

THE STREET RAILWAY JOURNAL

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Street Railways Public Benefactors.

II.

The first proposition in our preceding article was that "A street railway is impossible without, at least, passably good road-beds, and good roads almost necessitate good sidewalks."

Now, while it may appear like "begging the question" to attribute all or a greater part of the improvements with which we are familiar in our modern city highways, these improvements are certainly to be credited to the street railways more largely than is generally supposed. To any one familiar with the requirements of tramway traffic, this assertion will require no proof; but the general public may need to be reminded that a street car horse requires good road to travel upon, or he will wear out rapidly, the same as any other horse. Then the very laying of the track requires: first, that the foundation should be firm; second, that the grade should be regular in cross section; third, that there should be no abrupt breaks (or ruts) in the continuity of the road-bed; and fourth (as we said in the second proposition of our previous article), that the street, in order to render possible the maintenance of such a road-bed, should be adequately drained.

So much for the general aspects of the case; further than this we have to consider the peculiar benefits rendered by a street railway company as a common carrier.

The principal reason why corporations of this class are not accorded the same justice which is accorded by the popular mind to ordinary business firms or individual business men is that their business, once established, becomes a public necessity. This may sound paradoxical, but the paradox is the strongest form of argument.

A street railway company usually has enough difficulty to secure its franchises. When the first road is proposed in a town, the populace opposes it on general principles, as "new fangled"—much on the grounds Louis Napoleon took, when George Francis Train wished to introduce the street railway system into Paris. The story runs as follows: "In the early days of tramways in Europe George Francis Train obtained audience of the Emperor Louis Napoleon, in order to secure his consent to their introduction in Paris. Mr. Train stated that they would enhance the ease

and shorten the time of getting about the city and descanted upon their convenience to the citizens. 'But we don't want any such new-fangled Yankee Notions,' replied the Emperor; 'let Paris remain as she is—the city of beauty and fashion and pleasure.'"

People don't want the noise, object to the dust, object to the tracks, object to street cars, as liable to explosion, and object to the men composing the companies, as likely to absorb the town.

After the franchise has once been secured, and the populace accustomed to the accommodations afforded by the line, they arrange their daily life accordingly, and rely upon it in the conduct of their business. Then, the new means of transport having become a business necessity, anything tending to disturb existing relations is looked upon as a direct injury. So it comes about that as a street railway becomes more and more useful, more and more of a public benefactor, the public becomes more and more factious regarding it, and complaints against it, and efforts to restrict its independence become more and more persistent.

But, looking at the matter calmly and from a purely impersonal business standpoint, why should a street railway company, any more than a baker, be expected to do anything which is not profitable?

Leaving the question here for consideration, we shall try in our next to show that the average street railway does more for a smaller return than almost any other public or private enterprise. M.

Street Railroad Tracks.

EDS. STREET RAILWAY JOURNAL:—

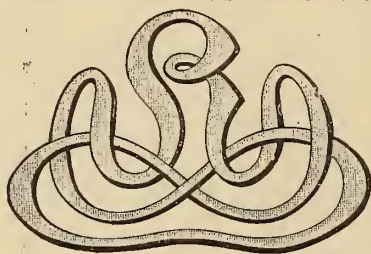
As spring work upon street railroads will soon commence, it behooves the officials to consider well upon various matters pertaining to track construction, and among the most important is that of rails, quality and kind of material, shape, etc., etc. I wrote an article entitled *Iron vs. Steel for Street Rails*, that excited much discussion. I brought the matter before the last Convention of the American Street R.R. Association and asked for the practical experience of the members as to the relative durability of steel and iron rails, but did not obtain much information. Some members thought steel the most durable, others thought iron would wear equally as long. Of course a

good quality of steel and of iron is assumed. If the iron will wear as long as the steel, no street railroad can afford to use steel. The best cash offer I can get to-day for old steel worn out after four years and two months' service is \$10.00 per ton. I could get \$18.00 per ton for old iron! I would say that the above-mentioned steel rails developed no imperfections in the wear. They wore quite uniformly excepting at the joints, and actual measure of a number showed that 50% of the head had worn off during that time, but the joints had lost much more metal, and it was this great wear at the joint that caused me to perfect my patent fastening. (If you will pardon the egotism, it is the best fastening for the ordinary street rail in use to-day. The only objection ever offered was that the nut would rust fast to the bolt and interfere with repairs when they became necessary. Experience has demonstrated that the grease applied to the bolt effectually prevents this rusting, and I have yet to hear of one that cannot be unscrewed. The tracks laid with this fastening ride so smoothly that passengers, as well as employes, notice and speak of the absence of all jars in passing over the road, and this will prolong the useful life of the rail at least 10%.)

From a point of view, considering the question of the railshape, as affecting transportation in the cars, the centre bearing rail is undoubtedly the best. It is more free from mud, etc., and offers less resistance to be overcome in propelling the cars. The track is more stable for the weight of the car and its load is not carried upon one edge of the stringer, but from a "paving" point of view, the advantage is on the side of the step rail. Loaded vehicles seek the lines of rails from a greater distance, and nothing can be provided to maintain this traffic cheaper than the metal rail. This wear is so great with us that although we have eighty cars passing in sixty minutes on rush trips, the tram wears about as fast as the head. It is, therefore, good economy to maintain the paving in such condition that the heavily loaded vehicles can everywhere get into the tram, rather than cut grooves into the stone alongside the rails. This is a matter frequently overlooked, although well worth consideration.

AUGUSTINE W. WRIGHT.

Chicago, April 9th, 1885.



American Street Railway Association.

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Completed Construction of New Roads.

[The following is a record of the discussion on the Report of the Completed Construction of New Roads at the last Convention of the American Street Railway Association. The full text of the report itself will be found on page 8 of our November issue.]

Mr. Wright said: I am not entirely clear upon the question of best material for rails. I would be glad to have the practical experience of this Convention on that subject.

D. K. Clarke, says: "It does not seem to be certain that the steel rail is the most durable." I have a piece of steel rail here (exhibiting rail) that has had two years' service, taken out and the ends cut off. That does not speak very well for that rail. In August, 1879, in my own track, I laid down half a mile of steel rail, and my first duty upon returning will be to take it up. It is worn out.

Mr. Richardson inquired: Is that made (indicating a depression in the rail) by an iron chair? Did it make that abrasion in the steel?

Mr. Wright answered: Yes, sir. I have brought a rail joint chair from Chicago to show the wear of joints. This chair has had four years' wear in my track (producing chair). The rail has cut into the chair a quarter of an inch with a corresponding wear on the bottom of the rail. At the last Convention, I was asked as to the relative durability of steel and iron, and I stated, from my steam road experience, that it was six to one, that a steel rail would outwear six iron rails. I have talked with some steam railroad men since, and, I think there are very few steam railroad men who can give the actual tonnage that steel rails will carry. Requirements of a rail on a steam railroad and on a horse railroad are different. Upon a steam railroad, Prof. Dudley, of the Pennsylvania, advances this theory: The force acting upon the steel rail upon the steam railroad,

can be divided into two general heads. Gravity, of course, tends to break the rail, whether the train is in motion or standing still, which is a constant force. You can conceive that force great enough to break the rail. The action upon the driver he divides into two heads. There is an adhesion between the head of the rail and each car wheel, necessary to overcome the journal friction. Unless that force is greater than the journal friction the wheel slides. If greater, the wheel revolves. That is very light; it is estimated at six pounds per ton on an ordinary steam railroad track. Then there is the force that the locomotive exerts in propelling the train, the adhesion of the driving wheels upon the rail, which must exceed the sum total of all the friction of the train, as well as its own friction, to overcome its own dead weight. Mr. Chanute, of the Erie, experimented with a locomotive, and raised it off the rail. He painted it with white lead, and found that the driver, with five feet diameter, bore one-quarter of a square inch on the rail head. The weight on that driver was ten thousand pounds. The Pennsylvania Class K engines have sixteen thousand pounds upon a driver; but are seven feet in diameter, say sixty thousand pounds to the square inch. Upon the steam road, you are passing beyond the ultimate strength of iron. Iron won't stand that strain; it requires steel. A mild steel, such as Mr. Wharton makes, will outwear the harder steel. The Wharton rail will outwear the hard steel rail. A mild steel rail is the best for street railroads generally. I would be glad to have some statistics from the gentlemen present, as to the actual wear.

Mr. Moxham, of Cleveland, said: Mr. President; The matter resolves itself into either one of two things: pure technicality, absolute practice. I should like to follow Mr. Wright into the technicalities; but it would be making a long story, and that we would not have one-half the information that we could get by referring to practice. Mr. Wright urges, because statistics have proved that some iron rails will outlast some steel rails, that we must come to a general deduction. Before you can make a comparison of any sort, you must define what you are comparing. * * * I have for fifteen years manufactured iron; but have given it up; been forced to by the competition of steel. I could make an iron rail that would very nearly compete with steel in durability; simply because it is hard to find the exact point of division between iron and steel. Experts have endeavored to find this dividing point, but so far have failed. Making an iron which in certain cases has been proved to be, theoretically and practically, the best iron that could be made, analyzing it and finding what I had, I could not determine whether I had iron or steel. But it is not a question of a special quality of iron. When we speak of an iron tram rail, we mean that quality which is furnished commercially; and there is as much, or a greater difference between that ordinary quality and a specially made iron, as there is between a good steel and a poor iron. Even assuming the special quality of iron to equal the ordinary steel, its price is so much greater that this consideration would decide the matter in favor of steel; or we may institute again a comparison between the poorer qualities of both. Mr. Wright has shown us a sample which, according to his supposition, lived but two years. Let us accept the supposition that a steel rail only lives two years. (I do not think that there is a street railroad man here that has used steel to any extent that does not know that the ordinary steel rail will last indefinitely longer than that.) Either that the steel was of poor quality or had been subjected to unusually hard conditions of wear. I will assume that the steel was of poor quality. We will, therefore, compare that to iron of poor quality. I have known, and, perhaps Mr. Littell will bear me out, that iron rails have

been put into use in Louisville, and have lived six months only. If we assume that an iron rail of poor quality lasts only six months, and the steel rail of poor quality two years, there is four to one in favor of the steel. It is possible to make an iron that will last as long as a steel rail. This leads to this suggestion: Whether this material that is equal to steel, that is, a special class of iron, is the iron we speak of when we speak of iron rails. It is not. It is, therefore, a worthless discussion, if we are to take an iron that would cost so much money that we cannot put it into a tram rail. The question is unworthy of any prolonged discussion. We hear that soft steel is preferable to hard. I do not see why the street railroad man cannot rest in perfect confidence with the quality of steel generally furnished; it is made precisely of the same kind of steel that is put into the "T" rail. We all know of the great experience and knowledge that has been brought to bear upon that part of the question by railroad engineers. It being considered cheaper and better for the larger business of steam railroads, it is better to stick to that for the incidental demands of street railroads. The quality of rails can be safely left to those who have made it a study.

Mr. Wharton said: As to that particular sample which has been offered by Mr. Wright, as showing a steel rail of two years' service in Philadelphia. I think I can explain what that rail end is. I have been laying for the Philadelphia Traction Company, a number of miles of cable railroad. In taking up the old railway, there were a great number of steel rails which had been down, not two years, but, to the best of my knowledge and belief, ten years. I am sure, that two years is not correct. But even if that were correct, these rails were laid upon a poor foundation; in some cases, upon old timber. It is a great mistake, for a railroad company ever to put good rails on bad timber. If you put down steel rails, give them a fair chance. These rails put down on old timber, soft and spongy, are liable, to be battered out at the joints. These particular rails, of which this is a piece, the end having been cut off, were thus battered down at some of the joints, and I recommended that it would be economy if the Company would allow us to cut that portion of the rails off from the end. That was done, and these rails are now under the new cable railway; the ends only being cut off, giving a good railway that will, probably, last ten years more in service.

Mr. White said: I think that Mr. Wharton furnished to our corporation the first steel curve furnished to any street railway in the United States; and also, the same corporation contributed a large share towards the expense of making rolls for the purpose of running steel rails; something like thirty-six hundred dollars. He furnished us, also, the first steel rails that were ever used by a street railroad company in this country. We have about a thousand tons now in use, all made by the Pennsylvania Steel Company. The first curve was laid at the corner of Avenue D and Fourteenth Street, and mutually used by the Central Park, North and East River Railroad Company and one line of our cars. About a year and a half ago that was renewed, and it had a continuous service of sixteen years, or very nearly. The first steel rails we laid were laid on our Grand Street road, which was and is a road of very large traffic; the largest, with the exception of Broadway, just opposite the Fifth Avenue Hotel. These rails were bought at an enormous price. The first portion was laid at the beginning of or during the war. We had a rail sixty-three pounds to the yard. Since that we have had sixty pounds. That rail will never wear out. The defect in the service is only in one regard—the steel being soft, the traffic has worn off the head of the hp, and we have to keep continually spiking and re-spiking to get more service out of it. The question in my mind,

when I bought the last rails, ran in the line of the experience of our Chicago friend. I said that complaint was made, and it was discovered by actual test, that in the competition of prices, they were making the steel a little softer, and that we would not get the service out of it. I did not state that I thought we had service enough; and I do not think that the rails will last as long if made softer. He said he did not know that that was so; that the process was a homogeneous one, and was pursued by all reputable works, and what was made by one reputable concern was as good as that made by any other; that there was no difference in quality. I have taken up this year about ninety tons of iron rails, which have been in constant service for about thirteen years on our roads, and been renewed but once since the corporation has had its existence. That is on Avenue D and Lewis street. Those were made at Pottsville, and they are a good rail, and much called for. Our corporation has never bought a cheap rail. We do not want cheap stock of any kind. There is very little wear or tear to steel rails. Heavy trucking will make and carry off slivers of the iron rails, which does not occur with the steel. An iron rail honestly made is worth the money, even to-day, and a steel rail honestly made is infinitely preferable at current prices. There is not to be understood to be any comparison of the cost or service, according to my judgment, between an iron rail and a steel rail at the same price. Economy lies in taking the steel. I would make one criticism on Mr. Wharton's report. The time is coming when we will consider the necessity of a pocket casting longer in its outgoing end to receive the rail entered on. As to the plates which we use to support our joints, the entering end of the plate could be, at least four inches longer than we now use them.

Mr. Wharton remarked: If Mr. White notices my report, he will find that I made no allusion to this matter.

Mr. White replied: The report states that it should be made with pockets. I make the suggestion, not respecting the size, but the length to admit the new rail. It should be longer at the exit than it is at the entrance—a proper bearing to increase the service.

Mr. Patrick, of Pittsburgh, said: We have both iron and steel rails on our line in Pittsburgh. For the last five years, we have used the Pennsylvania Steel Works forty-eight pound rail. We also use the Cambria Steel Works forty-eight pound rail, and we have used our own iron. The rail you use here is different in its construction from ours. We have a five-inch rail, with three-inch roadway and two-inch tramway. Our gauge is five feet and two and a half inches; yours four feet and eight inches. You are not required to put down a rail for the accommodation of the public, and consequently, the wear is made much heavier on the tram than with ours. The gentleman is right, that that character of rail is not liable to wear out. The rail we put down is half an inch on the roadway, and two inches on the tramway, leaving three inches for the public. The public, as a rule, follows the track having the vehicles running along the roadway of our line. We find the steel rail in the central part of the city has lasted us five years. It is now about worn out; that is, the roadway. The trams are not worn out. The iron rail made at one of our works there in the city has lasted about the same time. The question, then, is, which is the cheaper to put down, the steel or the iron? If I have to pay ninety dollars a ton for the steel rail (which I did pay for the rail now in use), and forty-five dollars a ton for the iron rail, there would be very little question as to which is the cheaper. I can now buy the steel rail for thirty-six dollars a ton, and I cannot buy the iron rail for less than forty dollars a ton. Hence, if they had an equal life, steel would be cheaper. But if the steel rail is made from

thirty-five to forty carbon, it will stand longer by one-third than the best iron rail we can put down. The only trouble is, that if there is a very heavy frost and a very hard winter, a forty carbon steel rail is liable to break. The rails used on the Pennsylvania road, is a thirty-five carbon rail. The iron wheel we are using weighs about two hundred pounds to the wheel. We wanted it lighter, to make the cars light as possible. We made cast steel wheels, weighing one hundred and twenty-five pounds to the wheel, saving a considerable amount in weight, say 300 pounds to the car. It was about the first of March. They were forty carbon. From March to December they were run and there was not any perceptible wear on the wheels. It is an admirable wheel. We had a very heavy frost last December. One morning the car was started out on the track as usual, and after going about two squares, the rim of the wheels run off, leaving the spokes. Some say it was shrinkage from the cold; some that it was defective construction; but it was done.

Returning to the matter of rails: A steel rail, such as we have, with the three-inch roadway for tram work, is worn out by our wagons, and the life of it is about five years. The life of the best iron rail we have had is about five years. The life of some of our iron rails has been, as a minimum, about three years.

Mr. Wharton said: I think a very good illustration of the comparative service of the steel rail as against the iron rail would be shown by an examination of the tracks in Fulton street, of this city. When the track was relaid, about eight years ago, the centre-bearing steel rail, forty seven pounds to the yard, was put down. That rail is there to-day. It is very little worn. It is solid on the timber. The surface is as good as it ever was, and the rail has a prospect of being good for eight or nine years more. It is a street used by heavy trucks to a very great extent and a great many heavy stages and omnibuses are constantly passing over it, turning in and out, and wearing the sides of the rail. Mr. Sharp, the President of the Twenty-third Street Railway, operating that road, can undoubtedly corroborate me. When you compare iron with steel rails, it is hardly fair to bring up any particular instance. I will, however, bring up a case, as it has been done by others here. In the year before the Centennial Exposition, in Philadelphia, the roads were very desirous of renewing and putting their tracks in order. Among others, the Hestonville Railroad Company wanted to relay their tracks, and they got iron rails made at Pottsville. At the same place many excellent and good rails have been made. Iron rails are very uncertain; they do not mean anything in particular. Now this special lot of iron rails was put down across the bridge over the Schuylkill, and in about two weeks' time I had to take them up and put down other iron rails. My men said to me: "Mr. Wharton, we wish you would go out and look at those rails, they are worn out." I said: "It is impossible; for they have been there only two weeks." They replied: "Yes, but they are worn out; go and look at them." I took two or three men with me, as I wanted to show them they were mistaken. When we got there we found slivers of iron from the top of the rails, varying from an inch to three feet long, scattered all over the bridge. I got them to gather them up by the armful, and throw them into the river. I got a second lot of iron rails to replace them. I made the mill renew the rails. They did it without a great deal of fuss. I put down the second lot of iron rails. They were not much better than the others; they lasted three months, and I had to take them up for the same reason. I put down a third lot, and the Company commenced to get tired. The third lot of rails lasted a good while longer; and the railroad company let up on the whole business, and let them go although, practically

the rails lasted only about a year, when they were replaced by steel rails. When you speak of an iron rail, it does not mean anything in particular. The steel rails are there yet.

Mr. Ladd said:—"I have had some little experience with iron and steel rails, on a road operated by steam, while acting as Superintendent of the New Bedford & Taunton Railroad. In 1869 we put into our track twenty tons of John Brown's steel rail, and they have been in constant use fifteen years. I examined them a year or two ago very carefully, and did not notice any abrasion; in fact, they were, seemingly, in as good condition as they were on the day they were placed in the track. These steel rails have been there fifteen years, and are just as good now as ever. I think that is evidence enough that an iron rail is not worth as much as a steel rail. There is also quite a difference in the quality of iron rails. The New Bedford & Taunton Railroad was built in 1840. Its rails were imported from Wales, and were of excellent quality. Some of them remained in the track for five and twenty years, and the old rails, when removed, brought in the market two and a half dollars more per ton than any other old rail, on account of the extra quality of the iron used in their construction.

The New Bedford & Fairhaven Street Railway was built in 1872. The rails were iron, manufactured at Pottsville, Penn., by Mr. Hayward. They have now been in use twelve years, and we have not removed, on account of wear more than a half dozen of them. The track from New Bedford to Fairhaven was laid with a rail weighing thirty-five pounds per yard, and the rest with a forty-five pounds per yard rail. For the last two years, we have put down steel rails, weighing fifty pounds per yard, and we believe them to be better and cheaper in the end."

Mr. Wharton: How many months do you run sleighs instead of horse cars?

Mr. Lusher: We run over the rails from eight to nine months. There are three or four months, in which we do not run over the rails, but, as a general thing, we use the rails from eight to nine months. The scraps are very valuable, indeed, and are very much sought after.

Mr. Wm. Richardson said: The road which my friend White refers to, as having laid some rails fourteen years ago, was laid with fifty pound iron rails, or what was then supposed to be the best quality of rails. They have been replaced with steel, which has been used since that period, and these rails are said to be good to-day. I think the travel of Grand Street is fifty per cent. greater with trucks and other vehicles than when the iron rails were there. The width of the street is as trying to the rails on the track, as it is on the Broadway and Seventh Avenue road in Broadway, without any exception, unless on Broadway, a very short distance below the Fifth Avenue Hotel, where, because of the narrowness at that point, all vehicles have to follow the track. As to Fulton Street, it is certainly as heavy and trying in its traffic on that part of the street, where the Bleeker Street and Fulton Ferry Railroad runs, as it could be on any portion of Broadway. So far as trucks and other vehicles can test the severity of the use of rails, the places specified afford a more thorough test than can be found on any other street railroad in the country, and possibly, as great as it would be on many steam roads. One thing has been suggested by Mr. Wright, that is, the test made by the Pennsylvania Railroad. In Pittsburgh, they found that iron rails would last, switching in and out with their trains and running over them, about six months; while steel rails would last for three years and six months. Possibly no more thorough test can be made than in a place of that kind. Having made the motion to adopt the report, and approve its conclusions, it seems now the proper time to have specified

any objections to be made to that report. As a whole it is a most important paper; valuable to every street railroad man in the country. I can give no better advice than this, that before making a contract for the building of a road with William Wharton, Jr., & Company (limited), or any other contractors for the building of street railroads, you should carefully study that paper. But as to ties. Yellow pine ties, as well as stringers are suggested. At the North, where chestnut ties are accessible, we cannot have anything better than chestnut. We can get a much larger size tie than we can afford to get of yellow pine, and it costs about two-thirds as much. I certainly will not go back on chestnut. I doubt if I would on white oak, as in preference to chestnut ties, where buried in the ground. As to laying a track with a pitch in it of four or five inches, or an inch to the foot, in the straight track, I would not do it in any case, all the Common Councils in the country to the contrary notwithstanding.

Mr. Wharton remarked: I do not know what the gentleman alludes to.

Mr. Richardson replied: I allude to the part where I understood you to say that it was desirable to have the tracks on a level; and at any rate, where, under the circumstances, it might require it, never to have one rail more than a few inches higher than the other.

Mr. Wharton said: My whole intention was to convey the idea that the straight track should be level, and the curves also; but that it was sometimes impossible to get the curves level, when we should do the best we could under the circumstances. The particular part to which Mr. Richardson alludes, refers to curves only. "Great care should be taken in laying the curves to have them of regular curvature, uniform gauge, and with no abrupt changes of surface. Ordinarily, a curve laid with the inner and outer rails on the same level will give the best results in service, but there are instances when, from the grade of the streets, it will be found necessary to elevate one rail higher than the other. The outer rail may then be elevated a few inches above the inner without any disadvantage, and, possibly, in some cases to advantage; but the inner rail should never be higher than the outer, if it can possibly be avoided, although a slight difference in this respect, where absolutely unavoidable, can be allowed, if the curve is very carefully and accurately laid down."

Mr. Richardson said: I stand corrected. On streets where there has been a slight deviation in the track, I would sooner put a foot difference between the tracks than I would in the tracks. About the gauge of tracks. If I did not misunderstand the gentleman, he said that the gauge had been fixed by local ordinance with a view to accommodating the width of the vehicles used in the respective cities. Am I correct?

Mr. Wharton said: I do not wish to convey the idea that it was established by that only. I will read: "As the gauge of street railways is almost always established by the local authorities to conform with the legal gauge of the ordinary vehicles of such city, there is, in consequence, no universal or standard gauge for them. Your Committee is, however, of the opinion that from four feet eight inches to five feet two inches gauge will give the most satisfactory results, as a general rule." I have been in different cities and conversed with parties getting up specifications for new railways; and that was one of the governing causes which determined very largely the gauge of the street railway. It was one of the first things brought up.

Mr. Richardson said: That is exactly as I understand it—that the gauge of railways in different cities has been fixed with a view to the accommodation of the width of the vehicles that were to run in them, other than the cars. It struck me very much as in the case of the old gentleman who said that he had "noticed that by a wise dis-

persation of Providence, large rivers always run by great cities." I think that the gauge was fixed in this city, and greatly throughout the country, in the first place, by the fact that the New York and Harlem Railroad here, and the Brooklyn and Jamaica Railroad in Brooklyn, adopted the four feet eight inches gauge of track. Then came on the other street railroads, each following the four feet eight and one-half inches gauge of track; and which has been thoroughly fixed in this city and Brooklyn, growing out of these facts. It has been so strongly fixed, that it could not now be changed to any other gauge, however much it might be of advantage to the railroads to change. It would require the concurrent action of so many companies. The fashion has been followed generally in that way in Philadelphia. They have a gauge of five feet and five feet two and one-half inches. We have nothing here in the way of a law, so far as I know, to regulate the gauge of tracks, and that accounts for the manner and the extent to which the centre-bearing rail has been used. Too much cannot be said as to the advantage of using that form of rail for economy of operation, both in reference to the cars and the rails. The only regulation that has been made, so far as I know, is the legislative provision that that form of rail should be used that is most in accordance with public convenience. The railroad companies considered that to be for the public convenience, and have preferred to provide for the easy riding of street cars rather than for other vehicles. They consider that they have consulted the public convenience by having that form of rail which is easier for the rider, than for the man who drives the omnibus or wagon. Sometimes there has been opposition on the part of property owners to the centre-bearing rail being laid. On one occasion on the Fifth Avenue line, we were gradually changing the flat rail, and a great deal of trouble was made about it. We succeeded in getting a resolution through the Common Council, allowing us to use the centre-bearing rail on the grades. That street proved to have so many grades, and to be so up-hill and down-hill, that by the time the centre-bearing rail was laid, there was very little that was not centre-bearing. [Laughter.] As to the form of rail, of what earthly use is that lip on the rail? What was it put there for? Who originated that idea to prevent this spreading tendency? The timber is chamfered away to make room for it, and if that very lip was above instead of below, it would help vehicles to turn out of the track. What you want, is a perfectly flat undersurface, which shall have an even edge. The lips that were formerly cast or rolled in the centre-bearing rail are everywhere discarded, and we have a flat, even surface. As to the tendency to wear on this joint-plate, it would certainly indicate, to my mind, that the timber was in such condition that it gave way under the rail, which made a continual ramming on the plate; so that this depression was caused to an extent that it would not be on solid timber. As to the joint-plates of eighteen inches in length, to which Mr. Wharton referred, they are certainly the very best thing we can get; laying them one foot under one rail, and six inches under the other rail, so as to give the greater support to the rail on which the car is coming.

Mr. Richardson said: The report as a whole, is so good, so instructive, so thoroughly beneficial to the horse-car interests of the country, I cannot say too much in indorsement of it. It is a hand-book of instruction for those who are about to lay tracks. One thing, in conclusion, in regard to what the length of the rail ought to be. Mr. Wharton speaks of thirty feet. I would say get them just as long as you can get the mill to roll them, and have just as few joints as possible.

Mr. Littell said: I would like to ask the Chairman one question in regard to laying a curve. Should the curve be of the same

gauge as the track, or should there be a difference?

Mr. Wharton replied: The best way to do it is to put the curve down to the regular standard gauge.

Mr. Kemp, of Troy, said: Why is this lip on the bottom of the flat rail? In our city we have tried to use the centre-bearing rail, and after having a resolution passed unanimously by the Common Council permitting its use, we are still obliged to live up to the requirements originally laid down, that we should use the Philadelphia pattern. Last Summer I was about to order two hundred tons of rail, to be laid down in a part of our city where we have a single track, and where the authorities would not allow anything but a single track. On our track is carted all the ingots made at the Bessemer Steel Works, at Troy. They have wagons loaded with about five tons of these ingots, and when they get on our track there is a regular procession of them. As the cars come down and meet them, they are obliged to turn out. In doing so, the wheels of the carts crowd on the flanges of the rails. The question came up by the party who desired to sell us rails, in regard to that lip which Mr. Richardson said is useless. The party trying to sell the rails insisted that the spikes could hold the rails. We were very much afraid to rely solely on the spikes, because, as every wagon turned out, it appeared the rails parted. I submitted the matter to the scientific men of the Polytechnic Institute and I told them to give me their opinion whether this lip was of any use. I told them, that in order to use the lip, we were obliged to chamfer off the edge of the timber, and that enough timber was cut off to allow it to fit snugly. They decided it was of some benefit to us, if it was crowded down in the timber, and that it would hold to a considerable extent. I decided I would keep the lip on the rail; but I want to get rid of it, if it is of no earthly benefit.

Mr. Wharton said: The question of laying street rails, like many others, has progressed. When I first became connected with the business, it was very common, it was universal, not only to have the lip on the inner edge of the rail, but on the outer edge also; and both of them very much deeper than they are at present. In fact, I have noticed, and the gentleman from Brooklyn will also remember, that the earlier forms of centre-bearing rails had that lip. The spike-holes were of the usual size, and the rail working a little up and down, finally enlarged the holes, so that they were cut entirely round. They reduced the size of the lip. I believe that I was the first one who absolutely insisted upon having the rails rolled without the outer lip on the rails. I quite recently have had rails made without that lip. I have been always advocating them without any lip. I can imagine in some particular instances and under certain circumstances, it may be valuable to hold the rail in position. I would take the risk, on every railroad in which I was ever interested, to dispense with the lip and give the rails a full bearing over the five inches. It would be well to put the spike-holes nearer together and have extra spike-holes, so that when the holes in use get too large, or the spike-heads are worn away, you would have an entirely separate and new set of spike-holes through which to drive fresh spikes into new and sound timber. I think the lip is an expensive notion, and I do not see where you get the good of it. In Philadelphia they stick to the lip, partly because they do not care to make a change, and partly because they do not know any better. In Philadelphia we always plane the portion on which the lip rests, so as to provide for it, as nearly as possible, a good solid bearing. I do not advocate it at all. I think it is a mistake.

Mr. Richardson said: I would like to say that I have not the slightest doubt, if the gentleman wants anything to protect his rail, he will be obliged to have it much

deeper than that [indicating the lip * on the rail produced by Mr. Wright]. If he has the width of the timber coming down a few inches further, it might do what the Polytechnic professor thought it would do in this case. The next best thing is cutting, that is, planing it just the size you want to fit it. There is not enough of it to prevent the rail from spreading. I would suggest, in addition to spikes, to have good solid paving, coming well up to or above the rail on the outside. That will do more than all the lips on the inside.

Mr. Wharton said: In regard to the ties which Mr. Richardson alluded to, I have never seen in the construction of railroads, that the hewed ties furnished were to any degree of uniform size. They are universally some large and some small; some straight and some twisted. The reason why I mentioned yellow pine is, that in this part of the world they are the cheapest in cost, the easiest to get, and they are the best ties. They can be obtained of uniform size, and give a uniform bearing to the rail, when they are placed at regular distances apart. They have been proved upon steam railroads to be the best, and we presume them to be the best on horse railroads. It is a very serious matter to have ties of varied surfaces, because the track is held up better with large ties than with small ones. Instead of not endorsing chestnut or white oak, I would say that I think they are better than yellow pine; but they do not come in this part of the world sawed to uniform dimensions and of regular size, so as to be as cheap as yellow pine sawed ties.

Mr. Parsons, of Philadelphia, said: It is not often that I have had the chance of finding fault with Mr. Wharton. But as I have the opportunity now, and also for the purpose of deriving a little instruction, I find fault with him, and would like to ask for some information. In the first place, in Brooklyn and New York, Mr. President, they make more money than we do in Philadelphia, and they build their roads according to their own ideas. In Philadelphia, we have to conform to the city regulations. Mr. Wharton says that the rails, as originally laid in Philadelphia, have undergone many changes. I do not agree with him.

Mr. Wharton replied: I did not say that the rails in Philadelphia had undergone a great many changes. Unfortunately, they have not, I said "street rails;" by that I did not allude to Philadelphia. They have a great many railroads, and there are a great many rails in Philadelphia; and I take great pride in that city. I alluded to the street rail, as changed. Unfortunately, however, they have not changed very much.

Mr. Parsons continued: Street railways in large cities are better constructed now than they were originally; they are more substantially built, and to a great extent

OFFICE OF THE
NORTH CHICAGO CITY RAILWAY CO. }
CHICAGO, November 19, 1884. }
* Mr. W. J. RICHARDSON, Secretary American Street
Railway Association.

Dear Sir:—At the last annual meeting, the question came up as to the advantage of having a lower "lip" on the bottom of rails to prevent them from sliding outwards on the stringers. Some of the gentlemen present thought this lip of no benefit. I do not agree therein. Trautwine, in his Engineer's Pocketbook, p. 181, speaking of the defrutive strength of pine and spruce, says: "We have very little experimental data on this subject. What there is on timber is in the direction of the fibres, and, consequently, does not apply to beams which are exposed to shearing at right angles to the direction of the fibres * * * The resistance to pine and spruce parallel to the fibres (which is much the weaker direction), is said to be from 500 to 800 lbs. per square inch." The ordinary width of stringer being five inches, and rail thirty feet long, we have 30 ft. x 12 in. x 4½ in. = 1,620 square inches at 500 lbs. per in. = 810,000 lbs. as the force required to split the stringer off. All the lateral strain on our tracks tends to force the rails outward, and I consider it advantageous to have this strength of material preventing the rails from moving upon the stringer, and relieving the spikes. Of course I assume a good fit as between the rail and the stringer. I thought the above might be of interest to you to insert as a footnote under the discussion. It would be a mistake to leave off the lip on the rail.

Respectfully,
AUG. W. WRIGHT,
Supt., Track and Construction.

differently. Instead of using wooden beams, tie-rods are used, making the tracks more substantial and less liable to spread, but we still have exposed to all the street traffic the spike, which, as we all know, soon wears off on the head; and as a consequence, the rail becomes loose if it cannot be fastened down securely. I think that the lip is of great advantage, if it is properly fitted into the string-piece; but as the spike becomes loose, the rail gets a wavy motion. It seems to me that we should therefore, make some changes in the construction of our rail. For that reason, I am very anxious to hear from those present using the "girder rail," which has a smooth joint, and where there are no spikes exposed to the heavy street traffic, and no way for the rail to get loose. If there are any companies represented here that have used the girder rail, I would like to know what their experience has been in the matter; and also as to its cost. In addition to the heavy expense of repair in the present form, you will never have a solid bearing or a firm road.

Mr. Humphrey said: I have been highly gratified with the discussion relating to street railways in the large cities. As I represent a small road, it does not apply so much to us. We have a narrow gauge road. When we started, and had been going along for a few years, some of those whom the politicians call "Mugwumps" [Laughter], found fault with our road, and said that the street railway would last ten years, and then we would have to take it up. Now, I have learned from the discussion here, that our rail ought to last thirty years; and I consider my stock in the road raised up to one hundred and twenty-five! [Laughter.] There is another point not represented here. The "T" rail laid in the city, and also outside—in the suburban portion of the city. The road that I represent has seven miles; five miles are laid the same as a steam road. I did not know but that there were other companies represented here that have a certain portion of their road outside the city and not paved, and from whose delegates I could get some information. What I want to get at is the way to take care of that. I thought this question would come up here. I am greatly interested in the report, and think it is a very valuable paper; but the discussion seems to be confined almost entirely to the large cities. I should like to get some information on this subject.

Mr. Rodgers, of Columbus, said: My friend, who has just taken his seat, said he came from one of the smaller towns; and he hoped to have the experience of persons representing larger interests, and of very much more extensive experience in the construction and erection of street railways, than his own. The time for the discussion is limited, and, therefore, I propose to occupy but a moment. I arose more for the purpose of asking an expression from those who have had considerable experience with the girder rail; or, rather in regard to the forms of rail generally. I have observed in use largely here, and in other cities, the centre-bearing rail; and I presume there is no question as to the desirability of that rail, where it may be used according to the city regulations. So far as the girder rail is concerned, it is a matter of considerable interest to those who are operating railroads in localities where repairs are difficult to make and expensive. I can say, in reference to the company that I represent, that we have made some repairs with the girder rail. For a short distance we have laid some of the rail, and it has been used now for something over a year. The experiment has been entirely successful. It has answered our purpose very well, and gives general satisfaction to the riding public. So far as the city authorities go, there has been no objection made to it by them. I should be very glad to hear expressions from those who have used, in other places, the same rail; and especially, as to its use in the larger cities, if

it has been introduced in such. The rail we have used is the fifty-two pound rail, on an old Macadamized road. I have found no difficulty with it in any respect. It has operated very successfully, and I should be very glad to hear from others who have had any experience in any form of girder rails. The question was asked as to the cost of construction. My impression is that the cost of laying the track is considerably less; at least, we have found it so. I am not prepared to say, however, what the difference in the expense is; but it certainly is laid at less expense than the other track laid in the ordinary way. In our case, it has certainly been laid at less expense.

Mr. Holmes, of Chicago, said: In my opinion the allusion to the girder rail is a most important one. I do not believe it is the only rail we should use. That rail has been used in San Francisco for over nine years; and having made some very protracted visits to that city, I have studied into the use of it, and am certain that the people of San Francisco have no idea of giving it up. The construction with that rail is very much cheaper, and there is no possible objection to it on account of the public, any more than there is with any other, and it gives such smooth, easy riding. I really believe that in five years' time it will be the rail of the country.

At the request of the Convention, Mr. Longstreet, of Providence, exhibited a model of a girder rail track which had been patented by Mr. Brayton and himself, and of which some 300 tons had already been laid in Providence. The model was to scale, and showed the method of construction. The rail was supported by, and keyed to, cast-iron plates two feet long by six inches wide, resting on concrete foundations, and held together by tie-rods of iron. No wood or spikes were used in the construction, and the expense was shown to be below the cost of a substantial tram rail track.

Mr. Littell said: Mr. President, I do not want to consume, unnecessarily, the time of the Convention, but I wish to say that we have put down seven hundred tons of girder rails. We laid them in 1881; and in 1883 we laid six hundred tons of centre-bearing rails like them. We like the rail very much, and our people like it. It makes a very smooth road.

Mr. Moxham said: Before the subject is dismissed, it might be proper for me to say that I have made a special and careful study of this question. Mr. Holmes has alluded to the San Francisco rail. I have concluded, from all I have been able to gather, that that rail was the first used in the country; I am a little inclined to think in any country. The next and more important effort seems to have been in England and on the Continent. In England they have gone to the extreme in the use of the girder rail. In this country there has been a great deal done in various forms of girder rails. Mr. Longstreet has given the matter a great deal of thought. There is no one system, no one rail, but a number of them to choose from. I believe, with Mr. Holmes, that the girder-rail is the coming one for the purposes of street railways.

On motion, the report of the Committee was adopted.

Our News Column.

We take special pride in calling attention to the great quantity of Street Railway news in this issue of our paper. In nine cases out of ten, the items are official; and in most other instances they are supplied us by traveling agents of street railway supply houses, from notes taken while on the ground.

We have clearly demonstrated (1), that there was an opening for a Street Railway Journal; (2), that this Street Railway Journal has filled that opening.

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Luminous Railway Cars.

"Know ye the land where the Halsey and Myrtle
 Have emblems on cars that are run on their line;
 When the rage of the driver, the love of the turtle
 Now melt into sorrow, now madden to crime?"
 —*Bride of Abydos*, i-1

Our venerable and esteemed contemporary, at once the Phoenix and the Methuselah of American railroad literature, is not satisfied with having given to the world the brilliant idea of luminous harness for street railway service, but has added to the literature of railway illuminations the following:

"The Swiss railway companies now cover a portion of their carriages with a phosphorescent preparation which makes them visible at night."

The Phoenix proves itself to have the piercing vision of the graceful lynx, and the deep wisdom of the silent sphinx. It has discovered and announced a hint which should make the fortune of the first line adopting it.

No longer

"That orb'd maiden, with white fire laden,
 Whom mortals call the moon"

shall reign the night and illumine the noisy street or dusky track.

Rich and rare cars, fair beyond compare,

"Blue, darkly, deeply, beautifully blue"

and luminous with golden sheen, shall rejoice the home-wending citizen, when

"Night's candles are burnt out, and jocund day
 Stands tip-toe on the misty mountain tops,"

and attract the yokel from a distant land, in no less measure than now does the Greatest Show on Earth.

How inspiring! In day time, the down car

"Fills
 The air around with beauty"

as it climbs the first grade; and then passes over the summit where live the "nobs."

"So sinks the day star in the ocean bed,
 And yet anon repairs his drooping head,
 And tucks his beams, and with new spangled ire
 Flames in the forehead of the morning sky."

It recalls, the while, those sweet lines

"Spake full well, in language quaint and olden,
 One who dwelleth by the castled Rhine,
 When he called the flowers, so blue and golden
 Cars, that on earth's firmament do shine;"

and makes us young again.

The Luminous Car! Bright essence of Pearl Street sagacity, I see thee now ("in my mind's eye") as thou rollest by St. Mark's Place,

"Time writes no wrinkle on thine azure brow,
 Such as the painter's eye beheld, thou rollest now."

How sweet! In the house opposite, in the twilight, sits an aged man, serenely waiting for the summons. His gaze, too, seeks down the long vista, the glowing fleck which betokens the 6:40.

"Unto dying eyes
 The horse car slowly grows a glimmering square."
 —*Princess*.

The patriarch smiles; he gently waves his emaciated hand, blessed with good doing. He has seen the luminous car and has no more wish nor need to live. His eyes close for aye, and, like the car itself, his soul is

"Gone, glimmering through the dream of things
 that were."

Of this car it might be truly said:

"Rich and rare were the paints she wore,
 And a bright gold light on her front she bore."

No more shall the growling "cit." complain of the car which at once cheers him, transports him from place to place, and affords him symbolism and a subject for philosophical reflection. No! he shall rather say, with Eliza Cook:

"I love it—I love it, and who shall *dar*,
 To chide me for loving that old *hoss car*."

The Luminous Car! Indeed,

"She [rides] in beauty, like the night
 Of cloudless climes and starry skies;
 And all that's best of dark and bright
 Meet in her dashboard, and her eyes
 Thus mellowed to that tender light,
 Which Heaven to gaudy day denies."

The Luminous Car! Think of the good it will do at night; at once a "guide, philosopher and friend."

"Thus, when the lamp that lighted
 The traveler, at first goes out,
 He feels awhile benighted,
 And looks around in fear and doubt.
 But soon, the prospect clearing
 By cloudless starlight on he treads,
 And thinks no lamp so cheering
 As that light [the horse car] sheds."
 MOORE—*I'd Mourn the Hopes*.

The Luminous Car! Think of the inspiration it will afford the early milkman and the night patrolman. When

"Morn,
 Waked by the circling hours, with rosy hand
 Unharred the gates of light."

their souls have been prepared for poesy; and if

"The horse car came down, and the milk wagon
 poled,
 And its panels were gleaming in purple and gold."

instead of the milkman giving the reckless car driver in charge to the policeman, he would turn to the latter, and pointing to

the glowing rear dashboard of the luminous car, would feelingly quote:

"She was a form of life and light,
 That, seen, became a part of sight;
 And rose, where'er I turned mine eye,
 The morning car of memory."
 —*Giaour*.

We shall have a special luminous donation car of our own, made by contributions from all the car builders and inventors in the country. It will be

"The princeps copy, clad in blue and gold."

Then when

"The sentinel [cars] set their watch in the sky"

we shall softly roll homeward, shedding azure radiance around us, and emitting an aurea as we go.

We shall keep our special donation Luminous Car in first-class condition at the expense of the donors, their heirs, executors, administrators and assigns, forever; for it hath been sweetly, truly said, that

"The [car] is fairest when 'tis [painted] new,
 And [varnish] brightest when [it's free from
 streaks.]"

And yet, while in the Luminous Car there is poesy, mystic symbolism, the concord of sweet rays and the epitome of bright hopes, is there consolation therein? Were not the old ones better? Ah me!

"I remember, I remember
 The horse cars dark and high,
 I used to think their painted tops
 Were close against the sky.
 It was a childish ignorance,
 But now 'tis little joy,
 To know I'm further off from heaven,
 Then when I was a boy."

Though there will be aptness and truth in the quotation,

"Blossomed the lovely cars, the forget-me-nots of the angels;"

though we may with telling fitness, in referring to the grand concourse of theatre cars up Fulton Street at 11:15, recall to our best girl the charming lines:

* * "Now glowed the firmament
 With living sapphires,"

etc., we doubt whether we shall be much happier—unless the man-who-hugs-his-girl-up-in-the-corner is suppressed by an unpoetic conductor.

We wish it distinctly understood (and in saying this we speak entirely in the interest of our semi-centenarian though still poetic neighbor, that the Luminous Car principle, present and to come, will be no less adapted to the gorgeous Pullman than to the despised bob-tail; no less to steam roads than to those urban ways on which the effulgent vehicles are propelled by the refined mules of Louisville. Head-lights on steam roads need, in fact, be unnecessary; the cars themselves will announce their coming; and our proposed eighteen-hour train between New York and Chicago will appear like a glowing streak of light having a length of about 600 miles, or the exact distance traveled between sunset and sunrise, or from 18 to 6 o'clock.

As we live we learn.

"'Tis the sunset of life gives me mystical lore,
 And [incoming trains] cast their shadows before."

The Value of Street Railways.

Rapid transit lines, stage routes, elevated and underground railways, but more especially *street railways* are most potent in influencing the destinies of cities, because they work into the economy of society under the subtle yet constantly operative law of the DIVISION OF LABOR.

"My time is worth more than my street-car fare" is the correct result of many mental calculations constantly made, because an organized system for transportation can accomplish the task for the people of even a small town—much more than of a wide-spread metropolis—cheaper and better than they can do it for themselves. Instance, a plumber and his assistant about to execute a job at even so short a distance as half or three-quarters of a mile; it is obvious that the unlucky (?) patron would prefer to pay for the "time" plus the street car fare than to liquidate the bill including time spent in walking one or two miles.

From this extreme example to the case of the poor sewing woman carrying home the results of her long and pitiful industry and including almost every conceivable condition of business and industry, the real fact remains that "the time is worth more than the cost of the fare."

This is the suggested thought: That in the division and subdivision of the multitudinous employments of the toilers—and the people of a city are fearful workers—of a greater or a lesser city, "the company" can do its part of the general work in transporting cheaply and conveniently the great multitude better, in every sense, than the people can do it for themselves. Second: That without this cheap and convenient system of internal transportation, working within and in co-operation with the other greater or lesser divisions of labor that the modern great city could not exist. Cities of a million population now are few in number and those several cities in the near future with *five millions population* would never exist except in the imagination of sanguine and false prophets, but which by the aid of street transportation will be facts to be learned from the geography of our children.

T. A.

Crowded Cars.

"All that board the platform are but a handful to the tribes that struggle in its bosom."

Once in a while comes from the traveling public a wail of woe as to crowded cars, and the suggestion that the French system be adopted—that of limiting the number of passengers carried to the actual seating capacity of the conveyance, and furnishing numbered cards to those in waiting at the terminals or stations, so that the first come is the first served.

There are some good points about this plan where the line is short and the "headway" also, and the climate somewhat regular, but for long lines and infrequent cars, and the capricious weather of most American towns, it won't work; *particularly on the last car!*

We will just suppose the case of a man with wife and child, arriving in a pouring

rain in time to catch the "last car," and being confronted with the sign "full;" or being handed one ticket. Shall he ride home and leave wife and child? or send his wife home alone and he and the child sleep in the waiting room; or how?

Still there is no doubt about it that the extreme impatience and haste of passengers often produces unreasonable crowding and not only causes discomfort, but opens the door for quarrels and pocket picking, and contagion.

There might be imposed a certain limit of crowding under ordinary circumstances: as for instance where the cars run on short headway, the weather clear and likely to continue so, and the driver knows that no advertised trains or public entertainments will be missed by a few minutes' wait on the part of the excluded ones.

There is, too, a probability that more fares would be collected. Some few people might walk instead of riding; but then again there are many who will not try to ride on certain lines during the crowded hours; and the conductors would miss fewer fares of those who did get on.

A Handsome Lithograph.

We have received and have to return thanks for a sheet of vignettes of the Officers of the American Street Railway Association from its organization in 1882 to the present time. It is a complimentary souvenir (and, be it said, a very neat one), published by J. M. Jones' Sons, of West Troy, N. Y. The sheet is heavy paper, 22x30 inches, and contains around the edges square "cabinet" portraits of each member of the Executive Committees for the three years, the Secretary and Treasurer, and the Vice-presidents; and across the centre, on round plaques, portraits of the four Presidents. Under these is a perspective view of a street railway barn, and a summer car passing a close car at full speed. The pictures are in black and brown tint, on white surface, and the whole piece is worthy of a good frame, and place over the office desk.

In Low Latitudes.

One would think that in the enervating climate peculiar to territory south of Mason & Dixie's line, people would need no education, as far as riding on street cars is concerned; but to one who has traveled to any extent 'neath southern skies, and visited southern cities, it must appear strange that even where there are street car lines, the majority of the people walk in preference to riding.

A solution of this seemingly paradoxical problem may be that the poverty of the Southerners since "the late unpleasantness" causes them to save every penny for the absolute necessities of life, and never to pay out a nickel for riding from one given point to another, when that nickel might be saved by hoofing it. However that may be, I cannot but incline to the belief that this is false economy; the money expended with cobbler during the course of the year might be more than proportionally reduced

by being deposited in the fare boxes of yefestive bobtails.

Up to the present time comparatively few southern cities have any surface transportation facilities outside of the regulation "carriages," or fever boxes.

With commercial traffic always on the increase, one would think that a line built wherewith to connect most depots and hotels, would pay in almost any city with a regular population of anything from five to ten thousand inhabitants; yet even in such towns as Raleigh and Wilmington in North Carolina, and Portsmouth and Roanoke, Va., we find a sad lack of cheap transportation facilities. Montgomery, Ala., is another, and in all of these towns much business is done, two of them being State Capitals. However, I am glad to say that a line has recently been projected in Montgomery, and will probably be built and opened for business in the near future.

How many other towns of any importance are still without street railways in this land of sun and hoe cake, remains to be seen, but one thing strikes me as significant, and that is wherever we find a street railway we find projections for more. At Chattanooga, where there is but one, another is to be immediately built, and the Chattanooga street railway is to be extended in the spring, to the mountain, one and one-half miles from its present terminus. At Nashville, I had the pleasure of meeting Mr. D. Dederick, Superintendent Line Street R.R., and the patentee of a new turn-table, of which nothing but clever words have been said. Mr. Dederick is also Superintendent of the Cherry & Jefferson, Broadway & Vanderbilt, and the Church & Spruce Street Railroads. Twenty-three close cars are run over these four lines, of which 19 were built by the John Stevenson Co., equipped with its gear and super springs; and the remaining four cars were furnished by the Brownell & Wight Car Co. of St. Louis; besides the above, the Company owns 3 summer cars, built by the Laclède Car Co. And right here does it not seem remarkable to Northerners that out of a total of 25 cars run by one company in a southern city, but 3 are summer cars, while winter cars used during the heated term in higher latitudes are intolerable, and not to be endured? In justice to Nashville, however, I must say that its inhabitants claim for it cooler weather during the dog-days than many northern cities are blessed with. How true this may be I do not care to say, but from personal experience in both zones, I prefer summer rustication in the classic Cream or Garden Cities, rather than in that of the rocks.

After a delightful run through Eastern Tennessee over the admirably equipped N. C. & St. Q. R.R. to Chattanooga, and from there via the East Tennessee, Virginia & Georgia, through Cleveland, we find a welcome at the Hatter House at Knoxville. Here, the street railway is held in high regard; an interview with Mr. T. L. Beaman, Secretary, Treasurer and Superintendent of the Knoxville Street Railway Co.—at present the only street railroad in that enterprising place—elicits the fact that two more lines are about to be laid; one from Market Square to Mechanicsville via Asylum

Street, about one mile in length; and the other from Gay Street, by way of Crozier and Hardy Streets, to the Fair Grounds, distance above the same as the other. The first is incorporated for \$20,000, with officers (so far) as follows:

Dr. Tadlock, President, W. H. Simmons, Esq., Secretary and Treasurer; Superintendent not yet decided upon, but rumor says that — I was asked "not to give it a way," so please excuse details.

Mr. Beaman has recently patented a rail, embracing the finer points of the T, centre bearing and side bearing; and it was darkly hinted by outside parties, that this rail is to be adopted on one of the new lines.

Leaving Knoxville in the evening, or rather a trifle after midnight (for any time after noon is "evening" here), I reached Bristol in time for breakfast, proceeding at once toward Norfolk, over the N. & W. R'y. At Petersburg, Va., a halt is made to pay my devoirs to Mr. Geo. Beadle, sole proprietor of the Petersburg Street R.R. The growth of this line has been rapid: Projected in October '82, chartered in November of same year, and opened for traffic the following September; it is readily seen that but little time was lost in its construction. The total cost of the road was \$50,000, including 9 cars, two "second-handers," and seven furnished by the Jones Car Co. of Schenectady, N. Y.; all bobtails. Mr. Beadle is the inventor of the fare-box (now made by Wales Mfg. Co. of Syracuse) used on his road. In discussing the relative merits of horses and mules, Mr. Beadle gave it as his experience that the festive mule will withstand the heat, and the effects of starting cars on heavy grades better than the horse does. I noticed that the cars were equipped with the Higley gear, of which I may have occasion to refer at a later day. A visit to the stables convinced me that the refined habits of the Louisville mule were by no means unknown here, and the abominable odor of uric acid was conspicuous by its absence. Thanks to the courtesy of Mr. Frank Beadle, a son of Mr. Geo. Beadle, and Superintendent of road, my brief sojourn in Petersburg, of historic memory, was rendered most enjoyable, and the cordial invitation extended to me to "come again" will assuredly be accepted in the near future. It was with feelings similar to those experienced on leaving old friends, that I again boarded the cars for the seaboard, via Richmond. And here I find another projection, that of a road from the corner of 8th and Broad Streets via 8th, over the free bridge to south end of Hull Street, Manchester, a distance of two miles. The charter for this line was granted as early as '82, but lack of funds and enterprise prevented the projection materializing. However, times move with the sun and there is to be no more delay; it is expected that the road will be open for business sometime this summer; the estimated cost will be in the neighborhood of \$50,000, including equipment.

Major Bolton, President of the Richmond Street R.R., and Chief Engineer of the R. & D. R.R. system, was away from the city, so I was disappointed in one of our objects in visiting the old Confederate capitol.

And here I must leave you for the present; let me record the fact, however, that wherever it goes, the STREET RAILWAY JOURNAL has an assured welcome, the only complaint being that it "don't come often enough."

E. V. CAVELL.
Green Cove Springs, Fla.

Street Railways and the Daily Press.

EDS. STREET RAILWAY JOURNAL:—

At the last Convention of the American Street Ry. Association, the president of a prominent company expressed his regret that the daily press had not been notified of the convention, that they might have had reporters present to give to the public the utterances of those gentlemen in convention assembled representing the chief street railroads of the American Continent. Inasmuch as I entered a protest against the admission of the representatives of the daily press, I take this opportunity of expressing more at length my reasons therefor.

For what purpose is a street railway company organized? I answer for one of two reasons. Either to develop an otherwise inaccessible property, or to derive a profit from the transportation of people. The latter incentive has been in the great majority of instances the avowed purpose, and, in the words of M. M. Kirkman, "In the operations of railroads the objective point of endeavor is the revenue that accrues from the business. It is for this that the proprietors contribute money for the construction of railroads; it is for this that they are operated."

A certain district having been built up, and the people experiencing great inconveniences in getting to and fro on business or pleasure, some energetic individual thinks it will be to his pecuniary interest to furnish transportation. He talks up the matter, and probably with great difficulty interests others in the project. A charter is obtained from the State Legislature, and subsequently an ordinance from the local authorities, granting permission to construct the tracks, in certain streets, upon certain conditions. In other words, a contract is entered into as between the company on the one hand and the people, through their representatives, on the other hand. The latter expect to receive full value for the rights and privileges granted the company. Individuals are induced to subscribe for the stock, and in due course of time the road is constructed. The people at once derive the benefits incident to the operations of the road. Not so the stockholders. The records will show that many of the prosperous roads of to-day passed many a weary year without earning the expected dividends upon the investment. "Hope deferred maketh the heart sick" is a trite but not the less true proverb. As dividends failed to materialize, the original stockholders would in many instances be forced to part with their stock, unless their financial condition was such that they could wait for the good time coming. The expenses of operating a railroad are in a measure independent of the traffic. The cost of motive power, cars, horses, build-

ings, vary in a great degree with the traffic. Not so the track expenses. The track will cost nearly as much if used by one car as if used by a hundred. Actual count at a point in Chicago showed that the sixteen feet of street pavement maintained by a horse railroad was used FORTY TIMES while the balance of the street was used once.

But our street railway having entered upon its service to the public, affording convenient and frequent conveyance to and fro along its lines at the lowest possible cost, tends to create traffic and reacts to the public good. The value of all the property in its neighborhood is increased; new life is instilled, and buildings commence to spring up on every hand. Business seeks a location along its lines, because the people are drawn thither from each side. In constructing the street railroad, therefore, the projectors, although actuated by selfish motives, "have built better than they knew." Over a century ago that wonderful man, Adam Smith, wrote: "Every individual is continually exerting himself to find out the most advantageous employment for whatever capital he can command. It is his own advantage, indeed, and not that of the society which he has in view. But the study of his own advantage naturally, or rather necessarily, leads him to prefer that employment which is most advantageous to the society."

The street railroads give employment to many thousands of deserving men. Permit me to quote the Hon. Moody Merrill, of Boston, who said, upon taking the chair at the first street railroad convention, 1882: "There are now organized and doing business in this country and Canada, four hundred and fifteen street railways. These companies employ an army of about 35,000 men. They run 18,000 cars, which with the horses attached would make a solid line of cars reaching from Boston to Albany. More than 100,000 horses are in daily use, and, calculating that the average life of a horse in street railway service is four years, it makes the annual consumption of horses 25,000, a fact of much importance to the farmers of the country, east, west, north and south. To feed this vast number of horses requires annually 150,000 tons of hay and 11,000,000 bushels of grain. These companies own and operate over 3,000 miles of track—nearly enough to span the country from Boston to San Francisco. The whole number of passengers carried annually is over 1,212,400,000, or a number nearly equal to the entire population of the globe. The amount of capital invested in these railways exceeds \$150,000,000, with absolutely no security, but the faithful and satisfactory service rendered the traveling public by the companies themselves."

As the street railway business is growing rapidly these figures must be increased for to-day, and the *indirect* value of these railways to the country at large is seen to be immense, and in the ramifications of the interest benefit the merchant and the manufacturer, etc., etc., but especially the former.

Returning to the supposed railway whose fortunes we were following. After weary waiting, perchance for years, the increased traffic, which is largely due to the con-

struction and operation of the said street railway, permits the payment of a regular dividend. The stock begins to be in demand and the price is appreciated. Instantly the public begins an outcry against the *monopoly*, forgetting in its wilfulness the years that passed *without* dividends. The cry is at once for more and better cars, etc., etc., etc. The interests of the corporation and the public appear to differ. The corporation is managed in the opinion of its officials for the best interests of the company, and these are always best for the public, did the public but judge intelligently. The daily press with a few exceptions, far between, instantly takes up the popular cry and its columns are filled with attacks upon that dread monster, "monopoly." The corporation had no organ by which to make its side of the case heard and the verdict went by default. It is this unfair spirit, evinced day by day upon the part of the daily press, that caused my objection to its presence at our convention. It would not allow us credit for ANY good qualities, but would hasten to curry popular favor by seizing upon anything and everything that it could distort into reprehensible views or actions.

What would be the condition of the cities of the world to-day without the street railroad? The value of property would be depreciated many millions of dollars, and the inconvenience to the masses would be simply indescribable. No other system compares with it in cheapness and regularity of service, and it transports the myriads of its patrons with unexcelled frequency and cheapness. Under the summer's sun, in winter's biting blast, in sunshine and in rain it never fails. AUGUSTINE W. WRIGHT.

Mileage, Feed, &c.

EDS. STREET RAILWAY JOURNAL:—

In answer to a "A Reader" in your last issue asking information about mileage, feed, &c., I submit the following method as followed by this company.

We use for feed—hay, corn, oats and bran. The corn is crushed, not ground, a portion of the hay is cut and mixed with the corn. Eight working horses are allowed to each car, and each team runs 19 miles daily. The horses are fed two hours before work, and are on the street 4 hours out of 24. The amount of feed we allow a working horse daily is as follows:

Corn (crushed).....	15 lbs.
Hay (cut).....	6 "
" (long).....	7 "
Bran.....	¾ "
Straw for bedding.....	3 "

We feed oats to fresh horses and those that are "off their feed" from various causes.

JNO. B. PARSONS,
President.

Lombard & South Streets }
P. Ry. Co., Phila. }

[We have to thank Mr. Parsons for his trouble, and ask others to give their usage. We wish the STREET RAILWAY JOURNAL to be a medium of exchange among street railway men. Each one, by putting questions and giving information, encourages others to do the same.—EDS.]

Shoeing Horses.

EDS. STREET RAILWAY JOURNAL :

I fail to see what is new in the "best system" of shoeing horses in the use of street railways, as offered us in your March issue by Mr. Thos. Leggett, unless it be as a novel advertisement.

He has no "shoe to sell or axe to grind!" His interest is only for the horse! But still it is a strikingly plain fact that his alleged "new system" is only the well known old plan of a particular horse-shoe manufacturer, and he is most careful to explain that it is a certain pattern of this manufacturer's shoes that he uses!

If Mr. Leggett has anything new and truly worthy to impart on this subject, let us have it by all means; but why foist upon us "best systems" that are novel or available only as a new form of advertisement for some manufacturer? No doubt, "if the horses had a voice in the matter, they would demand a change;" but I suspect they would confine their demands to their own needs, and not to urging the wares of any manufacturer who sees his pet system of shoeing gone out of adoption, unsupported by the test of experience, and in favor of better methods.

For I submit, that it is well known, certainly here in the East, that the toe system of shoeing has not proved sufficient to keep horses' feet in the best condition possible with their work on street railways, and that this system is an abandoned one. While it is indeed desirable to give the frog and heel part of a horse's foot all the free action possible, it is not true, that, in allowing such parts to pound pavements wholly unprotected, no injury will be done them; for their natural action is exceeded or carried too far, and results in breaking the bar between the frog and heel, and in bruises and undue wear.

It is generally recognized here, that since the whole (and not the toe alone) of a horse's foot is subjected to the unnatural work of pounding pavements, all parts of the foot should be protected in proportion as the work they are put to is in excess of their natural use. So, then, we use a full shoe extending back and protecting the heel; and we consider that nothing less than a full shoe can be used. The shoe should, of course, be light; and yet it should be thin enough to give the heel all necessary movement, and the frog all the pressure upon the ground that it can stand, at the same time protecting both heel and frog from undue wear.

And I will add, that I recommend no particular manufacturer's shoes.

RAILROADER.

[The foregoing is a *bona fide* communication from a street railway man. We submit that he has not disproved any of Mr. Leggett's statements, nor proved any of his own. Suppose Mr. L. takes the matter up again and gives us some data; then let RAILROADER take the advise that he offers to Mr. Leggett and does not take himself: "If he has anything new and truly worthy to impart on this subject, let us have it by all means."—EDS.]

Street Car Horses.

Car horses, said the foreman of the Third Avenue Street Railroad Company to a *Tribune* reporter, are injured in a variety of ways. They run the greatest risks during the hottest part of the summer and the coldest of winter. These two periods aggregate about four and a half months. The month of September was the hardest month of last year for car horses. An intensely warm term came on the heels of a cool period and the result was the prostration of a large number of car-horses in this city as well as in many other parts of the country. Leaving intensely hot and cold weather out of the question, the most perilous season for the car horse is dry, windy weather. The cobble stones over which he travels are then as smooth as polished glass. Not a particle of any foreign substance can get a foothold on them, and the sharply shod hoof will slip from them with the same ease as the human foot will slide off the smooth side of a banana skin. Some of the roadbeds offer even more than the usual facilities for accidents of this nature. They are constructed on the shape of a watershed, sloping from the centre to the tracks. On these the car horse has a hard time indeed in wintry and windy weather. Comparatively few accidents happen in wet weather. Unless they happen to break a limb, only a small percentage of horses which slip and fall suffer permanent injury. With rest and care they generally recover from sprains and strains. Out of 1,700 horses the Third Avenue Company loses but one a week, according to its foreman. The latter has ninety-three hostlers under his eye, besides a large number of men employed in other capacities. Each hostler is expected to groom twenty horses per day, and to feed and bed them.

The stables are as clean as it is possible to keep them. The horses are in keeping with their surroundings. Horses are purchased at all seasons, but the best are bought in the fall. The seller is willing to take much less at the beginning than at the end of winter. The company has a standing price of \$155. Some splendid specimens of horseflesh have been bought for this figure. Gray is the color preferred. Horses of this color are said to suffer less from the heat than blacks and bays. From eight to ten horses are used in a snow sweeper, and one team possessed by the company attract much attention as they rattle through the avenue. The ten grays whirl the huge sweeper along as if it were a light road wagon. Several of these horses stand seventeen hands high. Every new purchase is subject to an attack of pinkeye. This is attributed to change of climate and surroundings. Most of the horses come from the West, and they are found to require from a week to two weeks to obtain their "sea legs." It is a common opinion that the lot of the car horse is not a happy one. In comparison with the fate of a large number of horses which receive but little sympathy, the car horse is to be greatly envied. He is not overworked; he is well fed, well housed, and is seldom ill-treated with impunity.

Mr. Holmes on the Traction Company's Troubles.

Mr. C. B. Holmes, Superintendent of the Chicago City Railway Company, was recently interviewed by a reporter on one of the Chicago dailies, and expressed himself as follows on the subject of the Philadelphia Traction Company's mechanical difficulties:

"The first piece of cable road constructed in Philadelphia was put in one year ago last summer, and was something like a mile in length. The projectors of the road had previously visited this city and we made them familiar with our methods of construction and our various appliances; but they expressed the conviction that our expenditure of money had been too great, and they endeavored to construct an equally effective road at a cost of about half the money.

"Their first construction cost them, I am told by their engineer, something in the neighborhood of \$146,000, and it proved an utter failure. It was taken up and thrown away. Last season the same company constructed from twelve to sixteen miles of cable track, which was in some respects an improvement on the first experimental mile put in a year before, but the construction was altogether too light and had no ability to resist the lateral pressure of frost, which is simply enormous. If our construction here had been made in the same way, it would have given us even more trouble than they had, as our frost goes so much deeper and its pressure is so much greater.

"I notice in the papers that the cost of this road is stated to be \$600,000, but it is my impression, received from various sources, that the expenditure was much greater—probably over a million. This construction had no ability to resist the great lateral pressure, and as soon as the frost came the slot closed. The engineer of the construction told me that they had taken up the pavement, inserted wedges in the slot, and forced the slot open, and had attempted to hold it open by inserting bolted rods between the slot-iron and the stringers upon which the rails are placed. But this afforded only temporary relief, for as soon as the temperature changed again the slot not only closed but drew the rails themselves toward the slot, so that in operating the cars with horses a large number of wheels and axles on the cars were broken.

"This information," said Superintendent Holmes, "was given me by the President of one of the companies in Philadelphia. We have never had the slightest trouble with our construction here in Chicago in the way of the slot closing, as we made special provision to guard against that, it being the thing to fear most. That feature of the construction was made perfectly secure. As is known to all the citizens of Chicago, the iron-work and the concrete which inclose the iron-works were made with special reference to intense frost.

"Statements have been made in the Eastern papers that the cable line here had been troubled with its slot closing up. These reports are wholly without founda-

tion. The only thing that could have given rise to any such impression was the fact that in the construction of the road we received a few car loads of slot-iron that had a ragged edge from imperfect rolling. The parties who furnished this iron instructed us to return it at their expense, but we had 1,500 men at work, and the streets torn up, and we could not afford to wait for new shipments of iron, but were obliged to use this, purposely placing the slot-irons closer together than a finished state would permit, and afterwards chipping off the ragged edges. That was all, or nearly all, that was done before the cars commenced operating. A few spots were finished afterward, but with this exception there has been nothing to give any impression whatever that our slot had ever closed on us.

"There have been a few cases, especially in the early days of the system, when inexperienced drivers have held on to cables too long and thereby cut them, but experience has relieved us of all trouble of this sort. We have had two cases when minor portions of the machinery have proved of insufficient strength under the intense strain at times brought to bear upon them, but we have strengthened these parts by adopting much heavier machinery. In February one section of this heavy machinery was placed in position, and to-day we have received and are hauling to the works the last of this heavy machinery. When occasion arises, or as soon as it is possible to do so, we shall remove the last portion of light work and insert this heavier construction in its place.

"The last winter has been an unprecedented one in severity of frost and volume of snow, but it has been of use to us in enabling us to discover wherein were the weak points of our construction, and so completely remedy them. The weak and imperfect construction adopted in Philadelphia should not weigh against the true merits of the cable system.

"It is absolutely necessary," said Mr. Holmes, in conclusion, "that the construction should be strong and stable to insure comfort to the public and to the operators. When this is done, there is no system yet devised which will compare in excellence with the cable system for transportation in large cities."

Additional Transportation Facilities in New York City:

EDS. STREET RAILWAY JOURNAL:—

The present need for additional transportation facilities in the City of New York will be conceded by any one who has occasion to come down town between the hours of 6 and 10 o'clock A.M., or to go up-town between the hours of 4 and 7 o'clock P.M.; and the future necessity thereof will be made even more manifest by reference to the following statistics and estimates:

POPULATION OF NEW YORK CITY.			
		Increase.	
In 1850....	515,547	.....	..
In 1860....	813,669	298,122	58 per cent.
In 1870....	942,292	128,623	14 "
In 1880....	1,206,299	264,077	28 "
Increase in 30 years....		690,752	

—being an average of 33 per cent. in each decade upon the population at the beginning of each. As the second decade included the period of the civil war, and the third covered the great financial and industrial depression following the panic of 1873, it will be safe to estimate a like decennial increase of 33 per cent. during the ensuing thirty years, which would make the population:

In 1890.....	1,604,380
In 1900.....	2,133,800
In 1910.....	2,837,950

—the latter being over 2½ times the population in 1880.

The number of passengers transported per annum upon city surface and elevated railways has been for the years ending September 30th of each year, as follows:

Years.	On Horse Roads.	On Elevated Roads.	Totals.
1855	18,488,459	.....	18,488,459
1860	36,455,242	.....	36,455,242
1865	82,054,516	.....	82,054,516
1870	115,139,553	.....	115,139,553
1875	165,997,602	920,571	166,918,173
1876	166,401,018	2,012,953	168,413,971
1877	160,924,436	3,011,862	163,936,298
1878	160,952,832	9,236,670	170,189,502
1879	142,038,391	45,945,401	187,983,792
1880	150,390,391	60,831,757	211,222,348
1881	155,800,993	75,585,778	231,386,771
1882	166,510,617	86,361,029	252,871,646
1883	176,625,434	92,124,443	268,749,877
1884	187,413,242	96,702,620	284,115,862

The above figures indicate how rapidly travel increases when additional, and especially when superior facilities are furnished. It is worthy of note that the transportation facilities on the elevated railways reached their maximum in 1881 as the following record shows:

Miles run by trains in 1881.....	6,117,238
" " 1882.....	5,917,051
" " 1883.....	5,919,931
" " 1884.....	6,056,766

Despite which their traffic increased from 1881 to 1884 by 21,116,842 passengers, or 28 per cent.

With the increase in population, the additions must go farther and farther from the centre of business, necessitating a constantly increasing ratio of travel to population.

The increase of travel from 1870 to 1880 was 96,082,785 being 83⅙ per cent. of the amount in 1870, upon which basis the amount of traffic would be—

In 1890.....	388,103,940
In 1900.....	712,558,834
In 1910.....	1,308,261,919

The increase from 1880 to 1884, without any increase in the transportation facilities, has been 72,893,514 being 34⅙ per cent., upon which basis the travel would be

In 1890.....	450,000,000
In 1900.....	956,000,000
In 1910.....	2,031,000,000

In view of the increase of population, its greater distance from the business centre, and the additional facilities of a superior quality to be furnished by the New York Cable Railway Company's system of cable

roads, it is safe to estimate the travel at an average of the two estimates, say

In 1890, 420,000,000, an increase over 1884 of.....	136,000,000
In 1900, 835,000,000, an increase over 1884 of.....	551,000,000
In 1910, 1,670,000,000, an increase over 1884 of.....	1,386,000,000

which certainly indicates that plenty of traffic awaits the new enterprise, and clamors for its completion.

If the cable roads should all be built by 1890, and should attract only 75 per cent. of the increased travel, they would carry 102,000,000 passengers.

The east side axial line (Lexington Avenue) would have, within two blocks on either side, the following existing traffic to draw from without any allowance for increase :

In 1884 Third Avenue elevated carried.....	47,695,460
In 1884 Second Avenue elevated carried.....	10,249,263
In 1884 Second Avenue surface carried.....	19,397,072
In 1884 Third Avenue, surface carried.....	31,395,490
In 1884 Fourth Avenue surface carried.....	15,038,579

Total.....	123,775,864
of which elevated roads carried... ..	57,944,723
and surface roads carried.....	65,831,141
	<hr/>
	123,775,864

while the increase in this territory will be at least 9,000,000 per annum during the five years from 1885 to 1890, if facilities are furnished, for which there is now no adequate provision.

A reasonable estimate would allow the Lexington Avenue cable line one-fourth the aggregate traffic of this district in 1886, say.....	33,000,000
and one-third the increase in 1887, say.....	36,000,000
and one-third the increase in 1888, say.....	39,000,000
and one-third the increase in 1889, say.....	42,000,000
and one-third the increase in 1890, say.....	45,000,000

These figures but partially indicate the value of the cable railway projected on Lexington Avenue to this district of the city.

WM. P. SHINN.

Answering Questions.

We have received a letter containing some questions which have been unsuccessfully submitted to others for answer, and which involve considerable work. We wrote the sender (a non-subscriber) that we should answer them in our columns. He replied asking if it would not be equally convenient to answer by mail.

It might be just as easy and convenient for us to answer the questions by letter, but we see no reason why we should do so. Our time is sold to this Publishing Co., and we have a certain interest in the profits of the business. To take from one to five hours to answer questions which have already been sent back by three persons would be unreasonable. We should prefer taking the

same time and answering the questions in editorial columns, where they will benefit others than the querist, especially as those others contribute to the support of the papers by their subscriptions.

Our correspondent will pardon our frankness; but our regular business is that of scientific expert, and such questions should be accompanied by a check of \$20.00, to order of our Company, if immediate and personal attention and reply is wished.

While the hospital physicians treat cases free at clinics, for the benefit of the students who have paid their fees, they always charge for attendance at the house and for private treatment at their own offices. The cases are parallel.

Collection of Fares—I.

The Atlantic Avenue Railroad Company, of Brooklyn, exclusively uses an alarm-register with which to check the collection of fares, known as "Richardson's Time Alarm-Register." It is the invention of Mr. W. J. Richardson, the secretary of the company, and has been in continuous use on the lines of that company over a year. It is said to have been so satisfactory that there are now being made improved registers, outwardly similar to those now in use, with which to equip the new cross-town line. This line, it is expected, will be in operation about June 1st, and will run from Hamilton Ferry, at the extreme southerly end of the city, to the Brooklyn terminus of the great East River Bridge.

This alarm-register is used exclusively for recording adult and half fares. Where there are many different rates of fare, as is notably the case with the Concord (N. H.), road,* the use of this register is not recommended, as it was not designed for that purpose. The five-cent or adult register will record one thousand fares, and the three-cent register one hundred and fifty; both sets of dial hands being so constructed as to preclude the possibility of tampering with them in any way. The dials are obscured from the conductors' view.

Every conductor is obliged to have two dollars in change, and just that amount with him when he goes to work. At the end of every half-trip, he must deduct the amount of money he starts with, namely, two dollars, and turn the balance of the money into the office. The conductor ascertains the number of cash fares received, by dividing the balance by five, after having deducted the amount of cash received in three cent fares. These calculations must be made at least sixteen times a day, and on one line as many as twenty-two times a day.

By this system, no excuse should be made by the conductor for not turning in just the number of fares his register shows him to have recorded. Unless by such a system as this, conductors never will count their money, and they are thereby induced to get into a loose habit of keeping their cash and accounts. By this system, they are required to count their money, and turn into the company's office the balance over and above the amount of two dollars.

* See page 171, report of the American Street Railway Association, 1884-5.

The five-cent or adult fare-bell is large and gives a clear resonant ring. In connection with the register is the watch movement, which carries at all times the standard time of the company. The attachment of this movement to the register has had the effect of almost entirely doing away with "loafing" or running behind time.

The register being wholly under the control of the conductor, in case of a fire with hose across the rails, preventing the further progress of the cars, the conductor's accounts are never mixed, as is necessarily the case oftentimes, with the stationary registers. The conductor likewise cannot charge that his register has been tampered with, either in his possible absence from the car, or by malice or from any other reason, on the part of the passengers or others. Fares can be collected with it more quickly than with any other register used.

It is the judgment of Mr. Richardson that no register, portable or stationary, is worth anything unless it is supplemented by a thorough detective system; for perfection in an alarm-register is only to be attained by the invention of a machine that will fit inside of a man and make him honest. Till then all systems of checks will be but helps to keep men honest.

C. B. L.

Street Railway Insurance.

The formation of a street railway fire insurance company is being seriously considered by the managers of some of the leading street railway companies of America. The rates on the depot buildings and equipment owned by these companies has long been fixed outrageously high. There has been, as it were, a combination made by the insurance companies, equivalent to a "strike" against the street railway companies, by which they have arbitrarily placed the rates on the property at a figure to suit themselves, and in no sense justly proportionate to the character of the risks. Those companies that have not entered the "tariff" combination, are equally high in their rates of insuring this class of property.

It is conceded by the managers of all fire insurance companies that the moral character of the risk of street railway property is of the highest order; for incendiarism, to them, for the purpose of making money, can never be a temptation. Should the running of a railroad be unprofitable, and the owners desire to dispose of the stock, they could do it to better advantage, and make more money, by selling their property to the highest bidder, than they possibly could by a resort to incendiarism.

As to the arbitrary action of the companies, take, for instance, the cities of New York and Brooklyn. The "tariff companies," so called, forming the combination, have fixed the rate for all street railway, brick buildings, at one and a half per cent., and all frame buildings at two per cent. Wherein, we ask, is the justice of any such rating of property as this? We have in mind two pieces of property; the first, a one-story brick stable, that is about as liable to burn as rails under water; the other, a large depot building with several

floors, surrounded by lumber yards. The rates on both pieces of property are the same, simply because the companies have determined that the rates shall arbitrarily be set, as before stated.

The insurance statistics of street railway property, covering the business of nearly two hundred companies all over the country, from their dates of operation, show that not one dollar in three of premiums paid has been paid back by the fire insurance companies in losses. The insurance companies have no way of determining the losses on special lines of property, as, for instance, street railway property, except as each company shall determine what the rates shall be according to the business done by it, covering any special line of property. While the losses in one company may have been considerable, in another company they may have been little or nothing. The company that has lost largely will fix its rate accordingly; and the company that has lost but little or nothing will grade its rate according to that fixed by the company which has the highest rate.

Such a company as is proposed to be formed, should have almost a monopoly of the fire insurance of street railway property in America. The company should be controlled by representative street railway men, to be assisted by an underwriter, as inspector, of large and extended experience. The company, though provided with an absolute capital of say, not less than half a million, should be based upon and controlled by the essential idea of mutual insurance.

It is an indisputable fact, that mutual insurance of all kinds, whether life, fire, marine or casualty, have been universally and invariably successful, while uniformly able to insure at less cost to the insured than joint stock companies.

The expense of conducting the business of stock companies is a very considerable item in the cost of insurance, by reason of the payments to agents in soliciting business, as well as the cost of maintaining several high salaried officers.

The Street Railway Association of the State of New York will have interested with it the managers of some of the leading street railway companies in America in the organization of such a company as has been outlined. This company expects to be the insurance company of American street railways; and it is confidently believed that the saving it will be able to effect to those companies that insure with it will not be less than 33½ per cent., and possibly 50 per cent.

WILLIAM J. RICHARDSON.

Notes.

THE CHICAGO CITY RY. Co. is building 70 open cars.

LINCOLN (Ia.), is going to extend its street railway track.

THE HOLYOKE ST. R.R. Co. (Mass.), may buy two open cars.

SYRACUSE, N. Y., just opened a new line, H. J. Hart, Superintendent.

THE NAUMKEAG CO. OF SALEM (Mass.), is building two new open cars.

THE KANSAS CITY CABLE RAILWAY CO. (Kan.), is not in operation yet.

THE LYNCHBURG (VA.), ST. RY. Co. expects to add two summer cars.

CHARLESTON, S. C., is to have a new street railway; I. S. Riggs, President.

SOUTH CHICAGO, 12 miles from Chicago, is building a new street railway.

THE ORGANIZATION of the Sayre, St. R. W. Co., of Sayre, Pa., is not yet completed.

THE BELLAIRE, CHILLICOTHE & CANTON is a new Ohio Street Railway Company.

BROCKTON, MASS., is to have another street railroad running to South Abington.

THE MADISON ST. RAILWAY Co. (Wis.), will lay about two miles of track this year.

THE FONDA & FULTONVILLE RAILWAY Co. (N. Y.), is abandoned and the rails torn up.

THE WHEELING & ELM GROVE R.R. (W. Va.), may extend its road 1½ miles in the fall.

THE WASHINGTON & GEORGETOWN R.R. Co. (D. C.), will add five more double box cars.

THE ACUSHNET ST. RAILWAY Co., New Bedford (Mass.), has not yet commenced to build.

THE WILMINGTON CITY RAILWAY Co. (Delaware), is doing nothing but ordinary repairs.

THE KEOKUK STREET RAILWAY Co. (Ia.), will lay two miles of additional track this summer.

THE LA FAYETTE ST. RY. Co. (Ind.), expects to build one mile of road during the summer.

THE LOMBARD & SOUTH ST. PASS. RY. Co. (Phila.), intends running 6 cars more than last year.

THE CHARLES RIVER ST. R.R. Co. will build 1½ miles of track and buy 10 cars and 100 horses.

THE PEOPLES' PASS. R. W. Co. (Phila.), expects to increase the average of cars run, probably by 20.

THE CITY R.R. Co. of Poughkeepsie thinks of improving its track but can't tell to what extent.

THE NORTH HUDSON COUNTY RAILWAY Co. (N. J.), will open its cable railway for business July 1.

THE AKRON ST. RY. AND HERDIC Co. (Ohio), is arranging to build three miles of road this season.

KENTUCKY STREET RAILWAY Co., Louisville.—Mr. Z. Phelps has recently resigned and sold his interest.

THE CITIZENS' STREET RAILWAY Co., Springfield (Ill.), will lay a half-mile of new track this spring.

THE CENTRAL PARK, NORTH AND EAST RIVER R.R. Co. will probably increase the number of its cars and horses.

THE FRANKFORD & SOUTHWARK P. R.R. Co. (Phila.), expects to add two to four cars as the occasion requires.

NEW BEDFORD (Mass.)—We understand that 36 new cars have been ordered for the new street railway in this town.

THE CITY AND SUBURBAN RY. Co., of Sa-

vannah, Ga., proposes to lay part of its present track with steel rails.

THE TOLEDO CONSOLIDATED STREET RAILWAY Co. (O.), will put new rails on four miles of their track this summer.

THE PITTSBURGH, OAKLAND & E. LIBERTY P. R.R. is relaying its tracks and expects to put a cable in in the near future.

THE PEOPLES' RAILWAY Co., Springfield (Mo.), will add three new cars and an additional mile of track this season.

THE SALEM & DANVERS STREET RAILWAY Co. (Mass.), will build three miles of road to connect Danvers with Peabody.

OSWEGO, N. Y., is to have a street railroad. Amount necessary to build all subscribed; work to commence at once.

THE TRENTON (N. J.), HORSE R.R. Co. contemplates enlarging its stable and car house and adding more horses and cars.

THE UNION RATTAN COMPANY, of 125 Chambers Street, has a new broom designed especially of street railway stables.

THE METROPOLITAN R.R. Co., Boston, which is always making additions, as business increases, is building 50 new cars.

THE CITIZENS' STREET RAILWAY Co., Little Rock (Ark.), expect to construct from one to two miles of track this summer.

THE LEWIS & FOWLER MANUFACTURING Co., Brooklyn, reports that it was never so busy as now; being 30 days behind orders.

THE NEW WILLIAMSBURG & FLATLAND R.R. Co. will repair about 20 blocks of tram rail with 50 lbs. centre-bearing steel.

THE STILLWATER & MECHANICVILLE ST. R. W. Co. (Minn.), has to add more cars and horses to accommodate the travel.

THE SOUTHERN RAILWAY Co., of St. Louis, intends putting down one mile of track with the Johnson rail and will re-lay one mile.

THE ROCHESTER CITY & BRIGHTON R.R. Co., adds 10 new cars this spring; has some extensions to make and old track to relay.

THE HIGHLAND ST. R.R. Co. (Boston), is building a new brick stable for 200 horses, at Grove Hall, for the West Roxbury Park travel.

THE PHILADELPHIA CITY PASS. RY. Co. is leased to the West Philadelphia Pass. Ry. Co. for the term of 900 years from January 1, 1884.

THE CONEY ISLAND, SHEEPSHEAD BAY & OCEAN AVENUE R.R., is going to make alterations, of which we are promised particulars.

THE BENTON, BELLEFONTAINE RAILWAY Co., St. Louis (Mo.), has put on two new cars and will make a half-mile extension this season.

THE CHARLESTON CITY RAILWAY Co. (S. C.), intends to double its track where it is now single track, with the centre-bearing street rail.

THE SPRINGFIELD STREET RAILWAY Co. (Mass.), is relaying a part of its track, using Kyanized lumber, and Jones is building 3 open cars for it.

THE SECOND AVENUE R.R. Co., New York City, is building an addition to its depot,

185 x 200 feet; and will start its First Avenue line about May 1st.

THERE is now a street railway from Pittsburgh to Wilkesburg, Pa.; and there is some talk of building one from Beaver Falls to New Brighton.

THE CREAM CITY R.R. Co., Milwaukee (Wis.), will have some new summer cars this season. They will extend their double track about one-half mile.

FOUR hundred men are at work on the upper portion of the 42nd and Manhattanville line, New York City, and double cars will run to 40th Street shortly.

THOS. BROWER, former Superintendent of Rochester & Brighton Railroad, Rochester, N. Y., is back again in his old position after an absence of two years.

PITTSBURGH now has a People's Park Railway with ten cars, 75 horses and mules. Pres., Wm. McCreery; Treas., Jas. Boyle; Supt., Wm. J. Crozier.

THE WASHINGTON ST. & STATE ASYLUM, R.R. Co. (Binghamton, N. Y.), will extend its line to the Insane Asylum, a distance of $1\frac{1}{2}$ miles, using cable power.

THE PROSPECT PARK AND CONEY ISLAND RY. Co. is now improving and reconstructing its road-bed with new ties and stringers and new steel centre-bearing rails.

APRIL has been a more satisfactory and prosperous month, with street railway lines all over New York City and in Brooklyn, than was the month of March.

THE MINNEAPOLIS ST. RY. Co. is having built by the Jno. Stephenson Co., 16 new cars, 16 feet long, all to be equipped with "Small's" Automatic Fare Collectors.

THE HESTONVILLE, MANTUA & FAIRMOUNT P'ASS. R.R. Co., has within the last year added 10 new open cars and expects to rebuild its old cars as soon as possible.

THE 5TH WARD R.R. Co., Syracuse (N. Y.), intends adding two cars, July 1, to increase its service double (from 10 to 5 minutes headway) during a portion of the day.

MR. JOHN STEVENSON says that his company is running full time but affairs are not as lively yet as was expected, and there are few signs of immediate improvement.

THE EAST CLEVELAND R.R. Co. (O.), are building five open cars in their shops. They will build one mile of new track (electric conduit) to Fairmount Reservoir this spring.

THE FEDERAL ST. & PLEASANT VALLEY P. R. Co. (Pittsburgh), is laying about 75 tons of new curves, frogs and steel rails and will probably make some additions to its rolling stock.

THE BROOKLYN STREET RAILWAY Co., Cleveland (O.), are using the Demorest Duplex Register with much satisfaction. They will extend their tracks one and one-half miles this season.

THE CONEY ISLAND AND BROOKLYN R.R. Co. is discussing, but has not decided upon, the desirability of changing motive power below the city line, from horses to locomotive, cable, electricity or any other device.

THERE is a new cross town line from Hamilton Ferry, Brooklyn, to the Bridge, belonging to the Atlantic Avenue Co. and

to be started about June 1. The Atlantic Avenue line will add largely to its facilities.

THE Cable Cars are not yet running in Tenth Avenue, New York, but will start up shortly. This company has just purchased 100 sets of hand-made harness from J. F. Leahy, the manufacturer, 245 Tenth Avenue.

ALL the conductors, inspectors, starters, etc., on the 42nd St., Manhattanville and St. Nicholas Avenue Railway, New York, are (says Superintendent Smith) to wear handsome uniforms of police cloth with special buttons.

BAYONNE, N. J., must wait yet a little longer before it gets an independent line; also Montclair, as the Railroad Bill in the last Legislature failed to be reached in the Senate before adjournment. It passed the Assembly unanimously.

MIDDLESEX R.R. Co., Boston. The increase in the business requires this company to make extensions of tracks and further increase in stable accommodations, which will be done this year, as has been done about every year in the past.

THE NEW HORSE CAR SPRING patented by I. H. Randall, M. M. of the Metropolitan Railroad, Boston, Mass., and made by Andrews & Clooney, New York (Lewis & Fowler Manufacturing Company, Brooklyn, Agents), is being praised very highly by those companies which are trying them.

THE METROPOLITAN R.R. Co. Washington (D. C.), proposes to relay its track with centre-bearing rails, to the amount of 200 tons, and to add 18 open cars for summer use; also to build a new brick car house 256×58 feet, two stories high, and a frame car house 120×37 feet for its branch road.

THE HOUSTON, WEST STREET & PAVONIA Ferry R.R. Co. (N. Y. City), will soon put on 10 new one-horse cars to shorten the headway from the Grand Central Depot to Avenue C. and 10th St., and will transfer there to the cars now running from Green Point Ferry (E. 10th St.) to Pavonia Ferry, Chambers St.

THERE is a well authenticated rumor that Mr. Bidgood, late Superintendent of the Sixth Avenue line, New York City, is about to take the Superintendency of the Fourth Avenue line. Mr. B's numerous friends rejoice that he has returned from his Southern trip much improved in health.

THE STEINWAY AVENUE & HUNTER'S POINT R.R. Co., of Queen's Co., has just completed 8 new open cars, built by its Master Mechanic, Mr. Hess; all are equipped with the "Randall" gear. The enterprise exhibited by the General Manager of this company, Mr. C. J. Campbell, is highly commendable.

ROBT. McCULLOUGH, General Manager of the Benton & Bellefontaine Street Railway Co., of St. Louis, is about trying "Small's" Automatic Fare Collector on one of his cars. As Mr. McCullough is recognized as an authority in St. Louis on R.R. matters, he must see merit in this device.

THE LEWISTON & AUBURN HORSE RAILWAY got a charter from the Maine Legislature, March 7, authorizing it to operate

about three miles of its road which runs to Lake Grove on the borders of Lake Auburn, out of the city, by steam. This will be done this season. The road carried to that summer resort last year 40,000 passengers in 11 weeks.

THE STEINWAY & HUNTER'S POINT R.R. Co., of Long Island City, N. Y., has just increased its capital stock from \$60,000 to \$250,000 and merged in it the Astoria & Hunter's Point R.R., the Steinway Avenue and Bowery Bay R.R., the Broadway & Bowery Bay R.R., and the Jackson & Steinway Avenue R.R., all with the consent of the Commissioners, as per their decision of April 7.

THE recent decision of Judge Shipman, in the United States Court, in case of Fairhaven and Westville R.R. Co. vs. Augustus Day of Detroit, will be of interest to parties using the "Day Patent Track Scraper." Suit was brought by the patentee for royalty for the use of the patent which the street railway had paid once in good faith to other parties. The decision was in favor of the Fair Haven and Westville road after continued litigation.

THE WOODLAND AVENUE ROAD, Cleveland, O., running on the east side of the river, and the West Side St. R.R. Co. are now consolidated as the Woodland Avenue and West Side St. R.R. Co. and carry passengers 8 miles for one fare of 5 cents or a ticket. This makes the largest plant in Northern Ohio and covers the entire west side of the city, besides running through the most important business streets of the east side, passing from east to west side market houses.

THE HOUSTON, WEST STREET & PAVONIA Ferry R.R. runs from the Grand Central Depot to the foot of Chambers Street, via 34th Street, 23rd Street, 10th Street and Houston Street ferries. Judge Richard Kelley (President of the Fifth Avenue National Bank) was recently elected President of this road and the new administration. It is proposed to divide this long line and make two independent lines, with transfer of passengers at 10th Street without charge.

NEW HAVEN is particularly fortunate in having not only one but five different horse railway companies operating lines in the city, each having cars on its own track.

FAIRHAVEN AND WESTVILLE R.R. Co. is operating a line from Fairhaven to Westville. It has seven miles of track, employs sixty men, and has twenty-two cars, mostly Stevenson, and one hundred and fifty-eight horses. In repairing cars it is using the "Bemus Car Box" to replace the Higley Gear; also uses a new patent switch, which straightens the track ahead of the cars.

THE DAFT ELECTRIC LIGHT COMPANY is equipping a surface road in Baltimore, known as the Baltimore & Hampden Line—two-and-a-half miles in length—with their electric motors. A third rail has been laid which is to be used as the positive conductor. The dynamo machine to supply the current is on its foundations and all that is now required to complete matters is the motive power. One motor is

already built and tested, and the remainder will be ready in two weeks. They are constructed to draw two cars each. It is expected that they will be in operation inside of three weeks, and their success demonstrated.

Cable Railway Notes.

THE New York Cable Railway Company proposes to use these patents.

THE 125th Street and 10th Avenue route will probably try another system.

THE National Cable Railway Company controls the A. S. Hallidie grip patents.

THE National Cable Railway Company reports being in negotiation with companies in Baltimore, Washington and Cincinnati and has sold a license for Omaha.

THERE is a Commission, now sitting in the Tribune Building, appointed by the Supreme Court to consider the applications to the court for permission to construct roads upon all the routes laid out.

THE 155th Street Elevated Railway, New York City, has as yet done nothing. Its projectors expect to obtain the consent of nearly all the property owners. The required consent of the Board of Aldermen has been obtained.

THE grip used on the Brooklyn Bridge appears to be no good. Whereas a good system should take three cars with one grip, on the Bridge one grip is needed for each car. By a proper system the car should start at once with the grip at the Brooklyn end and not use locomotives at all.

THE Chicago Cable Company claims to have run right along during the past winter when the steam roads were completely blockaded up with snow. Some say that its stock has depreciated since using the cable; others say the reverse; we call for the figures.

IN Brooklyn, a cable railway company has been reorganized and a commission appointed. The Nassau Cable Railway Company is the company's name. The commission reported that a cable road was not needed. This report has not yet been acted upon by the Court.

IN Philadelphia an experimental grip and tube are being fooled with. A mile and a quarter was laid from Columbia Avenue to the Park, and had to be thrown out. Now 15 miles are down, of the Bonzano wrought iron tube, and this has so far proved a failure, from all that we can hear. It will probably cost more to experiment and reconstruct than for a license to use some well tried system.

THE National Cable Railway Company made a proposition some time ago, to put its system on the Brooklyn Bridge and carry passengers for 2 cents each, instead of nearly 4. The reduction of fare by the Bridge people is claimed to be the direct result of this proposition. The Cable Railway people would have sold sixty car tickets for a dollar and let foot passengers go free.

THE KANSAS CITY CABLE ROAD made a trial trip with the Board of Directors on the 2d inst., and it was in every way successful. By the time we go to press, they will probably be running regularly. This road is built on the two-cable system owned by D. J. Miller, who is constructing the Third Avenue Railroad Cable line in New York City, and which so far seems to possess great advantages over the single cable system, there being at least six railroads in New York City and vicinity which are awaiting the opening of the Third Avenue line about June 1st, which, if as successful as predicted and as Kansas City is, they will at once adopt and commence to build.

THE New York Cable Railway Company, if the Commission reports favorably and the court approves the report, and then the Board of Aldermen will give its consent, will go in vigorously, commencing with Lexington Avenue, to supply the future wants of New York City pretty liberally. The movement by rail in New York City was 284 millions of passengers in 1884, and will probably be 420 millions in 1890, and 830 millions in 1990; so there must be 136 millions to be provided for in six years. The great bulk of the

people see no more people in the street now than formerly. They don't recognize the increase, though in 4 years there has been an increase of 72 millions carried by the street railroads in New York City. The elevated roads have had an increase of about 21 millions in 3 years; about 40 millions since 1880.

Car Ventilation.

[We take the following from our other paper, the JOURNAL OF RAILWAY APPLIANCES, because it contains so much that is here applicable.]

One master car-builder writes, thanking us for opening out the subject of car ventilation, and another one says that we have "merely opened a bottle of discontent.

Better a bottle of discontent than a vial of wrath and a cave of pestilence. Cars as now built and run are foul and unhealthful, very largely because they do not give their passengers clean, pure air of proper temperature and the right degree of moisture.

A little more moisture in the air would add greatly to the comfort and health of passengers and to the revenue of the road. It would not, perhaps, increase the receipts of physicians, but it is not the promise of car builders to help the doctors along, any more than for the doctors to help the undertakers.

Seems to us that the time has about arrived when each sleeping car or long run passenger coach should have in it a buffet containing remedies for the headaches and sore throats occasioned by alternate overheating and under-cooling, and by entire neglect to provide moisture in the atmosphere.

It seems ridiculous—and it would be more so if it didn't cost lives and money—that cars cannot have an equable temperature, a graded degree of moisture, and a full, draftless supply of clean air; unflavored with bouquet de stogie and aroma de baked bean.

Is there any reason why a passenger should be made to breathe the second-hand air?

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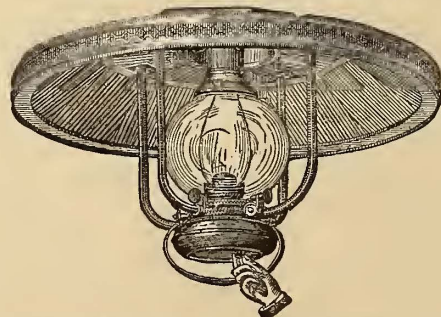
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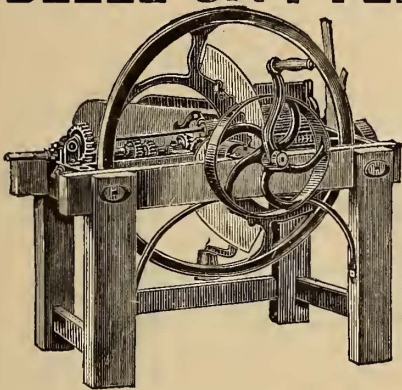
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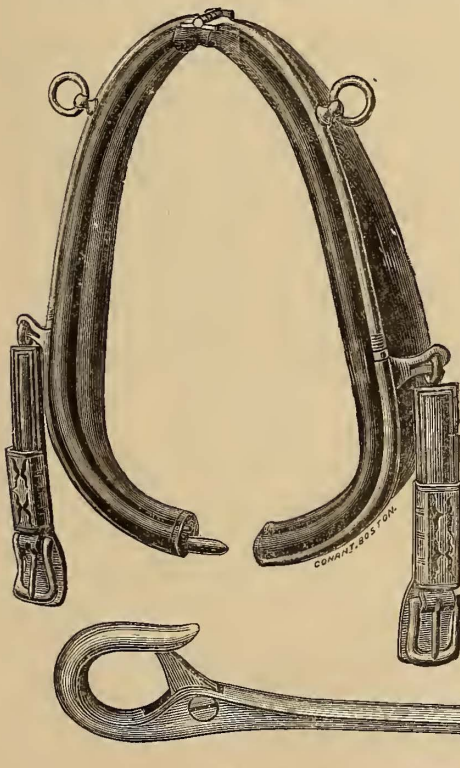
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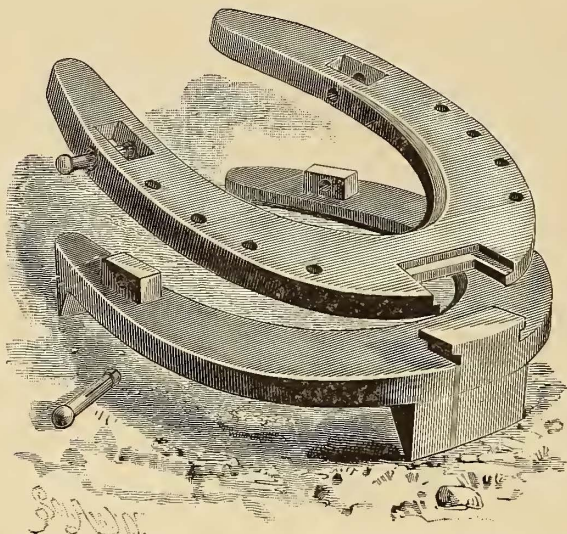
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Are making a plain, narrow-webbed shoe, with beveled surfaces for Horse Railroad work. It is "FORGED" from the very best Iron, and is tougher and harder than any shoe heretofore made, and will be sold to consumers at a small advance on the prices charged for ordinary mill shoes. They also make a Calked Shoe with a Square Toe, just the same as hand made, and the company warrants them to wear as long as the very best hand work.

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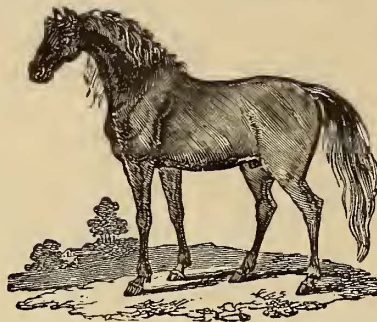
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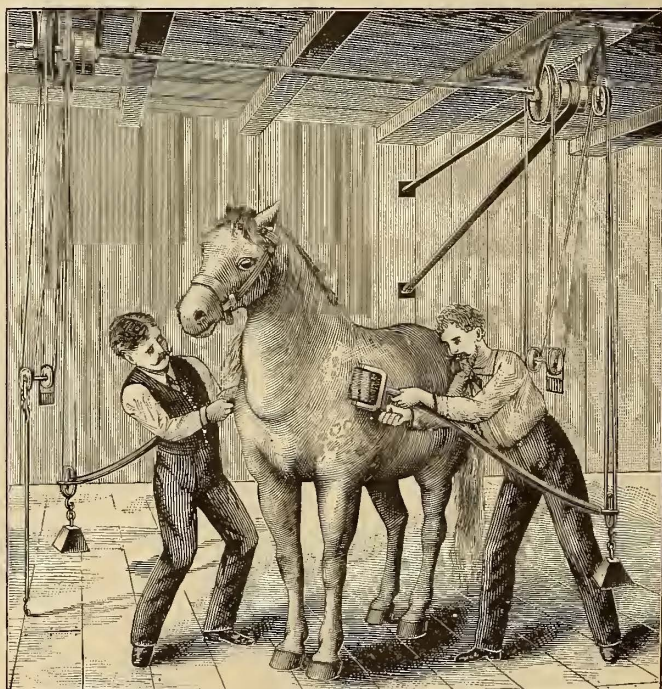
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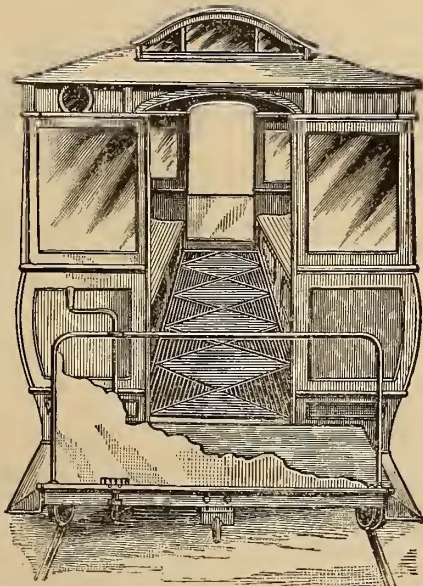
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Our Boxes are constructed with great care and of the best material. The case or wood, is of cherry, neat in design, and the front of Money Drawer and front edges of box are of metal, nickel plated in the best manner. The front of Box is very easily detached in one piece, and the inside or glass chute is quickly removed for cleaning. In addition to the glass chute through which the money passes, there are two additional glass plates, $\frac{1}{4}$ of an inch thick, one in front and one in back of box, so that in case the outer plate should be broken, the money is still protected. The Money Drawer is metal, and securely fastened by two safe drawer locks, the keys of which can only be removed when the drawer is locked, thus proving a safeguard to the collector.

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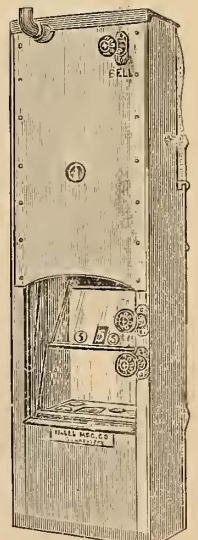
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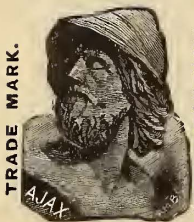
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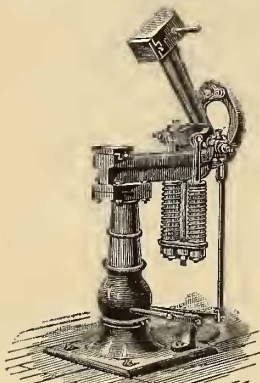
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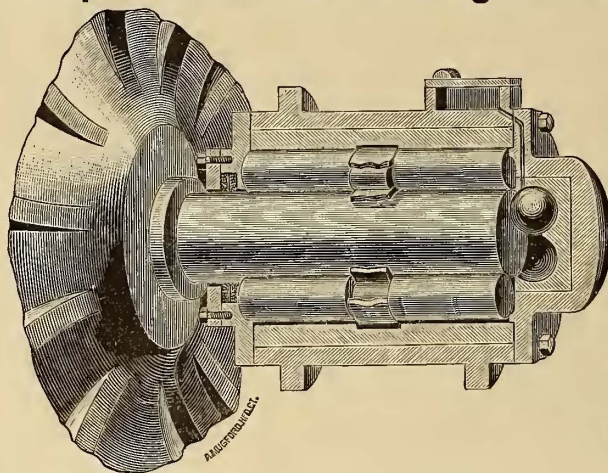
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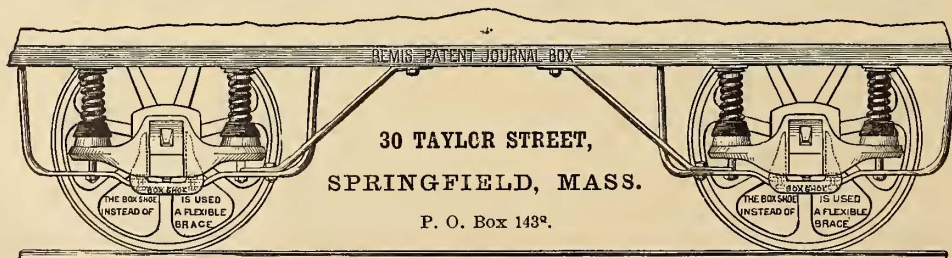
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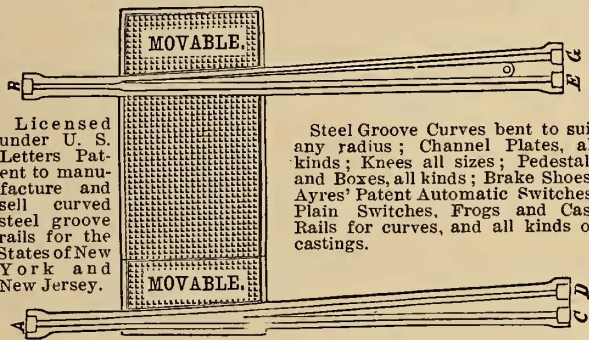
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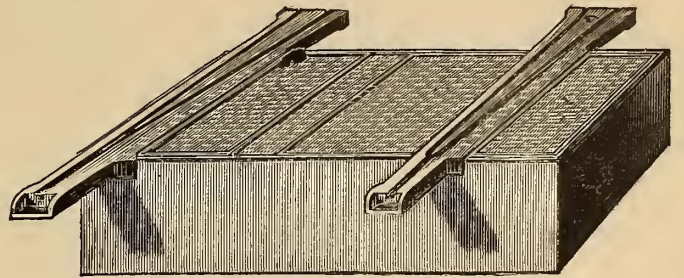
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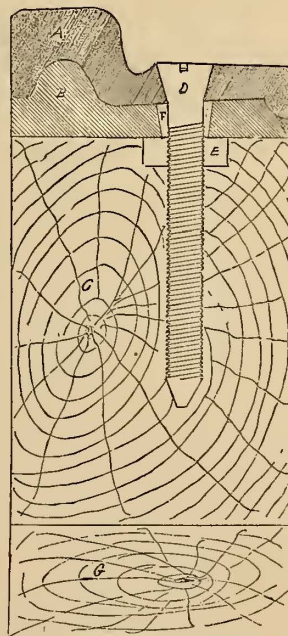
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PATENT JOINT FASTENING.



The accompanying cut shows a cross section through joint. *A* is the rail, *B* the joint chair, *C* the stringer, *D* the patent screw fastening, *E* the nut, *F* a slot in chair allowing rails to contract and expand. The chair cannot settle and the rail ends are held level with each other, preventing the many evils of ordinary construction.

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For Horse Railways, Omnibus Lines, Etc.

The Advantages

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are its ready application to Horse-Car service, or to any other purpose where cheap harness is required. It only costs about half as much as leather traces, while at the same time one set of Rope Tugs will (when used on horse cars) take the place of three or more sets of leather traces, as the Tugs remain attached to the car all day, no matter how many changes of stock are made. The relief horses having hooks attached to their hames, all that is necessary is to unhook the tugs from the working team back in the fresh horses, hook on the tugs, and the change is made. Railroad men will at once perceive their adaptability and economy from the above facts. They will also last longer than leather traces, and require but very little care. From their durability and cheapness they are also especially adapted for all kinds of farm use and heavy teaming, as farmers, etc. can easily repair them.

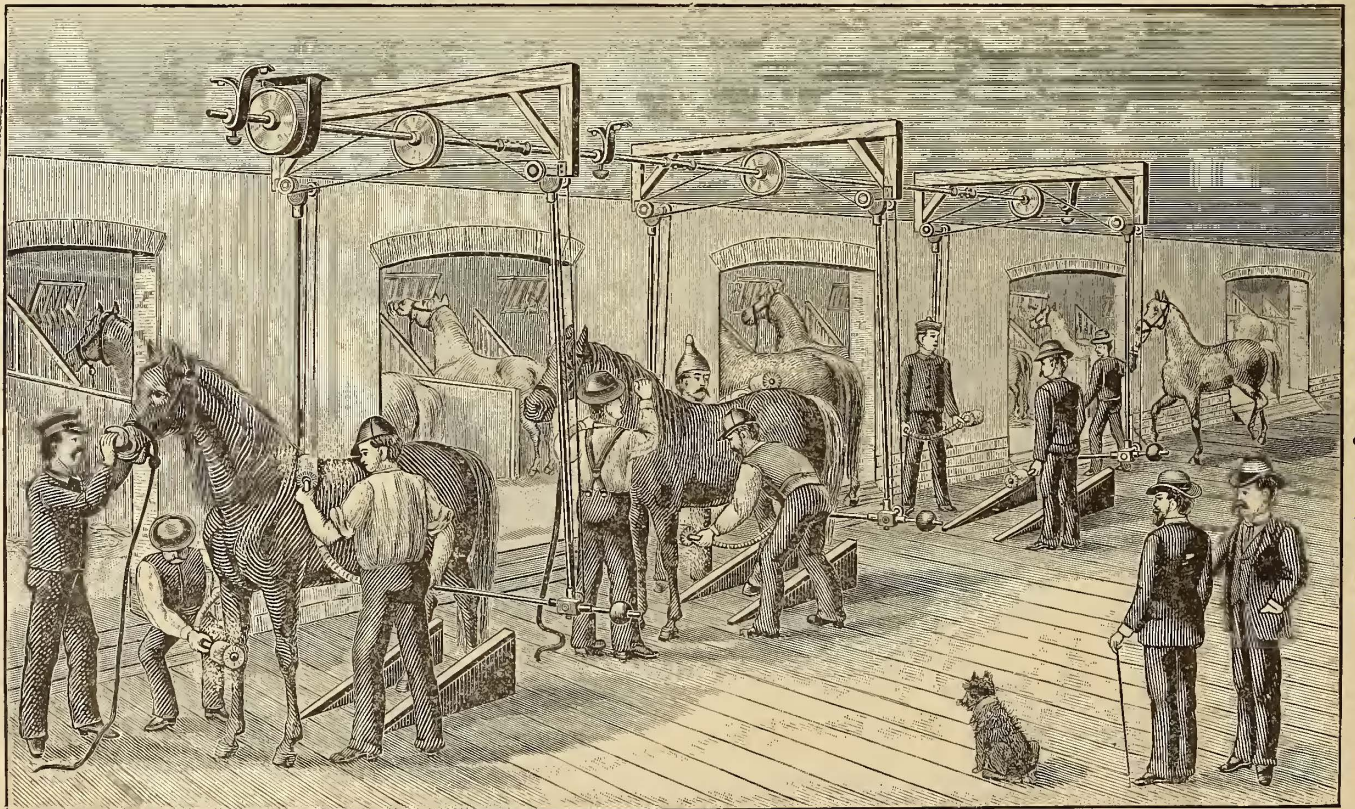


Patent No. 171,232, December 21, 1875.

In use on the Chicago West. Div. R'y.; Louisville City R'y Co.; Milwaukee City R'y.; Transverse R'y Co., Pittsburg, Pa.; Citizens Street R'y Co., Pittsburg, Pa.; Pittsburg and Birmingham, Pittsburg, Pa.; Central City R'y, Peoria, Ill.; Grand Rapids R'y; Minneapolis St. R'y Co.; St. Paul City R'y; Houston City R'y, Texas; Superior Street R'y, Cleveland, O.; Cincinnati City R'y Co.; Fifth Ward Street R'y, Syracuse.; Detroit City R'y.; Ft. Wayne and Elmwood St. R'y., Detroit, Mich.; Galveston City R'y; Springfield City R'y, Springfield, Ill.; Toledo St. R'y, Toledo, O.; Adams St. R'y, Toledo, O.; Atlanta Street R'y, and others, in all on about 100 Street R'ys in United States and Canada, and a large number of other prominent Street R'y Companies throughout the Country. Send for descriptive Circular containing testimonials, prices, etc., to

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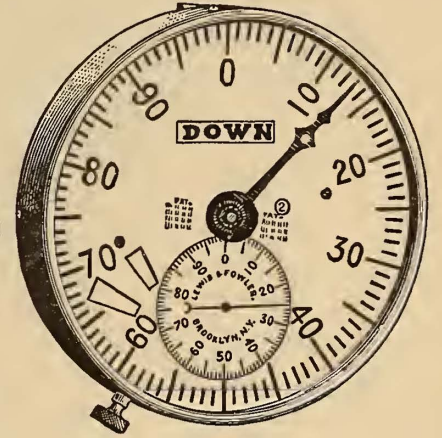
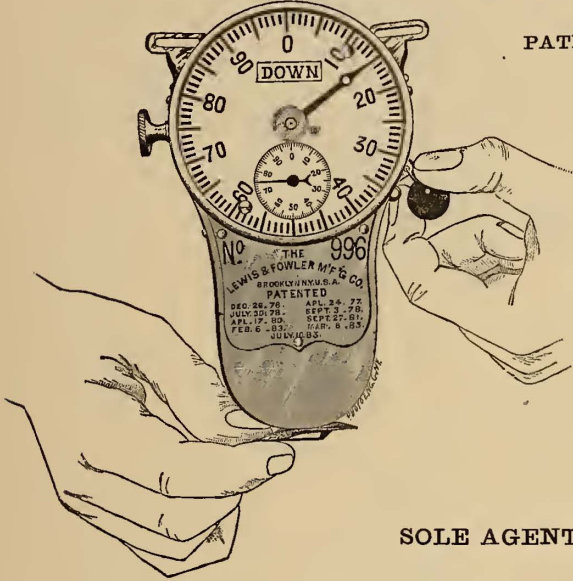
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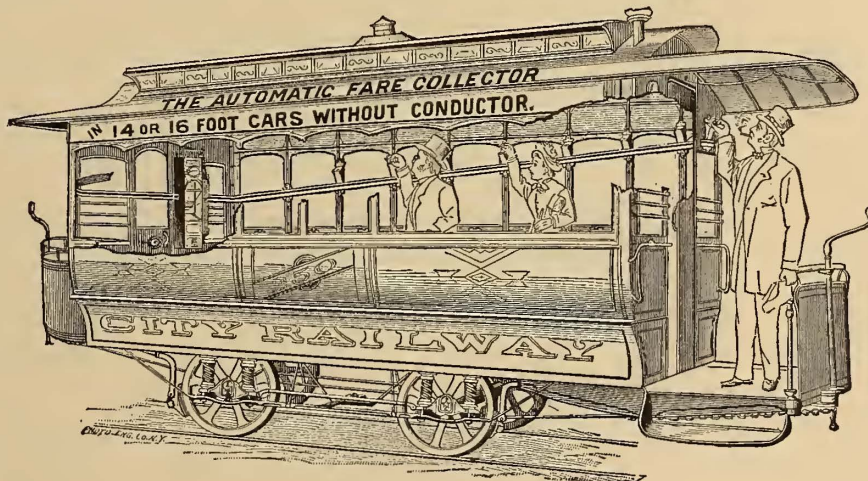
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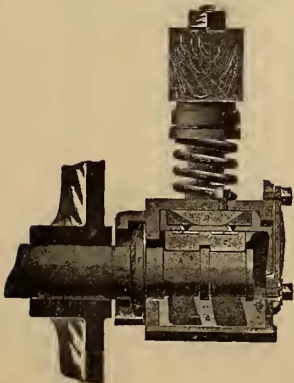
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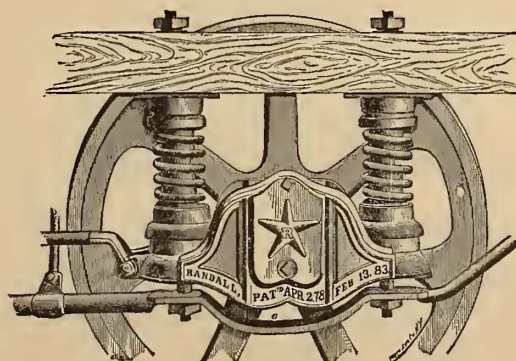
Sectional View.

Front View.

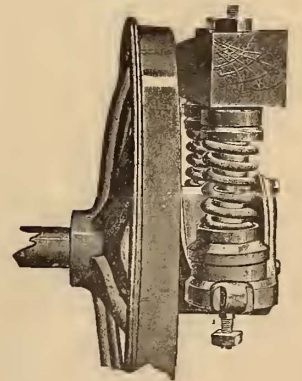
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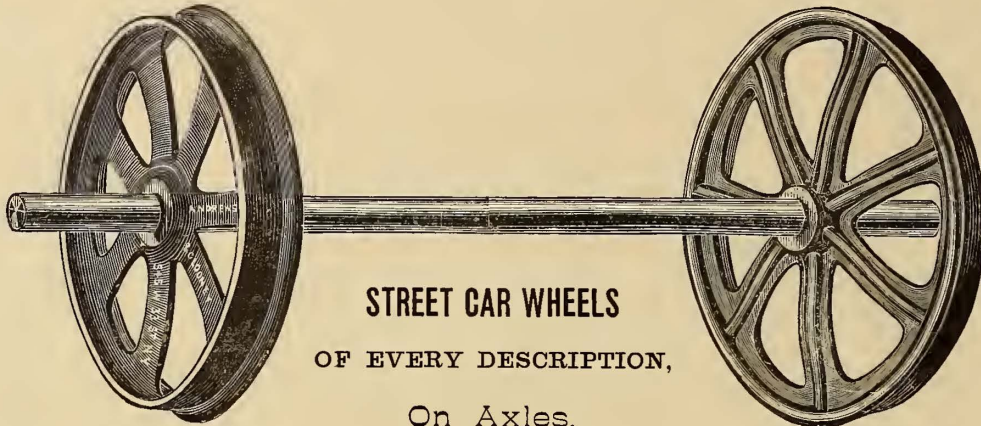
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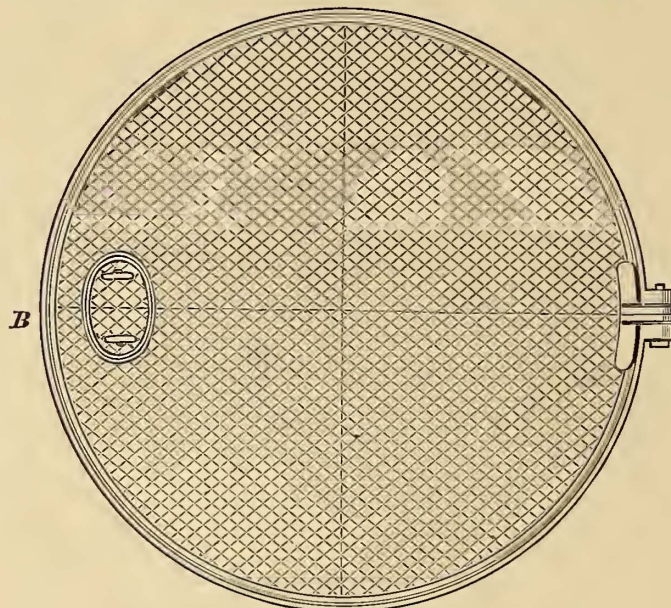
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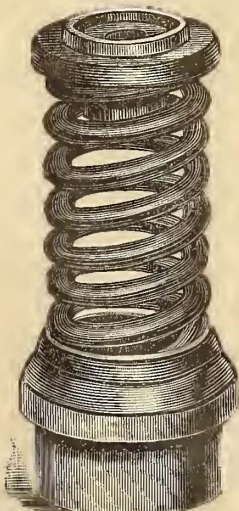
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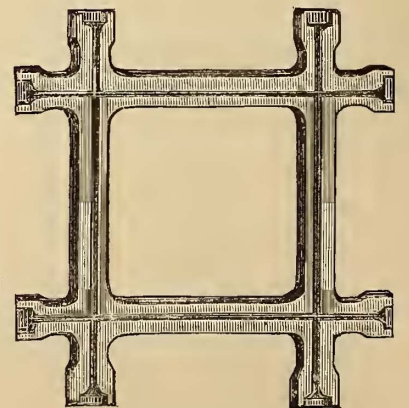
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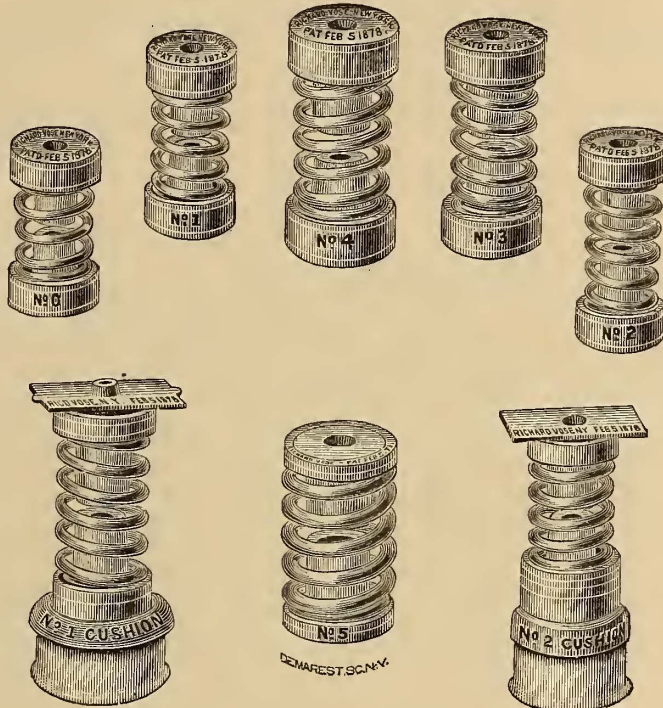
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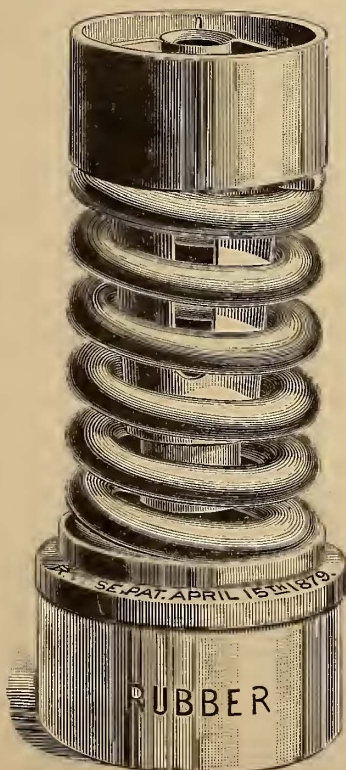
Patented, April 15th, 1879.

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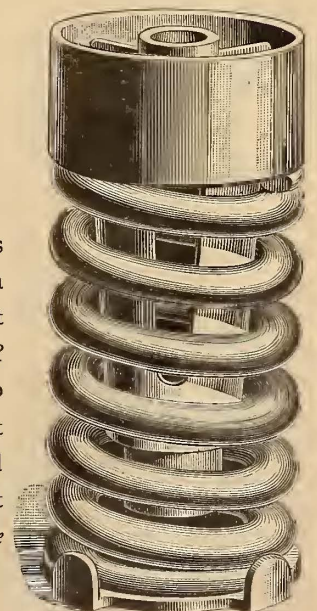
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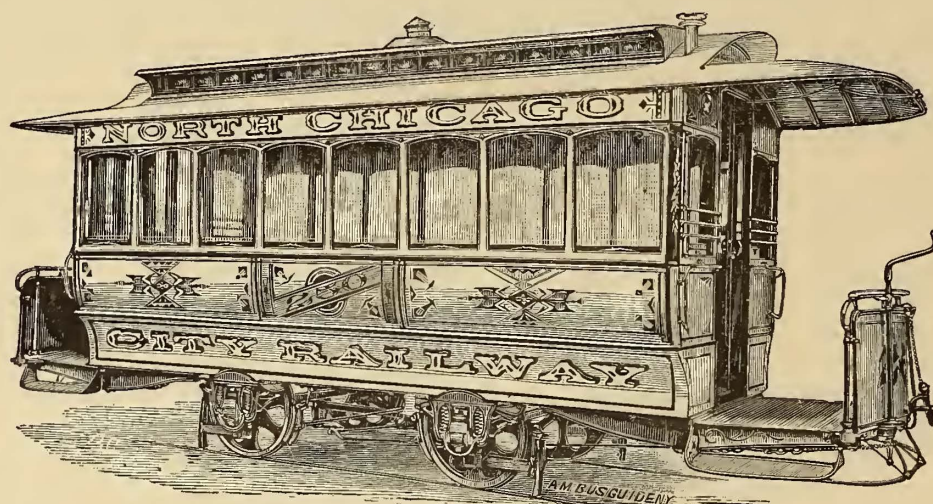


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