Boston & Worcester common moved between 35 and 36½, and the preferred sold at 87½. Massachusetts Electric issues were heavy. The common, after selling at 18, ran off to 17½, on sales of a few hundred shares. While the preferred declined from 65½ to 64. West End common changed hands at 98 and 99, and the preferred sold at 115 and 114¾. Trading in the tractions in the New York curb market has been extremely light, owing largely to the transfer of the dealings in the Interborough-Metropolitan issues to the New York Stock Exchange. Interborough Rapid Transit receipts alone figured in the week's transactions on the curb, about 1500 changing hands at from 217¾ to 226. The majority of traction issues showed a decline on the Cleveland exchange last week. Northern Ohio Traction & Light common dropped from 30 to 28¾ on sales of about 800 shares. This in the face of the statement that the stock will be placed on a 2 per cent basis in July. About $20,000 worth of the Consolidated 5s sold at 100¼, a fractional decline. Lake Shore Electric Railway declined to 15¼, a fall of 1 point during the week. Cleveland & Southwestern Traction sold at 14, also a fractional decline. The new Aurora, Elgin & Chicago sold at 30½, a decline of 2 points from the price of the old common, which is supposed to have the same value. Cleveland Electric Railway sold at 78. Cincinnati, Newport & Covington common continues to advance on the Cincinnati exchange. The stock opened the week at 64, and sold at 66 the early part of this week. Cincinnati, Dayton & Toledo stock was active for the first time in some months, and it moved up to 27 on sales of about 600 shares. Cincinnati Street Railway sold at 144½. Toledo Railways & Light declined to 30, and Detroit United to 92, in sympathy with movement on the New York exchange. At Columbus, the Scioto Valley Traction common has been in strong demand at around 39. The property is making gains of 80 per

cent gross over last year, and dividends on preferred stock will start July 1. Columbus Railway & Light common has been active at around 82, and the old Columbus Railway common was active at 103.

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 3	May 9
American Railways	51¼	51½
Boston Elevated	a154	153
Brooklyn Rapid Transit	75	82⅝
Chicago City	150	150
Chicago Union Traction (common)	6⅛	6⅛
Chicago Union Traction (preferred)	21½	21½
Cleveland Electric	80	78
Consolidated Traction of New Jersey	79½	79
Detroit United	92¾	94
Interborough Rapid Transit receipts	219	223
Interborough-Metropolitan Co. (common), W. I.	49¾	52
Interborough-Metropolitan Co. (preferred), W. I.	82½	85¼
Interborough-Metropolitan Co. 4½s, W. I.	—	87¾
International Traction (common)	37½	36½
International Traction (preferred), 4s	73	71
Manhattan Railway	148	152½
Massachusetts Elec. Cos. (common)	17	17¾
Massachusetts Elec. Cos. (preferred)	64½	65
Metropolitan Elevated, Chicago (common)	26	26½
Metropolitan Elevated, Chicago (preferred)	—	64½
Metropolitan Street	108	113
Metropolitan Securities	70⅝	70¼
New Orleans Railways (common)	30½	31
New Orleans Railways (preferred)	—	—
New Orleans Railways, 4½s	—	86
North American	93¾	96⅞
North Jersey Street Railway	27	27
Philadelphia Company (common)	49¾	50¾
Philadelphia Rapid Transit	25⅜	26¾
Philadelphia Traction	98¼	98½
Public Service Corporation 5 per cent notes	94	94
Public Service Corporation certificates	—	68
South Side Elevated (Chicago)	88	89
Third Avenue	126	127
Twin City, Minneapolis (common)	110¾	113½
Union Traction (Philadelphia)	62	62¾
West End (common)	98	98½
West End (preferred)	114½	114½

W. I., when issued. a Asked.

Metals

According to the "Iron Age," the production of anthracite and coke-iron in April amounts to 2,073,645 gross tons, compared with 2,165,632 tons in March. The furnaces are running at the rate of 484,000 tons a week. Foundry pig is rather quiet, with an easier tendency in some localities. Further activity is reported in steel-making irons. The cast-iron pipe foundries continue exceedingly busy. Pacific Coast orders for structural material have been very light. Further rail orders for 1907 are looking up. The Pennsylvania enquiry is for 180,000 tons, and two Western roads are in the Chicago market for 70,000 tons. Copper metal continues strong; heavy sales for near delivery being reported at 19 cents. Quotations are unchanged at 18½ to 18¾ cents for Lake; 18¼ to 18½ cents for electrolytic, and 18 to 18¼ cents for castings.

YOUNGSTOWN & OHIO COMPANY'S PLANS

The Youngstown & Ohio River Railway Company, which is being promoted by prominent Cleveland people to build a line from Youngstown to the Ohio River at East Liverpool, has secured a 99-year lease on 6 miles of the Pittsburg, Lisbon & Western Railroad (steam), extending from Salem to Washingtonville. This section will be electrified immediately and will be used as an entrance to Salem from the main line of the road. The Cleveland Construction Company, which is building the new line, has secured all the required right of way, has purchased rails and ties for 28 miles of road, and will commence construction work immediately from Washingtonville to East Liverpool, by way of Lisbon. Officials of the company state that there is no truth in the report that it has affected amicable arrangements with the Youngstown & Southern Railroad, which is operating a line from Youngstown to Columbiana, and which, it is reported, proposes to build a parallel line through Lisbon to East Liverpool

ANNUAL MEETING OF THE NEW YORK STATE ASSOCIATION

It is officially announced that the regular annual convention of the Street Railway Association, of the State of New York, will be held at the Grand Union Hotel, Saratoga, N. Y., on June 26 and 27. It is confidently believed this meeting will be one of the most successful ever held under the auspices of the association. Saratoga is conveniently reached from all parts of the State; the hotel proprietors promise to take the best of care of the convention; an excellent programme of papers, reports and discussions is in course of preparation and especial entertainment features will be provided for the ladies. Further particulars concerning the programme, and other features of the meeting will be published in a later issue.

CLASSIFIED ACCOUNT OF SUBWAY OPERATING COMPANY'S EXPENSES GETTING READY TO RUN

August Belmont, president of the Interborough Rapid Transit Company, has supplemented his former statement of the investment of the company in the operation of the subway with a moderately detailed account of the expenditures under the head of "Equipment." This item, as it was lumped in the first statement, made it appear that equipment was responsible for upwards of $22,000,000. It now appears that the $22,000,000 included all of the company's expenses up to the time that the company began running trains, expenditures for salaries, lighting, legal expenses and such matters while the enterprise was still in the constructive stage and was earning nothing, having been regarded as capital investment. In this matter the company followed the usual practice of accounting, even in charging interest on the investment during construction to capital account.

The detailed statement of capital expenditures follows:

Engineering	$444,461.09
Main power station building, engines, generators, boilers, tools, machinery, etc.	7,047,540.32
Sub-power station buildings, tools and machinery	2,145,468.16
Cables	1,940,686.82
Third rail and bonding running rail	405,349.41
Train inspection sheds and Lenox Avenue shops and yard	391,472.13
Telephone line	42,714.02
Cars	8,043,366.31
Tunnel and station lighting and equipment	364,209.42
Interest on various expenditures from date of purchase to Oct. 27, 1904	594,876.10
Office furniture and fixtures	17,128.76
Signal system	691,643.72
Legal expenses, including counsel fees and salaries of attorney and assistants, and all other law department expenses, including office rent, printing, etc., from May, 1902, to Oct. 31, 1905.	101,027.19
Salaries of general officers and clerks from May, 1902, to Oct. 31, 1905	332,787.01
Directors' fees	20,525.00
Insurance	8,208.98
Stationery, printing, advertising, etc.	24,800.40
Miscellaneous office expenses, etc.	51,700,43
Shop and yard, Fifty-Fourth Street (since abandoned)	2,074.99
Structure and track tools	6,877.09
Total	$22,676,917.35

Comptroller Metz has detailed one of the city's accountants to go over the books of the subway company and verify the above statement. Assuming that he will find it correct, there still remains the matter of $12,100,000 cost of subway lease to be explained in equal detail. The declaration of Mr. Belmont's representatives that the apparent profit of $7,000,000, for which the present company had to pay the Rapid Transit Construction Company when the lease was transferred, had all gone into the property is likewise a matter for verification by the city authorities.

LONG ISLAND'S NEW TRAIN SCHEDULE—THE PART PLAYED BY ELECTRICITY

The spring time-table of the Long Island Railroad will go into effect on Thursday, May 17. A number of additional trains will be run on the several divisions of the road and the running time of numerous trains will be reduced, thus giving faster service than during the winter, and in some respects as good as the full summer schedule. The change which will be made in June, however, will introduce still more trains. The many new locomotives which are already in use will enable the operating department to keep to schedule time, and the additional equipment of coaches and parlor cars will help to overcome one of the chief difficulties of the past, when for lack of equipment there has repeatedly been vexation on the part of the officials as well as the traveling public.

The adoption of electricity on the Atlantic division, between Flatbush Avenue station, Brooklyn, and Jamaica, and to Rockaway makes a vast difference in the running time of trains, permits the running of a greater number of trains each way and thus adds materially to the betterment of the entire service of the road. On and after May 17, 194 of these electric trains will be operated daily. The electric service will be extended to Valley Stream, on the Montauk division, 15¾ miles from Flatbush Avenue by way of the old southern road, known as the Locust Avenue route, which is to be operated as a part of the Atlantic Avenue division. Ten trains each way will be run over this section between Jamaica and Valley Stream, and thirty each way between Flatbush Avenue and Belmont Park.

A study of the new schedule shows that there will be many small changes in the time of running trains, nearly all in the interest of better service by reason of shortening the time of trips. In some instances trains will start a few minutes later than at present from the island stations, and reach the western terminals at the usual time. In several instances trains which are now doing duty for many stations will be changed, so that there shall be an express to take care of the larger stations and a local to accommodate the rest.

STUDENTS OF POLYTECHNIC INSTITUTE OF BROOKLYN MAKE TRAIN TEST

On Monday evening, May 7, the students in the electric railway course at the Brooklyn Polytechnic Institute under their instructor, Sydney W. Ashe, made a train test on one of the Brooklyn Rapid Transit Company's "L" cars on the Fifth Avenue line. The car left the Thirty-Sixth Street yards at 9:30, equipped with a new train-testing set, the thesis of Messrs. Hewlett and McCarty, of the Polytechnic. The instrument contained a roll of paper 10 ins. wide, arranged to pass under pencils which recorded line voltage, motor current, time in half-seconds, wheel revolutions and instantaneous speeds. In addition, records were taken of the peaks of the total line current, and of the motor voltage while accelerating. The test was a great success, complete data being obtained over the line from Thirty-Sixth Street to New York and return to Sixty-Fifth Street, and then to the Thirty-Ninth Street yards.

This recording device was built in line with ideas of Mr. Ashe, who had had considerable trouble in obtaining satisfactory results with the testing sets hitherto made. An interesting feature was the use of a Weston magneto tachometer, which was mounted on the end sill of a car-truck on rubber cushions. This instrument was belted to the 5-in. axle of the trailer truck. Wires were then led up from the instrument to the recording device, which followed variations of the voltmeter needle. Prior to the test the car was moved over a small stretch of track, making a given number of wheel revolutions. This distance was taped and the circumference of car wheel accurately determined. One important result of the test, was the proof of the great superiority of the Westinghouse unit switch control, over the older forms of Westinghouse upright control, and various forms of hand-control. The test was made possible by the cooperation of various officials of the Brooklyn Rapid Transit Company, namely, Messrs. Calderwood, Roehl, Gove, Smith, and their assistants, Mr. Brown and Mr. Dempsey, and was very successful.

On Monday, May 14, a similar test will be made on the railway company's instruction car No. 999, which is equipped with upright control. The Monday following, a complete test will be made on a four-motor trolley car of the latest type.

THE REORGANIZATION OF THE HUDSON VALLEY COMPANY

The reorganization of the Hudson Valley Railway Company has been completed. E. Clarence Jones & Company and Charles W. Morse, jointly, are now in control of the company, and it is intended to operate in connection with the Hudson River lines of steamers from New York to Troy and Albany, which are controlled by Charles W. Morse through the Hudson Navigation Company, and make a direct route for passengers and freight between New York and all points on the Hudson Valley Railway Company and to Lake George. The reorganized company will have $3,000,000 capital stock and a total authorized issue of $4,000,000 first consolidated mortgage 5 per cent bonds. Of these bonds, which are now the same securities as were authorized before the readjustment of the company's finances, $2,228,000 have been issued, $1,290,000 are held in the treasury to secure an authorized issue of $645,000 collateral trust bonds, of which $500,000 are outstanding and $145,000 are in the treasury; $482,000 of the mortgage bonds are reserved to retire divisional bonds. The debenture "A" income 5s amount to $700,000, of which $227,000 are in the treasury, and the debentures "B" income 2s to $2,500,000. The consolidated bonds are a first mortgage on the entire system of about 127 miles, subject only to $482,000 divisional bonds on about 26 miles.

CHICAGO TRACTION MATTERS

Mayor Dunne's letter, sent last week to Chairman Werno of the local transportation committee, in which he urged the immediate betterment of the street railway service of the city and outlined a plan for securing improvements, has been received with commendation by both municipal ownership advocates and those opposing municipalization. The traction situation, however, is awaiting the outcome of the motion for a new trial in the ninety-nine-year case made by the traction companies. Mayor Dunne feels confident that the motion will be overruled. If it is, the Mayor expects the Council to work along the lines suggested in his letter. Regarding his attitude the Mayor is quoted as having said:

"I am in favor of better service. I want it just as soon as we can get it. I will champion any plan for getting it which will not jeopardize municipal ownership. I want it made plain that I have not tried and will not try to hinder the improvement of the transportation facilities in even the slightest way. My position is directly the opposite, and I believe the lines can be rehabilitated within two years. I don't mean to wait that long before we do something in this direction. The plans and specifications for improvements can be approved in short order. Just as soon as the companies make an agreement with the city, just that moment we will have municipal ownership in easy reach. Things ought to hum from this on."

Alderman Werno sent out invitations to traction officials to attend a meeting of the Council, at which it was proposed negotiations for settlement were to begin. Among those invited were T. E. Mitten and General Counsel E. R. Bliss, of the Chicago City Railway; John M. Roach and W. W. Gurley, of the Union Traction Company, and Henry A. Blair, of the North Chicago and West Chicago companies.

The City Council, not content to wait for the decision as to whether or not a new trial should be granted the traction companies in the ninety-nine-year case, has unanimously passed an order for equipping the Blue Island Avenue cars with electricity and rerouteing them. Mayor Dunne opposes this action, because of the fear of giving the traction company additional rights in case the rehearing of the ninety-nine-year case is granted, and he may veto the ordinance.

A petition of more than two hundred property holders and business men along Cottage Grove Avenue has been presented to the Council by Alderman Bennett. The petition asks that the Cottage Grove Avenue cable line, from Thirty-Ninth Street south, be equipped with the overhead trolley. The claims of the Chicago City Railway under the ninety-nine-year case do not apply to this part of Cottage Grove Avenue.

The case involving the relative rights of the Union Traction Company and its underlying companies has been postponed, because of the illness of Judge Grosscup. Julien T. Davies, Henry W. Taft and R. R. Govin, representing New York capitalists, who came to Chicago to appear before Judge Grosscup and induce the underlying companies to apply jointly for franchises and licenses, returned to New York without having accomplished anything definite towards bringing the companies together.

INDIANAPOLIS-FT. WAYNE LINE OPENED

Through limited service between Indianapolis and Ft. Wayne over the Indiana Union Traction and the Ft. Wayne-Wabash Valley Traction Companies' lines was begun Tuesday, May 1. The first car out of Indianapolis left at 7 a. m., and made the trip in 4½ hours, and the first car out of Ft. Wayne left at 5:20 a. m., and made the trip in a few minutes less than schedule time. There are four trains each way daily, which connect at Ft. Wayne with more than ten railroads, and complete traction service through to Toledo and Lima.

Six cars are used for this service, known as the "Kenilworth," "Ivanhoe," "Talisman," "Woodstock," "Kokomo" and "Peru." They are each 62½ ft. long, and divided into four compartments, including a buffet for light luncheon. The entrance to these cars is by side doors, opening into the observation platform at the rear. This platform is enclosed by heavy plate-glass, corresponding to the oval shape of the rear end of the car. Corner settees, upholstered in leather, and camp and rocking chairs have been furnished for the observation apartment. The interior is provided with rich, figured green plush upholstered high-back seats and lounges. The buffet separates the passenger compartment from the smoking-room. The latter is large and well furnished with chairs and lounges, upholstered in leather. The forward compartment for baggage has two sliding doors. This room is separated from the motorman by an open frame work. In this compartment are placed the hot-water heater, fire extinguishers, emergency tools and telephone equipment. The seating capacity of each car is fifty-five passengers.

The initial car, "Kenilworth," was brought to Indianapolis the day before the opening of service, and the public was invited to inspect it. Frank D. Norveil, general passenger agent, and other officials of the companies were present to welcome the visitors.

THAT PUBLIC SERVICE CORPORATION REPORT

The report of earnings of the Public Service Corporation, which gained circulation in the daily press recently, and was regarded as unfavorable, is unauthoritative. In explanation, Frederick Evans, secretary of the Public Service Corporation, declared that neither he nor anyone else connected with the company gave out the figures which were a part statement of Public Service earnings.

"At the annual meeting of the Public Service in April," Mr. Evans said, "no such report was made. Neither has it been made at any other time or place. If it was to be made, the annual meeting would be the place for it. Such a report has not been made to the State. What was published were figures pertaining to only three of our lines.

"We made to the State some time ago a report which was to be given at regular intervals. It was about the amounts of the stock and securities, and things of that sort of our different properties. I cannot say whether the published figures about two or three trolley lines were correct or where they came from. I was informed that something like them were published in a financial paper recently. If that is so I do not know where the latter obtained them.

"Nothing has been given out by the Public Service Corporation."

EARNINGS OF THE SAO PAULO COMPANY

The Sao Paulo Tramway, Light & Power Company's report for the year ended Dec. 31, 1905, from the point of view of earnings is the best in its history. Gross earnings show an increase of $489,067, or 34 per cent. Net increase 31 per cent over the preceding year. The company paid 8 per cent last year on its stock and still had a surplus after the application to contingent fund of $50,000 of $363,032. Aside from the contingent fund, which after the addition noted amounted to $79,350, there seems to be no conspicuous allowance for the maintenance of the properties. If considerable sums are applied to this purpose the company's accounts as presented do not make it clear. The operating expenses of 35.1 per cent of gross earnings do not appear to conceal any large expenditure for maintenance.

EASTERN OHIO PROPERTY TO BE FORECLOSED

The reorganization committee of the Eastern Ohio Traction Company have announced to stockholders that the reorganization plan for refinancing and extending the property to connect with the Mahoning & Shenango Valley Traction Company's lines, has failed, about 15 per cent of the stockholders having refused to take part in the reorganizaton which called for an assessment of about $38 per share, for which the holders were to receive securities in the reorganized company. The bondholders will ask the Cleveland Trust Company, trustee under the mortgage, to declare the principal due, in default of the payment of interest, which means the foreclosure of the property and the wiping out of the stock, which is owned entirely by Cleveland people. In all probability a committee of bondholders will be formed to buy in the property. The system consists of about 90 miles of road, extending east from Cleveland into sparsely settled farming country. The trouble with the system is that it is composed of two branches, originally independent roads, which were consolidated some years ago. One road through this district would have been an excellent proposition, as the freight business is very heavy. If an extension could be built to connect for Youngstown and Pittsburg, and the property improved, there is little doubt that it would still be a good proposition. Last year it lacked only $8,000 of paying fixed charges and is making fair gains. The difficulty is that the physical property is depreciating because there is not sufficient capital properly to maintain it.

INFORMAL DISCUSSION OF CLEVELAND LEASING PLAN

Seven of the fifteen directors of the Cleveland Electric Railway Company discussed the franchise situation for several hours last week. As there was not a quorum, no action could be taken, but it is stated that a number of directors expressed themselves as willing to consider a leasing proposition that might be made by Mayor Johnson, providing the conditions safeguarded the property so it could not be destroyed. They are unwilling, however, to consider the price of $85 per share for the stock, which Mayor Johnson desired to use as a basis for the leasing settlement. It is doubtful if the company will submit a new franchise proposition to the city. It has submitted one and been turned down, and there are few, if any, of the directors that do not feel that any proposition at this time would be used against the company and fail to aid in the solution of the problem.

FLY-WHEEL ACCIDENT AT MANSFIELD

The main power station of the Mansfield Railway, Light & Power Company, of Mansfield, Ohio, was badly wrecked and thrown entirely out of commission on Thursday, May 3, by the bursting of the fly-wheel of the 850-hp Corliss engine, which furnished power for the street railway system. The wheel was 20 ft. in diameter, with 50-in. face, and weighed twelve tons. The engine was entirely demolished, and a large portion of the roof of the building was carried away. Surrounding buildings were damaged somewhat, and one steel stack was knocked down, while another was shifted from its position. A 450-hp Cooper engine adjoining the machine that was wrecked was badly damaged, while a 350-hp Russell engine was slightly injured by falling debris. A 450-hp Allis engine was uninjured, although covered with wreckage. One wall of the building was thrown out of plumb and will have to be rebuilt. An engineer was slightly hurt, and a fireman was burned while attempting to shut off the steam. No one was seriously injured, however.

The accident affected the public utilities of the city to a considerable extent. The entire lighting and power systems were disrupted, the street railways were tied up, and the interurban lines radiating from the city were unable to get beyond the city limits. The Shelby-Mansfield line was entirely tied up. One engine was started within 24 hours, and a small amount of power was obtained from the Ohio Central Traction Company and the Ohio Brass Company, which enabled the company to move a few cars and start some of the power and lighting circuits. A new engine has been contracted for, and factory experts are repairing the damaged machines. The loss to the plant and business is estimated at between $75,000 and $100,000. B. B. Pierce, chief engineer of the company, and Otto E. Osthof, chief engineer of the H. M. Byllesby Company, of Chicago, which has a controlling interest in the Mansfield Company, are in charge of rehabilitating the plant.

THE BASIS OF THE SOUTHERN CONSOLIDATION

A statement has been submitted in New Orleans outlining the allotments which the holders of stocks in the street railroad companies, which make up what is known as the Newman group, are to receive in a new holding company which it is proposed to organize for the purpose of taking over the properties in Nashville, Little Rock, Birmingham, Knoxville, Memphis and Houston, as referred to in the Street Railway Journal for May 5. The schedule is understood to be tentative. It proposes the following basis:

Birmingham Railway holders of 100 shares of preferred stock will receive 105 shares preferred in the new company; holders of 100 shares common will receive 150 shares new common and ten shares preferred. Memphis Railway holders of 100 shares preferred will receive 90 shares preferred; holders of 100 shares common will receive 108 shares new common. Nashville Railway holders of 100 shares preferred will receive 90 shares new preferred; holders of 100 shares common will receive 82 shares new common. Little Rock holders of 100 shares preferred will receive 105 shares new preferred; holders of 100 shares common will receive 125 shares now common. Knoxville Railway holders of 100 shares preferred will receive 100½ shares new preferred; holders of 100 shares common will receive 90 shares new common. Houston Light & Power Company holders of 100 shares preferred will receive 102½ shares of new preferred; holders of 100 shares common will receive 187½ shares new common.

CHANGE IN PLACE OF MEETING OF CENTRAL ASSOCIATION

The May meeting of the Central Electric Railway Association will be held at the Algonquin Hotel, Dayton, Ohio, Thursday, May 24, instead of at Columbus, as was reported at the last meeting. At a meeting of the executive committee of the association, held May 1, Robert W. Waite, vice-president and treasurer of the Louisville & Southern Indiana Traction Company, New Albany, Ind., was elected a member of the executive board, to fill the vacancy made by the resignation of G. F. Wells, who, as previously noted in the Street Railway Journal, has resigned as general manager of the Terre Haute Traction & Light Company, to enter the home office of Stone & Webster in Boston.

CONVENTION OF THE SOUTHWESTERN ELECTRICAL AND GAS ASSOCIATION

Final arrangements have been completed for the annual convention of the Southwestern Electrical and Gas Association, which is to be held at Galveston, May 16, 17, 18. A very interesting and attractive programme has been prepared by the committee. Mr. Stichter, editor of the "Question Box," reports that although this the first year of the inauguration of this feature, widespread interest has been shown by the members of the Association and outside electrical, gas and telephone companies, and that he has received numerous questions concerning each branch of the association, the answers and discussion of which brought forth at the convention should prove both valuable and interesting.

A pleasing entertainment has also been provided for each day of the convention, including a tour of inspection of the grade raising work of the city, the sea wall, and the dredging apparatus used in connection therewith, the latter, through the courtesy of the engineers in charge of the work, having been retained so that its operation might be seen by those present at the convention. There will also be an excursion down the harbor and to the jetties.

The Galveston Business League's rooms in the Tremont Hotel have been selected as headquarters of the convention, and many applications for reservation of rooms have already been received. Special prices have been obtained, and those expecting to attend it are requested to make application for accommodations, stating number of rooms, whether with or without bath. These should be addressed to H. S. Cooper, chairman of the entertainment committee, care of the Galveston Electric Company, so that all may be provided for and avoid confusion and misunderstandings upon arrival. Arrangements are being made by the committee for special rates on all railroads.

TUNNEL BETWEEN CAMDEN AND PHILADELPHIA

James N. Vandegrift, of Syracuse, has been commissioned to prepare plans for the proposed double-track electric railway tunnel under the Delaware River, which will connect Camden, N. J., and Philadelphia, Pa. The work calls for 2700 ft. of tunnel under the river and a mile of subway approaches. The promoters of this undertaking are the Wolf Brothers, of Philadelphia and New York. Plans for the construction, so it is said, will be ready by September.

The tunnel under the Delaware River is an important connection between Philadelphia and the electric and steam lines in New Jersey which center in and around Camden, the present means of transportation across the river being the ferries.

CORNERSTONE OF UNITED ENGINEERING BUILDING LAID

Andrew Carnegie laid the cornerstone of the United Engineering Building, at 25 to 33 West Thirty-Ninth Street, New York, Tuesday afternoon, May 8. Mr. Carnegie gave $1,500,000 for the erection of the building, which will be used as the headquarters of the American Society of Mechanical Engineers, the American Institute of Electrical Engineers, and the American Institute of Mining Engineers. The ceremony was brief, and the only decoration was a large American flag, which draped the southeast corner of the building, where the stone was laid. It is expected that the building will be ready for occupancy by Jan. 1, 1907.

ANNUAL REPORT OF THE GENERAL ELECTRIC COMPANY

The annual report of the General Electric Company, made public May 4, shows profits of $3,458,098 (including $173,389.52 from securities sold, and $798,539.27 from royalties, dividends and other sundry profits. There was paid in dividends during the year $3,861,062, and $1,000,000 was written off the company's patent account. The surplus for the year was $2,458,098, making the total surplus $12,027,295. The total sales of the year amounted to $43,146,902, and the total orders received $50,044,272. The former was an increase of about $4,000,000, and the latter about $15,000,000 as compared with last year.

The portion of the report referring to the orders received during 1905 relates in most part to the company's railway work. The company received during the year orders for over 300,000 hp of heavy traction motors, viz.: of sizes from 125 hp to 200 hp. Its orders for all railway motors for the year were about 750,000-hp capacity. The Sprague-General Electric train control was used on Jan. 31, 1906, on 4026 cars, an increase of 1029 over last year. This control has now been adopted to single-phase working. Up to Feb. 1, 1906, the company had received orders for 535 steam turbines, and had shipped to customers 346. The turbine sales last year included orders for forty-four turbines from eleven of the principal foreign countries. These turbines are now made in units of 12,000-hp rating. The company's single-phase apparatus has been ordered by many roads, among them the Pontiac & Joliet Railway, Toledo & Chicago Interurban Railway, Milwaukee Electric Railway & Light Company, Central Illinois Construction Company, and Richmond (Va.) & Chesapeake Bay Railway Company. The New York Central locomotive on Jan. 31, 1906, had run 29,568 miles. The total maintenance cost, as reported by the New York Central Company, is only about one-fourth the average maintenance cost of a steam locomotive. The West Jersey & Sea Shore Railway is now being equipped, and has 64 miles of track.

In the department of long-distance transmission of electricity reference is made to the Kern River development, where the Edison Electric Company, of Los Angeles, Cal., is installing four 7000-hp General Electric Company generators, to transmit the electric power a distance of 115 miles to Los Angeles. Another interesting plant is that of the Jhelum River, in Kashmir, India, where 5500 hp of the company's generators will be used to transmit power about 60 miles for industrial purposes, and eventually for the operation of a 156-mile electric railway. This contract was largely due to the highly successful operation of the 11,000-hp 92-mile transmission plant in Mysore, India, for which the company supplied the electrical apparatus some three years ago.

THE CLEVELAND, ASHLAND & MANSFIELD TRACTION COMPANY

Bids for building the Cleveland, Ashland & Mansfield Traction Company's proposed line have been submitted, and are now being canvassed by the executive committee, and the contract for construction will soon be let. This road is promoted by Col. C. V. Hurd, of Cleveland, and is to run from Mansfield in a northeasterly direction to Seville, in Medina County, at which point it will connect with the Cleveland & Southwestern, making a continuous and direct line into Cleveland. The route has been carefully surveyed and located, and the rights of way have been nearly all contracted for, only a few being left to be adjusted by condemnation proceedings. The bonds to be issued have all been subscribed for at par, nearly half the amount by local investors along the line, the balance by Cleveland capitalists.

The Roberts & Abbott Engineering Company, of Cleveland, under whose supervision the contracts will be let, has done all the engineering work, and is interested in the promotion. Among those who are back of the enterprise are F. T. Pomeroy and A. E. Akins, president and vice-president of the Cleveland Southwestern; J. F. Harper, L. J. Wolf, H. C. Lang and Levi Measheim, of Cleveland, and F. E. Myers, of Ashland. The chief points touched are Mansfield, Ashland, West Salem, Lodi, Leroy and Seville.

ORGANIZATION OF THE NATIONAL BRAKE & ELECTRIC COMPANY

Announcement has just been made that the plant and other assets of the National Electric Company, which were sold recently under foreclosure, were formally transferred on May 1 to the National Brake & Electric Company, a corporation of Wisconsin, with a paid-up capital of $1,000,000. The new company, as successor of the Christensen Engineering Company and the National Electric Company, will continue to manufacture air brakes and electrical machinery with extended facilities and abundant working capital. In soliciting a continuance of the patronage with which its predecessors in the business were favored, the company assures customers of superior workmanship and reasonable prices, and that prompt attention will be given to orders.

As the pioneers in the manufacture of motor-driven air compressors and in the adaption of air brakes for electric traction service, the company proposes to maintain its high position by the development of improved devices to meet the new conditions due to the more exacting demands of the present day. The general sales office has been located at No. 519 First National Bank Building, Chicago, Ill., where all correspondence to the company should be addressed.

STREET RAILWAY PATENTS

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

UNITED STATES PATENTS ISSUED MAY 1, 1906

819,044. Car Fender; John Dobos, New York, N. Y. App. filed Jan. 23, 1906. Comprises a rotary brush obliquely mounted in the car frame, and having a gear connection with one of the car wheels, whereby the brush is caused to rotate in a direction contrary to the direction of movement of the car.

819,081. Concrete Roadbed for Railways; Julius W. Schaub, Chicago, Ill. App. filed Jan. 22, 1906. A roadbed for railways having longitudinal rail supports, a body of concrete having portions located between and beneath said rail supports, means for detachably anchoring said rail supports to each other as well as to that portion of the body lying between them, and means for laterally supporting the rail supports from the outside.

810,146. Trolley Wheel Guard; James H. Lane and Uriah Gulnick, Newark, N. J. App. filed May 8, 1905. Mounted on vertical axles on the harp are a pair of L-shaped guards, adapted to normally close over and retain the trolley conductor in place under the influence of tension springs connected to the arms for this purpose.

819,189. Radial Railway and Tramway Truck; James S. Warner, Forest Gate, England. The truck frame is connected to the axle-boxes by suspension links, so arranged that they connect the journals and the truck frame and control their relative movement.

819,203. Car Brake; William W. Broga, Springfield, Mass. App. filed Sept. 23, 1904. A combined momentum and hand-brake adapted to be operated by either or both actuating means.

819,215. Passenger Car Frame; George Gibbs, New York, N. Y. App. filed May 13, 1905. Details of construction of a car frame designed to attain maximum strength and seating capacity with minimum weight.

819,277. Braking Apparatus; William L. Holman, San Francisco, Cal. App. filed April 26, 1905. A brake handle capable of operation near a wall of the car through a partial arc and a brake stem or shaft in two parts clutched together at the floor of the car, engages automatically and is released by a foot treadle.

819,292. Car Wheel; Frank Latimer, High Bridge, N. J. App. filed Dec. 18, 1905. Comprises a tire and a center interlocked transversely by independent dove-tailed interlocking means.

819,293. Electric Railway; Mathias A. Lazareff, New York, N. Y. App. filed May 19, 1905. A protected third rail which is divided into sections along the roadway, the different sections of which are individually energized as the train approaches by means of mechanical connections moved by the train.

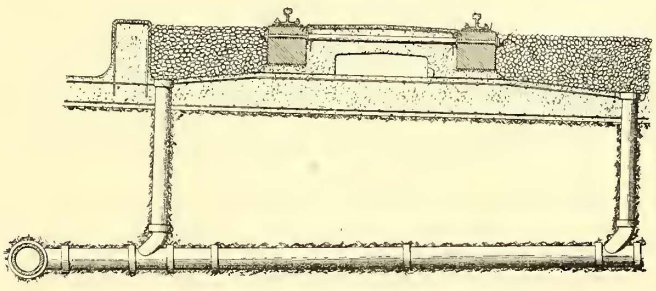
819,322. Electric Signaling; Jacob B. Struble, Wilkinsburg, Pa. App. filed Nov. 16, 1901. In order to avoid the actuation of signals by "wild" currents from the motors of passing trains, a special relay is provided in the signal circuit, which moves under the impulse of direct but not alternating currents, and which is effective to prevent actuation of the signals under "wild" currents.

819,323. Railway Signaling; Jacob B. Struble, Wilkinsburg, Pa. App. filed March 12, 1902. Relates to an alternative construction for accomplishing the same results as in the preceding patent. The transformers in this case are effected by alternating and not direct currents.

819,326. Control to Apparatus Governing the Passage of Cars or Vehicles Along a Railway; Matthias Van Asch Van Wyck, New York, N. Y. App. filed Oct. 26, 1905. Relates to means for maintaining a train-stop in operative position. The train stops are first depressed by the approach of a train and then again made operative after the train has passed.

819,327. Control of Apparatus Governing the Passage of Cars or Vehicles Along a Railway; Matthias Van Asch Van Wyck, New York, N. Y. App. filed Nov. 10, 1905. Relates to modifications of the above.

819,397. Railway Signal; Rollin A. Baldwin, South Norwalk, Conn. App. filed Feb. 6, 1904. A block signal system for single-track trolley roads, comprising a special circuit wire fed from the trolley by the passage of a car and magnets which alternately light or extinguish the signal lamps as required.



PATENT NO. 819,081

819,402. Self-Releasing Brake Handle for Tram Cars, etc. Marius Belmondo, Marseulle, France. App. filed Aug. 8, 1905. The brake ratchet is released by depressing a spring-controlled lever in the brake handle.

819,647. Switch-Operating Device; Alfred H. Gore, Shelbyville, Ind. App. filed Jan. 23, 1906. Details of construction of a lever on the car adapted to engage a lever in the roadbed which is suitably connected to the switch point.

819,677. Electric Block Signal System; Paul J. Simmen, Chico, Cal. App. filed July 31, 1905. A plurality of conductors disposed in overlapped relation along the length of the roadway, and a shoe on the train makes connection with one or two sections ahead, so as to determine the position of trains on the blocks ahead.

NEW PUBLICATIONS

Strassen-Eisenbahn-Gesellschaft, Hamburg. One of a series of Historical and Biographical Sketches About Hamburg. 19 ins. x 13 ins. Published by Julius Eckstein, Berlin.

In commemoration of the twenty-fifth anniversary of its corporate existence the Strassen-Eisenbahn-Gesellschaft (Street Railway Company), of Hamburg, Germany, has had published an elaborate souvenir brochure. In this publication an historical account is given of Hamburg traction methods from the early horse car and steam dummy days up to the present time. Following this there is an extended description of every department of the company's activities, including its great car-building plant, which supplies rolling stock to many other German companies. The text and illustrations have been prepared with characteristic German thoroughness, and reflect credit on the railway officials who were responsible for them.

Report of the Twenty-Fourth Annual Meeting of the American Street Railway Association, held at Philadelphia, Sept, 27-28, 1905. Published by the Secretary of the American Street and Interurban Railway Association, New York; 453 pages.

This is the last report of the American Street Railway Association, and not only contains the report of the Philadelphia convention, but also an account of the steps taken by the executive committee in the reorganization of the association upon its present basis. It therefore includes the interesting report of Professor Henry H. Norris, who was selected to study the most desirable form of organization, with analyses of the constitutions and methods of working of fourteen national and international technical associations. The proceedings at Philadelphia were devoted in large part to the reorganization of the parent body, and the contributions by Professor Norris, Mr. Doherty and others familiar with organization matters make the volume of special interest to those interested in association organization. Nevertheless, a great deal was accomplished in a technical way, and this is also reported in the usual complete manner. The volume also contains a list of those registering at the meeting, members of the association, the new constitution and by-laws, and excellent full-page engravings of President Ely and ex-Secretary and Treasurer Penington.

PERSONAL MENTION

MR. DAVID TODD, of Youngstown, Ohio, has been appointed secretary and treasurer of the Youngstown & Southern Railroad in place of Mr. F. D. Wilkerson, who has resigned to go in other business.

MR. THOMAS LOWRY, president of the Twin City Rapid Transit Company, and the Soo road, is back at his Minneapolis office, greatly benefited in health by a residence of five months in the Southwest.

MR. EDWIN F. FABER, superintendent of the Delaware city lines of the Columbus, Delaware & Marion Railway, of Columbus, Ohio, has resigned to become superintendent of the Elgin-Belvidede Interurban line at Elgin, Ill.

MR. E. J. DAVIS, for several years contracting agent for the Columbus, Buckeye Lake & Newark Traction Company and the Columbus, Newark & Zanesville Railway, of Newark, Ohio, has been promoted to be general passenger and freight agent of the two lines with headquarters at Columbus.

MR. HENRY F. VOGEL, vice-president and general manager of the St. Louis Car Company, has tendered his resignation to President Kobusch. Mr. Vogel will rest for several weeks, during which time he will consider several propositions which he has received.

MR. C. F. BAKER, superintendent of power of the Brooklyn Rapid Transit Company, has resigned, and Mr. C. E. Roehl, electrical engineer, will, in addition to his other duties, have charge of the operation of all power and sub-stations of the various companies comprising the Brooklyn Rapid Transit system.

MR. R. B. STEARNS, formerly superintendent of the Northwestern Elevated Railroad, Chicago, on May 1, assumed the duties of general manager of the Chicago & Milwaukee Electric Railroad, which position was made vacant by the resignation of Mr. A. L. Drum, whose resignation from the company to take up other work is noted elsewhere in this issue.

MR. J. H. CRAWFORD was on May 1 appointed master mechanic of the Wheeling Traction Company and subsidiary lines, of Wheeling, W. Va., to fill a vacancy caused by the resignation of Mr. J. F. Ford. Mr. Crawford was previously master mechanic of the South Jersey division of the Public Service Corporation of New Jersey, with headquarters in Camden.

MR. A. L. DRUM has resigned from the position of general manager of the Chicago & Milwaukee Electric Railroad, and as consulting engineer will devote his attention to the erection of the large power station of the Chicago & Milwaukee Power Company, which will be erected at Waukegan, Ill., to furnish power for operating the Chicago & Milwaukee Electric Railway, and for commercial uses.

MR. JOHN YOUNG, formerly general manager of the Glasgow Tramways, has resigned as general manager of the Metropolitan District Railway of London, but has been elected a director of the company. Mr. A. Collinson has been appointed general manager of the Metropolitan District Railway to succeed Mr. Young. Mr. Collinson was formerly connected with the engineering department of the Northeastern Railway of Great Britain.

MR. JULIUS S. JENSEN, of New Haven, Conn., has been appointed to the position of superintendent of the power stations of the Consolidated Railway Company. The office includes all the lines of the company in Connecticut, Massachusetts and Rhode Island. Mr. Jensen has been a mechanical engineer in the electrical department of the railroad for several years, before which he was in the motive department. He is a native of Copenhagen.

MR. J. A. BENDURE, for the past five years general manager of the Lima Railway & Light Company and the Lima & Toledo Traction Company, has resigned to become associated with Jos. B. Mayer, of Buffalo, N. Y., who is engaged in promoting an electric railway out of Buffalo. Mr. Bendure has been succeeded by Mr. F. T. Hepburn, who has been with the Cincinnati Traction Company. Mr. Hepburn will not only have charge of the properties mentioned, but also the Ohio portion of the Ft. Wayne, Van Wert & Lima Traction Company. All of these properties are now controlled by the Schoeff syndicate of Cincinnati.

MR. OREN ROOT, JR., general manager of the New York City Railway Company, has been appointed vice-president of the company to succeed Mr. Frank S. Gannon, who, as previously noted in the Street Railway Journal, resigned to take up the duties of the presidency of the Atlantic & North Carolina, the Virginia & Carolina Coast, and the Norfolk & Southern Railways. Hereafter Mr. Root will perform the duties of both offices. Mr. Root, who is only 33 years old, was graduated in 1894 with honors from Hamilton College, which is also the alma mater of his father, his grandfather and his uncle, Elihu Root. Soon thereafter he entered the service of the New York City Railway Company, then the Metropolitan Company, in the construction department. Subsequently he became assistant to Mr. H. H. Vreeland, then general manager. Shortly after the election of Mr. Vreeland to the presidency of the company, Mr. Root was elected as his successor as general manager. This was about three years ago.

MR. CHARLES L. SPIER, associate of Mr. Henry H. Rogers, of the Standard Oil Company, president of the Staten Island & Midland Beach Railway Company and an officer in a number of electric railway companies, was killed in his residence at New Brighton, S. I., early Monday morning, May 7, either by a burglar or through the accidental discharge of his own pistol; it is uncertain which. Death must have been instantaneous, for the bullet entered the left breast, cutting through the lower part of the heart. Mr. Spier was 38 years old, and was prominently identified with street railway interests near New York. Among the various offices held by Mr. Spier were: Secretary and treasurer of the Asbury Park & Sea Girt Railroad Company, director in the Commercial Newspaper Company, vice-president and director in the New Jersey & Staten Island Ferry Company, president and director in the New York Investment Company, director in the Rapid Transit Ferry Company, secretary, treasurer and director of the Richmond Borough Company, president and director of the Atlantic Coast Electric Railway Company, secretary, treasurer and director of the Seashore Railway Company and director of the Southfield Beach Railroad Company. He was also president and director of the Staten Island Midland Railway Company, vice-president and director of the West End & Long Branch Railway Company, president and director of the Yetman Transmitting Typewriting Company and vice-president and director of the Richmond Light & Railroad Company.