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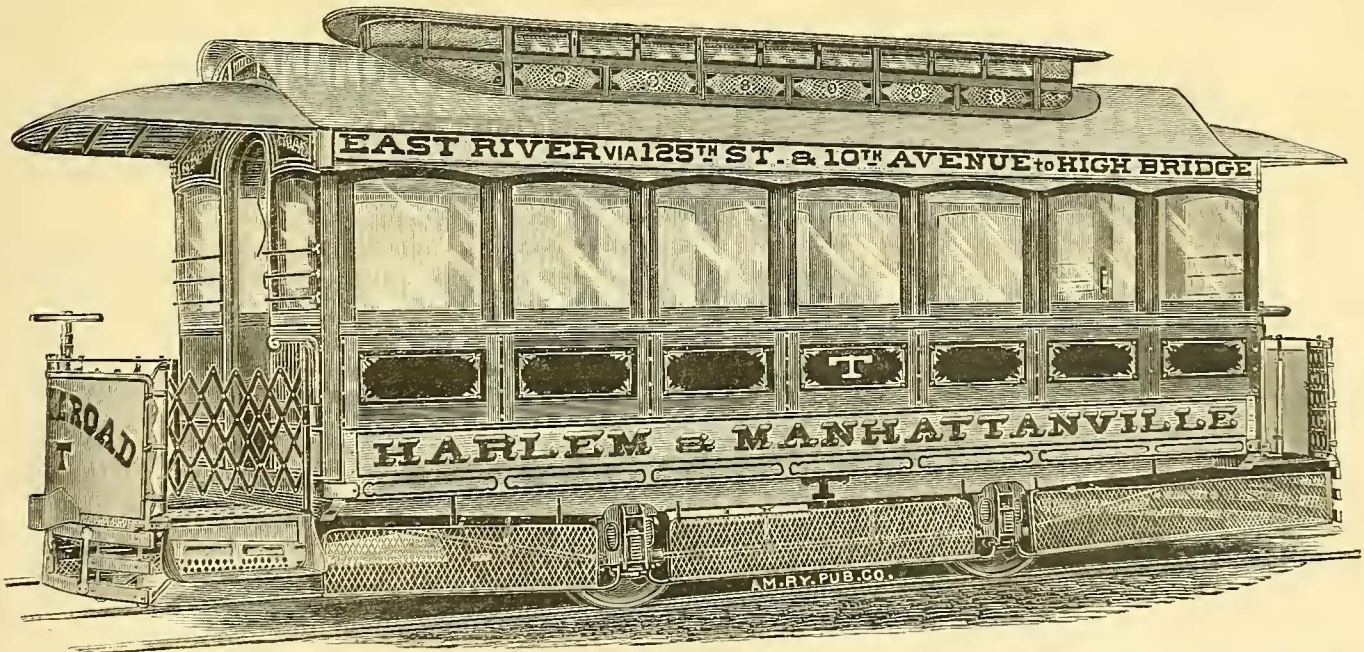
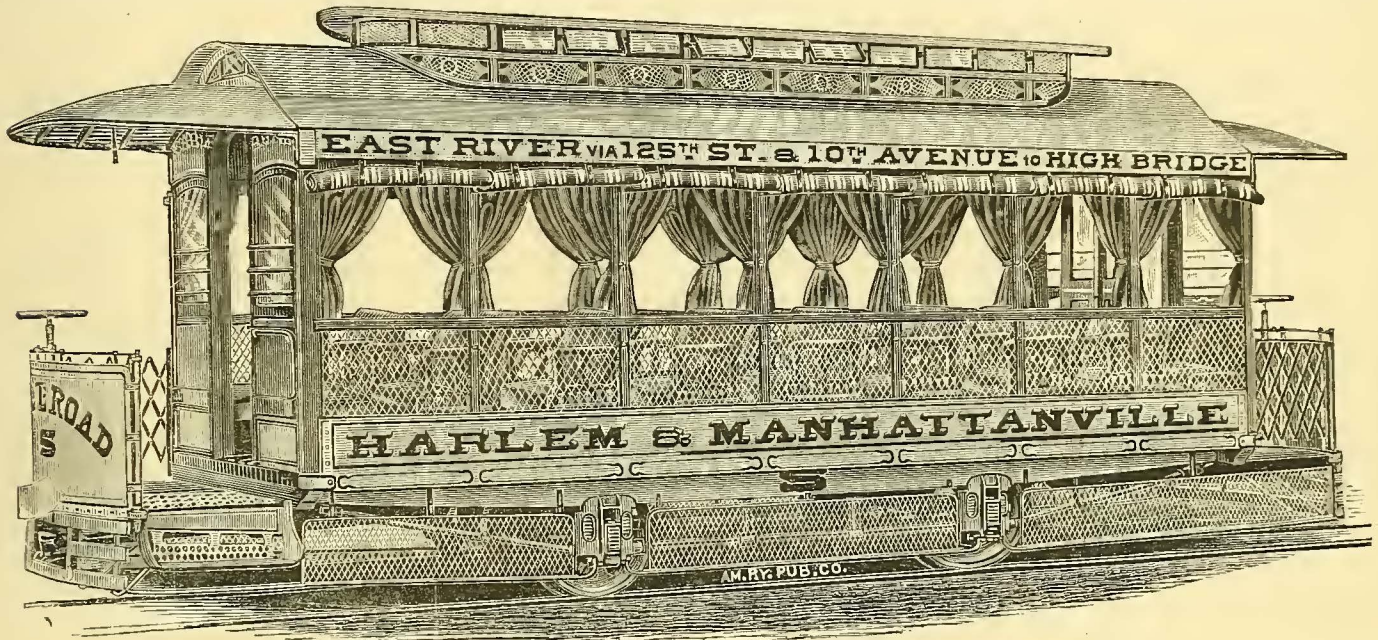
# THE STREET RAILWAY JOURNAL



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COMBINATION CAR, DESIGNED BY SUPT. JOHN H. ROBERTSON, AND BUILT BY J. G. BRILL & CO., FOR THE N. Y. CABLE ROAD.

### Summer and Winter Car.

We are enabled to give complete illustrations of a new car that has been designed by Mr. John H. Robertson, Superintendent of the Third Avenue R.R. Co., of New York, for use upon the Tenth Avenue Cable Line, which is owned and operated by the Third Avenue Co. The principal

features of the car that are novel are the arrangement of the seats, the floor framing and the removable panels and windows, by which the car may be made into a close or open one, as the requirements of the season may demand. It will be readily understood that the ability to change from one to the other will effect a great saving, not only in the original outlay in the purchase of cars

where open cars are used in Summer and close in Winter, but also in the expense of handling, storage and the construction of suitable shelters for those cars that are out of use. Where a road has only two or three cars the strain is practically inappreciable, but when four or five hundred are idle, there is an enormous waste of interest on investment, and a necessity for storage

rooms of the largest capacity. Mr. Robertson has overcome all of these difficulties in the simplest possible manner. He merely takes out the side panels and the windows, substitutes a wire screen for the one and curtains for the other, and an open car of large capacity is the result. In the cars which we illustrate, the seats are ar-

from the window portion of car. It is also held in place by ordinary wood screws. It is therefore the work of a few moments only to change from one style to the other, and the material to be stored is reduced to the window sashes and panels, which may be piled away in a very small space.

While the arrangement of this car is in

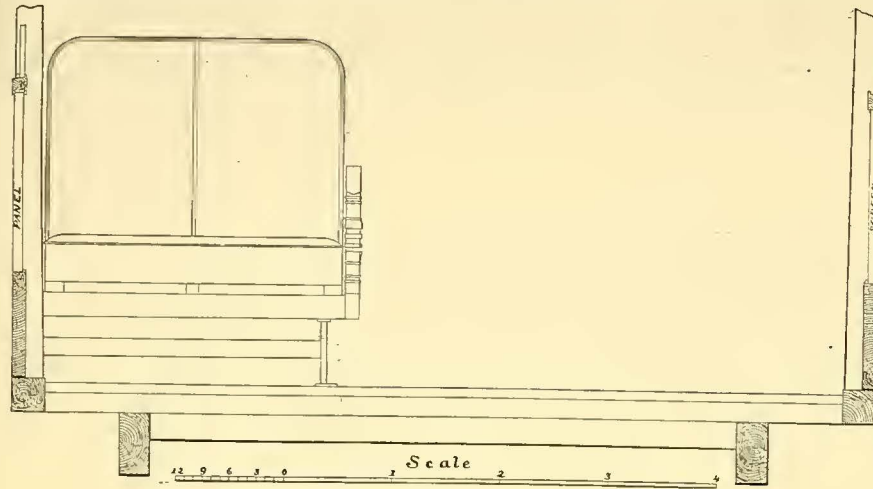
and seated, and very easy; the roof is of a strong and substantial design, and provided with double-deck lights and ventilators, as will be seen in the elevation and perspective views.

In winter the cars are to be heated by stoves placed in the corner of the car, though any other method of heating would answer as well. Light is provided by a handsome double center light that will enable passengers to read without excessive straining of the eyes in the evening. The builders of these cars were Messrs. J. G. Brill & Co., of Philadelphia, Pa., to whom great credit is due for the fine finish that they have given to the interior and the care that has been bestowed upon all of the details of the car.

The length of the body of the car is 22 ft., the width of the car 8 ft., the width of the main framing 6 ft., and the seating capacity thirty-two.

#### Glasgow Street Railways.

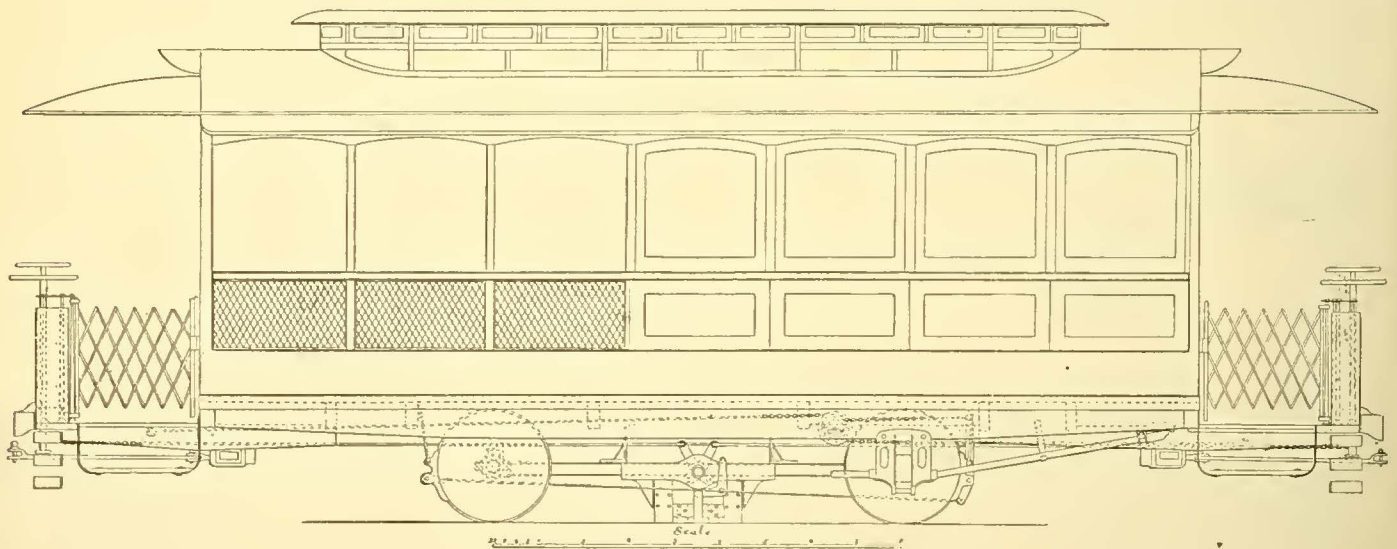
The street railways of Glasgow, Scotland, are owned by the municipal authorities and are worked on the principle of being a source of revenue to the rate payers of the city. In 1871 the Glasgow corporation obtained parliamentary powers to borrow money for the purpose of constructing a complete tramway system throughout the city, and when the lines were finished they were leased to the Glasgow Tramway Company for 23 years on the following terms: Payment of 1, the rate of interest on the



ROBERTSON'S COMBINATION CAR---CROSS SECTION.

ranged as in an ordinary passenger coach of a steam road, and in order to do this there was of necessity a different arrangement of floor framing from that ordinarily in use in close cars. The regular framing was left unchanged, with the side sills taking the jaws or pedestals for the wheels. Upon this frame there is placed an auxili-

every way satisfactory both to the company and the public, it is evident that a variation in the details may be made by which the rail may be removed and the car left exactly like an ordinary open car, with seats running all of the way across, if an intermediate seat be placed in the aisle. But for use upon a cable line where the



ROBERTSON'S COMBINATION CAR ---SIDE ELEVATION.

ary frame that projects beyond the main sills to the full width of the car. This framing is lighter than the other, and is made of sufficient strength only to keep the car body stiff and carry the load that may be placed within. Our side elevation and cross section show the method employed to hold the panels or screens in place. The former are held by lips that project over the posts, to which they are fastened by an ordinary wood screw. The wire screens have a frame work of  $\frac{1}{2} \times \frac{1}{2}$  iron that slips in between the parts and below the rail that is used to divide the paneled

cars are run more rapidly than with horses it is desirable that the speed should, in all cases, be diminished, at least, when passengers wish to enter or leave; and for this it is absolutely necessary that an aisle should be provided so that all entrances and exits be made by way of the rear platform.

The other arrangements of the car are of the latest and most approved designs. The cars are, of course, provided with couplers whereby they may be run in trains or handled by horses, if it should be necessary. The seats are reversible cane backed

actual money borrowed to construct the works; 2, payment of 3 per cent. on the actual cost to form a sinking fund to wipe out the cost of the works by the expiration of the lease in 1894; 3, payment of 4 per cent. to form a renewal fund, and 4, a rent in the form of £150 per annum for every mile of tramway in actual use within the city boundary. The tramway company also lodged with the corporation bonds on heritable property to the extent of £60,000 as a pledge that they would implement their bargain. The various payments the tramway company have to make to the city

authorities in terms of the lease amount in the aggregate to £29,000 per annum or £560 a week. The permanent way is kept in order by the tramway company, who are reimbursed for any repairs they make out of the renewal fund lodged by them with the corporation. Practically the lines are not only a source of income to the corporation, but their cost is being gradually wiped out, and at the close of the present lease the city will be in possession of a valuable property that has not cost the citizens a single penny.

The tramway company, who work the lines and possess a complete monopoly of the street passenger traffic of Glasgow, is a good dividend paying concern, their highest distribution of profits being 11 1-3 per cent., and their yearly average from the beginning until the present date 6 per cent. Recently an underground railway was opened, but as yet it has had no material effect on the drawings of the tramway company. The capital of the tramway company amounts to £315,000, the miles in operation 26 miles of double road (steel), and the passengers carried over 800,000 a week. A uniform charge of one penny (two cents) per mile is made for each passenger inside and outside the cars alike, and the city is marked off into mile and half-mile stations, so as to enable the conductors to levy the fares. Children between five and twelve years of age are charged half-fare, and a special service of workmen's cars is run at a reduced charge of one-half penny (one cent) per mile. An elaborate system is in operation to prevent dishonesty on the part of employees, the salient features of which are the use of the bell-punch and the depositing of £2 by each conductor as security for his intromissions. The cars are drawn by horses, the directors of the company being of opinion that they can obtain better financial results in that way than by the use of steam. The company have everything within themselves; that is to say, they construct cars, make harness for horses, and have shoeing forges and a block of dwelling houses for their workmen. Their stud consists of 2,507 animals (2,253 horses and 244 mules), and the distance run daily is about 12 1/2 miles by each team. Provender, an important item in tramway management, is dealt with in this way. Each horse is allowed 27 1/2 pounds of food daily, made up as follows: Maize, 11 pounds; hay, 9 pounds; oats, 6 1/2 pounds; bran, 1/2 pound, and linseed, 1/2 pound. In addition to the passenger fares, the company draw a revenue for advertisements displayed on their cars, the carriage of parcels, the carriage of mails between the different railway stations in Glasgow and the general Post Office by special vans, and the conveyance of letter carriers from the Post Office to the various delivery districts, also by special vans. A limited number of cars are run on Sundays. In one of the suburbs of Glasgow there is a tramway line worked by steam, but this is a comparatively small concern. The directors of the Glasgow company do not desire steam cars, but even if they did it is unlikely that parliament would sanction the use of steam in the streets of a busy city.—Bradstreets.

Street Railway Locomotives.

The well known English house of Messrs. Merryweather & Sons have for some years been at work in the introduction of a locomotive that is especially adapted to street railway service, and claim that they have succeeded in producing a machine that is both economical and serviceable.

Their first line opened was in Paris, where some forty engines were used to perform the tram service in place of horses. Since that time the amount of capital embarked in steam street railway enterprise has been steadily growing, and at the present time the manufacture of street railway locomotives, and special cars for use in the streets, finds employment for no less than 3,000 mechanics. The use of these engines effects a saving in the running expenses of the street railway companies that have adopted them, amounting in the aggregate to \$145,000 per annum, and in addition gets rid of the unavoidable cruelty which is occasioned by the employment of horses for tramway work.

The North London Tramway Company was the first line in London to adopt steam. It has fifteen engines constructed by Messrs. Merryweather & Sons, and its example will doubtless soon be followed by other London lines.

The engine is apparently in favor, as the receipts are double those of the horse cars, which ran in course of their gradual introduction alternately on the same line. The North London street railways at present extend from Stamford Hill through the most populous parts of Tottenham and Edmonton to Ponder's End, and a branch is in course of construction along Seven Sisters Road to Finsbury Park; there is a large amount of horse traffic over the whole of the route, but the use of the engines is not found to cause any inconvenience whatever. This engine is constructed for a gauge of 4 ft. 8 1/2 in., and is fitted with cylinders 7 1/2 in. in diameter by 12 in. stroke placed inside the frames, the whole of the motion being thoroughly accessible to the engine man on the road. The boiler is of mild steel, with copper fire-box and brass tubes 1 1/2 in. outside diameter.

The ashpan is specially arranged to prevent dropping cinders or showing fire, but can be easily raked out when required; the ashpan is operated from both ends of the engine. The wheels are of steel with rolled steel tyres shrunk on and secured by screws. The condensing arrangements are so constructed that exhaust steam is never visible even when ascending hills. The condenser is of the type known as Merryweather's air condenser, and consists of a large number of thin copper tubes arranged across the roof, the ends being secured in tube-plates, outside which are attached copper troughs for the passage of the steam; these troughs are fitted with diaphragms at regular intervals to cause the steam to cross and recross the condenser. The condenser is a feature of importance in a tramway engine, and its proper construction means a great deal monetarily in

wear. A well-made condenser has been shown to last seven years, whilst others have not lived three years. A condenser costs £100, therefore, in this one item the cost of maintenance in an engine can be readily gauged.

In order to meet the Board of Trade regulations, a powerful centrifugal governor is driven from the driving axle by gear direct, without chains or belts. The governor operates on a throttle valve which closes when the speed reaches eight miles an hour. Should the speed not then be checked, as for instance in descending an incline, a small steam valve is opened giving steam to the brake cylinders and applying the brake. This acts automatically, and ceases to act when the speed has been reduced below the given limit. An ordinary screw-brake is also provided with a handle at each end of the engine, and the steam brake, besides being actuated automatically by the governor, can be applied by the pressure of the driver's foot on the treadle. The car-brake is operated by a lever admitting steam to a brake cylinder which acts on the brake blocks through the medium of a chain. In this engine, all car-handles, regulator, engine, car brakes, etc., necessary for working, are in duplicate, so that a man may always drive the engine standing at the forward end.

Messrs. Merryweather & Sons were the pioneers in England for steam railways in the public streets, and engines of their manufacture are now running on lines in England, Australia, New Zealand, India, France, Germany, Spain, Holland, etc. The cost of working on two of the first established English lines equipped with these engines is as follows: Stockton and Darlington, four years at work, 6 1/2 cents per mile.

The following report has also been submitted by the engineer:—

Stockton & Darlington Steam Tramways Company, Limited. Cost of repairs and running of engines for six months, from January 1st to June 30th, 1885.

Number of miles run . . . . .	55,286	
Drivers' steam-raiser, and cleaners' wages . . . . .	\$1,598.88	\$.029
Renewals . . . . .	898.16	.016
Fuel (coke and coal) . . . . .	746.08	.013
Oil, waste and other stores . . . . .	170.72	.003
Water and gas . . . . .	108.00	.002
Total . . . . .	\$3,521.84	\$.063

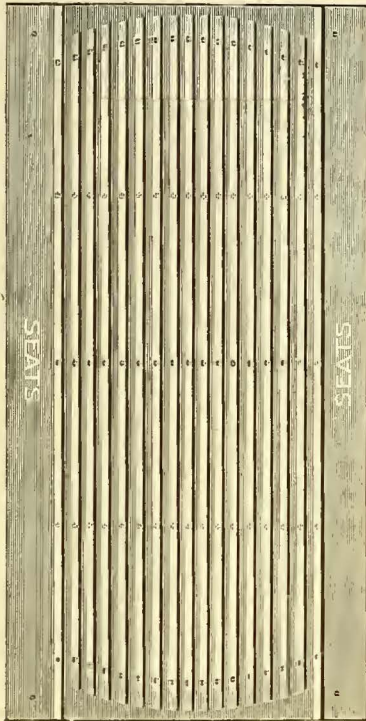
Consumption of coke per mile 9.52 lbs.  
Total mileage from commencing to run, 356,340.

No firm has had so lengthened an experience in cost of running engines, and no company, we believe, can give results from so extended an experience as they can with the Merryweather engine, as will be seen by referring to the results of working published from time to time.

THE DAFT ELECTRIC LIGHT Co. have just issued a new illustrated catalogue of their machinery as adapted to the propulsion of street cars. The data given are very full and complete in every respect.

### Everit's Street Car Floor.

The floor, whose general appearance is shown in our illustration, is designed to take the place of the mats of wood or cocoa that are now in general use. It consists simply of strips of ash or other hard wood, three-quarters of an inch wide and one-half an inch thick, screwed or nailed rigidly to



the floor, and having their ends trimmed off to allow for sweeping out. When using these strips, the floor is first painted and the strips laid straight through the middle and spaced equally on each side. It will be seen that with this device there are no obstructions to sweeping out or washing the car from end to end.

\*W. L. Everit, New Haven, Conn.

### The Cambridge, Mass., Consolidation.

The consolidation that was practically made some time ago has at last been legally effected, under these conditions:

First—The name of the consolidated company is to be the Cambridge Railway Company.

Second—The consolidated company will have a capital stock equal to the combined capital of both the said companies, to wit: A capital of one million, nine hundred and fifty thousand (\$1,950,000), divided into 19,500 shares, of the par value of \$100 each.

Third—The consolidated company will assume and pay both principal and interest, the outstanding funded debt of both roads.

Fourth—The consolidated company will own all the property of every description whatever, real, personal or mixed, including lands, buildings, leases, tracks, horses, cars, equipments, supplies, cash and cash assets, notes, causes of action, together with all the franchises, locations, rights, powers and privileges of each road.

Fifth—The Boards of Directors of the two roads, namely: Preutiss Cummings, Joseph H. Tyler, Israel M. Spellman, Edwin Dresser, Otis S. Brown, Francis J. Parker, Charles E. Raymond, Edmund Reardon and Henry F. Woods will act as board of directors of said consolidated company.

When this agreement was presented to the stockholders, 10,703 shares were cast in favor of, and 47 against the consolidation.

### Road and Rail Vehicles.

Although most tramway companies, especially worked by steam traction, have the right to carry goods as well as passengers over their lines, few or none appear to avail themselves of the privilege. The reasons for this state of things are various, but one of them lies in the difficulty of transporting the goods from the nearest point of line to its ultimate destination. Even if the goods have to be delivered in the same street as the tram line passes through, the waggon cannot remain long enough to be unloaded, as it would delay all their tramway traffic meanwhile. Unlike a road lurry, it cannot be drawn to one side clear of the line and close to the door of the consignee. In most cases, moreover, the goods have to be brought from some point outside the tramway system and delivered to some other point without the limits of the system, which would in the ordinary course of things mean two transshipments of goods. To overcome the difficulty several vehicles that will either run upon tram rails or upon the streets and roads have been invented, although hitherto with little practical success. In Perrett's plan the wheels are made with a loose flange, which, by means of an eccentric arrangement, can be dropped below the tread of the wheel or withdrawn at pleasure, the flange only projecting at the bottom. In another somewhat similar wheel the flange is made in segments, which can be projected or withdrawn all round the wheel, as required. The latest, and perhaps the best device of the kind, however, is patented by Mr. Alfred Dickinson, the general manager of the South Staffordshire and Birmingham District Steam Tramways, which consists of a strong road lurry or other vehicle carrying two sets of wheels, one set adapted for road and the other for tramway traction. The latter revolve in bearings at the end of arms or levers, which are rigidly secured to the axle of the road wheel. When not in use the arms carrying the tram wheels, which project beyond the periphery of the road wheels, are inclined, so that they do not reach to the level of the rails, but when they are required to run they are brought down perpendicularly, so as to stand exactly beneath the road axle. By this means the lurry, together with its road wheels, is lifted 2in. or 3in. higher, the weight being borne by the tram wheels, which are made of a suitable gauge to the tramway upon which it is intended to be used. The working apparatus by which the wheels are raised or lowered consists of a horizontal screw running longitudinally beneath the lurry, turned by a movable winch handle placed at the side near one end, motion being communicated by means of bevel wheels. The nut of the screw traverses to and fro, and is connected by a series of levers to an arm on each of the road axles, the rotation of which lifts or lowers the arms carrying the tram wheels and axles. When running upon the tramway the swiveling forecarriage of an ordin-

ary road vehicle is not required, so that in this instance provision is made by which it can be prevented from swiveling by means of a locking pin. The shafts for horses also not being required are made easily removable. On the other hand provision is made for coupling to an engine by a suitable draw arrangement attached to the front axle. One of these luries has been constructed, and tried upon the tramway with satisfactory results, being run up and down at speeds varying from five to twenty-five miles an hour. The time occupied in detaching the engine, putting on the windlass handle, and lowering the lurry for use on the road was one minute, whilst the operation of attaching the shafts and putting in the horse occupied two minutes more, so that the whole business of substituting road for tram traction occupied only three minutes. The gross weight of the lurry, including the shafts, is 82cwt., its capacity being five tons, which, however, would necessitate two horses for road traction. The diameter of the tram wheels is 1ft. 5 in.; that of the road ones being 3ft. 4in. The extreme length of vehicle is 10ft. 6in.; width, 5ft.; height of side, 8in.; and the extreme height from rail, 4ft. 1in.

Although this waggon may be found to overcome the difficulties it is intended to surmount in an efficient manner, there are one or two points of detail which appear to be objectionable. The great strain thrown upon the screw and nut apparatus when running upon rails through the vehicle being perched up so high without being stayed in any other way than by the levers attached to the apparatus in question will probably be found to be one of them, whilst another lies in the small size of the wheels, 1ft. 5in., which is 10in. smaller than the usual size of tramcar vehicles. The difficulty of fixing an efficient breadth, which will probably be insisted upon by the Board of Trade if used on steam tramways, is also another point which must be looked to.

In Hamburg omnibuses adapted to run either upon road or rail have been in use for some years, and a vehicle of this description was recently made by the Lancaster Wagon Company for use on one of the Holloway routes. The apparatus in these instances consists of a guide wheel which runs before the front wheel on one side of omnibus, and drops into the groove of the tram rail. By simply pulling a lever the driver can lift or lower the wheel at pleasure, so that when running on the rails, if any obstruction takes place, if on a single line he meets another tram vehicle, he can instantly raise the guide wheel and take to the road, as there are no flanges to the wheels, which are of the ordinary road type made of the right gauge to run on the top of the rails.

The guide wheel is carried by a strong arm pivoted upon the front axle so that when down it also locks the fore-carriage of the vehicle and prevents it from swivelling. As bearing upon this subject it may be remarked that many of the omnibuses which run alongside the line of docks at Liver-

pool have wheels which adapt them to either run on the rails or upon the road. In this case the wheels are made very broad, 6in. or 7in., for the purpose of running on ordinary railroad rails which are laid down with guard rails alongside. The wide wheels of the omnibuses bear upon both rails, and the concavity of the tyres is sufficient to keep them on the track without binding them should a railway wagon or other obstruction be in the way. The great saving of power by using smooth iron rails instead of rough stone is enormous, and any invention which will help to bring about the substitution of one for the other is to be welcomed, as it is a matter of considerable and increasing importance. The proposed plateway between Liverpool and Manchester is an instance of a scheme having this end in view, and although never carried out in consequence of the Manchester Ship Canal Bill passing, yet the idea, which was to lay down flat iron or steel plates alongside the road upon which ordinary road vehicles might be drawn either by traction engines or horses, is undoubtedly a good one, and will possibly come to the front again in some other direction, perhaps in the busy streets of our large towns.

#### A New Electric Engine for Street Cars.

A new electric tram engine was shown recently at the station of the North Metropolitan Tramway Company, Stratford, England. This is a center at which fair trials have always been accorded to any new motor and it is understood that in the event of the new inventors and the tramway company agreeing upon terms, a practical experiment of no small importance will be made in electric tramways upon the new line to Ilford. The electrical engineers in this case are the Electric Locomotive and Power Company (limited), who claim to have solved the problem of economical working by combining the electrical power with the mechanical aid of the lever principle. The electro-motor is connected by pinions horizontally with a large stationary rack and vertically with the wheels. When the electrical engine is started the pinion of the horizontal armature gears into the stationary rack, and so causes the motor itself to revolve. The motor then becomes by the action of its fixed vertical shaft, the driving axle and communicates its motion to the wheels of the car. By means of clutches a backward or forward motion can be secured without reversing the direction in which the electro-motor is revolving. The electricity is supplied from fifty cells of, say, a total of 280 amperes. It is claimed that the average discharge is from 40 to 45 amperes per hour, and that an engine consuming only two tons of coal per week, will charge batteries sufficient to do the work of four cars requiring at present forty-four horses per week. Apparently the engine is controlled with perfect ease, and though at present it is fitted up separately from the car itself, so as to take the place of

horses and utilize existing cars, the company claims that it can in future easily be constructed as a part of the passenger car. Electric Review.

#### Splicing Cables.

EDITOR STREET RAILWAY JOURNAL :

In your September number you make some reference to the method of splicing the wire cables of the cable railway system, and it is stated in that article that the splice used lasts only about *four weeks*, but with the introduction of the described splice all this was changed, and the splice lasts *twelve months*, etc.

In the cable now in use on the Presidio and Ferries Cable Ry. Co. of this city, a splice put in by us has lasted *twenty-four months*, and on the Clay Street Hill R.R. Co.'s line we have just taken out a rope that had been in constant operation for *sixteen months*, and the splice was the same as when put in by us sixteen months ago.

In the California Street Cable Ry. Co. our splices last as long as the ropes, and we do not find any trouble in making splices that will last as long as the cable and cables of our make have lasted from *nineteen to twenty-four months* in constant use.

We have made almost every conceivable splice, and, as we understand it, the same as you describe, but have come back to the simple splice we now use, and which, by its simplicity and durability, has recommended itself to the owners of all the cable roads using our wire cables.

CALIFORNIA WIRE WORKS.

#### Elevated Railroads in Paris.

A lecture was delivered at the Conservatory of Arts and Trades by M. Banderali, Engineer-in-Chief of the material and the movement of the Northern Railway, on the New York Elevated Railway system. The lecturer began with a summary of the several systems of tramways used in American cities. He explained the economical and topographical reasons for adopting the "aerial" or elevated system in New York. Although a considerable portion of the future Paris Metropolitan will be above ground, still, it is said by the lecturer, the manners and temper of the French would hardly favor a system which consists in making trains to travel over metallic spans supported by cast-iron pillars, at ten, fifteen, or even twenty-five metres above the public roadway. Mr. Banderali explained that a subterranean road would have cost 11,000,000 francs per kilometre, nearly \$4,000,000 per mile (a mile is equivalent to 1,609 metres, or about one and two-thirds kilometres) while the elevated only cost 3,500,000 francs, about \$700,000. What most pleased the audience was the explanation of the improvements found and applied by the practical and inventive genius of the Americans, in regard to the building, and especially the method of running, the elevated road.—Ex.

#### Railway vs. Street Lines.

When the elevated roads were first projected for New York, it will be remembered that there was a great hue and cry raised by the street car lines that their occupation would be gone indeed if these terrible overhead roads were permitted to be built. They fought well but were overcome, and have had an unexampled era of prosperity ever since. That they have not been alone in this experience will be seen from the following quotation from the London Financial News: When the Metropolitan Railway was opened in 1863 there were far-seeing people who predicted that in a few years the last omnibus would disappear from the streets of London. To the omnibus people themselves it seemed as if the world was coming to an end. They gave up improving the plant, and every penny worth of paint spent on their clumsy ramshackle vehicles was considered to be practically thrown away. Our street conveyances, both 'buses and cabs, were, perhaps, never so bad as in the decade which followed the opening of the Underground Railway. Horses fell 30 per cent. in value, and it was thought to be only a question of time when they would follow the omnibuses to the limbo of extinct fashions. The stock of the London General Omnibus Company fell below par, and for a considerable time it might have been bought between 80 and 90. Oxford street and the Strand were once more to be rustic lanes, and the West end squares to be as silent as graveyards.

But it has not fallen out as people predicted; Oxford street and the Strand are to-day busier thoroughfares than ever; the West end squares are bright and gay compared with what they used to be; London contains half as many more horses as it did when the Underground Railway first threatened to abolish them; there are now two omnibus lines for every one that existed 20 years ago; the vehicles are larger, roomier, and better appointed than any ever seen on the streets before; the street traffic of all kinds has grown almost as rapidly as the underground traffic, and the antiquated omnibus holds its own, or rather more, against the railway. We have actually lived to see complaints made in railway reports of omnibus competition, and of passengers being carried by horse-power at fares which the steam-horse cannot descend to. It is a contrary world altogether, and that is one of its paradoxes. No one ever suspected that the triumphant progress of steam traveling would sustain a check like this. It was to go forward conquering and to conquer and there was to be no conceivable limit to its growth.

Every succeeding report of the two Metropolitan Railways throws fresh doubt on the boasted elasticity of their traffic. Neither of them shows the growth it ought to do. In the case of the District line there is actual retrogression, and though the Metropolitan traffic continues to creep up it is at a diminishing rate. The gross receipts keep up an appearance of progress, but the receipts per mile and the receipts per head

both exhibit a marked decline. In the first 10 years all three made enormous strides year by year. The number of passengers carried in 1863 was under 9,500,000. In the following year there was an increase of fully 2,250,000, in 1865 of over 4,000,000, in 1866 of 5,500,000, in 1867 of nearly 2,250,000, in 1866 of over 4,250,000, in 1869 of over 9,000,000. The increase went steadily on at an average of 2,000,000 to 3,000,000 a year till 1873, when it suffered a sharp check. In 1875 it started again and from 2,000,000 to 4,000,000 a year were added to the number of passengers till 1882, when a second reaction began. In 1883 the St. John's-wood railway receipts were included in those of the Metropolitan, and the comparison is no longer exact. It shows roughly, however, that the large additions of mileage brought in by the St. John's-wood line, the City extension, and the Harrow extension, have barely maintained the rate of progress which the original Metropolitan enjoyed when it stopped at Aldgate.

Instead of bringing in floods of new traffic, as they were expected to do, the extensions have poured in only dribbles just sufficient to offset the loss which the parent line might have shown in their absence. It would be rash to say that the Metropolitan Railway has reached the length of its tether, but it has certainly passed the first bloom of its youth and prosperity. With street competition, both omnibus and tramway, cutting into it at so many points, it will have to fight harder for its future increase, and possibly even to keep what it has got. The Metropolitan District is still harder struck by its road competitors. There are more of them, and they run parallel to it almost all its length. The traveling public in London seem to be returning in a remarkable degree to their old love. For various reasons of health, comfort, and economy they prefer an omnibus carrying them direct to their destination to an underground train which they have to go out of their way for, and again out of their way to get away from. The battle of railway *versus* omnibus inclines at present decidedly in favor of the old fashioned vehicle.

#### Los Angeles Cable Road: A Correction.

EDITOR STREET RAILWAY JOURNAL:

Please oblige us by correcting the statement made in August number of STREET RAILWAY JOURNAL in which you say "The Temple Street Cable Railroad, Los Angeles, Cal., is operated and constructed under the patents of S. O. Brown." Such is not the case. Mr. Brown is our superintendent of construction. But this Company operate entirely under the original (Hallidie) patents, and is licensed by the Pacific Cable Railway Co. of this city

J. M. THOMPSON, Pres't.

San Francisco, Cal.

TIES to the number of 5,369,000, were used in France in 1884. About one-fourth of the ties used were imported from foreign countries, chiefly from Sweden, Galicia, Italy, etc. Wood has been the only material used for ties until the present.

#### The London Railway System.

In London the common methods of passenger transportation are carried on by means of railways, street railways, omnibus lines and steamboats.

While in Paris the railways play only a secondary part in the transportation of the public, they occupy in London the first place.

##### METROPOLITAN AND SUBURBAN RAILWAYS.

In spite of the great additions that have been made to the metropolitan and suburban railways, during the past fifteen years, it is very certain that the end is not yet, and that more extensions will be added in the future.

In extending in all directions as they have these railways have contributed largely to the development of London.

This development, which could only have been the work of time with the old methods of locomotion, has been very rapid, thanks to the city roads which traverse London and its suburbs in every direction. Certain parts of the city, which the omnibus lines did not touch, because they could not find therein sufficient traffic to pay their expenses, offer, since they have been crossed by the railways, an amount of life and traffic that was not counted upon. Property that formed a few years ago the outskirts of London, now constitutes a part of the great metropolis. The city has grown so that these outskirts now begin some ten miles from Charing Cross.

In 1870 the population of London was about 3,200,000, while a recent census gives the population at 3,955,000.

The greatest length of London is from east to west, from Blackwall to Hammersmith, a distance of something more than ten miles.

The only available means for traversing this distance a few years ago was by the use of the omnibus lines or the steamboats upon the Thames. By either one of these two methods of transportation the passage would have required at least two hours. It was at first reduced to one hour by the construction of the circular lines running to the north, and this has been still further reduced by the Metropolitan Railway from Blackwall to about forty minutes.

The advantages of speed and the low fares, together with the certainty of departure and arrival at the advertised hour, is greatly appreciated by a population like that of London, to whom time is money. For this reason the Metropolitan and Suburban were not slow in gaining their well-deserved popularity with the public.

The patronage is derived for the most part, during the morning and evening, from business men, employees and workmen, whose business does not oblige them to reside in the City or the West End, and who, for the sake of better accommodations or economy, live in the new outskirts or suburbs.

During the day, the traffic is derived from those, whose business or pleasure

takes them into distant portions of the metropolis. During pleasant weather, the London population deserts the city on Sunday, and goes in mass to Greenwich, Kew, Richmond, and to other localities dear to the heart of Londoners, and which are well known to all those who have visited the English capital. The nearness of the termini to the center of the city facilitates these excursions; and as all of the routes are connected together either directly or indirectly, the public is not obliged as in Paris, to take a long walk before reaching a depot from which the cars may be taken.

An examination of a map of the London roads shows, however, that these lines have not been laid out on any thoroughly well conceived plan, and that in many cases the roads have been duplicated or paralleled to the detriment of their action, and at an unnecessary expense.

The London system is similar in this respect to that of all the rest of England. Manufacturing is so flourishing at almost every point of the kingdom and the taste for speculation is so thoroughly well developed, that there is not only no locality that is not provided with its railroad, but there are frequently several which unite it to the metropolis.

The manufacturing and commercial centers, like Manchester and Liverpool, are united by four great lines running to London, namely: the Great Western, the Great Northern, the London and Northwestern and the Midland.

For the sake of developing their resources the London companies do not hesitate at any combination, any expense which can in any way bring about this result. If the state of their finances or their credit does not permit them to construct new branches, or necessary accommodations for the preservation or development of their traffic, they find a syndicate that will undertake the construction of the work for them, and to whom they pay an annual rental. London offers numerous examples of this kind. The Victoria and several lines known as Junction have been built upon this system.

Now, among the means used to attract the public, the companies have thought that the most efficacious means is to run their termini into London, and thus avoid the long distance that the traveler would otherwise be obliged to traverse in order to reach an outgoing depot.

It is known that in London carriages are not paid for by the trip, but by the distance traversed. The old stations were separated some distance from the center of the city, and the cab hire often exceeded that of the railway passage ticket. Under the old regime, a traveler going from Moorgate street into the city to Windsor by the Great Western, would have to pay 2s. 6d. (60 cents), besides the cabman's fee for taking him to the Paddington station, and 2s. 10d. (68 cents) for a second-class ticket from Paddington to Windsor, a distance of a little more than 21 miles. In going from Moorgate station upon the Metropolitan Ry. the train runs direct to Windsor and

only 6d. (12 cents) need be added, as the price of a ticket from Moorgate street to Paddington. There is, also, the further advantage of not being obliged to change cars until the destination is reached.

We could multiply examples of this kind, but prefer to return to the subject in the course of our discussion, showing the great advantage, from this point of view, of the London system.

The system of the Metropolitan and Suburban Railways owe their existence to the co-operation of the main railways which center in London.

The branch from Dalston street to Broad of the North London, which gives the London and Northwestern access to the city, the subterranean line from Paddington to Farrington street, the point of departure of the Metropolitan Railway, that from Charing Cross to Cannon street and to London Bridge, and still others which we could cite, have had their origin in the struggle of the London and Northwestern with the Great Western, and that of the Southeastern with the London, Chatham and Dover.

In order to penetrate those quarters where circulation is very active, as in the West End and the City, there were only two systems possible: the subterranean system adopted by the Metropolitan Railway, and the elevated system followed by the Southeastern, the London, Chatham and Dover, etc. This last method is more practicable in London than in Paris, since the houses are not so high. Nevertheless, in both cases the expense is very great.

As these expenses were out of all proportion to the amount of traffic which they could expect from long distance travelers, the companies thought that they could make an omnibus connection between the incoming and outgoing depots.

The rivalry between the companies, whose interests are not hostile to each other, should bring about some arrangement which would permit them to have several points of departure and exploit several lines in common.

These arrangements were not the same in all cases.

Some ran their trains upon the rails of friendly companies, either by a reciprocity of title or by a regular toll. Others run cars in their trains belonging to the other companies with which they connect. These cars, carrying passengers whose destination is upon the branch lines, are detached at the junction points often without stopping the train, and are attached to the connecting train which stops at the station or junction, and which is its point of departure. This system, which was formerly employed by the Compagnie de l'Ouest in France for the Argenteuil trains, which are detached at Asnieres from those for Saint-Germain, is frequently employed for suburban service in London.

More frequently, however, the connection between line and line is accomplished by a change of cars. Here was the greatest inconvenience that was met in the exploitation of the London railways. In many cases the traveler is obliged to change cars sev-

eral times on a short trip, and upon lines where the trains are run at long intervals, he is liable to find no place on the connecting train, and to lose in the attempt the time which he would gain by taking the railway in preference to the omnibus or the steamboat.

The companies use the city and suburban lines to carry passengers between the city and the suburbs; to start the trunk line trains from the several stations in the city; and to carry passengers across London who only wish to pass from an incoming station to one from which they can leave the city and continue their route.

It is from these three points of view that we will consider the advantages that will accrue to a city from having some method of steam transportation, after we have taken a brief glance at the older and principal London lines.

#### THE TWO GROUPS OF LONDON RAILWAYS.

The railways by which London and its suburbs are served may be divided into two groups, and are embraced by a radius of from seven to eight miles, namely: The circular group upon the right and left banks of the Thames and the central group. The circular group comprises:

1. The North London, which runs from Poplar to the east, then north by Bow and Victoria Park, crosses Hackney, Hamerton, Dalston, Camden Town, and ends at Chalk Farm upon the London and Northwestern.

2. The London and Northwestern, Hampstead and City Junction Railway, which commences at Camden Town upon the North London, crosses Gospel Oak, tunnels under the hills of Hampstead, leaves the main lines of Finchley and Edgware, and rejoins the London and Northwestern at Willesden Junction.

3. The West London Extension Railway, which connects with the London and Northwestern at Willesden Junction, and runs along the Thames by way of Kensington, West Brompton and Chelsea, crosses the river at Battersea and rejoins the London, Brighton and South Coast Railway, connecting also with the London and Southwestern Railway and with the London, Chatham and Dover Railway.

From Clapham Junction three circular lines run to London Bridge, all three being exploited by the Brighton.

The first, the West End and Crystal Palace Railway, runs from Victoria across Clapham Junction, where it runs beside the Southwestern, turns to the southeast by Balham, Streatham, Lower Norwood, passes below the Crystal Palace, and finally connects with the principal Brighton line at Lower Sydenham at the foot of Sydenham hill.

The second line, the South London, is shorter and is more used between Victoria and London Bridge. It does not connect directly with the West London.

The third is composed of a portion of the West End and Crystal Palace, of the branch from Streatham to Peckham Rye, and the remainder of the South London.

At the Old Kent Road station of the

South London, which passes under the Thames by way of the old tunnel constructed by Branel, serving Deptford and Rotherhite. The East London is in connection at New Cross with the Brighton and South-eastern lines.

The central group comprises:

1. The metropolitan net work, composed of the Metropolitan Railway, as it is properly called, which starts from Moorgate street and connects at the Brompton station with the District Railway, which originally stopped at the Mansion House.

2. The Metropolitan extension which connects with the Metropolitan at Farringdon street and at Aldersgate street, passes by Ludgate Hill, crosses the Thames, serves Blackfriars, Elephant Castle, Camberwell, and rejoins the South London at Brixton, establishing, in this way, a communication between the Metropolitan system and the circular group on the south.

3. The city lines of the Great Northern and the Midland connects with the Metropolitan at King's Cross, which connects in turn with the system of the south, forming in this way a great iron road from Brixton to Kentish Town and to Finchley Road.

4. The line from Charing Cross to Cannon street and to London Bridge giving a direct communication between the West End, the City and Southwark, meeting the Southwestern at Waterloo Junction and uniting at London Bridge with the Greenwich, Woolwich and Gravesend lines as well as that running to Brighton.

5. The line from Fenchurch street to Blackwall, starting from the city and connecting with the North London at Bow and Poplar.

6. The line from Bishopsgate to Stratford Junction which connects with the North London by a branch from Stratford Junction to Victoria Park.

7. The branch of the North London from Dalston to Broad street, giving this road a station in the city.

8. The portion of the London and Northwestern comprised between its terminus at Euston Square and Willesden Junction.

9. The portion of the Great Western, from Paddington, its principal point of departure, to its connection with the West London.

10. The branch from Baker street to Swiss Cottage.

11. The loop of the Metropolitan from Kensington (H. S.) to Kensington (A. R.) and from Brompton to West Brompton.

Most of these lines are merely radiating lines, which run from the Metropolitan system to the circular group on the right and left bank.

In order to make the system complete we must add to these roads, the lines of the Southwestern debouching from the two banks of the Thames to the suburbs on the west and southwest of London, as well as the London and Crystal Palace Railway (high level line), and the small branch from Nunhead to Blackheath Hill (Green-

wich), these two last lines having been exploited by the Chatham Company.

If the course of the roads which we have just enumerated were followed out upon the map it would be found that they almost all reunite in four points, where they connect with one another. These points, which play an important role in the exploitation of the city and suburban lines of London, are: Stratford Junction in the southwest; Willesden Junction in the northwest; Clapham Junction in the southwest; and New Cross Junction in the southeast.

These connections, in permitting the passage of trains from the high level to the low level lines, offer a great variety of combinations of connections which the companies can establish according to their needs.

The most important connecting point among those which we have just mentioned is that of Clapham.

The crossings of the five companies which meet there cannot be upon the same level, hence they must adopt a system of different levels analogous to that which obtains on the roads between La Chappelle and Saint Denis, except that in the system of the north, the crossings are made obliquely. At Clapham they are operated at a right angle either above or below the roads with which they connect a short distance away. Thus, the West London connects on one side with the line of the Southwestern, and on the other with the Chatham line, where it runs below the former. The connection of the West London with the West End and Crystal Palace takes place under the same conditions.

Therefore, in spite of the connections of the different lines of the circular group, it has been impossible to establish about London, a complete circular service taking the traveler to his point of departure, because of the gap existing between East London and Blackwall.

A traveler who starts from Poplar and follows the circular lines to their actual termini at East London, takes two hours and twenty-three minutes to traverse thirty-four miles, that is to say, one minute less than the trains of the Parisian Belt lines require to run twenty-two miles. And nevertheless there is a connection on the Parisian lines between those on the right and those on the left bank of the river.

But if these lines which compose the circular or belt lines of London do not present the unity of action of the Parisian Belt lines, they render to the public and the companies with which they connect a far better service.

#### CIRCULAR GROUP ON THE LEFT BANK OF THE THAMES.

We will now take as an example the circular group on the left bank of the Thames which plays a role to which the Parisian Belt line may be compared.

The connecting station at Stratford, where all the trains of the Great Eastern, both in entering and leaving London, pass, and that of Willesden, where all the freight

trains whose destination is Euston Square stop, are connected with each other by a branch from Stratford to Victoria Park upon the North London by the North London and by the Hampstead Junction line.

This last line, connected with the West London at Willesden as well as the North and Southwestern Junction Railway, gives access to the important stations of Kensington (A. R.) and of Victoria, and permits Acton, Kew, Hammersmith, Richmond, etc., to be served. These roads pass above those of the Northwestern, and the connection is established between the two lines, running the trains either by means of the upper or the lower station. Besides this, the roads which cross the Northwestern at Willesden Junction connect with it, and also allow the trains to pass from one line to another.

If we add to those roads which form the belt lines of the north, the branch from Dalston to Broad street, we can understand how those companies, which have the same interests and objects, that of drawing travel from their rivals, can bring their lines together and make communications between the east and the west and southwest, by having one point of departure in the city at Broad street, and two in the West End at Kensington (A. R.) and at Victoria.

#### NORTH LONDON.

In this combination of common service at the head of which the Northwestern is placed, the North London plays an important role, for it is the means of communication between the systems of the east and the west.

Its length including the Dalston branch is about twelve miles.

It was constructed to avoid the transshipment of freight passing from the eastern lines to that of the Northwestern and to draw into the station of Camden Town the products of all kinds that are unloaded upon the docks of the Thames. It has been utilized for a great many years for the transportation of passengers.

For this purpose they have built at Camden Town, where the tickets for the trains of the main lines are taken up, a station for passengers to which the name of Chalk Farm is given in order to distinguish it from the freight depot of the Northwestern which is just before it. It is in connection with Euston Square by a service of thirty daily trains over the main and suburban lines.

The service of the North London is as follows: Trains leave every fifteen minutes from Broad street, on one side for Chalk Farm and on the other for the Bow where they connect with Fenchurch street and for Poplar and Blackwall. Passengers going from a station at the east of Dalston to one at the west change cars at the branch, or junction point.

As the trains of the North London connect at Victoria with those running from Stratford (this connection generally taking place by means of a train running between these two stations) for North Woolwich, Cambridge, Epping, Ipswich, and the

whole east, passengers can go from Chalk Farm or Broad Street to any of these localities. The line from Blackwall to Chalk Farm, which is somewhat more than eight miles in length with thirteen stations, is traversed in 54 minutes. The fare is eleven and one-half cents for first class and seven and one-half cents for second class from Fenchurch to any station on the North London. From Blackwall the fare is increased by four cents. Tickets for the round trip are sold at a reduction. Round trip tickets from Fenchurch to Chalk Farm cost 17 cents for first class, and 11½ cents for second class.

#### LONDON AND NORTHWESTERN.

The Northwestern has in its turn three trains per hour from Broad Street to Willesden. These trains are semi-direct from Broad Street to Camden Town, where they take up passengers that are brought from the east by the North London and are also taken by omnibus from Camden Town to Willesden. Of these trains two run every hour to Kensington (A. R.) and to Victoria and the third to Acton, Kew, Hammersmith, and Richmond by the North and Southwestern Junction Railway, which is run conjointly by the Northwestern, the North London and the Midland.

The trip from Broad street to Willesden, making eight stops, takes thirty-two minutes, and that from Willesden to Victoria, making six stops, takes twenty-seven minutes. Trains from Broad Street to Victoria and vice versa connect at Willesden with the trains running up and down the line of the Northwestern. Travelers from the city and the West End are therefore not obliged to go to Euston Square in order to go to the north of England. They buy their tickets and take the trains of the Northwestern at Broad Street, at Kensington or at Victoria. There is also a service between Broad Street and the Mansion House by way of Willesden Junction, Earls Court, etc. The trains from Broad Street to Victoria connect at the latter station with those from Brighton, Chatham and the South. The same is done at Kensington, (A. R.) between the Northwestern and the Southwestern.

Travelers find in the Victoria Station buffets and toilet rooms and all other conveniences that are usually found in English stations.

The different services which we have just enumerated result in bringing the quarters of the east and north into communication with the suburbs of the west and southwest; in giving to the Northwestern two stations more central and less isolated than that of Euston Square; in permitting travelers from the east and the west to cross London and to pass from one line of railway to another without leaving the railways.

We can judge of the importance of these services by the following figures: The Broad Street station sends out and receives 446 passenger trains daily; 186 trains pass Stratford Junction and 238 trains take up and deposit passengers at Willesden Junction.

In such an extended system as the one which we have in hand, it will be seen that it is impossible to enter into all of the details of its operation, and there are many other combinations that are of less interest, but which all serve to add to the efficiency of the London system. When new lines are opened and shorter routes offered to the public they are not slow in finding out which will best serve their individual interests, and every consideration is subordinated to the all important one of the saving of time, which is money.

(To be Continued.)



**The Milwaukee Granulator.**

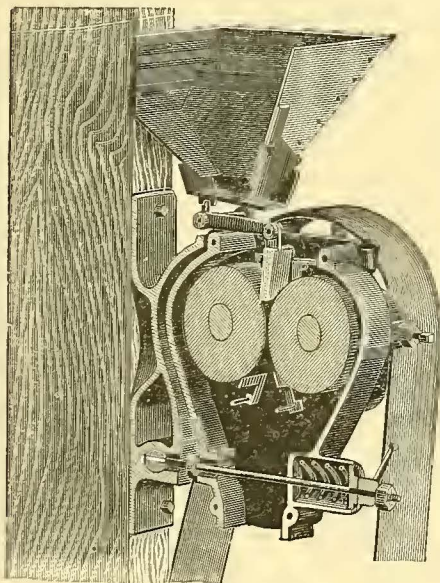
We illustrate a perspective and section view of a granulator\* for grinding feed that is especially adapted for use in street railway stables. The machine is a complete roller mill, with all necessary adjusting devices, yet so simple in operation and management that any one can run it, even though they never saw a roller mill before.

As roller mills have shown their superiority over all other systems for making flour, they are now showing their superiority for grinding corn meal, feed, and all the miscellaneous grinding required to be done in a feed mill, or custom flour mill as well. In Europe stones have been entirely discarded for feed purposes, and rolls substituted. It is only a question of time when the same will be done in this country.

This machine is especially designed to grind corn for meal or feed, screenings, grass seed, oats, barley, rice, rye, wheat cockle or any mixture of these grains.

The rolls used are of chilled iron, suitably corrugated for the work to be performed and are identical with those used in flour mills, being corrugated on the same machines.

The construction of the machine makes it very durable, easily managed and capable of doing superior work. With a buhr mill an experienced man has to be kept to dress the stone and keep it in order, which is not only expensive but necessitates the stone being idle about one-tenth of the time. The granulator can be run by any one and as the rolls require no dressing, they can be



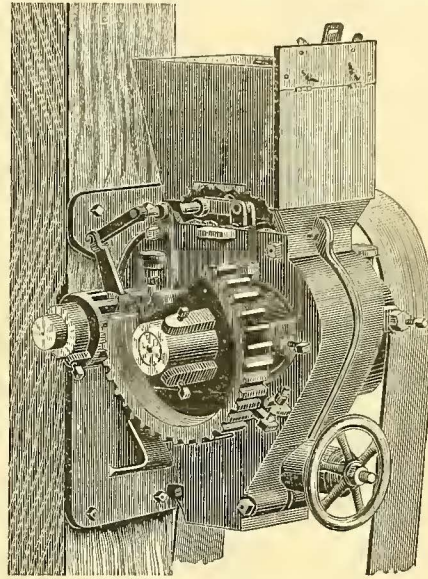
SECTIONAL VIEW.

kept constantly at work and need no repairs of any kind until the finely corrugated rolls wear smooth, which will be in from two to four years where machines are used steadily, but for ordinary feed grinding, if properly handled, it is claimed that the rolls should never require replacing.

By means of the hand wheel in front of the machine the rolls can be quickly and easily set together or apart, and kept in the same position given them whether grain is passing through or not.

As there are always more or less foreign

substances finding their way into the grain, such as nails, screws, nuts, bits of wire, stones, etc., which would be liable to cause damage to the rolls, there is provided a spring to permit the rolls to yield momentarily and allow the foreign substance to



PERSPECTIVE VIEW.

pass through with the minimum amount of injury to the rolls, the spring returning the rolls to their former position. One or two twenty-penny nails have been known to pass through the machine without any perceptible injury to the rolls, and in one case an eight-inch three cornered file was run through two granulators, without causing any damage, except a slight V shaped cut in the rolls. However, the manufacturers do not advise any such experiments.

All millstones and disc mills, whether horizontal or vertical, have a crushing, mashing and tearing action on what passes between their surfaces. The grain entering the eye of the stone is thrown by centrifugal force to the skirt, and in passing out undergoes a constant rubbing and tearing between the surfaces of the stones or discs. The grain becomes heated and the life is ground out of it, and instead of a granular and clean product, a hot, pasty mass, full of flour, is produced.

The rolls of this granulator are corrugated spirally, one roll running about three times as fast as the other, the teeth of the slow roll pointing up, while the teeth of the fast roll point down.

Grain passing between the rolls is thus sheared or cut, instead of mashed, and the point of contact being so small, there is no chance for heating. Feed ground on this mill will be found sharp and granular and of an even fineness, with but little flour in it, making, when mixed with water, a good, wholesome feed, and not a pasty mass as when the feed contains flour.

\*E. P. Allis & Co., Milwaukee, Wis.

We have received the annual report of the Birmingham and Aston Tramways Co. (Limited), and regret that its failure to give the mileage and number of horses, renders some otherwise very interesting data unavailable for comparison with the results of American practice.

**The Haycox Door Fastener.**

This device\* is intended to hold a door open or shut according to the requirements of the time being, and thus obviate that disagreeable tendency on the part of a car door to work open on a cold and stormy night, or shut on a hot summer's day. It acts upon the principle of the knee joint, where a slight weight suspended from the center is sufficient to bring an enormous pressure to bear upon the ends.

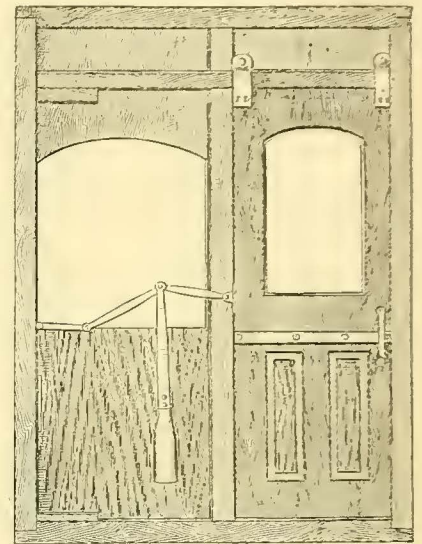


FIG 1.

Fig. 1 shows the door closed and the weight hanging from the center of the joint while Fig. 2 shows the apparatus with the door open, and it will be seen that it has a tendency to swing the arms back and thus hold the door open.

In use it is placed between the inner and outer panelling of the car, and is conse-

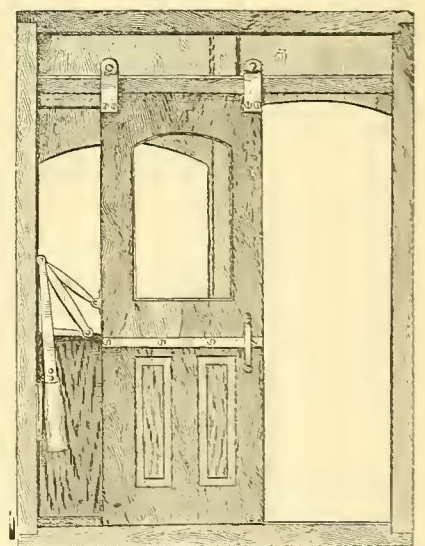


FIG 2.

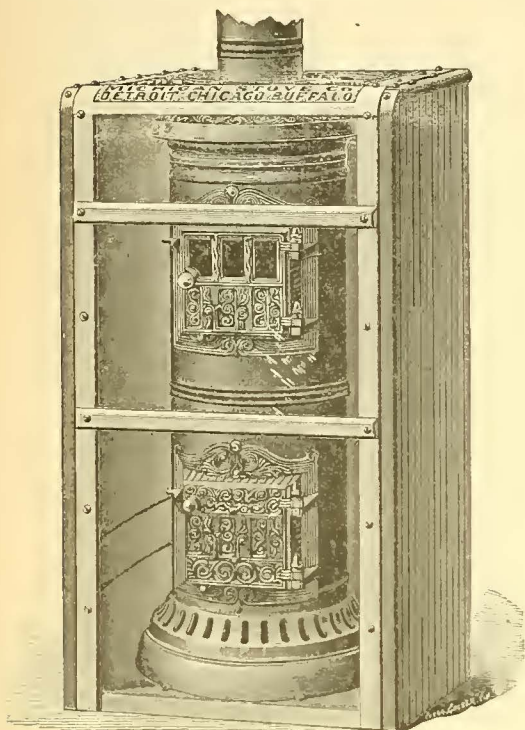
quently out of sight, and the passengers are ignorant of its presence. It does not hinder in any way the movement of the door, but simply tends to open or close it, according as the weight is before or behind the point of support of the back lever.

\* Haycox Door Fastener Co., 1158 Euclid Avenue, Cleveland, Ohio.

**The "Garland" Street Car Heater.**

So many attempts have been made to produce a street car heater constructed upon scientific principles, with the assurance of the manufacturer that it would do everything but pay the fare of the passenger, that it is refreshing to call the attention of our readers to a car heater for which the manufacturers claim nothing whatever except that it is a simple, plain, operating stove, without anything in its construction more than is to be found in any other plain draft heating stove.

The "Garland" car heater is certainly a



THE GARLAND STREET CAR HEATER.

most artistically designed and beautifully decorated stove of its kind. The cut shown herewith illustrates the stove in a polished, hard wood box, the frame of which covering the top and front is beautifully nickel plated. The feed door and lower door are so arranged that they are securely locked so as to prevent accident. It is intended to burn either anthracite or bituminous coal, and the experience of the street car lines in Detroit who have been using them is that the cost of running each stove is less than ten cents per day.

The manufacturers have recently constructed a new base, so arranged as to receive a capacious ash pan, the price asked for the new stove being but a trifle more than for the stove shown in the illustration.

The manufacturers of this stove are among the largest manufacturers of stoves and ranges in the world, which of itself should be a guarantee that their production is meritorious, and well adapted for the purpose for which it is intended. They are prepared to furnish the stove as shown above, or, if desired, can furnish the stove separate from the casing and frame, or they will furnish the stove and nickel plated

frame so that their patrons may build the casing if they desire.

\*The Michigan Stove Co., Detroit, Mich., Chicago, Ill., or Buffalo, N. Y.

**Good Construction.**

EDITOR STREET RAILWAY JOURNAL:

Your article in the September number on guess work construction, is good and to the point. A part of my business is the taking up and repairing of botch work, that has been put down by inexperienced, unskillful men. Such work would be dear if done for nothing. Railroad officials are getting their eyes open, and see the folly of practicing what they have called economy, in buying cheap material and employing unskilled labor. The demand is greater today than ever before for the best material and the most competent men to use it. I can name a number of roads which a few years ago were run on the patchwork plan and did not pay a cent, and which now, with fifty or sixty lb. steel rail, Florida pine stringers and other material to match, have a good track and are paying dividends. The Presidents of these roads will endorse what I say, and probably give you more information to the same effect.

A few suggestions may be in place just here. Firstly, have a good heavy steel rail; the center-bearing pattern is the best. Secondly, in laying the stringers care should be taken to place them so that the joints of timber will not come nearer than four feet to the joint of the rail, also making broken joints, that is, the timber joint on one side should be nearly opposite the center of the stringer on the other side. The rails should be laid on the same principle. The channel joint plate is best, and should be cut in with great care; and in double track the plate should be so punched as to place two-thirds of the plate under the drop or running rail. This is an important thing in order to get the most wear out of both rail and plate. It is safe to say that joints so arranged will wear twice as long as those placed in the center of the plate.

The plate should be at least eighteen inches long, half an inch thick, and made of steel.

When railroad companies get to that point of experience and intelligence which will demand the very best material to be obtained, and require it to be laid in the best possible manner, they will then receive the greatest returns for their investment. I have said many times to different railway officials, that it would pay them to borrow money sufficient to put their roads in first class condition and that by so doing they would increase the value of their roads fifty per cent. I do not know whether they borrowed the money or not, but I do know that some of them improved the condition of their roads, and the result was in accordance with my prediction.

The chief point to be considered in building a new road is to secure the best and most durable track. The expense of maintaining such a track will not exceed one-quarter of the cost of maintaining a

cheap and poorly built track. This is an established fact, and I know of many companies that have paid dearly to find it out.

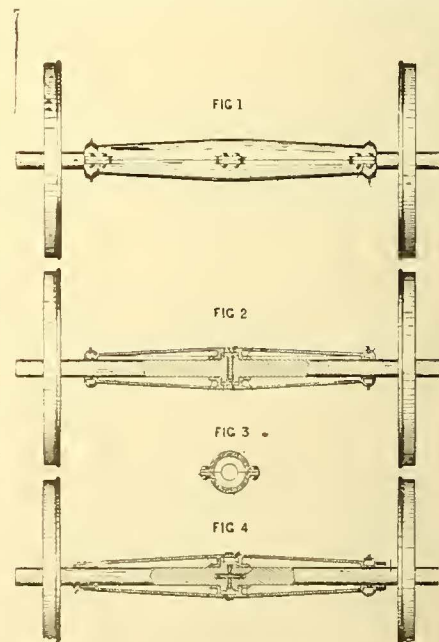
As regards paving, small cobblestone, uniform in size, with a row of block stone on each side of the rail, makes the best paving for street railway track, and if properly laid it will keep in place as long as any other paving. It is the opinion of all railroad officials of my acquaintance that this is the best stone pavement for horses to travel on, less likely to get smooth and slippery, and horses travel on it with more freedom.

I am well satisfied that most of the unprofitable roads now in operation are non-paying, not because there are no people to ride, but because the road is in a rough condition, has poor and dirty cars and broken down old houses, and the whole business is conducted on a cheap scale. My advice would be to bond such roads for sufficient money to put them in first class condition and I am confident that the net profit would be increased fifty per cent.

WM. P. CRAIG.

**White's Divided Axle.**

The device,\* illustrated in this connection, is a new attempt to solve the loose wheel problem that has been attracting the attention of railroad men for so many years. Instead of requiring an entirely new and separate apparatus in the construction of the independent wheels; the ordinary wheels and axle are taken and the latter di-



vided in the center. A wrought iron band, about one inch square, is then shrunk upon each end, and the axle upset so that there is no danger of them working off or loose. The amount taken out of the axle at the center by the cutting tool is made up by inserting a washer that is held in position by a dowel pin extending into each end as shown in Fig. 4.

The sleeves used for joining the two free ends of the axle, are made of steel castings ribbed on the inside, having bearings in the

center over the wrought iron bands that are shrunk upon the axle ends. They have also a short bearing at each end which are provided with oil holes and cups, as shown in Figs. 1 and 2.

The sleeves are made in two halves which are bolted together, as shown in Figs. 1 and 3.

A felt packing is placed between these sleeves in order to make a tight joint and prevent the leakage of oil. One end of the sleeve may be attached rigidly to the axle, and the other allowed to revolve; or both may be left loose as the constructor may desire.

The extra weight added by these sleeves is from 50 to 75 lbs. for each axle.

\* R. T. White, 148 High street, Boston, Mass.

**The Nelson Car Heater.**

We illustrate an outline of a heater\* which has been adapted to supply the requirements of street car heating, without occupying the space required for seating, and also to assist in ventilation. The stove

is located in the rear of the car, where a fire is maintained, and from which live coals are taken for kindling the fires in the small stoves. This is found to be more economical than building a fire with kindlings in each stove.

Besides the Second Avenue line, already referred to, the heater is in use in Newark, Jersey City, St. Louis, and elsewhere throughout the country.

\* Pugh & Russell, 51 Stewart Building, New York.

**The Berlin Metropolitan Railway.**

At this time when the question of rapid transit is attracting such extended attention in all the large cities of the world, it may be interesting to inquire into the principal features of some of the systems that have been used abroad.

In Europe, London and Berlin have their completed systems; while at Paris and Vienna the project is under consideration.

The railways within the limits of London have been well known for a long time, while there is less familiarity with the works that have been executed during the

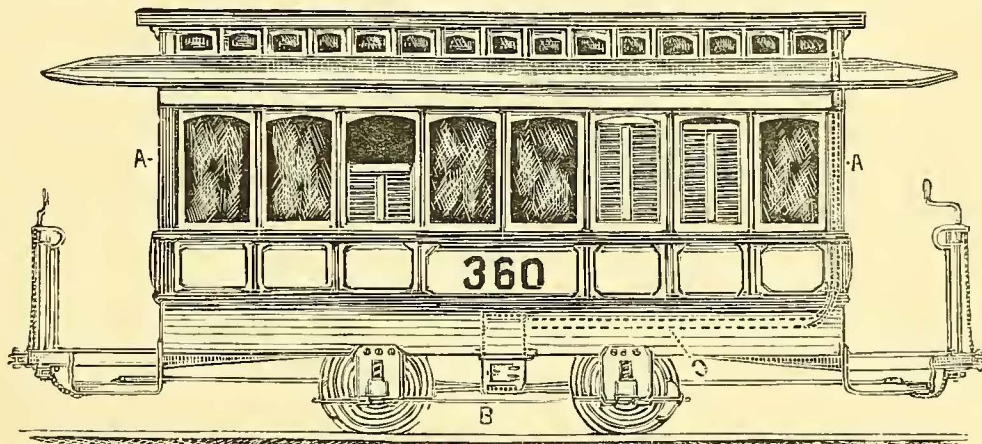
after the events of 1870-71; and opened it in sections in 1872.

Finally the Metropolitan Road (*Stadtbahn*) has just finished the work that was at that time begun. It was opened Feb. 7, 1882. Thanks to this new line, the trains can cross the capital without being broken up or traversing the line the second time, as easily as they would pass through the smallest station in the empire.

**CONSTRUCTION, VIADUCT, TERMINI.**

The Berlin Metropolitan Railway is elevated throughout its whole extent. The viaduct is almost entirely built of brick-work masonry, except the street crossings and bridges, which are for the most part metallic.

It is a sinuous line, which crosses the city from east to west, following practically the major axis of the ellipse formed by the belt line. It is separated only a short distance from the Spree River, which it crosses three times. Its length between the two termini (*Schlesischer Bahnhof* and *Charlottenberg*), is about nine and three-eighths



THE NELSON CAR HEATER.

consists of a small box placed below the flooring of the car and hung from a casting screwed to the floor. It drops far enough below the sills to admit of being fired from the outside, and projects up into the car to close under the seat. The only changes necessary for its adoption are the cutting of a square hole in the floor and the screwing down of the castiron plate already referred to. The stove is then lifted up through the opening and set upon lugs, where it is held by a pin. Outside the stove proper there is an air jacket, opening at the bottom, outside, and at the top, into the car. There is thus a constant circulation of fresh air upward and into the car, this air becoming heated in its passage by the hot surface of the stove.

The products of combustion are led off through a pipe running from the upper drum of the stove under the seats, and up to an outlet at the end of the car, thus securing the maximum amount of heating surface, coupled with ventilation, and with no demands made upon the pure air of the car for use in the stove.

The stove is designed to burn anthracite coal. On the Second Avenue Railroad in New York, where the stove is in use, a large portable furnace is placed outside the

past few years in Berlin. They are, nevertheless, owing to their recent construction, and the considerations which led to their completion, worthy of the highest interest to the engineer.

At Berlin, it is almost useless to state, the considerations referred to which led to the construction of this metropolitan road were almost entirely of a strategic nature. When the Prussian State Department took the work in hand, it did not have for its principal object the replacing of the several omnibus and street railway lines, which were amply sufficient for a city of moderate size; it looked farther; it desired to make complete connections between the lines running to the east and those running west, in order to give a possible mobilization of the army, the assurance of absolute success.

In 1870, Berlin did not even possess a belt line or railway. A single line, running transversely and somewhat separated from the city, united the centering lines. The concentration of the eastern troops upon the west, although well executed, was not accomplished without thoroughly proving the real difficulties of the task.

Moved by the obstacles raised by such a situation, the Prussian government built the Belt Railway (*Ringbahn*) immediately

miles. The radii of the curves vary from 900 feet to 1,650 feet. The grades are from 2 to 8 in 1,000. The line has four tracks throughout its whole length, occupying an average breadth of 50½ feet. The two northern tracks are reserved for local traffic, while the two on the south are traversed by passenger trains from the trunk and suburban lines; the two services being absolutely distinct.

Besides the two termini, the Metropolitan has eight stations. Three of them are so constructed that they are used for both the trunk line and local traffic; they are, in going from east to west, Alexander Place, Frederick Street, and the Zoological Gardens.

All of the termini and stations are remarkably well designed. As the line is an elevated one, the stations are naturally of two stories. The lower story, on the street level, contains the ticket-taker's gate, the waiting rooms, the buffet, etc. Large staircases give access to the upper platform, which is on a level with the road and covered. Baggage is only received at the stations used by the trunk lines. The baggage rooms are also upon the ground floor, the baggage being raised to the platforms by hydraulic elevators.

The construction of the termini is also of brick masonry. These bricks are partly dull and of different colors, and partly enamelled upon their exposed faces, giving the architecture a rather pleasing appearance, while it is, at the same time, somewhat peculiar. Stone (granite and brown freestone) has only been employed very quietly, and for the sole purpose of decoration.

The metallic imitation of woodwork which is used, varies in design for each station. It is usually remarkable for its lightness. Lighting is accomplished from three sides at a time; vertically from above and laterally from two sides where windows are placed. The rest of the carpenter's work is covered with corrugated iron.

The immense vaulted hall at the Frederick street station is worth mentioning; it is 230 feet wide and 492 feet long. Those at Alexander Place and at the Schlesiſcher station are equally remarkable.

There are as yet only a limited number of streets running parallel to the viaduct; but this matter has been provided for, and they are being increased from year to year. Where they do exist, the vaults of the viaduct are rented at a price that compares well with the rental of the finest locations in Berlin. They are especially desirable for wine cellars and restaurants, which are fitted up with the greatest luxury under the Metropolitan. There is no doubt but that the number of these establishments will increase with the opening of new lateral streets.

The bridges over the streets are of a very different type from those over the water. A description of them would occupy too much space. Those which are of especial merit are, in going from the east to the west: The viaduct near the station of *Janovitzbrücke* (in masonry.) At this point, in order to avoid considerable expense, the line passes along the bed of the Spree for a distance of from 1,650 to 1,950 feet.

The diagonal bridge over the Spree, of stone, between the station of *Börse* (the exchange) and that of *Frederick Street*.

The iron bridge over the Spree, just beyond the *Frederick Street* station.

The metallic viaduct over the *Humboldt Basin*, before the *Lehrter* station.

The iron bridge over the Spree near *Bellevue* station.

THE ROAD; SIGNALS.

The roadway is built on the *Haarmann* system, which is so generally used upon German railroads. The rail is of steel of the *Vignole* type, 16½ feet long, and weighing 60 lbs. to the yard. It rests on a stringer stamped from a metallic plate, which is one foot wide at the base, and 2½ inches high. This stringer is completely imbedded in the ballast.

The rails are fastened to the stringers by bolts, spaced about the same as the spikes in our fastenings to cross-ties. The rails are fastened together by cross ties.

Moving trains are protected by the block system in general use upon the German railways. The signals consist of semaphores with movable arms, and are of the *Siemens* system.

TRACTION; ROLLING STOCK; MOVEMENT OF TRAINS.

The locomotives in use upon the local service of the Metropolitan Railway are provided with a tender and have four wheels coupled. Two types differing very little from each other are actually used.

The oldest have a weight of 40 tons, equally distributed upon three axles. They are provided with a condenser, and with an arrangement of the firebox, and an exhaust which avoids the production of smoke or escape of steam.

The engines more recently put into service weigh 36 tons. They have no condenser, experience having proven that no inconvenience arises from allowing the steam to escape while traversing the city.

The fuel used consists of briquettes, which produce only very little smoke.

The trains consist only of second and third class carriages. There are no vans; and a guarantee against accident is granted only for one reserved compartment at the head of the train.

All of the trains are provided with a continuous compressed air brake of the *Carpenter* system.

For the local traffic the trains are run during the week at ten minutes intervals in each direction, from five o'clock in the morning to midnight. On Sundays and holidays they are run under five minutes headway.

The stops at the stations average thirty seconds each; and the average speed of the local traffic is about fourteen miles per hour, including stops and slow running.

MOVEMENT OF PASSENGERS AND FREIGHT.

The city of Berlin, which is in the full vigor of its growth, and whose population is every day increasing, contained at the last census 1,230,000 inhabitants.

It is difficult to determine the number of passengers which are carried over the Metropolitan railway in the trains of the trunk lines. Their numbers can only be found in the general statistics of the different lines.

For the local traffic the average circulation is from 25,000 to 30,000 passengers per day.

Below, we give the exact number of passengers carried since the opening of the road.

1882.....	8,324,348
1883.....	10,116,826
1884.....	9,158,762
1885.....	10,296,028

We see from this that the increase has not reached one million per year, except for the year 1883, during which the travel was very heavy, owing to an exposition which was very popular with the Berliners.

The price of third class tickets from one station to another is 2.4 cents, and for a through ticket 9.6 cents. In second class the corresponding charges are 2.4 cents more. Commutation tickets are sold to workmen at a reduced price, but they are only good from seven o'clock in the morning to six o'clock in the evening in winter, and from six o'clock in the morning to seven o'clock in the evening in summer.

Freight trains are not run over the tracks of the Metropolitan Railway, but are sent over the Belt line.

EXPENSES; RECEIPTS.

As we have already had occasion to state, it is the Prussian government who constructed the Metropolitan Railway.

The figures given as the total first cost of construction are 75,085,000 marks, or \$17,870,230; (1 mark=23.8c.) divided as follows:

Right of Way, 35,199,000=\$8,377,362.  
Construction, 39,886,000=\$9,482,868. Total expenses, 75,085,000=\$17,870,230.

The actual annual expenses amount to about \$868,200. The receipts, deducting the traffic derived from the trunk lines, amount to \$772,000. It is therefore from the receipts of the trunk lines, all of which belong to the State, that the deficit of \$96,200, as well as the interest on the capital sunk in the construction, must be made up.

Although the financial condition of the Metropolitan is in a crippled condition, at the outset, it is nevertheless improving. More could not be expected of a line which, at the time of its construction, presented only a strategic interest, and while the necessities of Berlin traffic required no such exploitation.

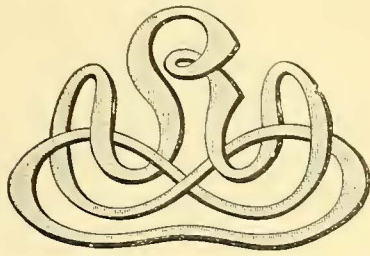
CONCLUSION.

There is a strong sense of admiration that will be felt, when the Berlin Metropolitan Railway is carefully studied.

We may criticize many of its features, and dispute the artistic value of the several parts, but it is none the less true that the whole is exceedingly remarkable, as well for the conception of the work, as for the great care taken in the execution of the smallest details. Furthermore, aside from its strategic importance, the Metropolitan has become in a few years indispensable to the Berliners population. It has enriched certain parts of the city, heretofore poor and neglected; and thanks to it, entire quarters have been built upon portions that were formerly worthless. Several thousand workmen, clerks and other employees can now, without loss of time, dwell in cheap and healthy houses outside of the city. If at any time the service of the Metropolitan stopped, it would be a misfortune that would strike the entire population. Suffice it to say the Berliners are proud of their Metropolitan, and have a right to be.—*Chronique Industrielle.*

For Halter Pullers.

Make large slip-noose around horse's body, draw moderately tight, pass end between front legs through bridle or halter and hitch. Undo halter strap and put around neck. This is used for bridle pullers, for leading horses, or for teaching a colt to be hitched or led. For every high lived horse put noose around body in front of barrel; for ordinary horse, just behind barrel, and for very obstinate ones as far back as you can put it.



**American Street Railway Association.**

**OFFICERS, 1885-6.**

*President*:—JULIUS S. WALSH, President, Citizens' Railway Company.

*First Vice-President*:—WILLIAM WHITE, President, D. D., E. B. & B. R. R. Company, New York, N. Y.

*Second Vice-President*:—CHARLES B. HOLMES, President, Chicago City Railway Company, Chicago, Ill.

*Third Vice-President*:—SAMUEL LITTLE, Treasurer, Highland Street Railway Company, Boston, Mass.

*Secretary and Treasurer*:—WILLIAM J. RICHARDSON, Secretary, Atlantic Avenue Railroad Company, Brooklyn, N. Y.

*Executive Committee*:—President, Vice-Presidents and Calvin A. Richards, Pres., Metropolitan R. R. Co., Boston, Mass.; John Kilgour, Pres., Cincinnati Street Railway Co., Cincinnati, O.; John Maguire, Pres., City Railroad Company, Mobile, Ala.; Thomas W. Ackley, Pres., Thirteenth and Fifteenth Street Railway Company, Philadelphia, Pa.; Chauncey C. Woodworth, Sec., R. C. & B. R. R. Co., Rochester, N. Y.

The next regular meeting of the Association will be held in Cincinnati, Ohio, the third Wednesday in October (the 20th),

**SUBJECTS FOR DISCUSSION AND SPECIAL COMMITTEES.**

*Cause, Prevention and Settlement of Accidents*:—Mr. Calvin A. Richards, Pres., Metropolitan Railroad Company, Boston, Mass.

*Sanitary Condition of Street Cars*: Mr. Edward Lusher, General Man'gr, Montreal City Passenger Railway Company, Montreal, Canada.

*Ventilation, Lighting and Care of Cars*: Mr. Walter A. Jones, Vice-Pres., New Williamsburg & Flatbush Railroad Company, Brooklyn, N. Y.

*Progress of Cable Motive Power*:—Mr. Edward J. Lawless, Supt., Kansas City Cable Railway, Kansas City, Mo.

*Progress of Electric Motive Power*:—Mr. T. C. Robbins, General Manager, Baltimore Union Passenger Railway Company Baltimore, Md.

**Secretary's Circular to American Street Railway Association.**

The following circular letter has been sent out by Secretary W. J. Richardson to the members of the Street Railway Association.

Dear Sir: The fifth regular annual meeting of the American Street Railway Association will be held at the Burnet House, Cincinnati, Ohio, the third Wednesday in October (the 20th), 1886, commencing at 10'clock, A. M.

Committees will report on the following important subjects, viz: "Cause, Prevention and Settlement of Accidents;" "Sanitary Condition of Street Cars;" "Ventila-

tion, Lighting and Care of Cars;" "Progress of Cable Motive Power;" "Progress of Electric Motive Power."

As the reading of the reports and the discussion thereon will consume considerable time, it is hoped that delegates, so far as practicable, will be in the city on the previous evening, in order that the meeting may commence promptly at the hour named, so that the preliminary work may be disposed of with as little delay as possible.

The Association has a membership of one hundred and thirty-seven companies, a list of which is sent herewith.

The New York Central & Hudson River Railroad Company has again very generously granted special rates to delegates and their wives; the cost of round trip tickets being as follows: Boston, \$25.25; Springfield, \$22.50; Worcester, \$25.25; New York, \$22.50; Albany, \$21.70; Schenectady, \$21.70; Utica, \$21.45; Syracuse, \$20.35; Rochester, \$18.20.

Negotiations are in progress with the Central Traffic Association for concessions similar to those made to the Association last year, namely: the full rate to be paid to Cincinnati from any point, and one-third of the full rate from Cincinnati home. Application should be made to the Secretary without delay, by those who wish to avail themselves of the reduced rates.

In order to obtain the best available accommodation at the hotel, it is advisable for you to write to the Burnet House at your earliest convenience, stating the number of delegates that will represent your company. For that purpose, please find herewith an addressed envelope.

A delegate's card is enclosed. Will you please promptly acknowledge the receipt of this letter by return mail, and forward the card duly filled out.

We trust your company will be represented on that occasion, as a very profitable and enjoyable time is expected.

W. J. RICHARDSON, Sec.

Brooklyn, Sept. 20, 1886.

**Street Railway Insurance.**

In connection with the approaching convention, it would be well, perhaps, for the members to reconsider the plan of mutual insurance against fire that was presented for their consideration by their Secretary, Mr. Richardson, some two years ago. His scheme was based upon carefully collected data from all over the United States and Canada, and the figures proved that the street railway companies only received in return about thirty-three per cent. of the premiums paid out. As all insurance is really based upon a mutual foundation of the aggregate membership making up an individual's loss, with the usual intervention of a middle man in the shape of a great insurance company that can pay high salaries and big dividends on the commissions received; and as many large property holders find it to their pecuniary advantage to insure themselves, there seem to be no good reasons except in the arrangement of details, why the street railways of the coun-

try, owning property widely separated, cannot formulate a schedule of rates that will drop far below anything that is offered by the regular companies, and give one another complete and satisfactory protection.

If this is done there is no doubt but there will be, not only a direct saving of expense, but that in addition to this, those roads who are so unfortunate as to have a fire, will experience less of the delay and annoyance in the adjustment of their losses, than falls to the lot of those roads who are insured and try to make collections under the present system.

**Membership of the Street Railway Association.**

From the official list of street railways that are now members of the association, we find that there are 137 roads represented in that membership, distributed as follows, among 28 States and Territories and Canada :

Alabama	1	road
California	1	"
Canada	4	"
Colorado	1	"
Connecticut	4	"
District of Columbia	2	"
Georgia	1	"
Illinois	6	"
Indiana	1	"
Iowa	5	"
Kansas	1	"
Kentucky	4	"
Maryland	2	"
Massachusetts	17	"
Michigan	6	"
Minnesota	3	"
Missouri	10	"
Nebraska	1	"
New Hampshire	1	"
New Jersey	6	"
New York	23	"
Ohio	2	"
Pennsylvania	16	"
Rhode Island	1	"
Tennessee	2	"
Texas	1	"
Utah Territory	1	"
Virginia	2	"
Wisconsin	2	"

Total 137 Roads.

**European Street Car Rail.**

The rail used in most European cities for street railway purposes, differs very essentially from that in use in this country. The iron is in the shape of a broad flat bar about six inches in width and one and one-half inches thick.

The upper side is slightly crowned or rounded, and midway along is a concave groove of about seven-eighths inch depth and seven-eighths or one inch width. This groove takes the flange of the car-wheel, and the tire or broad part of the wheel runs upon the upper surface of the rail. An important part of the method is in having the rail the full breadth of the upper edge of the timber on which it rests, This permits the paving blocks to be crowded up against the edge of the rail.

The advantage claimed is that it offers a comparatively unbroken surface to street traffic.

### Advancement of all Employees.

BY WM. E. PARTRIDGE.

Persons who employ large numbers of men at small wages, in occupations calling for little skill, complain that they can do little or nothing for the permanent advance of their men. They hold that improvement of condition is not possible if it is to be continued over a number of years; that in the trades but little removed from day labor there is no opportunity for a man to become more valuable as the years go by, and hence he cannot expect, nor in justice be given a steady advancement. The street car drivers have been instanced as belonging to a class to whom regular increase in earning power is not possible. These men may improve for a year or so but beyond that one man is as good as another.

It is generally admitted by those who have given the labor question most careful thought that the best results from labor are to be obtained where the men have an interest in their work and where they see before them a prospect of steady and regular gain or advancement of some kind. Many indeed believe that the true solution of all our labor troubles is to be found in devising means by which the laboring man may attain greater earning power and correspondingly increased wages.

Several street roads in the Eastern States have taken up this idea and are working on schemes founded on the idea that an old and steady man is worth more than a new and green hand. The men begin on small wages and are advanced fifty cents per day at the end of each six months till after about two years service the maximum rate is reached. The question comes up, Has a driver reached the limit of usefulness after two years of service? Is there not still something for him to learn in regard to the handling of his team and in the manner of doing his work?

Upon one of the lines in New York there is, or was not long since, a driver, the behavior of whose team and whose method of driving frequently attracted the notice of horsemen. Contentment was written all over the animals. They paid no attention to bells nor to their surroundings but their ears were sharp for the driver's voice. He spoke to them an instant before he moved the brake and they slackened their traces; when the bell struck to go ahead they made no move until he called. The lines swung lightly in his fingers but the horses did not surge forward in the traces. The voice turned them out square across the track for vehicles that obstructed their way, and brought them back again. A ride on the front platform was a lesson in driving which a lover of animals could not soon forget. Inquiry brought out the fact that as soon as this man got a team it usually began to improve at once; that all his teams were in good condition and that those which were run down, were often turned over to him to bring up. Incidentally it may be remarked that this is a confirmation of a

conclusion which is quite evident to passengers as well as superintendents, that a heavy percentage of the wear and tear of live stock comes from the platform quite as much as from the work of handling the car. The incident is suggestive because it shows that by study or instruction the value of the men may be greatly increased, that attention, kindness and a desire to do well may make a material saving to the company in wear and tear. If, among car drivers, wide differences are to be found, showing that with long experience may come increased knowledge, skill and earning power, practically, there can be no class of laborers of whom the same is not true.

With this fact for a basis or starting point the first step to be taken is to devise some plan or system by which it may be made for the interest of the men to improve and advance. It is argued over and over that nothing can be done for drivers, conductors and day laborers; that the work which has been attempted in the past, has time out of mind been rejected and failed to be appreciated. The discussion of the failures, and the causes which operated against the well intended but futile plans, cannot be discussed here. One thing only need be stated in regard to them, the result or benefits which they aimed at conferring upon the men were very insignificant.

European experience extending over many years has shown that all workers may be made to share in the profits, and by this participation the earnings may be increased in a geometrical rather than a simple ratio. In establishing a participation system, however, something valuable must be given if any value is to be expected in return. Failures have come to such schemes in the past because of the grand words and promises and ridiculously small results. One large house in this city, fifteen years since established a co-operative feature in the business. There was to be a general participation in profits and all the employees were to have a substantial interest in the success of the establishment. During the first year there was no small amount of curiosity and speculation on the part of the men. When the books were adjusted, those who had been receiving \$600 per year found that the new arrangement had increased their income for the year by nearly \$6, or about 12 cents per week. The result was too petty, too insignificant to deceive even the office boys. It was apparent to all that the scheme had been elaborated as a means for getting extra work done without increasing the force. The contempt with which it was treated the second year was outspoken, and it failed completely as a means of extracting extra work or of enabling departments to be run short handed.

It is possible to devise systems by which men may actually participate in the success of an establishment. Some of the greatest and most successful of the so called French co-operative associations are only large business or manufacturing concerns, in which the operatives have a substantial interest in the net earnings. Capital gets its

interest and the profit is divided upon a basis which assumes each man's wages to be the interest upon a certain capital invested. The business management is in the hands of the capitalist, but the supervision of details belongs to the workmen. Under such circumstances, economy penetrates each corner, waste in the most trivial manner is cut off and success is permanent. In view of the restless condition in which labor of all kinds is found and the great disasters which organized masses of working men may cause to capitalists, it is evident that some precautions must be taken for protection. These may be of two kinds only. There can be organization of capital and with a decidedly hostile intention. For a time this, though somewhat costly, will be successful. Unfortunately as the voting power is in the hands of the men this method of attack and resistance must soon be abandoned. The other method is that of co-operation. It is quite within the power of labor employers to devise such schemes for increase of earning power that the men will feel and see that it is for their interest to stick to the company. Until they have this feeling the roads will be to a large extent in the hands of the demagogue who happens to have the ears and the confidence of the employees.

### Newsboys Must Keep Off.

A prerequisite of a successful conductor or driver on the Third Avenue road related to the prescribed treatment of newsboys. The old hands knew about the regulation and ignored it. The new men didn't know how they ought to treat the little fellows who make a dollar or two a week selling newspapers on cars, until July 21, when Superintendent Robertson brought out the regulation and had it pasted up in the company's office at Third Avenue and Sixty-fifth street.

Conductors and drivers must prohibit all children under sixteen (16) years of age from selling newspapers and all persons from selling lozenges, books, pictures, flowers, or articles of any description.

For any violation of this rule the conductor or driver will be immediately discharged.

The attention of the conductors and drivers was called to it, and Superintendent Robertson, in explaining the revival of the order, said that it was for the protection of the company. There had been a number of hurts to the smaller boys, and rather than take any more risks he had decided not to let them get on the cars at all. The newsboys did not know of the order until along in the afternoon. Then they were already loaded up with the afternoon papers. Many papers were left over on their hands. Sorrow, indignation, and all sorts of resentful feeling were shown by the boys against the railroad company.

The new store box recently gotten out by Mr. Fowler, of the Lewis & Fowler Manufacturing Company, is compact, neat in appearance, and is well and economically built.

**Operating Expenses.**

Recently, Mr. W. H. Milliken, of San Francisco, Cal., on behalf of the City Railroad Company of that city, made a thorough investigation of the different systems for propelling street cars. From his comprehensive report the following is quoted: "The City Railroad Company has a present week day service of twenty single horse cars on the main line, and fourteen single horse cars on the branch line, with a varying number of extra cars, both single and double horse, during certain hours and on Sundays. The length of the road is 4½ miles on Mission street from the water front to Thirty-first street; and the short branch leaving main line at Fifth street, passing through and down Market street, and on Dupont street as far as Sutter street thence down Sutter to Market, gives an additional length of 1½ miles, making a total length of 5½ miles, for the entire line."

"The number of horses provided for the service, including those to take out 'extras,' and in place of sick and disabled animals, is 285; and by a fair method of calculation, I find the average expense per day of providing the propelling power for your cars, is somewhere about eleven dollars (\$11) for double horse cars and six dollars and fifty cents (\$6.50) for single horse cars, exclusive of the wages of driver and conductor, but including the wages of hostlers and shoers and costs of horses, harness, general wear and tear, and all items properly coming under the head of 'cost of propelling power.'

"The grades on your line are not steep, those on Mission street being practically level."

"The following table offers what is considered as an approximate estimate of the cost of construction and operating each system, exclusive of such items as taxes, licenses, engine house or stable rent, drivers' and officers' salaries, &c. For these items being common to all systems, they may be omitted without impairing the accuracy of the comparison.

**"COMPARATIVE TABLE,**

*"Showing Cost of Providing and Operating Various Systems."*

SYSTEM.	MAIN LINE.		BRANCH LINE.	
	Cost.	D'ly Ex.	Cost.	D'ly Ex.
H. P. ....	\$50,000	\$150 00	\$21,250	\$63 75
Cable.....	450,000	203 00	*	*
Electric.....	375,000	165 00	*	*
Coal Gas.....	130,000	200 00	45,000	123 00
H. Press. Air..	175,000	164 00	66,000	55 00
L. Press. Air..	105,000	125 00	40,000	53 00

\* Not available.

"I do not burden this report with detailed calculations, but will explain that I have charged the horse power system in the above table with about 200 horses, at eighty cents each per day to cover feeding, shoeing, grooming, and wear and tear of animals, with an item of wear and tear of cars, and interest on capital used in providing animals and rolling stock, the branch line being charged with eighty-five horses, and other items in proportion."

**An Improved Device Introduced by the Philadelphia Traction Company.**

The Traction Company have for some time been experimenting, in order to improve the running of their cable system, particularly to obviate the sudden jerks of the cars in turning curves, like those at either end of the Market street bridge. The matter was placed in the hands of J. G. Brill & Co., who tried one device after another without success, but finally hit upon an entirely novel contrivance in the way of a truck. It was apparently a solution of their difficulties, and the firm at once proceeded to cover their invention with letters patent, on which and the various improvements they already have five. Experimental trials were made of the new invention, which is called the "Patent Cable Truck," on Friday and Saturday last.

On Monday the Traction Company placed car 104 on the line, fitted with the new system of trucks, and it has been running regularly since. It turns all the sharp curves without disagreeable and dangerous jerks. The conductor said yesterday that the car had worked nicely, and turned the curves with the greatest ease. Mr. Brill, in speaking of the invention yesterday, said: "The great difficulty in our experiments was the fact that the grip arrangement interfered with the use of a king-bolt, or center-bearing. By this device we are enabled to dispense with a king-bolt and get a swing motion without the use of links. There are springs on each end of the bolsters, which take off all lateral thrust and jar of the car, and, instead of the king-bolt, we have a circular slot bearing, which permits the truck to turn easily in going round curves, and is better than a king-bolt in that the car does not tilt or rock. The company has for some time been considering the introduction of double-deck, open, excursion cars on their Market street line. What their conclusion will be I do not know, but there can be no doubt that they would be a great improvement. The cars are much longer and have a seating capacity of sixty below and forty on the upper deck."—Phila. Ledger.

**Cost of Feeding Horses.**

We are indebted to Supt. Duty, of the East Cleveland Street Railroad Co., for the following data, concerning the cost of feeding horses, per day, during the past six years, in the stables of this company. The figures include merely the cost of the feed, without that of attendance and stable labor.

The cost was, for

1880	21	cents
1881	22½	"
1882	24½	"
1883	19	"
1884	19½	"
1885	18½	"

These figures should be especially interesting to street railway men, and it would be interesting if we could procure similar data from other roads, together

with the cost of stable labor. This will, of course, vary with the number of horses, for the larger the number up to certain limits, the less will be the cost per horse. We see, also, that the cost in feed decreases in the figures given in the last years. This is probably due, to a certain extent, to the increase in the number of horses, which is now somewhat more than five hundred.

**Electric Railway at Vienna.**

It is about a year since the work of extension of 4900 feet upon an electric railway in Vienna has been completed.

The first section of this road was opened on October 22, 1883, some of the visitors to the electric exhibition being present at the time. A short time afterwards, April 6 1884, the remainder of the road was opened, and finally within a few months, they have opened the remainder of the road, which it was decided to add to the original project, so that the line starts from the station of the Moedling Railway to run to Hinterbruhl.

In order to judge of the favor this new method of transportation meets with the public, it should be known that this extension will not be the last, and that the Viennese will soon count among the number of their attractions, that of an electric way across the picturesque valley of the Bruhl and the Helenthal, which will end at Baden near Vienna.

That portion of the road last opened does not contain curves of as short radius as the old road. Since this extension was only 4900 feet in length and it was necessary to cross a brook, they limited the minimum radius of the curves to 260 feet, while upon the old road they used curves upon high embankments in crossing ravines of 110 feet.

The cost of this new line was \$15,500 for the roadway and \$1,600 for the buildings. The right of way and embankments alone cost \$14,500.

It was not desired, this time, to place the road in the street, as previous experience, when this was an unfortunate permission, has shown that the least negligence, often even a mere inattention, has resulted in a great deal of trouble.

Two more dynamos have been added. These machines were constructed in the workshops at Sudbahn, under the direction of Dr. Dolinar, electrician to the road, who took for his models the apparatus manufactured by Siemens and Halske. Two cars have also been added to the rolling stock, only one of them, however, being provided with a motor. The total cost of this extension including purchase of right of way, construction and material, reached the sum of \$46,950.

Vienna will, without doubt, have another electric railway. For Messrs. Siemens and Halske propose to undertake the construction of a steam road around the city, which will have a connection in the shape of an electric road, besides the street roads already in existence.



Monthly, \$1.00 per Year.

F. P. HARRIS, General Manager.

## American Railway Publishing Co.,

32 Liberty Street,  
New York.

Lakeside Building,  
Chicago.

Chicago, LAKESIDE BUILDING, E. L. POWERS, North-western Manager.

Boston, Mass., 185 SUMMER STREET, H. M. SWETLAND, Manager.

Philadelphia, 119 So. FOURTH ST. J. H. MCGRAW, Manager.

### Lighting, Heating, and Ventilation of Cars.

This subject is to be taken into consideration at the coming convention of the Street Railway Association and there is certainly no topic that is of more interest to the public, and one in which they are more vitally concerned. And just in proportion as the individual takes interest in the matter in just that proportion does it affect the receipts of the companies. For let the cars be hadly equipped with apparatus designed for the comfort of the passengers, and the sure results will be that the pedestrians upon the street will increase in numbers to the direct loss of the railways.

The open summer car needs no heat and its ventilation is perfect, but in the evening little or no attention is paid toward the lighting. Of this, however, we will speak later on.

The close car on the other hand presents a problem of no mean difficulty to the constructor in order to fulfill all of the requirements of health and comfort. In the first place we have to contend with the natural perversity of human nature, that same perversity that leads a man to choose the dainty titbits of the French cook rather than the substantial nourishment of the New England kitchen; the same that closes doors and windows, heats the air to the point of suffocation, enfeebles the lungs and weakens the constitution rather than breathe the free air of heaven or stand in a draught. So while the public clamor for free ventilation, the individuals of which it is composed, demand that the fresh air shall be admitted so imperceptibly that the most sensitive skin, and lungs that have become weakened by long exposure in overheated, ily ventilated offices, shall not be able to detect the slightest draught, and further, that however much fresh air is admitted, it must in no manner lower the stifling temperature of car's interior.

In considering the methods of doing this work, the constructor must look first to the cubic contents of his car, and then to the amount of air required to supply the demands of the average rush trip load. His sixteen foot car contains empty, about eight hundred and thirty-two cubic feet of

air. When loaded with thirty-two passengers the air space is reduced by two and one-quarter cubic feet per passenger, or to seven hundred and sixty cubic feet. Each one of these thirty-two passengers requires eight cubic feet of air per minute or two hundred and fifty-six cubic feet for the load. In short, if his car were hermetically sealed, the enclosed air would support the life of the load for a trifle less than three minutes.

Under these circumstances then, when all the air of the car must be renewed at least once every three minutes in order to support life, we can readily understand of what importance is every loose window sash, every chink in the doors, the ventilation of the roof, and of what actual vital importance is the entrance and exit of every passenger, when the door must be opened and some fresh air admitted.

The ventilation of the car that is to accomplish the best results must be placed outside the control of the passenger and must be so located that it will be impossible for the average individual to discover its whereabouts. Deck lights are not to be thought of; for they will be closed or if fastened open newspapers will be stuffed into the openings. The ventilated ceiling approaches most nearly to the typical device for baffling the suicidal attempts of the passenger. And if some means can be devised by which the pure air can be forced in, a long line of discontented passengers who love the pure air will rise up and call the inventor "blessed."

Heating is most nearly associated with ventilation, and indeed every fire heater that is placed inside the car must from the nature of its construction and action, partake more or less of the character of a ventilator. It draws the air from the bottom of the car, and compels a stream of pure air to be forced in through the chinks and crevices to take its place. But there is this great disadvantage, the air near the floor is usually, in a heated car, the purest in the whole interior, and as oxygen is what fire needs in order that it may burn, it is doubtful whether very much really pure air is drawn in and placed at the disposal of the lungs of the passengers.

There is no doubt that the sign "*This car is heated,*" would attract many passengers away from a rival line, and it therefore in the course of competition, becomes necessary for each road to heat its cars, though in some very large places this has not yet been done. But in selecting a heater, it would be well for the management to look for one that will at least tend to facilitate ventilation, and not merely heat and re-heat the foul air that is contained in the car.

Lighting is probably of the least importance. There is no doubt that a brilliantly lighted car is very attractive and will serve to draw passengers, but whether the increased traffic will pay for the increased expense remains for the management to decide. From the passenger's standpoint, beyond the attractiveness of the well lighted car, the ability to read is the desidera-

tum. But it is doubtful if this will prove under any circumstances an advantage to the eyesight, for the strain is necessarily very great, when one is subjected to the jolting of the car, however brilliant and steady the light may be. For those who wish it, there are many excellent car lights and it only remains to make the choice; but to ventilate and heat, that is the trouble, and that is the difficulty that the constructor is called upon to meet.

### Street Railway Stocks.

It will be noticed by a comparison of our quotations that there is an almost universal decline in all street railway securities in New York, while in Philadelphia the market remains about stationary with a slight upward tendency. It seems to be a matter of pure sympathy in very many cases, and the general effect of the strikes. In others it is due to a falling off in the dividends or to the competition prospective or already realized of the elevated roads. Some roads are beginning to feel in advance the coming reduction of the Manhattan fares; and though managers and dealers in securities express themselves as confident that the injury to the receipts of the surface roads will only be of a temporary character, buyers of the stocks are holding off and hence the decline. In other cases, where no trouble has yet been experienced with the employees, no cut has been made in the dividends and the whole business of the road remains as secure and well established a basis as ever, the stock has fallen off out of pure sympathy with other roads who have had trouble, and the feeling on the part of the public that street railway stocks are hazardous investments. This state of affairs will, however, be undoubtedly of a temporary character only and after the immediate effects of past troubles have died out the stocks will again go up. There will, of course, be an apparent exception in the case of those roads whose receipts are cut down by the action of the elevated roads. The rise of these will be slower; yet experience has proven that the receipts do finally recover all that was at first lost by the traffic that went from them to their over head competitors.

Jacob Sharp is responsible for the following on street railway taxation:

"You know that the street railroad companies ought not to pay any taxes to New York. The largest tax is paid by them, and who does it come out of? Why, the poor people. The nabobs do not ride in street cars; they have their carriages, or go on the elevated roads. So, you see, the poor are paying the taxes of New York and the rich are going scot free. Now if some of you 'wise men of the East' who come to Albany every winter to show the members and Senators how to run reforms would frame laws exempting street railroads from taxation and compel them to reduce their fares to two or three cents a trip then the public would be benefited and the poor equalize their taxation with the richer."



### Street Railway Journal.

With this issue the STREET RAILWAY JOURNAL closes its second year. The paper has grown from twenty to sixty-four pages. An idea of the character, variety and amount of matter published in its columns during the past year is given by the index to the present volume, published in this number.

The paper is not all it should be, nor all its founders intend to make it, but time is necessary to accomplish this result. That the measure of success already attained is abundantly appreciated is very evident from our advertising pages and otherwise. The paper is read by nearly every live street railway official in this country, if we judge correctly from our correspondence and subscription list. Our advertising pages show another thing, and that is the enterprise of a class of people who are catering to the street railway interests of the country. To this class of people is due very largely the progress and advancement of the street railway interests in the United States, and it is with no small degree of satisfaction that we call attention to their enterprise as shown by our columns.

### Dirty Street Cars.

A New York paper recently expressed itself somewhat vigorously upon the subject of dirty street cars. We quote it below: "Of all the annoyances to which the public of New York has to submit daily and hourly, dirty street cars are the most disgusting. This evil has become more marked recently, and The World is constantly in receipt of letters from indignant passengers. For filth, dilapidation and a general appearance of squalor and slovenliness some of the street car lines of this city cannot be surpassed in the civilized world. Ladies and gentlemen are compelled to sit down on seats sticky with nastiness, breathe loathsome air and look out of cracked windows that are splashed with dirt from one end of the year to the other. Some of these cars are washed only by the rain.

"There is not a street car line in New York that does not pay a handsome profit. There has not been a street line in this city within the memory of man that has not paid well. Some of the lines pay on their real investment more than a hundred and fifty per cent annually. The public has dealt with these lines in a spirit of princely generosity. It has made practically a free gift of its great franchises and yielded up with scarcely a murmur, the finest thoroughfares. New York is the richest field in the world for horse car enterprises. This is admitted by very one who knows anything at all about the subject.

"In return for all this generosity the beneficiary corporation exhibit an also incredible spirit of greed and brutal rapacity. With four or five worthy exceptions the companies provide cars that are fit only for cattle.

"We recently made a computation showing how these corporations rob the public.

The figures showed that if they were only allowed to earn 10 per cent. on a high estimate, of their invested capital, there would be due to the city each year nearly \$4,000,000.

"We have in mind one road that may be regarded as the worst sample of the lot. Its cars are a disgrace. In riding in one recently it was noticed that its once white ceiling was plastered with filth, its windows were foul and its seats and floors were covered with dirt. The iron dash boards were battered and rusty. Three or four big rents appeared in them. The sides of the car were masses of tin patches nailed on to cover breaks and keep the weather out. A disgusting odor saluted the nostrils. A more dilapidated, rickety, ramshackle old hen-roost on wheels could hardly be imagined."

### Personal.

Speaking of Col. Thos. Lowry, who has been so instrumental in the development of the St. Paul (Minn.) street railways, the St. Paul and Minneapolis Pioneer Press says:

"The franchise and other property of the Street Railway Company is largely the creation of Mr. Lowry's untiring activity and business sagacity. We cannot, in this connection, pay a tribute too high to be deserved to the management of Mr. Lowry. He first gave to St. Paul a system of street passenger transportation worthy of the name. When he came into possession the service was, in almost every essential, wholly unsatisfactory. He systematized and extended his lines in every direction. He adopted the latest improvements and supplied the finest equipments to be had. Although each year required new investments instead of returning dividends, the accommodation of the public was diligently sought. He closed his regime as owner by incorporating the cable line feature with the street railway system, and thus turned over to his financial successors one of the most magnificent properties in any city of the country. And the reward of this large and generous policy is found in the immense increase in value of the street railway company's franchise and equipments since the time when they first passed into the hands of Mr. Lowry."

Mr. John Brill, of J. G. Brill & Co., has returned from his European trip. He booked some important orders while across the water. Also Mr. Edward Brill, of the same firm, who has been abroad during the summer, is seen again on Philadelphia streets.

We referred last month to the benefits that are to be derived from the various class conventions that are held by associations that are formed for the mutual benefit of the members; and we wish to reiterate what we have already said, and urge every one who can and who is in any way interested in street railway progress and development to attend the Cincinnati convention.

### Notes and Items.

#### Boston, Mass.

THE CONSOLIDATED STREET RAILWAY COMPANY, of Boston, are having built at the Jones car works, West Troy, N. Y., a few *especially* fine cars for their Back Bay service.

"The cars," says the Boston Herald, "are to be of the most elegant design, and to surpass in workmanship and finish, any cars ever before built in this country." The cars will be delivered on or about November next.

#### Brooklyn, N. Y.

THE BROOKLYN RAILWAY SUPPLY Co. are preparing patterns for a simple and improved style of street or dirt sweeper, to be operated by either one or two horses, and which they propose to put upon the market at a low figure. They are busy filling orders for both sweepers and plows for various cities. They use cylinder brooms on all their sweepers, and have letters patent giving them the exclusive right to use the same on snow sweepers. They are also working up an improved sand car for use on paved streets.

THE LEWIS & FOWLER MANUFACTURING Co. have received an order from Kansas City Cable Railway, for a sufficient number of registers to equip all its cars. Also from Julius S. Walsh, an order for sixty to equip the Citizens Line, this making all the cars controlled by Mr. Walsh.

THE ATLANTIC AVENUE R. R. Co. have completed all of the preliminary arrangements for cabling the Park Avenue line. There have been no contracts let as yet, as they are waiting to secure the consent of the Common Council to the scheme. The property holders along the line are willing that the change should be made, and no trouble is anticipated in securing the consent of the City Fathers. When this is granted work will be commenced at once, and the whole hurried through to a completion. The Johnson system of cabling will be used.

#### Bridgeport, Conn.

BRIDGEPORT HORSE RY. Co. will extend their line one mile, through Fairfield avenue to Park avenue.

BRIDGEPORT & WEST HARTFORD HORSE RY. Co. are extending their line, which will give them 25 per cent additional track.

THE CHAPLIN ROLLER BEARING Co. have just received an order for their Tramway Car Box and Gear to go to Buenos Ayres for the city of Buenos Ayres Tramway Co. They report that their box and gear is meeting with much favor, and every road on which it has been placed is pleased with its neat appearance, easy draft, etc.

#### Catasauqua, Pa.

THE BRYDEN FORGED HORSESHOE WORKS Limited, of Catasauqua, Pa., have lately made marked improvements in the variety of design and in the finish of the horse and mule shoes manufactured by them. As a mark of appreciation, by their customers, of the efforts of

this company to furnish a first class shoe, we may mention that their works are at present running at their full capacity on orders. This company furnishes horseshoes to the principal railroads of New York City, Philadelphia, Brooklyn, Chicago, and many other of the largest cities in the United States. Letters patent have just been secured for a new design of horseshoe, by this company, a description of which will appear in a future issue.

#### Chicago, Ill.

THE NORTH CHICAGO CO. have ordered four cars with Small's Automatic Fare Collectors placed in them.

#### Cleveland, Ohio.

THE EAST CLEVELAND ST. R. R. Co. have just added six handsome new cars to their stock. These are equipped with the Hale & Kilburn patent spring seat; the Boswick journal box, and the new Haycox door fastener. Fulton Foundry furnished the wheels.

#### Connecticut.

The following roads have received charters in the State of Connecticut, some of them being constructed at the present time:—

Between Waterbury and Meriden; the incorporators are C. L. Blackwell, President First Nat. Bank, Waterbury, and Leander Turner.

In Danbury they are building 4 miles of road between Danbury and Bethlehem. The contractors are Haynes Bros., and the name of the road is the Danbury St. Ry. Co.

In New Britain, the "New Britain Tramway Co." has been chartered by C. S. Lander.

In New London [the New London Horse Ry. Co. has been chartered. Chas. A. Willis and John Tebbetts are interested.

A new road has been chartered this year in Stamford by J. B. Curtis and W. W. Jillisbee.

The "Trip Horse R. R." has been chartered by W. J. Clark and Charles Duraud. They are just about to build.

#### Des Moines, Iowa.

THE DES MOINES ST. RY. Co. have ordered the Lewis & Fowler Mfg. Co. to equip their cars with 20 of their Improved 12-in. "Alarm" Passenger Register in place of the Demorest Register now used by them, and six for new cars now building by Jones.

#### Peoria, Ill.

THE CENTRAL CITY P. Ry. Co., of Peoria, Ill., have just placed an order with the Lewis & Fowler Mfg. Co. for their Improved 8-in. "Alarm" Passenger Register.

#### East Saginaw, Mich.

THE EAST SAGINAW SOUTH RAILWAY COMPANY have bought out the old company, and taken possession within the past three months. They have constructed five miles of new track, put on four 16 open cars, and are doing a prosperous business.

#### Kansas City, Mo.

KANSAS CITY ELECTRIC RY. Co. have completed one mile of track, laid to the

standard gauge with heavy girder rails. Work has been in progress since the 1st of August; the engine house is completed, and the engines and boilers in position, with cars delivered, and it is expected that the road will be opened as we go to press. They will run four trains of two cars each, and will use electric motors constructed under the patents of Mr. John C. Heury, which are four in number, of 20-horsepower each. Grades are heavy, running as high as 6 per cent. The officers are as follows: President, W. W. Kendall; Vice President, Hugh McElroy; Secretary and Treasurer, Warren Watson.

THE GRAND AVENUE COMPANY are constructing eight miles of double cable road, in addition to their present facilities.

#### Louisville, Ky.

The report that the Fourth Avenue Park Ry. Co. has been organized is not true. The incorporator asked for a charter while the Legislature was in session, but nothing further has been done, so the company is not yet in existence.

#### Milwaukee, Wis.

MILWAUKEE CITY ST. RY. are building a new barn and car house, at the corner of Chestnut and Twenty-seventh streets, at a cost of about \$18,000.

THE CREAM CITY R. R. Co., of Milwaukee, have ordered from the Lewis & Fowler Mfg. Co. 14 sets of Small's Automatic Fare Collectors to be placed in 14 new 14-foot cars now building by the Brownell & Wight Car Co., of St. Louis. This company, after having tried the device for some time, have decided to equip all their cars with them.

#### Nashua, N. H.

THE NASHUA ST. RY. Co., Nashua, N. H., have been operating 4 miles of track and 5 cars since June first. They make 20 minute trips between Nashua Junction and Nashua. I. A. Willard, Superintendent.

#### New Bedford, Mass.

THE ACUSHNET STREET RAILWAY Co. have recently adopted the Dux Lubricant, and we understand that after a thorough test are much pleased with it. The Dux people report numbers of inquiries as the result of their advertisement in the STREET RAILWAY JOURNAL.

#### New Britain, Conn.

A street railway company has been formed with a capital of \$25,000, and will commence building a road at once. Lorin F. Judd is interested, and the contract has been let to A. J. Hutchinson, who is already building the Meriden and Waterbury roads. The line is to be three and one-half miles long.

#### New York City, N. Y.

JOSEPHINE D. SMITH, 352 Pearl street, has on file an order from J. M. Jones' Sons, agents, for 120 center car lamps, also one from the John Stephenson Co. for fifty, for cars now building for the Broadway, (N. Y.) line. She is also fitting out twelve new cars with two center lamps each for the Union R. R. Co., Providence, R. I., and is supplying center lamps for the six new cable cars now being built in the company's shops for the Tenth Avenue (N. Y.) cable road.

A. J. HUTCHINSON writes that he is very busy building the Waterbury (Conn.) R. R., 5½ miles long, and that he has the contract to build the street railway in Meriden, which will be of about the same length. Both are to be completed this fall.

RUFUS MARTIN & Co., 13 and 15 Park row, is a new firm engaged in the business of street railway contracting, equipping, and furnishing supplies. Their contract work includes the building of new roads, making repairs, alterations and equipment, and will embrace the furnishing of everything, including horses, and any supplies in the general line will be carried. They will also supply a special brand of axle oil, and Martin's Patent Change Belt.

THE NATIONAL STOVE Co., whose car heater has been fully described in these columns, now furnishes stoves for all lines in Brooklyn, also for Albany, Boston, Harrisburg, Minneapolis, Pittsburg, Syracuse, New York and various other points.

#### Norwalk, Conn.

THE NORWALK HORSE RY. Co. will extend their line this season to Winnapauk. This will give them 2 miles of additional track, and will require extra rolling stock. They are now making 59 round trips a day between Norwalk and South Norwalk, connecting with all the trains, over one of the finest roadbeds in the country.

#### Omaha, Nebraska.

THE CABLE TRAMWAY COMPANY of Omaha, has commenced work upon its roadway, and it is expected that the road will be opened about December 1. The track is being laid to a standard gauge, and ten cars will be run at first, each being furnished with a grip. The officers are: President, S. R. Johnson; Vice President, L. B. Williams; Secretary and Treasurer, C. E. Yost; Engineer, Robert Gillham. The general office is at 215 South Thirteenth street.

#### Pawtucket, R. I.

The track is being laid and stable is in course of erection for the new narrow gauge street railway of the Pawtucket (R. I.) St. Railway Company.

About eight miles of track will be operated by this company in the city of Pawtucket, and towns of Lincoln and Cumberland. The system used is the Providence pattern Girder Rail, gauge four feet. Messrs. Payson & Co., of Boston, Mass., are contractors for laying the rail, and Andrew J. Jones is doing the pavement. The road will be equipped with twenty-four one-horse bobtail cars, requiring about 140 horses, and it is expected the road will be in operation by November 10.

#### Philadelphia, Pa.

Wm. Wharton, Jr., & Co. mention the following among their orders for supplying steel grooved rails for curves: Globe Street Ry. Co., Fall River, Mass.; Louisville City Ry. Co., Louisville, Ky.; F. S. Stevens, Worcester, Mass.; Pawtucket Street Ry. Co., Pawtucket, R. I.; Lowell & Dracut St. Ry. Co., Lowell, Mass.; Philadelphia Traction Co., Philadelphia; New Bedford & Fair Haven Street Ry. Co., New Bedford,

Mass.; Chicago West Division R. R., Chicago, Ill.; North Woburn Street Ry. Co., Woburn, Mass.; People's Pass. Ry. Co., Philadelphia; Buffalo Street Ry. Co., Buffalo, N. Y.; Central City R. R. Co., Syracuse, N. Y.; St. Charles Street Ry. Co., New Orleans, La.; Bridgeport Horse Ry. Co., Bridgeport, Conn.; Springfield Street Ry. Co., Springfield, Mass.; Federal Street & Pleasant Valley R. R. Co., Pittsburgh, Pa.; Reading City Pass. Ry. Co., Reading, Pa.; Brockton Street Ry. Co., Brockton, Mass.; City Railway Co., Trenton, N. J.; Seventh Ward Railroad Co., Syracuse, N. Y.; Acushnet Street Ry. Co., New Bedford, Mass.; Metropolitan Horse R. R. Co., Washington, D. C.; La Crosse Street Ry. Co., La Crosse, Wis. They have also finished the building of about 1½ miles of track for the Camden Horse R.R. Co., with Johnson Girder rail; about two miles of track for the Chambers St. and Grand St. Ferry R.R. Co. of New York; also the track curves and castings for a large car house for the same company, corner of East and Cherry streets. They have also just furnished the track curves and castings for a depot for the People's Pass. Ry. Co., of Philadelphia, and a depot for the Brooklyn City R.R. Co. on Third Avenue, Brooklyn, N. Y.

J. G. BRILL & Co. report more orders on their books at present than ever before at any one time. They have just shipped five different lots of cars to Mexico. They have ten orders for Cuba, are completing a lot of mining cars for a silver mine in Mexico. An order from South America, consisting of 130 small tramway freight cars and 26 horse cars, of the latter four are double deck open cars, 20 are regular 16' cars, and two are sleeping cars, much like the ordinary sleeping cars in this country. An order of six cars for Spain. Also they are furnishing cars for new roads as follows: York, Pa.; Reading, Pa.; Chattanooga, Tenn.; Mountainsburg, N. Y.; Danbury, Ct.; Birmingham; North Adams, Mass.; Lockport, N. Y.; Yonkers, N. Y.

#### Richmond, Va.

THE RICHMOND & MANCHESTER Co. asks for the privilege of running its line up Seventh street to Marshall, up Marshall to Fifth, out Fifth to Clay, up Clay to Lombardy and along Lombardy to Main. The same company petitions the Supervisors of Henrico county for the right to run the line to the Reservoir Lake, and also for the right to run a branch road to the Soldiers' Home.

THE RICHMOND ST. RY. Co. asks the Council for the privilege of running its line up Ninth to Leigh, up Leigh to Brook avenue, and for the privilege of extending the Main street line to the western limits. The Council has shown that it will grant the petition of the company only upon the condition of its building a line to Church Hill and Oakwood Cemetery via the Church Hill avenue. The advantages which the proposed enterprise would be to Richmond cannot be too highly estimated. Houses would be built all along the line of the route between West Main street and

the reservoir, and the people who have to remain in the city all Summer would be able for ten cents to ride to the country once a day and breathe the fresh air.

#### San Francisco, Cal.

Articles of incorporation have been filed for the Powell & Jackson St. R. R. Co., and the officers elected are W. J. Adams, President; H. H. Lynch, Vice President; W. H. Martin, Treasurer; G. H. Waggoner, Secretary. The road will be 11 miles long, and 3 ft. 6 in. gauge. It is to run through Powell, Jackson and Washington streets, and will be operated by a cable. Work is to be commenced at once.

#### Springfield, Mass.

THE BEMIS CAR BOX Co. has orders for the Bemis Box for the Cream City (Milwaukee) road, for Wichita, Kansas, and for Springfield, Ill.

#### St. Paul, Minn.

The financial control of the St. Paul St. Ry. Co. has been placed in the hands of St. Paul capitalists. Col. Thos. Lowry has disposed of a part of his interest, and the majority of the stock is now owned by the parties referred to. Col. Lowry still retains a one-fifth interest, while the remainder is in the hands of outside parties. The cable feature, which has been incorporated with the horse lines, will be extended. Abundant capital is pledged to the undertaking.

#### St. Joseph, Mo.

THE UNION RY. Co. will increase their length of double track and make a T railroad.

#### Syracuse, N. Y.

THE SYRACUSE & GEDDES RY. Co. are now building a new stable and car house.

THE THIRD WARD RAILWAY Co., of Syracuse, owing to opposition from rival lines, is debarred from building by action of the "Cantor Bill," passed at the last session of the legislature.

The bid for right to build the road was run up to 100 per cent by the opponents of the enterprise.

At the next session of the legislature relief will be asked from this measure, and efforts will be made to build the road in the early spring. Right of way has been secured from the property owners and from local authorities, except three-quarters of a mile, which comes under the jurisdiction of the city authorities, and which was bid up as before stated. The parties having this road in hand are energetic, and will leave no work undone to carry the project to a successful issue. The line extends three miles, from the center of the city to the Solway Process Works. Officers of the Company are: President, W. B. Cogswell; Treasurer, W. S. Wales.

THE CENTRAL CITY RAILWAY Co., of Syracuse, are relaying a portion of their track and making other improvements. The line extends two miles from the center of the city to the lake.

THE BUTTERNUT STREET RAILWAY Co., of Syracuse, have secured the right of way, and placed themselves under \$60,000 bonds to build. The road will be built in the spring, and will extend two miles, from the

center of the city to Woodlawn Cemetery. This will be a very popular Sunday route.

THE SYRACUSE AND SOUTH BAY STREET RAILWAY, of Syracuse, N. Y., will be opened for public patronage Oct. 5. The track is now ready, and the managers are only waiting for the cars, which are promised by Jones of West Troy by the 3d.

#### Taunton, Mass.

TAUNTON ST. RY. Co. have just commenced an extension of their road.

#### Tampa, Fla.

The controlling interest in the Tampa street railway is owned by Martinez, Poor & Co. Mr. George T. Chamberlain is Secretary.

#### Winsted, Conn.

A charter is to be applied for at once for a horse railway in Winsted. George S. Rowe and others are interested.

#### Utica, N. Y.

THE UTICA BELT LINE RAILWAY COMPANY will begin track laying on the 22nd instant, and the line will be completed by the 1st of December. It will comprise eight miles of ordinary tramway and stringer track, with five minute switches, in a circuit of the main streets of Utica, and will be equipped with (15) Jones' closed cars. The officers of the Company are as follows: President, Dr. C. Tefft; Vice President, A. Jones; Secretary and General Manager, Isaac J. Griffith; Treasurer, Charles W. Mather.

#### Special Rates to the Convention: A Correction.

Just as we go to press we are in receipt of the following note from Secretary Richardson, of the Street Railway Association, showing that the special rates spoken of in his circular, printed on page 485 of this issue, have not been granted.

EDS. STREET RAILWAY JOURNAL:

In further reply to yours of the 23d inst., would say that I am this day definitely advised that the Central Traffic Association will not give reduced rates to delegates this year, and that by reason of their failure to grant the reduction, the Trunk Line Passenger Committee (which includes the N. Y. C. & H. R. R. R.), which was desirous to give us the reduced rates, have this day been forced to withdraw their special rates, as being unable to issue them without concurrence on the part of the Central Traffic Association.

WM. J. RICHARDSON, Secretary.

In another column we publish an article by Mr. W. E. Partridge, relative to the promotion of the street railway employee, and an increase of wages in proportion to his competency. There is no doubt but that this method would have much to do in smoothing off and doing away with the present belligerent attitude of the men, and seems to be well worthy of a careful trial.

A WORN CAR WHEEL TREAD, examined under the microscope, shows that the surface of the metal comes off in thin flakes or scales.

### Mutual Pecuniary Liability as a Cure for Labor Troubles.

An officer of one of our large railway systems gives in the "Open Letters" department of the September Century a plan for harmonizing the relations between employers and workmen. It is, in effect, that contracts shall be executed by the employer with each of his employees in which he shall agree to employ the workman for a specified length of time at a certain rate, and in which the workman shall bind himself to give an equivalent of labor for the pay which he is to receive. In this contract, it is further proposed, shall be set out plainly the acts on the part of the workingman which shall be regarded as breaking it, such as drunkenness, negligence, etc. And in order that the employer may have some protection against the employee who violates his contract, the writer suggests that a certain proportion of the weekly or monthly wages shall be held back by him until the contract is carried out.

Whatever may be thought of the practicability of the plan outlined by Mr. Church, it is certain that he has detected and called attention to the reason why it is so difficult to adjust the relations between employers and employees. The root of the difficulty lies in the fact that the law, as it now exists, does not put the two on an equal footing, but places the employer at a disadvantage. The workman can enforce his claim against those who hire him, if it be a legal one, to the last cent. More than this, if he is injured by some defect in the machinery of the shop in which he works, the chances are that a jury will give him heavy damages, and that the supreme court will refuse to disturb the verdict. But suppose the workman who has agreed to stay in a shop for three months, leaves at the end of the month, or that he comes to his work half drunk and spoils the job which he has in hand, or that he goes to sleep when he should be attending to his furnace and gauges and causes a boiler explosion—what remedy has the employer? He can collect damages neither for the breach of contract nor for the damages, simply because either the workman has nothing at all, or else what he has is hedged about by exemption laws. He is "execution-proof." Jack Smith may forget to turn a switch, and as a result the railway company may have to pay \$50,000 for cars wrecked, express matter burned and passengers killed and maimed, not one cent of which can it recover from the negligent employee. But if Jack Smith gets his thumb cut off under circumstances which in the eye of the law constitute negligence on the part of his employer, he may get \$5,000 for it. There has been at least one such verdict in this country.

When it comes to willful damage committed by employees against employers the disadvantages under which employers labor appear still more startling. The writer above referred to says: "In a recent railroad strike a large amount of property was destroyed by violence, and when a proposition was made by the workmen to submit their grievances to arbitration the other party put the question as to who would pay for these losses. On the refusal of the labor organization to assume this burden the peace negotiations were stopped." When during the last great strike on the southwestern roads—probably the one referred to in the extract just given—it was reported that the Missouri Pacific Railway Company would sue those of its striking employees who had aided in the destruction of its property and make them pay damages to the extent of their possessions, every one was startled. It was almost a new idea that workmen should be held liable, pecuniarily, for the damage done to their employer's property, or the property of other em-

ployers, during the strike. And yet who could successfully dispute the justice of such action? The instances in which employers are made to suffer great loss without having any remedy against the workmen or their representatives who cause the loss are innumerable. Only a day or two ago we met a car manufacturer whose work, including several contracts, the enlargement of his shops and the putting in of new machinery, had been brought to a standstill for many days because his foreman had "gone off on a drunk." This meant the absolute loss to the manufacturer of thousands of dollars. In how many cases during the last two or three years have all workmen suddenly left the manufactory at the command of some officer in a labor organization, although they were perfectly satisfied with their circumstances. If a business concern should treat those with whom it deals in that way, damages could be recovered from it at law. But the employer in such cases can only pocket his losses. He has no remedy.

The remedy indicated by the facts would seem to be one which shall place employers and employees upon an equal footing, making the latter pecuniarily responsible for violations of express or implied contracts, as the former are already. This can only be done through organized associations of workmen. These organizations must not only have a legal existence and be capable of suing and being sued, but must also have a sufficient amount of capital to make them practically responsible. If the Knights of Labor had a paid up capital of one million dollars not one out of fifty of the strikes which its officers have ordered would ever have taken place, because the leaders would not have risked suits for damages. Similarly, if the organizations which have instituted boycotts were pecuniarily responsible—if judgments at law for damages could be collected of them—there would have been very little boycotting. The existence of labor organizations capable of causing great financial loss to outside parties by illegal methods and yet utterly without financial responsibility, is an anomaly among our institutions.—Railway Review.

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**Street Cars in the City of Mexico.**

The District Railway company operates 150 kilometers of track, or about 93 miles English measure. Its rolling stock consists of about 139 first-class cars, 65 second-class cars, 46 platform cars for transporting furniture, merchandise, etc., 26 funeral cars, and 26 wagons for transporting material and fodder. The company owns 1,500 mules, eight estates in the city, and twelve in the suburbs. It transports nearly 10,000,000 passengers yearly. Fares range from 3 to 23 cents, according to distance and class, but in the limits of the city proper the first-class fare is 6½ cents, or a medio equal to 5 cents American money.

The divisions of the cars into first and second classes will be noted. This is an excellent idea, for people who want good company pay double what those particular are charged. The first-class cars are painted yellow and the second-class green. These cars runs in "trains" of two or three. There is always one first-class and one second-class car in a "train." On long distances sometimes two first-class and one second-class car are run, and sometimes four cars.

The hours for running cars are from early morning until 9 P. M., and on some lines stopping at 7 P. M. There is no all-night service anywhere.

There are a few short open cars, but a great majority are closed cars, with the windows down except in cold or rainy weather. Everybody smokes as much as he pleases on any car, from conductor to driver. Smoking is so universal here that a prohibition of smoking would make the people rise in revolt. Sometimes, I regret to say, the conductor has a novel, and reads slyly, to the neglect of passengers hailing his car from the sidewalks. The conductors do not take up tickets, but these are gathered by inspectors, who board the cars at regular stations, and after collection, make a comparison of books with the conductor. This system is said to work very well.

Conductors are paid from \$1 to \$2 per day; inspectors, \$1.50; drivers, 75 cents. Deduct from this 20 per cent. to get the equivalent in American currency. This would make the pay of a driver 60 cents.

The city lines are 14 in number, and there is a system called the "circuit" system—not exactly a belt railway, but a system of narrow-gauge tracks running away through the city, up one block and down another. These lines go east, west, north and south, and really form a useful feature of the system. There are seven narrow gauge circuit roads.

A novel and very useful feature is that of platform, and even box cars, in which furniture or goods are moved from point to point. Pianos are largely carried in this manner, and costly mirrors and such fragile goods. A platform car, to a point four miles out, costs but \$3 or \$2.40 American money. Six dollars pays for a service to the distance of 12 miles. Not over 7,000 pounds are allowed on a single car. I

should think this feature might advantageously be introduced into the street car service of the United States, especially in cities where the lines are not crowded with passenger cars.

The tourist in Mexico frequently sees, slowly traversing the city streets, black, lugubrious-looking platform cars, and the canopy of the same somber color. This is a funeral car, and following it there will be one or two cars filled with mourners, all on their way to some neighboring cemetery. The coffin is in plain sight on the funeral car. In the case of young children white cars are used. This service costs from \$4 to \$12 per car, according to the class, and is the usual mode of conducting a funeral here.

Although the etiquette of a Mexican street car is free and easy, and men smoke inside or on the platform, women are invariably treated with respect, and half a dozen men will get up and give place to any woman, young or old, rich or poor. The Mexican gentleman has all the courtesy for which the Latin races are famous, and life is smoothed and its angles rounded by the constant courtesy of this most polite nation. Do not imagine that because people

smoke in the street cars their interiors resemble the American railway smoker—all filth under foot and the air befouled with rank cigars and old pipes. The windows of the car being generally open, a constant current of air drives the smoke out of the car, and one hardly notices that smoking is going on.—Boston Herald.

**A Boston Scene.**

An open horse car. A young woman sitting at the end of a seat. A father with a crippled boy in his arms waiting for the well-dressed young woman to move along and make it easier and safer for the cripple. A stolid and heartless refusal of the passenger to change her place a little.

Probably the selfish and indifferent woman would resent the imputation that she was heartless in such an act.

The 14 miles of street railway in Glasgow are owned by the city, and bring to the treasury a rental of \$76,000 annually. There is no uniform rate of fare, but a penny a mile is charged, with reduced rates morning and evening, when the working people travel.

**STREET RAILWAY STOCK QUOTATIONS.**

Corrected by H. L. GRANT, 145 Broadway, N. Y. City.

New York Stocks.	Par.	Amount.	Period.	Rate.	Date.	Bld.	Asked.
Bleecker St. & Fulton Ferry.....	100	\$900,000	J. & J.	3/4	January, 1886	28	30
1st mort.....	1,000	700,000	J. & J.	7	July, 1900	116	125
Broadway & Seventh avenue.....	100	2,100,000	Q.—J.	2	January, 1886	220	240
1st mort.....	1,000	1,500,000	J. & D.	5	June, 1904	104	107
2d mort.....	1,000	500,000	J. & J.	5	July, 1914	103	106
Broadway Surface Guaranteed....	1,000	1,500,000	J. & J.	5	July, 1924	100	100
Additional.....	1,000	1,000,000	J. & J.	5	July, 1905	100	100
Brooklyn City—Stock.....	10	2,000,000	Q.—F.	2	August, 1886	190	195
1st mort.....	1,000	800,000	J. & J.	5	January, 1886	106	110
Brooklyn Crosstown.....	100	200,000	A. & O.	4	April, 1886	165	175
1st mort bonds.....	1,000	400,000	J. & J.	7	January, 1885	105	112½
Central Park North and East river.	100	1,800,000	Q.—J.	2	January, 1886	115	118
Con. mort. bonds.....	1,000	1,200,000	J. & D.	7	December, 1902	122	135
Christopher & Tenth.....	100	650,000	F. & A.	2½	February, 1886	132	135
Bonds.....	1,000	250,000	A. & O.	7	October, 1898	110	116
Central Crosstown.....	100	600,000	Q.—F.	1½	January, 1886	160	165
1st mort.....	1,000	250,000	M. & N.	6	November, 1922	114	115
Dry Dock, East B'way & Battery...	100	1,200,000	Q.—F.	2	February, 1886	160	165
1st mort consol.....	500	1,900,000	J. & D.	7	June, 1893	114	116½
Scrp.....	100	1,200,000	F. & A.	6	August, 1914	105	107
42d & Grand St. Ferry.....	100	748,000	Q.—F.	3	August, 1886	225	235
1st mort.....	1,000	236,000	A. & O.	7	April, 1893	111	136
42d St., Manhattan & St. Nich. av..	100	2,500,000				38	40
1st mort.....	1,000	1,200,000	M & S.	5	1910	109	110
2d mort. In. bonds.....	1,000	1,200,000	J. & J.	6	1915	58	60
Eighth Avenue—Stock.....	100	1,600,000	Q.—J.	2	October, 1886	205	210
Scrp.....	100	1,000,000	F. & A.	6	August, 1914	105	110
Houston, West St. & Pavonia Ferry	100	1,000,000	Q.—F.	2	August, 1885	120	130
1st mort.....	500	250,000	J. & J.	7	July, 1894	112	113
Second Avenue—Stock.....	100	500,000	J. & J.	5	July, 1886	185	190
1st mort.....	1,000	1,862,000	M. & N.	5	November, 1909	106	107
Consol.....	1,000	550,000	M. & N.	7	May, 1888	163	000
Sixth Avenue.....	100	1,050,000	M. & S.	3	August, 1885	200	210
1st mort.....	1,000	500,000	J. & J.	7	July, 1890	112	116
Third Avenue—Stock.....	100	2,000,000	Q.—F.	3	February, 1886	260	250
1st mort.....	1,000	2,000,000	J. & J.	7	January, 1890	110	112
23d St.—Stock.....	100	600,000	M. & N.	5	May, 1885	265	275
1st mort.....	1,000	250,000	M. & N.	7	May, 1893	110	113
Ninth Avenue.....	100	800,000				110	120
Chicago St. Railway.....	100				3 September, 1885	299	325

**Phila. Street Railway Stocks.**

Corrected by ROBERT GLENDINNING & Co., 303 Chestnut street, Philadelphia, Pa.

	Par.	Period.	Amount.	Rate.	Date.	Bld.	Asked.
Citizens.....	50	Q.—J.	\$500,000				
Continental.....	50	J. & J.	1,000,000			121	126
Frankford & Southwark.....	50	Q.—J.	750,000				
Germantown.....	50	Q.—J.	1,500,000				95
Green & Coates.....	50	Q.—J.	500,000				
Hestonville.....	50		2,030,000			29	
Lombard & South.....	50		500,000				
People's.....	50		1,500,000			40	
Philadelphia City.....	50	J. & J.	1,000,000				145
Philadelphia & Gray's Ferry.....	50	J. & J.	617,500				85
Philadelphia Traction.....	50		5,000,000			77½	78
Ridge Avenue.....	50	J. & Q.	750,000			225	240
Second & Third.....	50	Q.—J.	1,060,200			203½	204
Seventeenth & Nineteenth.....	50	J. & J.	500,000				
Thirteenth & Fifteenth.....	50	J. & J.	1,000,000			152	
Union.....	50	J. & J.	1,250,000			200	
West Philadelphia.....	50	J. & J.	750,000				

**SPECIAL NOTICES.**

**Rates for Special Notices.**

Advertisements of Street Railway Property "Wanted" or "For Sale," "Positions Wanted" or "Men Wanted," or similar matter inserted under his heading at 10 c. per line, eight words to a line. The name of the advertiser kept confidential when desired. Replies may be addressed "Care of STREET RAILWAY JOURNAL," at its New York, Chicago, Philadelphia and Boston Offices, as is most convenient to the advertisers. Replies will be forwarded, if desired. Excellent results have been realized by advertisements in this department.

**FOR SALE**—First class street railroad property in a live city of 50,000; a monopoly and a rare opportunity for an investment on account of present owner's time being demanded for other interest. Address, BANKER, care STREET RAILWAY JOURNAL, 32 Liberty street, New York.

**WANTED**—A party with \$50,000 to \$75,000 to form a Company for Consolidating several Street Car lines in a large and growing city. A good opportunity. A valuable franchise. Address, "CONSOLIDATION," STREET RAILWAY JOURNAL, 32 Liberty street, New York.

**WANTED**—A thoroughly reliable man experienced in Street Railway practice, to organize and manage a company, for the introduction of a new system of propulsion. Patentee will furnish capital. An exceptional opportunity for a man of large street railway acquaintance and with the energy and judgment requisite to success. Address, IXTON, STREET RAILWAY JOURNAL Office, 32 Liberty Street, New York City.

**WANTED**—A party with Capital to take one-half interest in horse and cattle grooming machine, now ready for operation, fully covered by patents. Will sell whole or one-half interest. Full control given in either case. Patentee has other business. Cannot give it his attention. Address, SAFETY, care STREET RAILWAY JOURNAL, 119 South 4th St., Phila., Pa.

**SWEEPERS FOR SALE CHEAP**—We have several Sweepers of other makers taken in exchange which will be sold thoroughly refitted very low on early orders. "Rattan lower than ever before. Write for prices. Address, Brooklyn Railway Supply Co., 37 Walworth st., Brooklyn, N. Y.

**SUPPLIES WANTED**—We anticipate building short line Street Railroad, gauge 3 1/2 feet; need two or more light-passenger cars and two or more flats and all supplies except Iron. Address, S. W. S., Aivardo, Tex.

**FOR SALE**—Three NEW One-horse cars, never have been used. Built by Jones of Troy, with Fare Boxes, fitted with Andrews & Clooney wheels. For sale low. The road for which they were built never having been completed. Address "W," this Office.

**WANTED AT ONCE**—Good second-hand cars, both one and two-horse. Address, BROOKLYN RAILWAY SUPPLY CO., 37 Walworth St., Brooklyn N. Y.

**WANTED**—Position as Superintendent or Foreman with some good street railroad, by a thoroughly practical and experienced street railroad man who has had 15 years' experience in the business; can refer to some of the most prominent street railroad men of the country. Address R. P. A., care STREET RY. JOURNAL, 32 Liberty St., New York.

**WANTED**—Small size of T rail either steel or iron, 12 lb. to 20 lb. weight, new or second hand in good condition for relaying. Address L. this Office, stating quantity, price and where seen.

**WANTED**—A reliable man as stable and track foreman who has had some experience in the street railway business. Address Erie City Pass. Ry. Co., care of Jacob Berst. Supt., Erie, Pa.

**FOR SALE**—Three second-hand Turntables 7ft. 6in. in diameter, with guide plates all complete; suitable for narrow-gauge roads of the Fulton Foundry, Cleveland, Ohio, pattern. Address Frank H. Andrews, 545 West 33d st., New York City.

**WANTED**—Position as Superintendent on a street railroad by an experienced man N. Y. City references. Willing to go South or West. Parties wishing a good, steady man, and one able and willing to look sharp after all the minute details of a road, will please address Superintendent, care STREET RAILWAY JOURNAL, 32 Liberty St., New York.

**FOR SALE**—Street Railroad connecting two live Manufacturing towns. Forty horses, 9 cars. We have exclusive franchise for 25 years. New road. Good Business. Address, HORSE RAILROAD, care STREET RAILWAY JOURNAL, 32 Liberty St., New York.

**WANTED**—Position on the construction of street railways. Am thoroughly acquainted with all details, estimates made for same, measurements taken for curves, switches, frogs and crossings of all shapes and angles. Would engage with railway switch works. No objection to going out of the country for few months or year. Address "CONTRACTOR," care St. Ry. Journal, 119 South 4th St., Philadelphia, Pa.

**FOR SALE.**

- Six Second hand One Horse Street Cars.
- Ten Second Hand Two-Horse Street Cars.
- Steel Rails, T and Street Patterns, all weights.
- Spikes and Track Supplies.
- Old Street Rails Purchased.

**HUMPHREYS & SAYCE,**

No. 1 Broadway, New York.

**RUFUS MARTIN & CO.,**  
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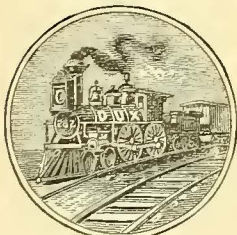
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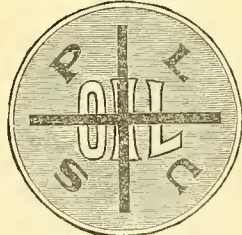


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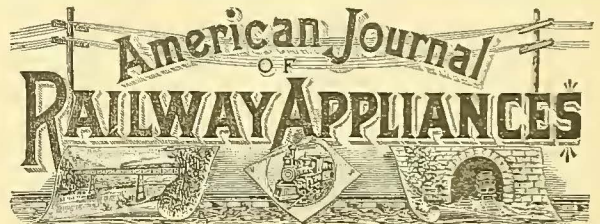
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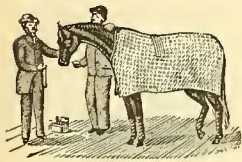
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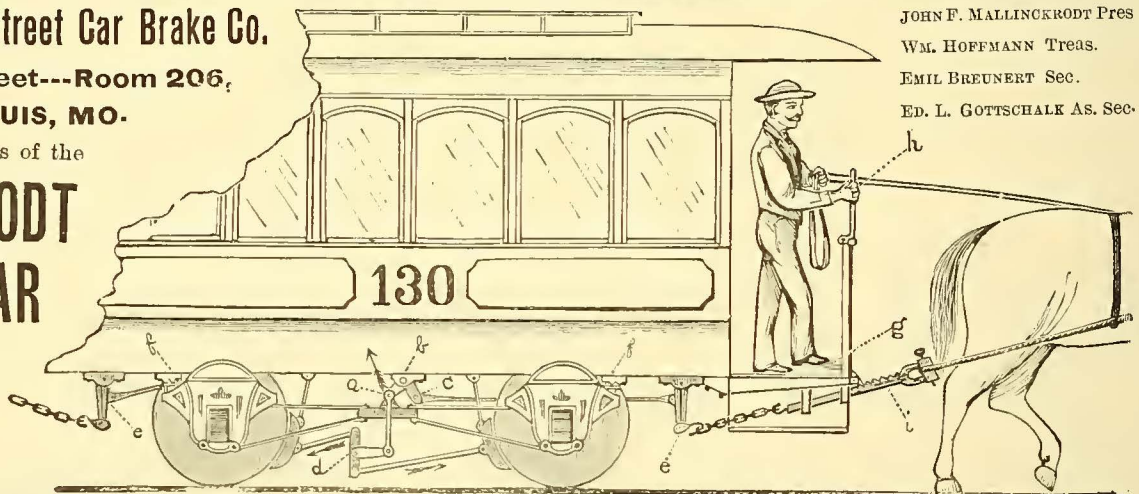
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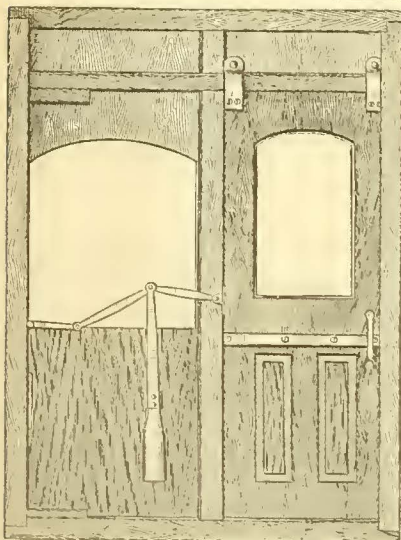


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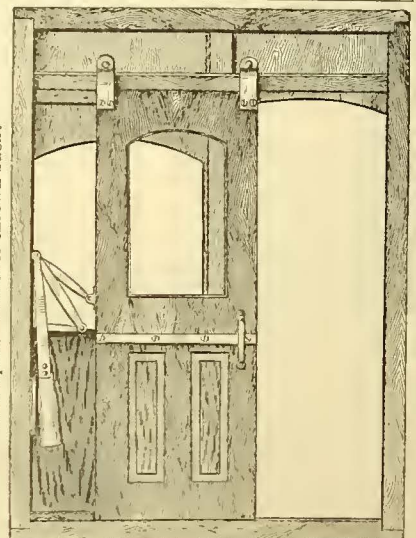
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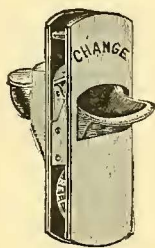
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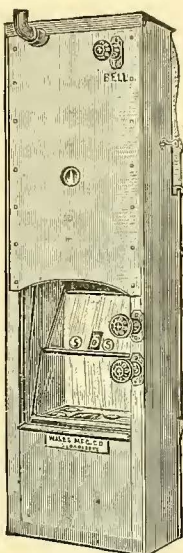
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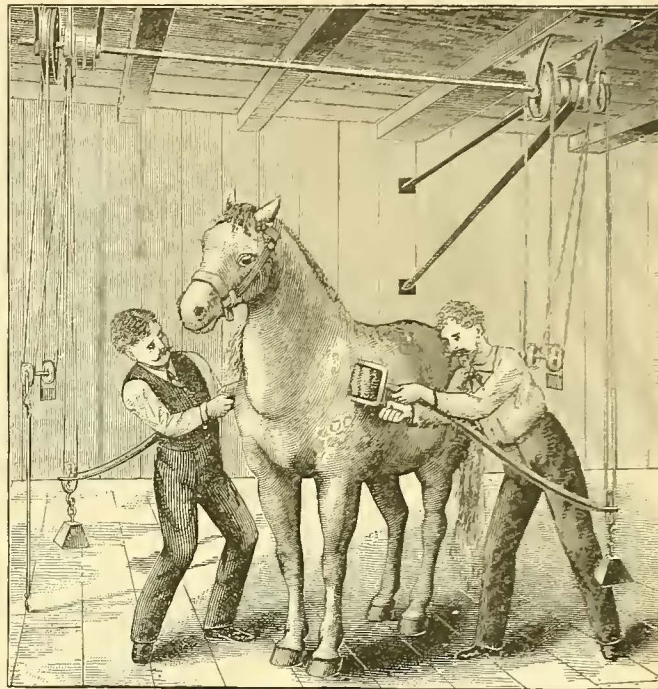
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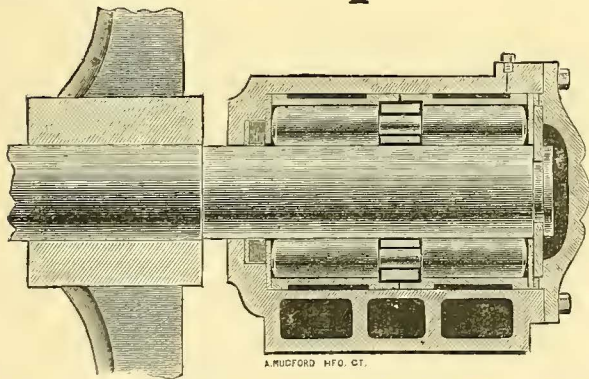


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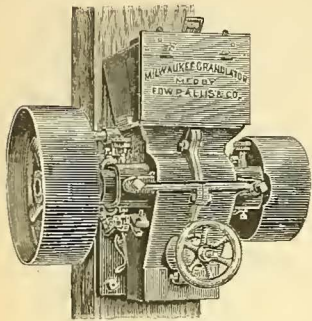
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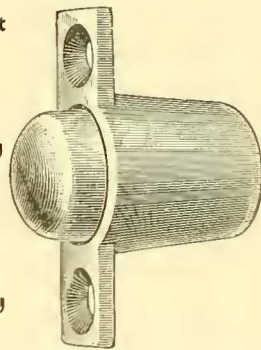
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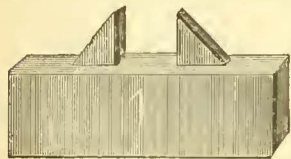
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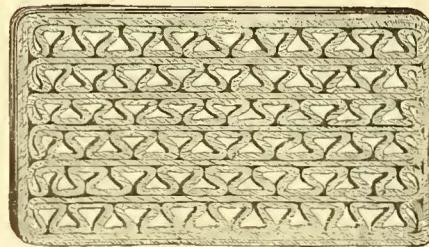
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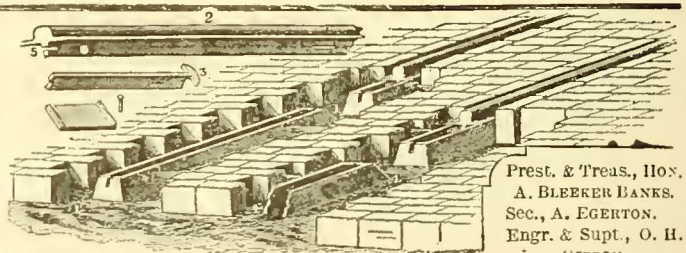
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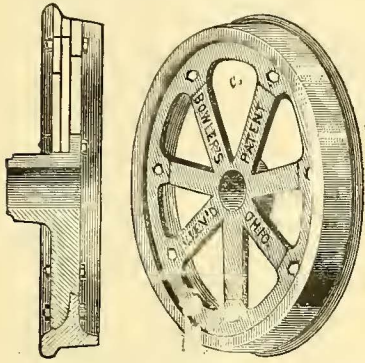
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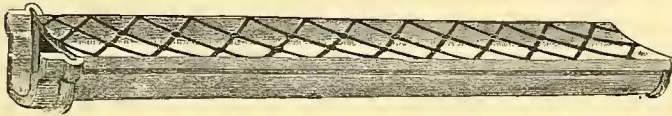
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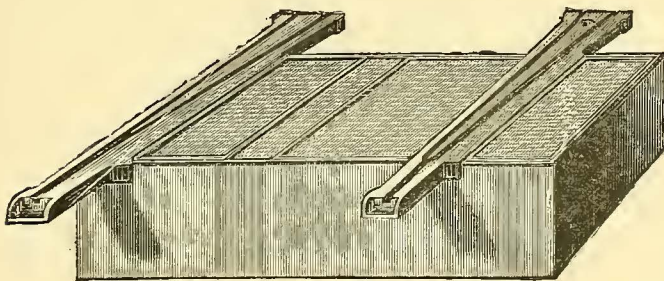
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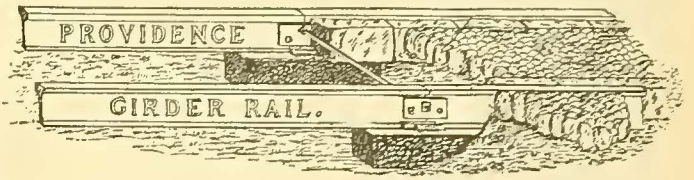


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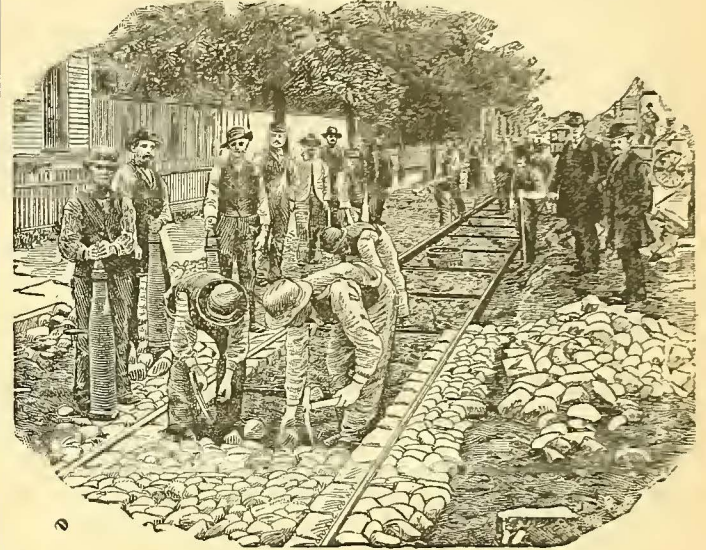


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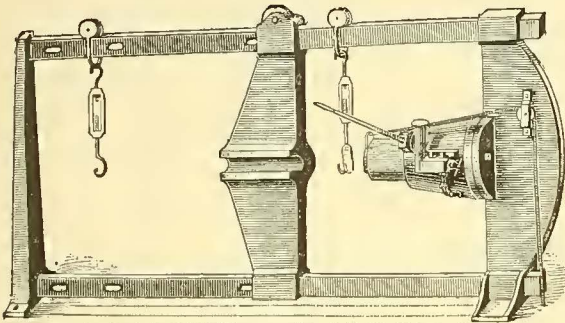
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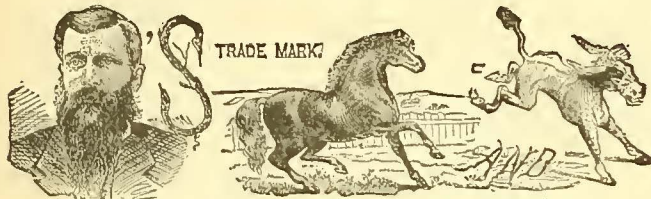
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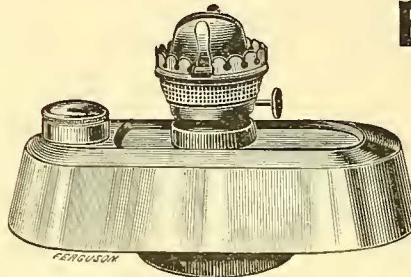
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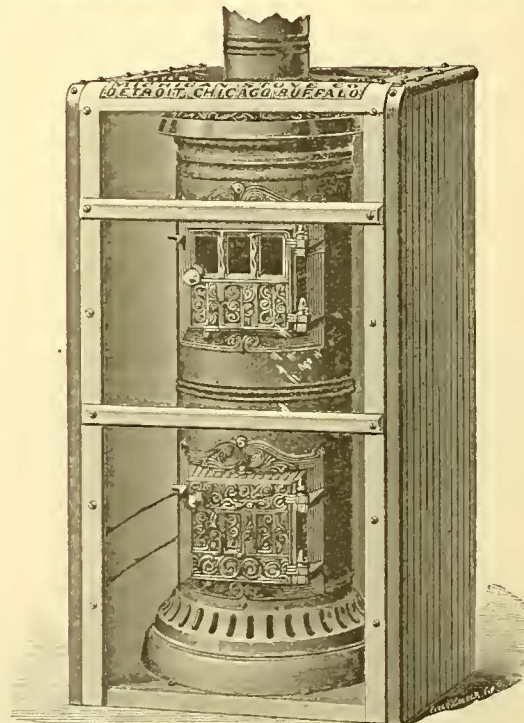


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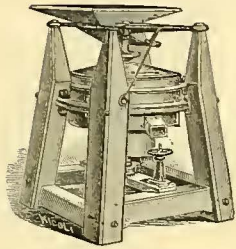


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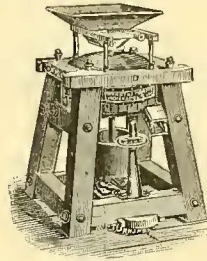


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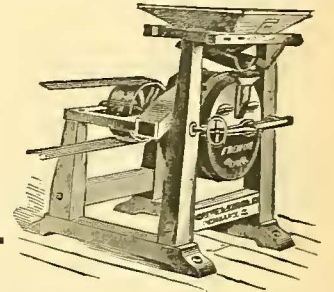


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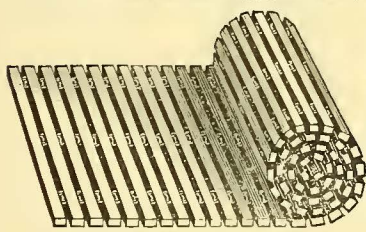
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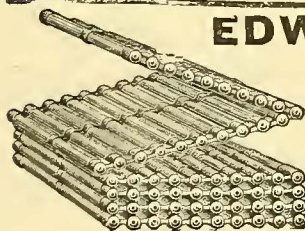
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The most durable, easiest cleaned and repaired wood mat ever made. We would respectfully call the attention of Managers of Street Railways to our latest Improved Reversible Folding Mat, made to fit any size car. Sample order solicited.

1193 Broadway, New York.  
FACTORY, Cranford, N. J.

Established 1856.

Incorporated 1883.

## The Feigel Car Co.,

BUILDERS OF

# Cars for Street Railways.

FACTORY

OFFICE

New Utrecht, N.Y.

No. 108 Wall Street, N.Y.

### EUREKA COLOR WORKS.

Established for the Manufacture of Pure Colors.

### EDW. E. JILLARD,

DEALER IN

## PAINTERS' MATERIAL, GLUE, ETC.

1645 NORTH TENTH STREET, - - - Philadelphia.

Specialty in Strictly Pure Tinting Colors for Car, Carriage, Ship and House Painters' use.

ESTABLISHED 1857.

INCORPORATED 1876.

# BROWNELL & WIGHT

## CAR COMPANY,

ST. LOUIS, MO.

BUILDERS OF

# Street Cars

OF EVERY STYLE AND SIZE,

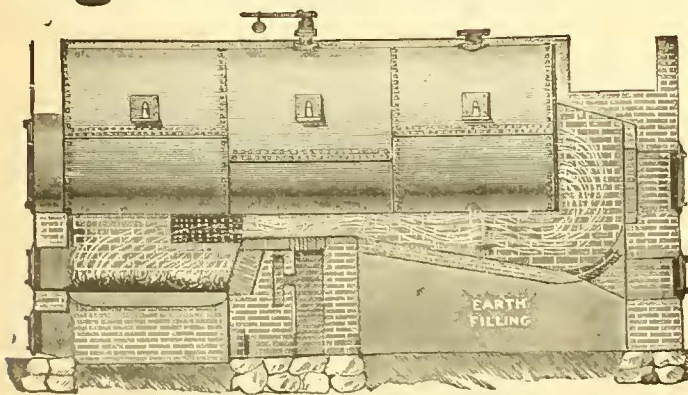
For Horse, Cable or Other Motive Power.

EXCLUSIVE MANUFACTURERS OF

# BROWNELL'S PATENT COMBINATION CARS

FOR SUMMER AND WINTER SERVICE.

# JARVIS ENGINEERING CO., Engineers & Contractors.



FOR ERECTING STATIONS  
FOR  
ELECTRIC POWER AND CABLE RAILWAYS,

USING

Jarvis Patent Furnace

For Setting Steam Boilers to Burn Cheap Fuel, such as Wet Saw-  
Dust, Coal Screenings or Slack Coal.

ALSO

ARMINGTON AND SIMS ENGINES,

Belting direct to Power Dynamos without using Shafting.

NO. 61 OLIVER STREET, BOSTON, MASS.

SEND FOR CIRCULAR.

# J. M. JONES' SONS,

AGENTS,

# Street Railway Car Builders

# WEST TROY,

# NEW YORK.

# PENNSYLVANIA STEEL COMPANY,

MANUFACTURERS OF

# STEEL RAILS

Of T patterns, weighing from 16 to 76 lbs. per yard.  
CENTRE BEARING Street Patterns, 42 to 60 lbs. per  
yard, TRAM Street Patterns 45 to 47 lbs. per yard,  
and Street Patterns for STEAM ROADS.

WORKS AT

STEELTON, DAUPHIN CO., PENN.

NEW YORK OFFICE, - 160 Broadway.

Philadelphia Office 208 South Fourth St.

# THE BRYDEN FORGED HORSESHOE WORKS, Limited

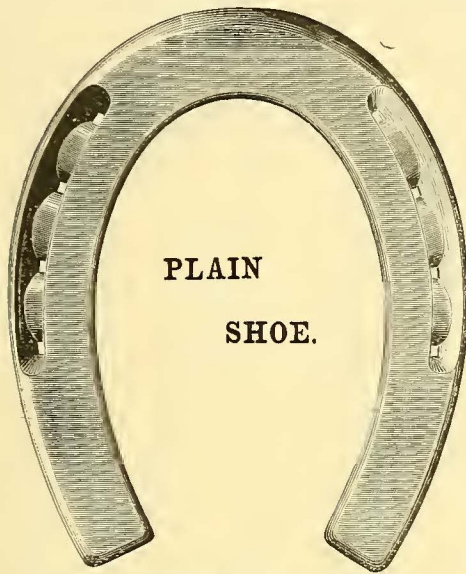
## CATASAUQUA, PENN.

MANUFACTURERS OF

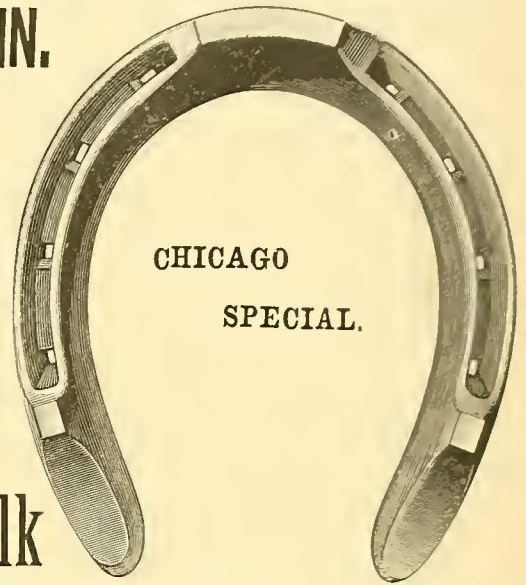
# THE BRYDEN

## Forged Solid Calk

### HORSE & MULE SHOE.



PLAIN  
SHOE.



CHICAGO  
SPECIAL.

These shoes are forged into shape under heavy drop hammers, greatly condensing the iron and adding very much to wearing qualities, making it nearly equal to steel in durability.

The distinctive feature of our system of manufacture is, that it produces a *finished* shoe, calked, or plain, ready for attaching to the hoof.

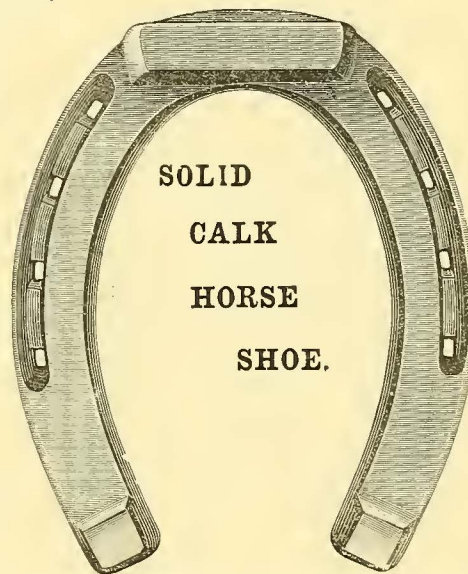
The crease is made low and the nail holes are punched well in and beveled to permit the nailhead to be well driven in, reducing the strain on the nails and insuring a firmly fastened shoe.

The foot bearing of the shoe is level, thus materially aiding in the preservation of the hoof.

It is not necessary to heat the shoe in order to fit it.

There are no welds in the shoe to break, the calks being solid forged up from the web.

OUR CALKED SHOE. A good, strong, reliable shoe to have on hand. The calks will not come off. Always ready to nail on. A handy shoe for the Winter, easily sharpened, and, as the calks will not break, will give as much service as steel. Made in sizes No. 1 to No. 6. Front and hind of steel or iron.

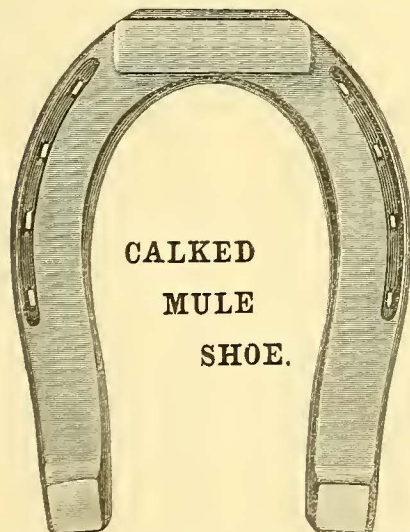


SOLID  
CALK  
HORSE  
SHOE.

The shoes have a good substantial clip drawn up from metal driven outside the regular outlines of the shoe for that purpose. The outer edge of the clip, when drawn up, coinciding with the outlines of the shoe, requires no robbing of the hoof wall to let in the clip.

Having ample capital and being equipped with the most modern and best machinery, and using only the best grades of material, we are confident of our ability to furnish consumers the best, the longest wearing, the cheapest and the most satisfactory shoe in the market. Our shoes are now extensively used by the largest street railway companies in New York city, Philadelphia, Chicago, New Orleans, Buffalo, Washington, D. C., and Brooklyn.

We present illustrations of some of the many designs of shoes manufactured by us.

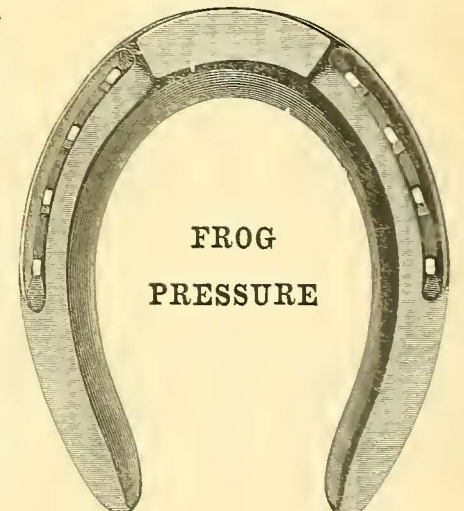


CALKED  
MULE  
SHOE.

OUR FROG PRESSURE SHOE. The advocates of the frog pressure system of horseshoeing have in this shoe the very thing they want. The best shoe made for curing corns or contracted feet. Made in sizes No. 1 to No. 6. Front and hind, iron, or steel.

OUR PLAIN SHOE. "The best railroad shoe made," so says one of the largest consumers of horseshoes in New York city. This shoe is used by the largest street railroads in New York city and Philadelphia. Made in sizes No. 1 to 6. Front and hind.

OUR CHICAGO SPECIAL. Designed to meet the wants of many of our western customers. Extensively used in Chicago, on the principal railroads and for custom work. A light calked shoe for shoeing trotting and driving horses. Made in sizes No. 1 to No 4 of iron or steel.



FROG  
PRESSURE

OUR CALKED MULE SHOE. Just the thing for street railway and coal mining work; solid calks. Made in sizes No. 1 to No. 5 in iron or steel.

**J. B. WHITE, Manager Sales Department.**

# THE NATIONAL HEATER. CAR

IMPROVED.

THESE CAR HEATERS ARE IN SUCCESSFUL OPERATION  
ON RAILROAD LINES IN THE UNITED STATES AND  
CANADAS, AND GIVE ENTIRE SATISFACTION.



THESE CAR HEATERS ARE IN SUCCESSFUL OPERATION  
ON ALL OF THE STREET RAILWAY LINES IN THE  
CITY OF BROOKLYN, NEW YORK.

## For Warming Horse or Street Railroad Cars.

It is Brick Lined, has Rotating and Dumping Grate, and Safety Door Catch.

It is neat in appearance, occupies but little space, is an ornament to a car, is not costly in price, nor expensive in its operation.

SOLE MANUFACTURERS

# NATIONAL STOVE Co.,

243 WATER STREET, NEW YORK CITY.



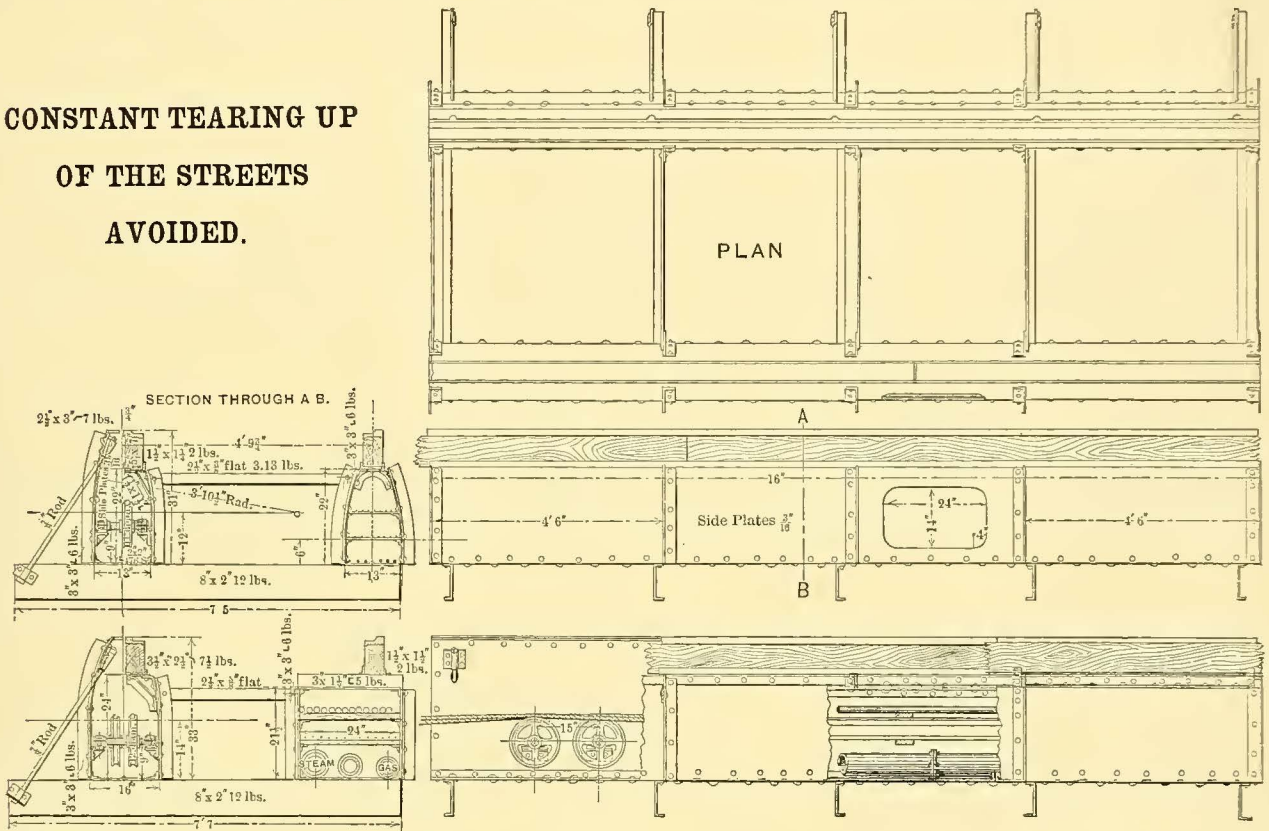
# The Gould Cable System

O F

## STREET RAILWAY CONSTRUCTION.

Fully covered by patents in the United States and England. Patents applied for in other European countries.

**CONSTANT TEARING UP  
OF THE STREETS  
AVOIDED.**



The conduit is placed at the side, doing away with the central conduit entirely. A conduit is supplied for natural gas, steam, electric and telephone wires, etc.

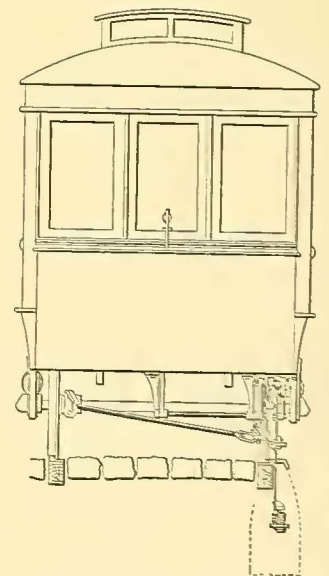
**THE RAILS ARE TIED TOGETHER AT THE SURFACE.**

The construction of the grip is the simplest known.

The slot which admits the grip is placed outside the rails.

The inventor will make favorable terms with parties desiring to put this system in to operation.

A capital chance for the right man to organize a company.



**N. B.—Parties Infringing on this Grip will be Prosecuted to the full Extent of the Law.**

Address all communications to

**J. H. GOULD, Ninth and Market Streets, Philadelphia, Pa**

S. M. CARPENTER, Prop.

C. J. LANGDON, Sec'y.

# FULTON FOUNDRY,

MANUFACTURERS OF

## STREET RAILWAY SUPPLIES,

Carpenter's Patent Turn-tables and Transfer-tables,

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Open Wheels of all sizes & weights.

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Wheels and Axles of all sizes fitted on short Notice.

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Chilled curve rail, Turnouts, Switches, etc., etc. Blue prints and Bills Furnished on Application.

Send for Illustrated Catalogue. Address,

## FULTON FOUNDRY,

202 MERWIN ST.

CLEVELAND, OHIO.

# THE WAY FOUNDRY COMPANY.

## WAY, RHODES & BLANKLEY,

“STREET RAILWAY SUPPLIES A SPECIALTY.”

### Contractors for Construction of Street Railways.

Manufacturers of

Curves, Frogs, Turnouts, All sizes of  
Crossings, Switches, Joint Plates, Knees.

Steel grooved and Tram Rails at special rates.

Pedestals & Boxes, All kinds of Brake Shoes. Turntables,

AND ALL MATERIALS USED IN THE CONSTRUCTION OF STREET RAILWAYS.

Twenty-third & Wood Sts., Philadelphia, Pa.

# TOM. L. JOHNSON'S IMPROVED FARE BOX.

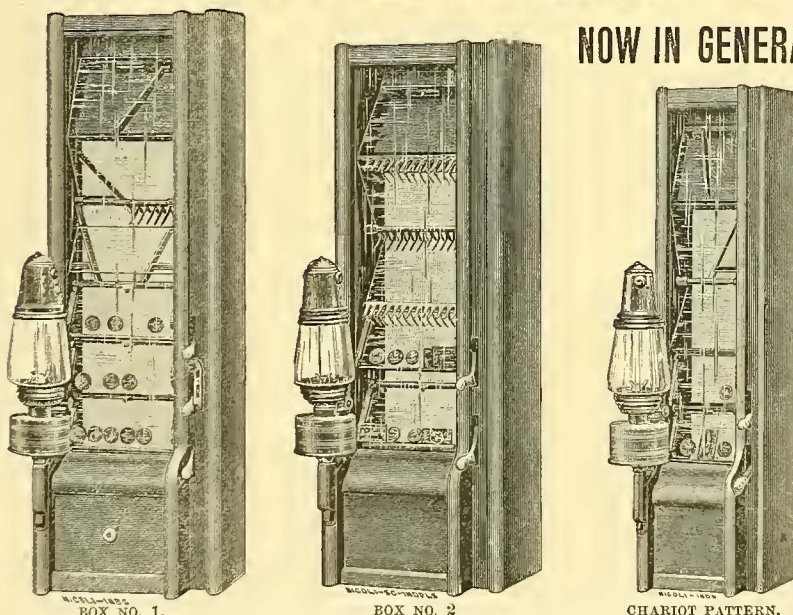
NOW IN GENERAL USE IN CITIES THROUGHOUT THE U. S.

## Ornamental to any Car.

REDUCTION IN PRICE WHERE TWO  
BOXES ARE PLACED IN ONE CAR.

Roads Equipped with Boxes on Trial, and if not Satisfactory, Returned Without Any Expense to the Company trying them.

Patented Oct. 14, 1873.



One of the principal merits of these Fare Boxes over all others, consists in the fact that the fares are not turned out of sight at once by the drivers, leaving nothing but the bare word and memory of the parties as evidence of the payment, thereby making it easy for deception to be practised, even though an officer is on the car, and is endeavoring to see that the driver is faithfully performing his duties. They are so constructed that the fares are kept in sight from one end of the road to the other, and at any point on the line an officer of the company, or indeed any other person, can tally passengers with the fares. The drops can easily carry from 75 to 80 fares, and can be counted without mistake, and counterfeit money can be easily detected. These boxes are very simple in construction, being cleared, when required, in five minutes, whereas any other box takes a much longer time. The glass fronts and drops render them so transparent that a person sitting in the further end of car can readily count the fares and make the tally, without making himself conspicuous in the matter, if desirable. They are lighted from an outside lantern, (which is only on the car at night, and should be taken off during the day,) giving an excellent light, for the fares can be seen almost as plain as by day. When the box is put in a car it can not be taken out or tampered with, unless the keys are obtained from the office, and can not be robbed without violence. Special attention given to correspondence on the subject of street railway construction, equipment and operation. Address all correspondence to

A. A. ANDERSON, with TOM. L. JOHNSON, Indianapolis, Ind.

D. W. Pugh, J. S. Pugh, F. D. Russell.

# PUGH & RUSSELL, STREET CARS, RAILS, AND EVERY DESCRIPTION OF STREET RAILWAY SUPPLIES.

General Representatives of  
**THE JOHN STEPHENSON COMPANY, Limited,**  
NEW YORK.  
**STREET CARS.**

General Agents of  
**THE A. FRENCH SPRING COMPANY, Limited,**  
PITTSBURG, PA.  
**STREET CAR SPRINGS.**

Agents for New York District, Indiana, Michigan and Ohio of  
**THE JOHNSON STEEL STREET RAIL COMPANY,**  
JOHNSTOWN, PA.

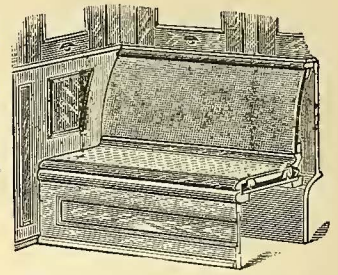
**NEW YORK,** STEWART BUILDING,  
Broadway, Reade and Chambers Sts.  
P. O. Box 3524.

**CHICAGO,** ADAMS EXPRESS BUILDING,  
No. 185 Dearborn Street,  
Rooms 13 and 14.

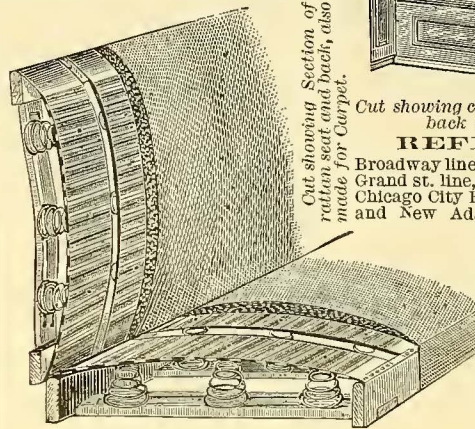
## THE HALE & KILBURN MANFG. CO.,

Extensive makers of Patented  
**Street Car Seats**  
of every description.

Our Patent Spring Seats covered with Rattan or Carpet are fast being adopted by the best railroads in the country. Seats for Steam Cars a Speciality. Owners and makers of all the Cobb patents



Cut showing car with rattan seat and back without springs.



Cut showing Section of rattan seat and back, also made for Carpet.

**REFERENCES:**

Broadway line (Pullman cars) New York  
Grand st. line, 3d and 4th ave lines, NY  
Chicago City R.R. Chicago W. Div. line,  
and New Adams street line, Chicago;  
East Cleveland R. R. Co.  
and Woodland Ave. and  
West Side R. R. Co.  
Cleveland; Union Line,  
St. Louis; 2d. & 3d St. R.  
R. Co., Frankford and  
Southwark R. R. Co.,  
Union Line, Chestnut &  
Walnut R. R., Ridge Ave  
R. R., or any other road  
in Phila.; and 100 others  
elsewhere.

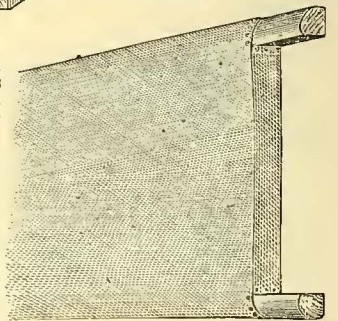
Many R. R. Co's use our Rattan Pat. Canvas Lined Seats for Summer and cover the same with carpet for Winter. This method of seating we recommend as durable and economical, for the reason both a Summer and Winter seat is obtained in one.

Estimates & Particulars cheerfully given, (mention this paper) satisfaction guaranteed.

**A TRIAL SOLICITED.**

OFFICES: 48 & 50 NO. SIXTH ST.,  
FACTORIES: 615 to 621 Filbert St.,

**PHILADELPHIA, PA.** Cut of section of cross for summer car.



JOHN A. EMERICK, President,

EDWARD H. JOHNSTON, General Manager,

SAMUEL LEES, Treasurer.

# Johnson Railroad Frog & Switch Co.

MANUFACTURERS OF

## Railway Switches, Stands, Frogs and Crossings.

ALL SUPPLIES FURNISHED APPERTAINING TO

# Steam & Street Railways.

Civil & Mechanical Engineers, Machinists & Contractors.

Blue Prints and Bills Furnished on Application. CORRESPONDENCE SOLICITED.

Works, Chester, Pa.

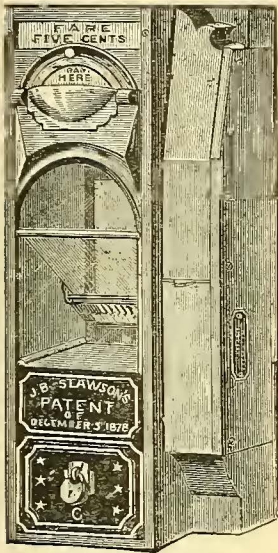
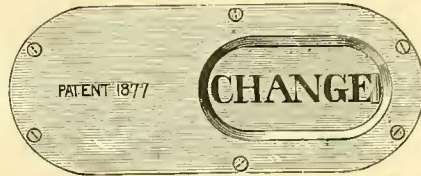
Office, 307 Walnut Street, Philadelphia

# SLAWSON'S PATENT FARE BOXES

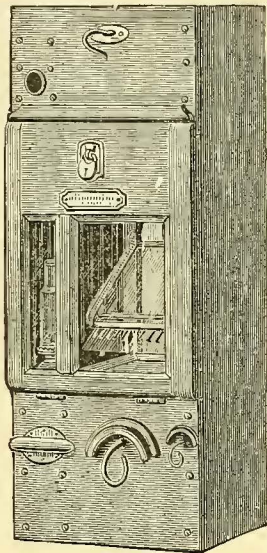
These Boxes are of the latest and most approved pattern, and contain a front door, by opening which all of the glass inside can be conveniently cleaned. This is a late patent, and is a very valuable improvement over the old method of taking the boxes apart for that purpose. They are well made and not liable to get out of order, cannot possibly be picked, and even if all the glass is broken no fare can be extracted from the drawer.

The late J. B. Slawson originated the "FARE BOX SYSTEM," and all of his Boxes, Change Gates and Drivers' Change Box are protected by several patents, and parties using them are not liable to claims for infringements, as may be the case with some boxes which are now being offered for sale.

These Boxes, etc., are now in use not only in the United States and Canada, but in Mexico, South America, Europe, Asia, Africa and Australia—in fact, nearly all places where street cars are used.

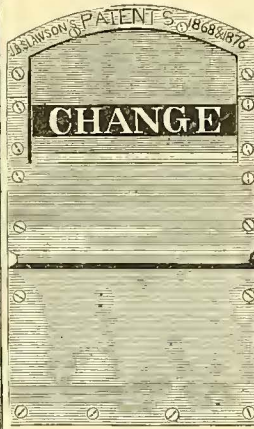


C. Front View.



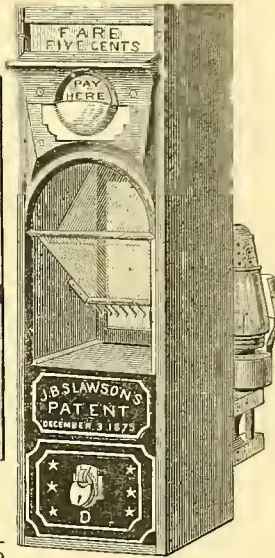
C. Back View.

Change Slide. Outside View.

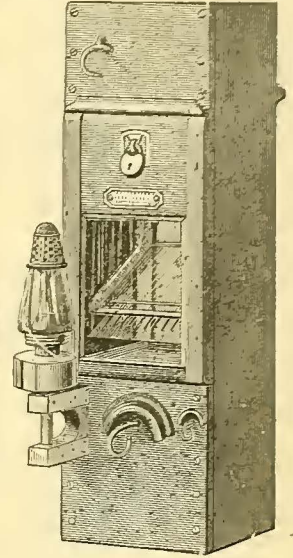


Change Gate. Outside View.

The prices have been greatly reduced, and are made to fit the times. Orders will be promptly filled by addressing,



D. Front View.



D. Rear View.

MILTON I. MASSON, Agent, 365 AVENUE A, NEW YORK.

or the JOHN STEPHENSON COMPANY, Limited, 47 EAST TWENTY-SEVENTH STREET, New York.

## WM. WHARTON Jr. & CO Limited,

Engineers, Manufacturers & Contractors,

Twenty-Fifth Street and Washington Avenue,

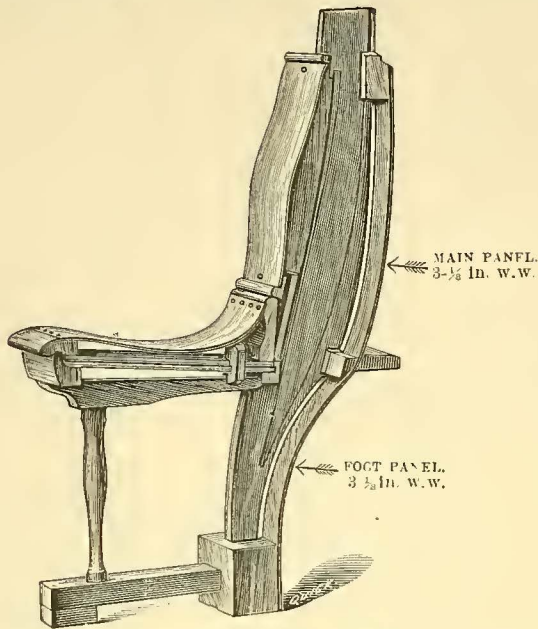
PHILADELPHIA, PA.

## CABLE RAILWAYS, GRIPS,

And All Appurtenances.

The Oldest and Largest Manufacturers of Street Railway Track Appliances in the World. Responsible parties contemplating Building, Renewals or Extensions will find it to their interest to correspond with us.

# STREET CAR SEATS & BACKS.



## THREE-PLY CAR SIDES.

Having given our three ply white wood car sides a thorough trial for a number of years in our city street and railway lines, which test has left them as firm and good as the day they were put in, we unhesitatingly place these sides in the market as a superior article. They are composed of three white wood (or poplar) veneers, each  $\frac{1}{2}$  inch thick, the grain of the center layer running at right angles with the two outside layers. Hence they derive all the special and well-known advantages of glued up wood over single ply, namely:

- 1st. They are fully 75 per cent stronger, for they brace and stiffen the car.
- 2nd. They are lighter, being only 3-8 inch thick, and so do not add so much dead weight to the car.
- 3rd. They will not check or split by change of atmosphere.
- 4th. They will not split or crack when nailing into place, even though the nail be placed near the edge.
- 5th. Being laid over a form to suit the shape of the car frame or post they cannot buckle or twist, a feature which also adds strength to the car.

For repairing cars these sides have no equal. Our Three Ply Car Seats and Backs, so well known all over the world, are now the most popular seat and back in the market, and recommend themselves especially for their *Lightness, Cleanliness, Healthfulness and Beauty*, as also their *Cheapness and Durability*. For they are indestructible by moths (the great enemy of upholstering), and will not harbor vermin or insects, or carry or communicate contagion or disease. Our trade in this line has grown in thirteen years to vast proportions, which in itself is a sufficient guarantee of their merits. They are made either perforated or plain to suit customer. Birch is the wood most generally used. Today fully one-half the railroads in the country are using these seats and backs. We would also call attention to our *Veneer Ceiling* for cars. They are made either plain, perforated or decorated, and greatly add to the beauty of the car. For repairing cars they have no equal, for they are placed over the carlines and cover all the old paint and wood work. The woods generally used are *Birch, Birdseye Maple, Oak and Mahogany*.

## GARDNER & CO.

Manufacturers of Car Seats and Ceilings and Depot Seating,

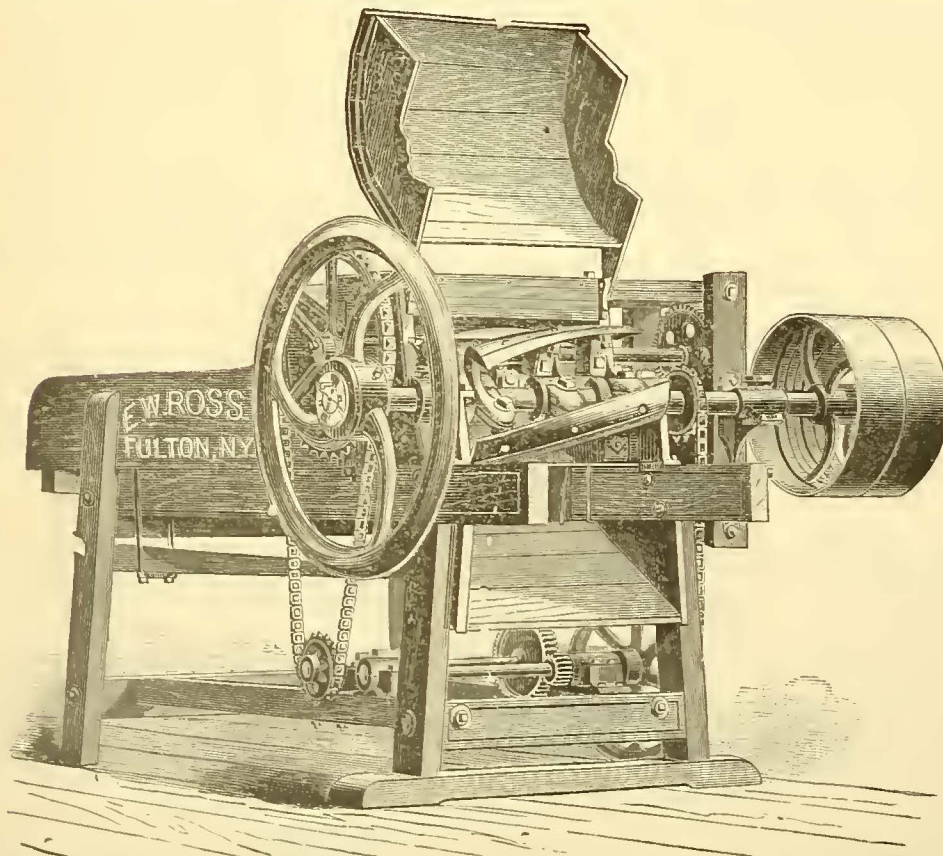
OFFICE AND FACTORY: 643, 645, 647, 649, 651, 653, 655 and 657 West 48th St., New York.

Sample and Salesroom: 206 Canal St., cor. Mulberry.

Send for Catalogue.

Address all Communications to Office.

# THE ROSS HAY CUTTERS



A FULL LINE OF CUTTERS BUILT EXPRESSLY FOR STREET RAILWAY BARN.

THEY HAVE COMBINED STRENGTH, DURABILITY AND GREAT CAPACITY.

ARE EASILY OPERATED AND CAN BE RUN TO FULL CAPACITY BY SMALL GAS ENGINE.

MACHINES SENT TO ANY PART OF THE U. S. ON APPROVAL IF DESIRED.

GUARANTEED TO BE THE BEST.

ILLUSTRATED CATALOGUE AND FULL PARTICULARS FURNISHED WHEN REQUESTED.

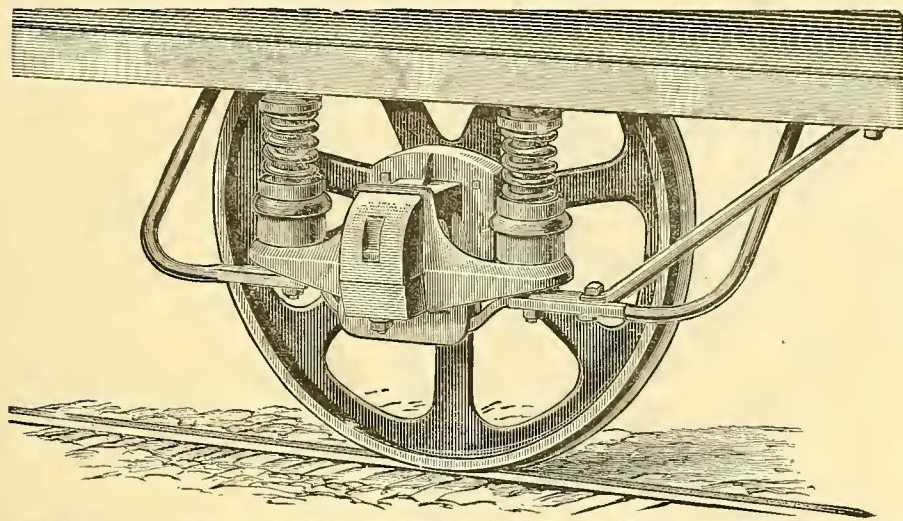
E. W. ROSS & CO., SPRINGFIELD, OHIO.

# THE BEMIS CAR BOX COMPANY,

MANUFACTURERS OF

## The Bemis Patent

## Journal Box.

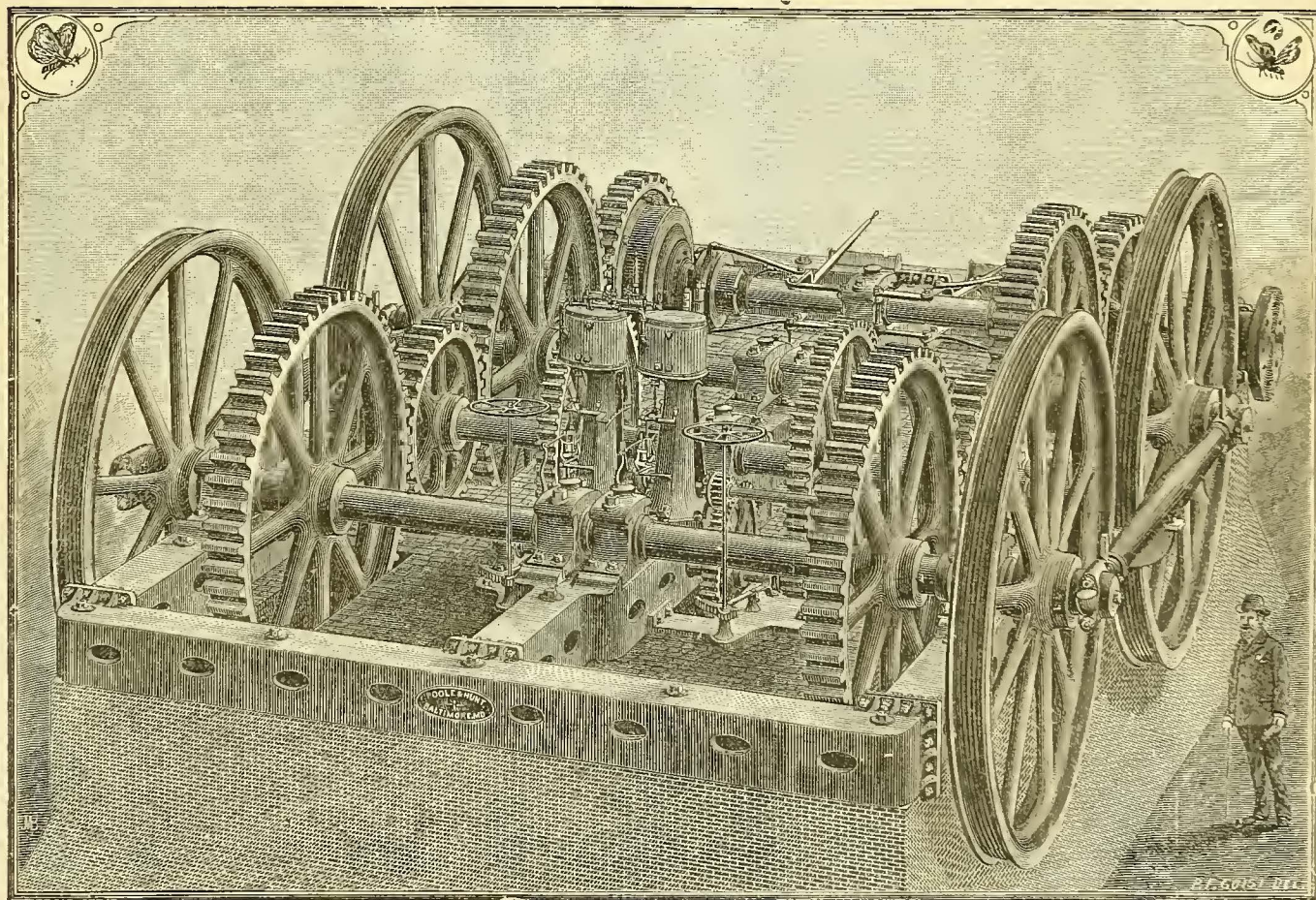


Light Draft, Easy Riding, Durable, Economical. Brasses are warranted for 10 years, and Journal for 20 years. Requires oiling or inspecting but once in 12 months. Boxes are positively dust proof.

30 Taylor St., Springfield, Mass.

# POOLE AND HUNT

Baltimore, Md.

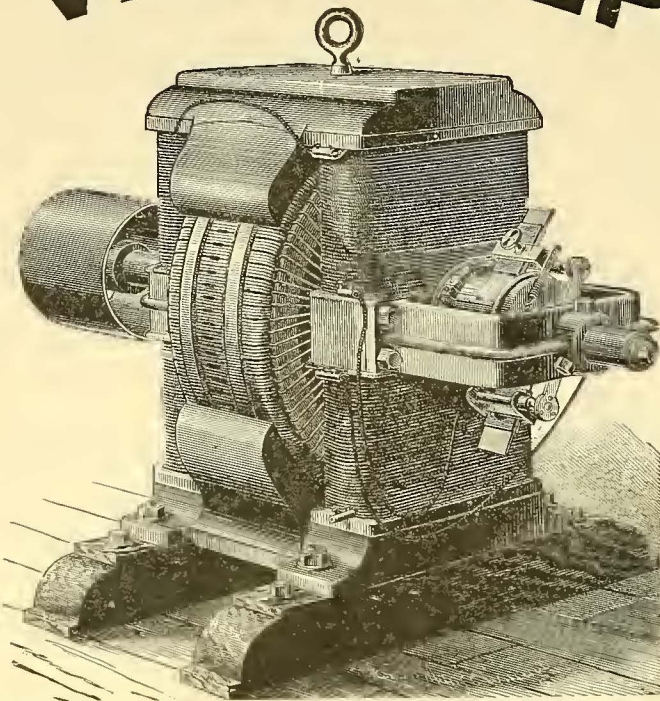


Manufacturers of Cable Railway Plant.

Machine Moulded Gearing for Mills and Factories.

CORRESPONDENCE SOLICITED.

**THE VAN DEPOELE**



**RAILWAY SYSTEM.**

**ELECTRIC**

**The Van Depoele Electric Manufacturing Company**

**21 NORTH CLINTON STREET, CHICAGO, ILL.,**

Owning the Van Depoele Patents for Electric Railways and for Van Depoele Motors, are prepared to equip railways with their Electric System.

We claim to have the best and most economical Electric Motor in the World.

---

**We are not Selling Stock, but Doing Business.**

Would be pleased to furnish estimates to new companies or those desiring to extend lines or wanting more rapid transit.

**Van Depoele Electric Manufg. Co.**



# RAILWAY REGISTER COMPANY.

## MANUFACTURING

MANUFACTURERS AND OWNERS OF THE Latest Designs, Improvements and Inventions in Registers, Indicators, Classifiers and Punches, for the Recording of Fares Collected on Street and Steam Railroads.

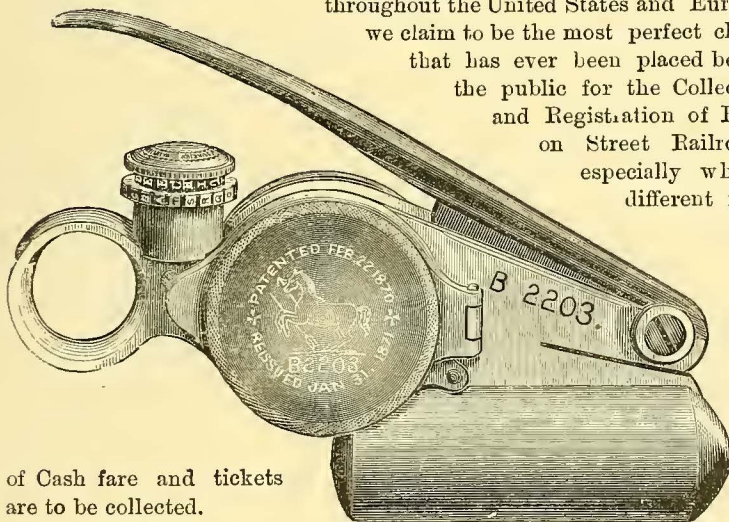


This company owns over 100 Patents embracing all the Valuable Features of Fare Registers, Indicators, etc., and was awarded three Medals at the Chicago Exposition of Railway Appliances.

JAMES McCREDIE, Pres., Buffalo, N. Y.

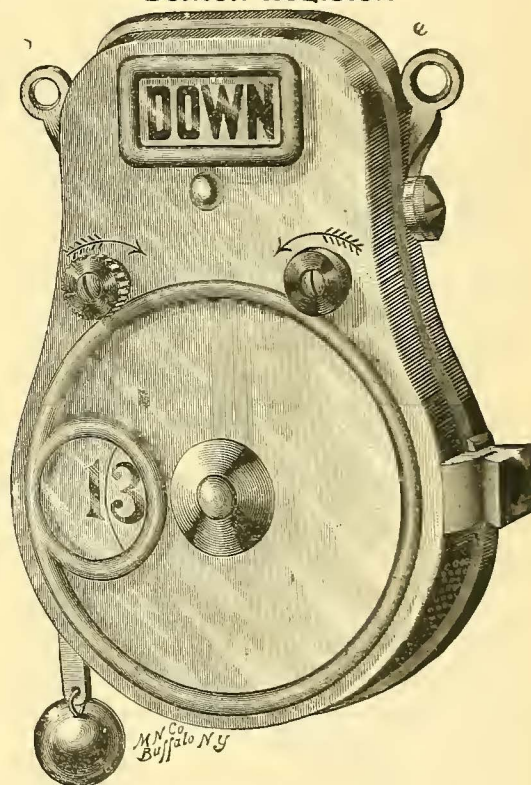
### The Alarm Registering Punch.

This Register, which is so generally used throughout the United States and Europe, we claim to be the most perfect check that has ever been placed before the public for the Collection and Registration of Fares on Street Railroads, especially where different rates

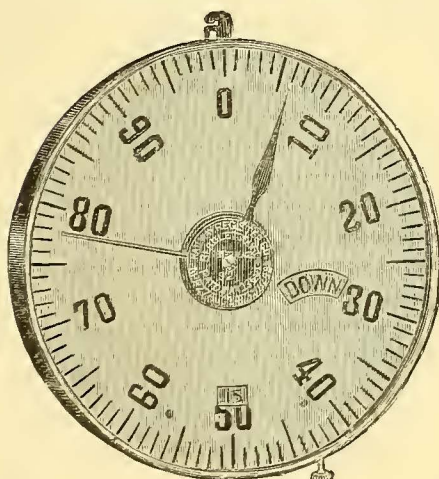


of Cash fare and tickets are to be collected.

### Benton Register.

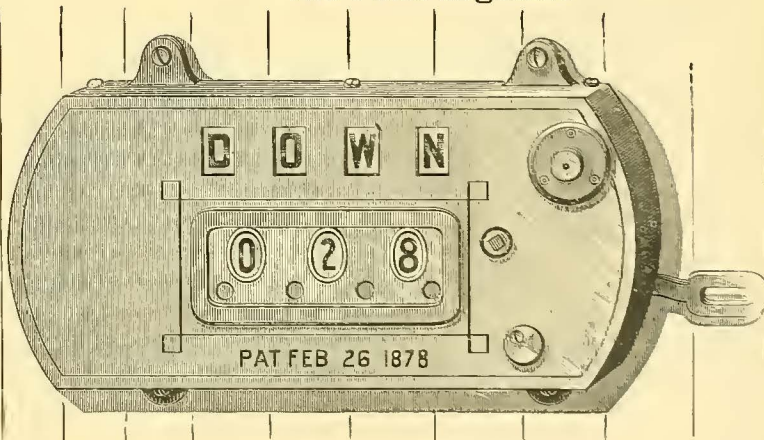


### The Monitor Register.



Railway companies desiring to use a Stationary Register will consult their own interest by examining this Register before adopting any of the cheap devices now offered as it is the most Reliable Register of its kind. For further particulars address

### The Pond Register.



**BEADLE & COURTNEY, Gen'l Agents, 1193 BROADWAY, NEW YORK.**  
Branch Office, 423 Walnut St, Ph'a

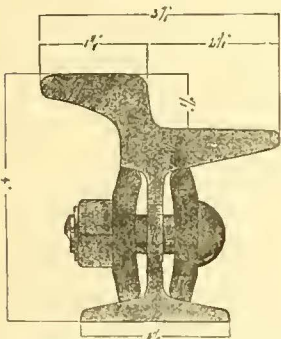
THE GIRDER SYSTEM OUR SPECIALTY.

THE

# Johnson Steel Street Rail Company.

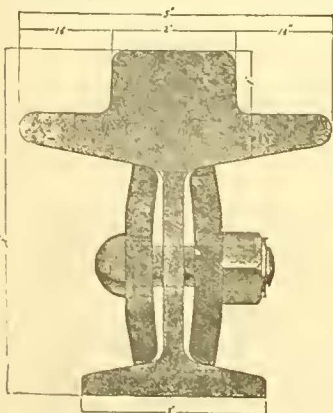
JOHNSTOWN, PA.

Section C. 38, No. 111.



Patented February 20, 1883.

Section E. 76, No. 117.



Patented January 29, 1884.

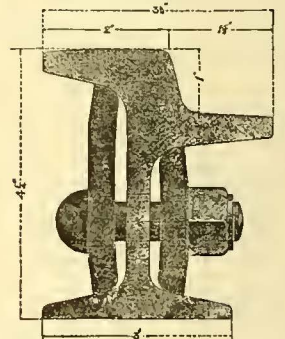
## SIDE BEARING GIRDER RAILS

OR

## CENTER BEARING GIRDER RAILS.

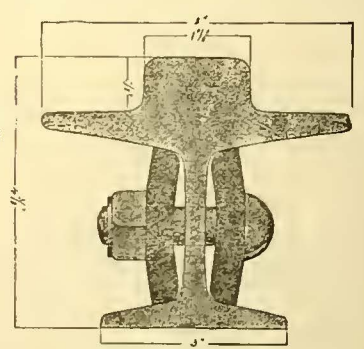
Large Assortment of different Weights and Sections.

Section D. 45, No. 11.



Patented November 27, 1882.

Section G. 58, No. 120.



Patented January 29, 1884.

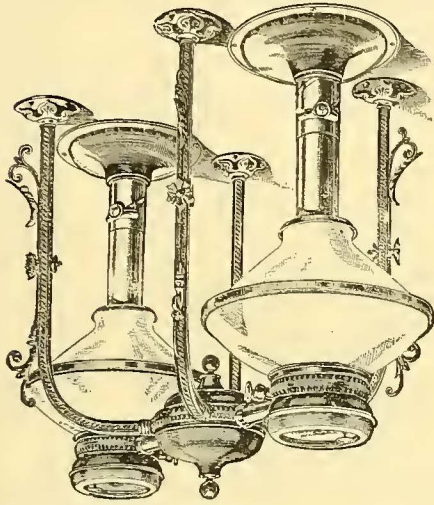
# Rolled Steel Switches, Frogs, Curve Crosses, Etc.

We Furnish Every Detail Wanted in Track Work.

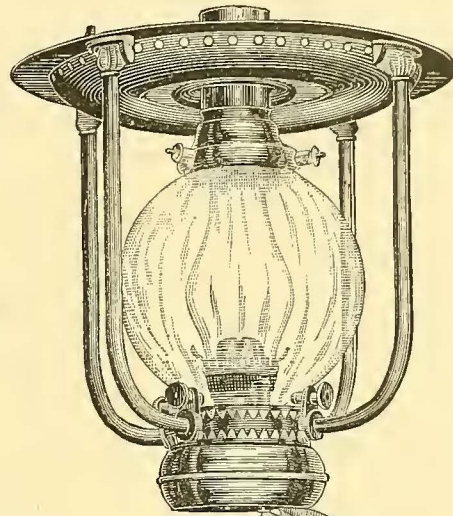
Our customers are guaranteed against all suits for infringements on goods purchased from us and we further undertake to defend the patents covering the details of our Girder System.

To those contemplating the use of the Girder System, we offer, FREE OF COST, to survey their routes, and after consultation as to the best and most economical construction, to furnish full and complete estimates of cost of the completed work. Send for Illustrated Catalogues.

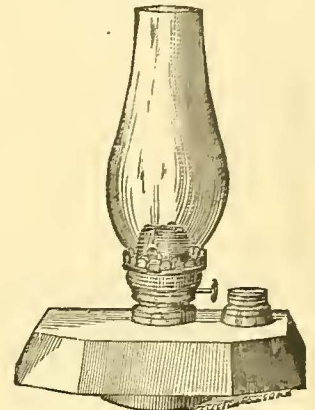
**JOSEPHINE D. SMITH, Successor to the late WILLARD H. SMITH,**  
 350 & 352 PEARL STREET, NEW YORK.



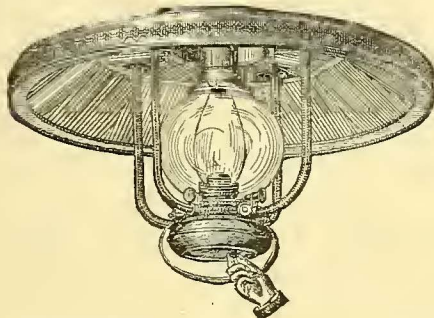
**No. 10.**  
 Two-light Car Lamp as used on Tenth Avenue (N.Y.) Cable Road.



**No. 2.**  
 Center Car Lamp in general use on Horse Railroads throughout the United States and Canada.



**No. 1.**  
 Tin Box Lamp, Brass Bottom.

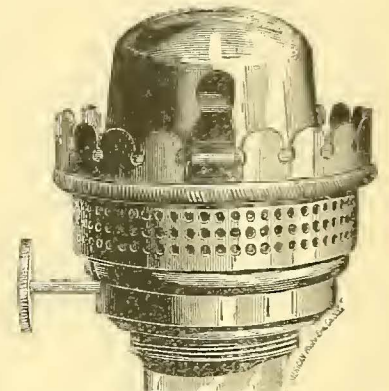


**No. 1.**  
 Center Car Lamp with 25 Inch Corrugated Glass Reflector.

MANUFACTURER OF  
 RAILROAD

**CENTER LAMPS & REFLECTORS.**

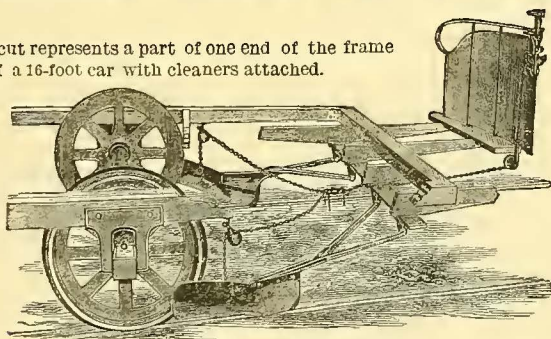
ALL KINDS OF TRIMMINGS PERTAINING  
 TO CAR LAMPS.



J. B. M. 2 Spring Burner.

**DAY'S IMPROVED STREET RAILWAY TRACK CLEANERS.**

The cut represents a part of one end of the frame work of a 16-foot car with cleaners attached.



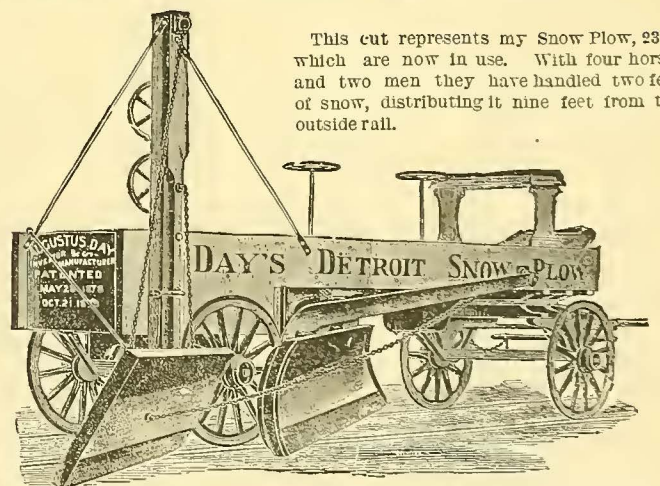
These Track Cleaners need no extended statement of their great superiority over all others invented. The fact of over three thousand pairs being now in use is sufficient evidence of their necessity and utility. Are adaptable to all kinds of rails and styles of cars. Clean Snow, Ice, Mud and Stones from the rail. The driver can raise or lower them instantly with one hand. To secure the largest benefit they should be attached to every car.

No estimate can be made of their advantage in saving of horseflesh hand labor, salt, and the making of time in stormy weather. Since their introduction new and valuable improvements have been made in their construction, mode of attachment, and convenience of handling. They are finished in a thorough, workmanlike manner of the best material obtainable, the design being to manufacture the most efficient article in preference to other considerations. Price includes right of use and is less than heretofore.

Reference is made to a few of the roads using these Cleaners.

Detroit City Ry., Detroit, Mich.	154	Pair
Chicago City Ry., Chicago, Ill.	400	"
Rochester City & Brighton R. R. Rochester, N. Y.	100	"
Albany Ry., Albany, N. Y.	75	"
Lynn & Boston R. R., Boston, Mass.	68	"
Boston Highland Ry., Boston, Mass.	46	"
Grand Rapids Street Ry.	48	"
Naumkeag Street Ry., Salem, Mass.	69	"
Bridgeport Horse Ry., Bridgeport, Conn.	40	"
Cream City Ry., Milwaukee, Wis.	40	"
Milwaukee City Ry., Milwaukee, Wis.	50	"
Buffalo Street Ry., Buffalo, N. Y.	32	"

This cut represents my Snow Plow, 23 of which are now in use. With four horses and two men they have handled two feet of snow, distributing it nine feet from the outside rail.



It is adapted to single or double track roads, adjustable where necessary; built in the most thorough and substantial manner of the best material. The Plow is not intended to supply the place of the small Track Cleaners, but be auxiliary to them. For execution in deep snow, ease, and convenience in handling, it surpasses all others in use. Orders should be given three month in advance.

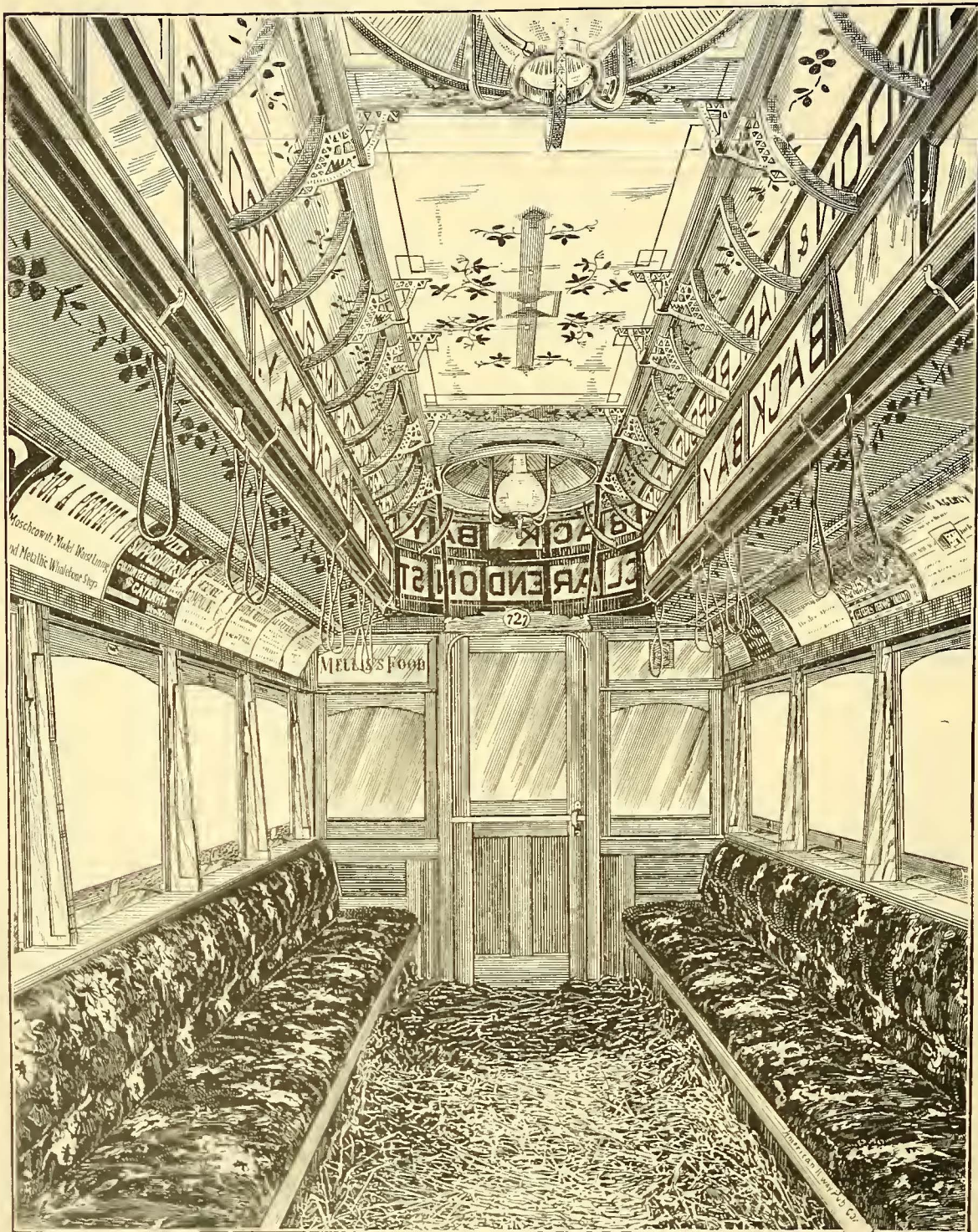
Reference is made to the following roads that use them:—Detroit City Ry., Detroit, Mich. (Two plows.) Rochester City & Brighton R.R., Rochester, N. Y. (Two plows.) Cream City Ry., Milwaukee, Wis. West Side Street Ry., Milwaukee, Wis. Chicago City Ry., Chicago, Ill. (Three plows.) Grand Rapids Street Ry., Grand Rapids, Mich. Highland St. Ry., Boston, Mass. Buffalo St. Ry., Buffalo, N. Y. (Two plows.) Johnstown Pass. Ry., Johnstown, Pa. Minneapolis St. Ry., Minneapolis, Minn. (Two plows.) St. Paul St. Ry., St. Paul, Minn. (Two plows.) Kalamazoo St. Ry., Kalamazoo, Mich. Worcester St. Ry., Worcester, Mass. South Bend Ry., South Bend, Ind. Milwaukee City Ry., Milwaukee, Wis.

For Further Information and Price, Address:

**AUGUSTUS DAY, 76 State Street, cor. Park Place, - - - - - Detroit, Michigan, U. S. A.**

# The United States Steam and Street Railway Advertising Company, Limited,

Sole Agents For The Blackmer Vibrating Sign.



Sole Agents For The Randall Car Advertising Rack.

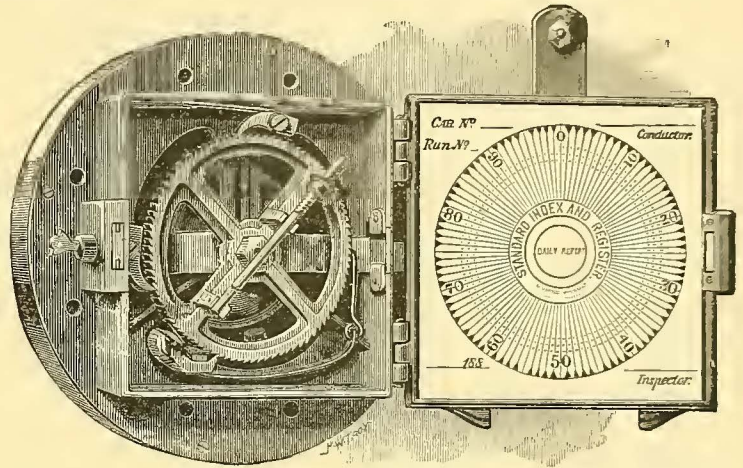
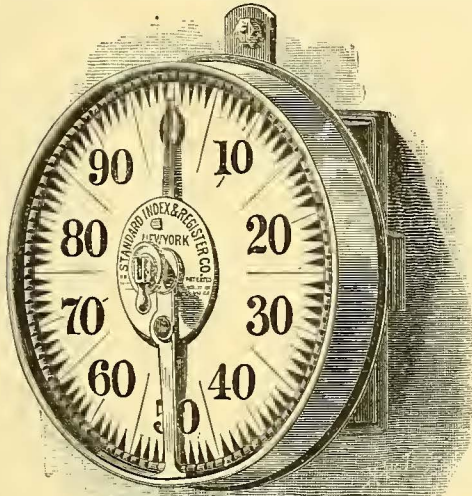
## Contractors For Advertising Space in Street Railway Cars.

WM. F. CARLETON, Manager, 239 Broadway, N. Y.

P. O. BOX 2366.

# THE STANDARD INDEX & REGISTER CO., NEW YORK, SOLE LICENSEES AND MANUFACTURERS OF THE STANDARD INDEX AND REGISTER, ADOPTED BY THE LEADING RAILROADS IN THE UNITED STATES,

For Indelibly Recording upon paper the number of trips made, and passengers carried for each trip as well as for any number of trips for any period of time, and sounding an alarm simultaneously with each registration made.



The recent decision of the U. S. Circuit Court in our favor after three years of litigation in which the Standard was involved, justifies us in accepting orders from railway companies generally for our Registers, which are celebrated for simplicity efficiency and *infallibility* as an indicating and recording register.

It will appear obvious upon inspection that the Standard Register is the only device that should be adopted by railway companies anxious to secure a correct report and record of trips made and fares collected, for the reason that, in addition to the visual dial and indicator, a permanent registration of each trip made, and the exact number of fares collected or passengers carried, is automatically made by mechanical means upon paper, by which the latter is punctured in a manner that prevents obliteration, and can be preserved in the office of the company for reference and comparison with fares turned in by the conductor, and for filing for future purposes.

## TESTIMONIALS.

METROPOLITAN RAILROAD COMPANY.  
PRESIDENT'S OFFICE. C. A. RICHARDS, 16 KILBY STREET,

Boston, March 9, 1883.

ELI BALDWIN, Esq., Prest. Standard Index & Register Co.,  
New York, N. Y.

Dear Sir,—In answer to your inquiry of March 8 I would most respectfully state, that after a trial of some months of the two hundred odd registers that you have placed in our cars, I feel that I do no more than exact justice to your company in giving you in the strongest and most unqualified manner my entire approval of them. They are in every way all that you claimed, and all that you promised me they would prove to be. In short, I like them. They answer my purpose completely, and I would not exchange or part with them for any other device of the kind I have yet seen.

Very respectfully yours, &c.,  
C. A. RICHARDS,  
President Metropolitan Railroad Co.

C. A. RICHARDS, President. CHAS. BOARDMAN, Treas. W. P. HARVEY, Secy.  
OFFICE OF

THE METROPOLITAN RAILROAD COMPANY,  
No. 16 KILBY STREET,

Boston, March 23, 1886.  
E. BALDWIN, Esq., Prest. Standard Index and Register Co.:

Dear Sir,—We have now in daily use *four hundred and twenty-five* of your registers. They have by repeated purchases come to this number. We like the registers very much, and have no fault to find with them. With an experience of four years we feel that we are justified in recommending them.

Very respectfully yours, &c.,  
C. A. RICHARDS, President.

CENTRAL PARK, NORTH & EAST RIVER RAILROAD COMPANY.  
G. Hilton Scribner, Prest. C. Densmore Wyman, Vice Prest. J. L. Valentine,  
Secy. and Treas. W. N. A. Harris, Supt.  
OFFICE, 10TH AVENUE, 53D AND 54TH STREETS,  
NEW YORK, August 31, 1882.

The Standard Index Register instruments purchased from you about a year and a half ago have since that time been in constant use upon the cars of this line, and I am very free to acknowledge their superiority over any device hitherto tried by us. We believe from our experience that in their construction

and result they attain the object sought with accuracy and at the same time with a minimum liability to external tampering or dishonest manipulation.  
Very respectfully,  
C. DENSMORE WYMAN, Vice President.

CENTRAL PARK, NORTH & EAST RIVER RAILROAD COMPANY  
G. Hilton Scribner, Prest. C. Densmore Wyman, Vice Prest. J. L. Valentine,  
Treas. Howard Scribner, Secy. W. N. A. Harris, Supt.  
TENTH AVENUE, 53D AND 54TH STREET,

NEW YORK, March 24, 1886.  
ELI BALDWIN, Esq., Prest. Standard Index & Register Co.,  
138 Fulton Street, New York:

My Dear Sir,—We have used about 150 of your "Standard Index Registers" for the past five years and such use has demonstrated their entire utility and adaptation for the purposes intended in their construction. We are more than satisfied with them, finding that by reason of the simplicity of their construction they require hardly any repairs, while they are accurate and reliable and at the same time by virtue of the inside paper dial are free from the danger of being tampered with. In a word we are thoroughly satisfied with the Standard and it is but just to you that I should express this opinion to you.  
Very sincerely yours,  
C. DENSMORE WYMAN, Vice President.

OFFICE OF  
THE BROADWAY AND SEVENTH AVENUE RAILROAD COMPANY,  
COR. 7TH AVE. AND 50TH STREET,

NEW YORK, March 25, 1886.  
ELI BALDWIN, Esq., Prest. Standard Index & Register Co.:  
Dear Sir,—Concerning your inquiry as to the result of our experience in the use of the Standard Register furnished by your company and the satisfaction given I will state that after five years' test during which they have been in use on the cars of our roads, we have found them the embodiment of all that you have claimed, and I cheerfully endorse them as the best registers that we have ever seen, and have found them reliable and not easily put out of order. In short we would not be without them. The paper register or tablet upon which registrations are recorded of the number of passengers carried and trips made is an invaluable feature, producing as it does an infallible and indelible record of fares collected, serving as a check where a division of trust is questioned. We have upwards of two hundred of your Registers on the cars of our roads at the present time.  
Very Truly Yours,  
J. W. FOSBAY, President.

# STANDARD INDEX & REGISTER COMPANY, 138 Fulton St., N. Y.

# RICHARD VOSE,

13 Barclay Street, . . . New York,

PATENTEE AND MANUFACTURER OF

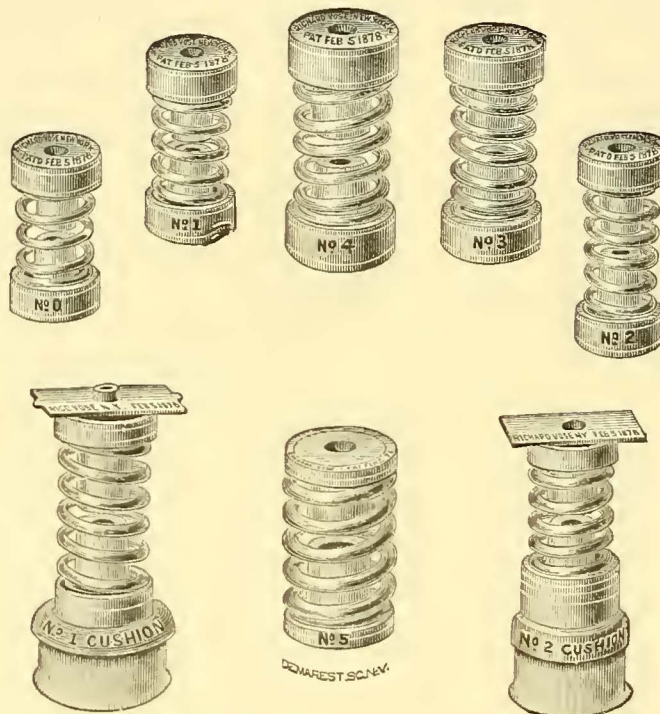
## Graduated Street Car Springs.

### RUBBER CONE.

Patented, April 15th, 1879.

ADAPTED TO THE

STEPHENSON,  
 BEMIS,  
 RANDALL,  
 HIGLEY,  
 BRILL,  
 JONES,  
 BALTIMORE  
 VOLK  
 And all other Boxes.



No. 0, for 10-ft. Light Cars.  
 No. 1, for 10-ft. Cars.  
 No. 2, for 12-ft. Cars.  
 No. 3, for 14-ft. Cars.  
 No. 4, for 16-ft. Cars.  
 No. 5, for 16-ft. Cars.  
 (Single Pedestal.)  
 No. 1, Cushion, for 16-ft. Cars.  
 No. 2, Cushion, for 12 and 14-ft. Cars.

## TESTIMONIAL.

MIDDLESEX RAILROAD CO., BOSTON, MASS.  
 RICHARD VOSE, Esq. Dear Sir,—We have had in constant use upon this road for several years the "Vose Graduated Spring," and they have given very general satisfaction. So much so that we shall continue to order them. Very truly,  
 CHAS. E. POWERS, Prcst.

NO. CHICAGO CITY RY. CO., CHICAGO, ILL.  
 RICHARD VOSE, Esq. Dear Sir,—This company has had in use for the past seven or eight years your Patent Graduated Car Spring, and our experience leads us to the conclusion that they are all in every respect which you represent them to be. And certainly all that we desire. Yours Respectfully,  
 V. C. TURNER, Prest.

B'DWAY & 7TH AVE. R.R. CO., NEW YORK CITY.  
 MR. RICHARD VOSE. Dear Sir,—We have 125 cars equipped with your Graduated Springs. They have given entire satisfaction. They are undoubtedly the best in the market. Very Resply,  
 J. W. FOSHAY, Prest.

BROOKLYN CITY R.R. CO., BROOKLYN N. Y.  
 RICHARD VOSE, Esq. Dear Sir,—Yours of May 27 to Mr. Hazzard, Prest., has been referred to me for reply. And would say that we have now in use about 600 sets of your Patent Graduated Car Springs. And up to date have given perfect satisfaction. Yours truly,  
 A. N. DICKIE, Supt.

CHICAGO CITY RY. CO., CHICAGO, ILL.  
 RICHARD VOSE, Esq. Dear Sir,—Replying to your favor of a recent date I beg to say that we have been

using your Graduated Car Springs since 1881 and have increased the number, until at the present time we are using 369 sets, and the same have invariably proved satisfactory. Yours truly,  
 C. B. HOLMES, Supt.

CAMBRIDGE R.R. CO., CAMBRIDGE, MASS.  
 COL. RICHARD VOSE. Dear Sir,—We have used your Graduated Street Car Springs for several years and I need only say with such success that we continue to use them. Very Resply,  
 W. A. BANCROFT, Supt.

CINCINNATI I. P. R. R. CO., CINCINNATI, O.  
 RICHARD VOSE. Dear Sir,—Send us 6 more sets of your new pattern Car Spring, same as the lot we ordered of you last Sept. in every way. This is the best answer we can make to your question of "How we like them." Yours truly, J. M. DOHERTY, Supt.

LYNN & BOSTON R.R. CO., CHELSEA, MASS.  
 RICHARD VOSE, Esq. Dear Sir,—All I can say in favor of the Vose Spring is that we continue to apply them to most of our new cars. Have about 60 cars equipped and think very well of them. If they could be produced for less money should think better of them. Very Respectfully Yours, E. C. FOSTER, Supt.

CREAM CITY R.R. CO., MILWAUKEE, WIS.  
 Gentlemen,—Yours of May 23 at hand, with regard to your Car Springs. We find they are the best in use. They come a little higher than the Barrel Spring, but they are much the better springs. Yours truly,  
 H. J. C. BERG, Supt.

LOWELL HORSE R.R. CO., LOWELL, MASS.  
 TO WHOM IT MAY CONCERN: We have used the Rich ard Vose Graduated Car Springs for several years, and are well pleased with them. Should be unwilling to change them for any other. All of our cars use these springs. Yours Respectfully,  
 J. A. CHASE, Treas.

DAYTON STREET R.R., DAYTON, O.  
 MR. RICHARD VOSE. Sir,—We have eighteen cars equipped with your Patent Graduated Spring, and will use your springs to replace all other kinds as fast as repairs are needed. Your springs give the best satisfaction to our company and patrons of any that we have ever tried. Yours Respectfully,  
 A. W. ANDERSON, Supt.

FT. WAYNE & ELMWOOD RY. CO., DETROIT, MICH.  
 RICHARD VOSE, Esq. Dear Sir,—For the past four years we have been using your Graduated Springs on all of our cars (30). Our Superintendent says that none of them have ever had to be repaired and that they are the best springs we ever used. Yours truly,  
 N. W. GOONWIN, Secy.

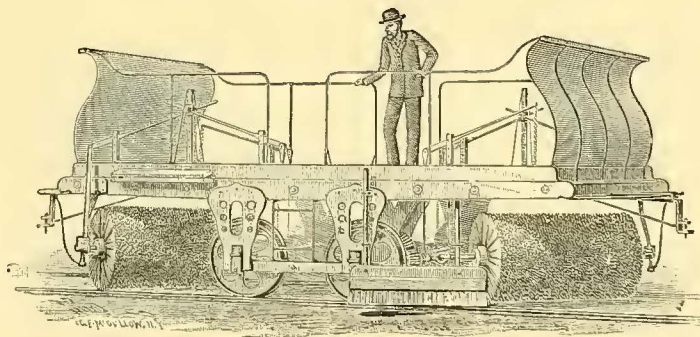
DETROIT CITY RY., DETROIT, MICH.  
 RICHARD VOSE, Esq. Dear Sir,—I have your favor of the 29th ultimo. We have about 70 cars equipped with your springs. Our experience is that they wear well and give general satisfaction. Yours truly,  
 GEO. HENDRIE, Treas.

# THE BROOKLYN RAILWAY SUPPLY COMPANY.

37 WALWORTH ST., BROOKLYN, N. Y.,  
U. S. A.

## RAILWAY SUPPLIES.

Yellow Pine Timber for Track Construction of Best Quality. Knee Spikes and Joint Plates.  
Rail Spikes at Lowest Manufacturer's Prices, Made to Order, to Fit any Rail.  
Any Kind of Materials Promptly Furnished Responsible Parties and Satisfaction Guaranteed.  
Second-hand Cars Selected by Experts for Parties at a Distance on Small Commission.



### SPECIALTIES.

Latest Improved Snow Sweepers of OUR OWN MANUFACTURE. Now used in nearly all the principal Northern cities. Rattan for refilling Brooms. Snow Plows. Sand Cars.

We have several Sweepers of other makers, taken in exchange, which will be sold, thoroughly refitted, very low on early orders. Rattan lower than ever before; write for prices.

**CORRESPONDENCE SOLICITED.**

# THE LEWIS AND

27 to 35 Walworth Street, and 31 to 37, and

PATENTEES & MANUFACTURERS OF

THE

## IMPROVED

USED BY RAILWAY COMPANIES IN ALL

PARTS OF THE COUNTRY.

⊖ “ALARM” ⊖

KEPT IN REPAIR ONE YEAR  
FREE OF CHARGE.

## PASSENGER

GUARANTEED THE MOST COMPLETE  
MACHINE IN THE U. S. FOR  
THE PURPOSE.

## REGISTER.

### SPECIAL NOTICE

MANAGERS OF STREET RAILWAYS, WHEN VISITING THE EAST SHOULD SEE THE LARGE OPEN CARS ON THE PAVONIA HORSE RAILROAD, JERSEY CITY, WHICH ARE RUN BY THE DRIVER AND “SMALL'S AUTOMATIC FARE COLLECTOR.” THEY ARE TWENTY-TWO FEET LONG, SEAT THIRTY-FOUR PASSENGERS, AND FREQUENTLY CARRY SEVENTY AT A LOAD.

The Lewis & Fowler Manufacturing Company, Sole Agents.

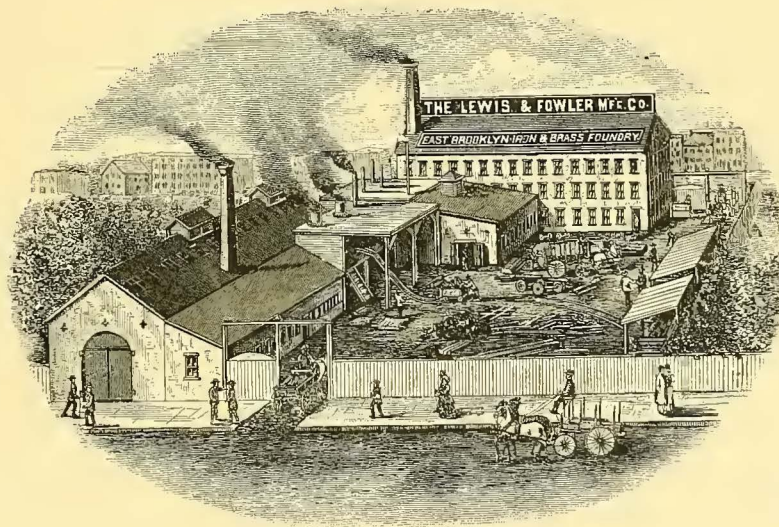


# FOWLER MFG Co.

32 to 40 Sandford Street, BROOKLYN, N. Y.

## Materials Furnished for Street and Cable Railway Construction

Knees  
 Spikes  
 Channel Plates  
 Frogs  
 Points  
 Tongue Switches  
 Grooved Rails for  
 Curves  
 Bent any desired radius.



Pedestals  
 Oil Boxes  
 Brake Shoes  
 Wheels and Axles  
 Brass Bearings  
 Turntables  
 Snow Sweepers  
 Plows  
 Etc. etc. etc.

## RAILROAD CASTINGS

Of every description and most approved patterns.

## FOWLER'S IMPROVED RANDALL BOX & RUNNING GEAR.

# ACKNOWLEDGED THE BEST!

## 115 R. R. Companies

USING THE

# “ALARM” PASSENGER REGISTER.

## THE LEWIS & FOWLER MANUFACTURING CO., PATENTEES & MANUFACTURERS.

AWARDED THE HIGHEST PRIZE MEDAL AT CHICAGO, ILL., 1883.

### READ THE LIST.

Albany Ry. Co.....	Albany, N. Y.
Allentown Pass. Ry. Co.....	Allentown, Pa.
Austin City Ry. Co.....	Austin, Tex.
Ashtabula City Ry. Co.....	Ashtabula, Ohio.
Brooklyn City R. R. Co.....	Brooklyn, N. Y.
Brooklyn, Bushwick & Queens Co. R. R.....	Brooklyn, N. Y.
Broadway R. R. Co.....	Brooklyn, N. Y.
Bushwick R. R. Co.....	Brooklyn, N. Y.
Bradford & Kendall St. R. R.....	Bradford, Pa.
Bay City R. R. Co.....	Bay City, Mich.
Baltimore Pass. R. R. Co.....	Baltimore, Md.
Baltimore Stage Co.....	Baltimore, Md.
Baltimore & Hall Springs R. R. Co.....	Baltimore, Md.
Baltimore City Pass. Ry. Co.....	Baltimore, Md.
Boone & Boonesboro Pass. Ry. Co.....	Boone, Iowa.
Brooklyn Crosstown R. R. Co.....	Brooklyn, N. Y.
Columbus Consolidated St. Ry. Co.....	Columbus, O.
Central Pass. Ry. Co.....	Pittsburgh, Pa.
Citizens Pass. Ry. Co.....	Pittsburgh, Pa.
City Ry. Co.....	Trenton, N. J.
Cass Av. & Fair Grounds R. R. Co.....	St. Louis, Mo.
Crescent City Ry. Co.....	New Orleans, La.
City & Suburban Ry. Co.....	Savannah, Ga.
Cedar Rapids & Marion St. R. R. Co.....	Cedar Rapids, Iowa.
Citizens R. R. Co.....	Baltimore, Md.
Chester St. Ry. Co.....	Chester, Pa.
Citizens Pass. R. R. Co.....	St. Louis, Mo.
Coney Island & Brooklyn R. R. Co.....	Brooklyn, N. Y.
Dry Dock, E. B'way & Battery R. R. Co.....	N. Y. City.
Detroit City Ry. Co.....	Detroit, Mich.
Denver City Ry. Co.....	Denver, Col.
Duluth City R. R. Co.....	Duluth, Minn.
East Genesee St. R. R. Co.....	Syracuse, N. Y.
Evansville St. R. R. Co.....	Evansville, Ind.
Elyton Land Co.....	Birmingham, Ala.
Fourth Ave. Railroad Co.....	N. Y. City.
Forest Park, Laclède & Fourth St. Railroad Co.....	St. Louis, Mo.
Fifth Ward Railroad Co.....	Syracuse, N. Y.
Front & Union St. Railroad Co.....	Wilmington, Del.
Forty Second St., M. & St. N. Av. Railroad Co.....	N. Y. City.
Grand St. & Newtown Railroad Co.....	Brooklyn, N. Y.
Greenpoint & Lorimer St. Railroad Co.....	Brooklyn, N. Y.
Grand River Railroad Co.....	Detroit, Mich.

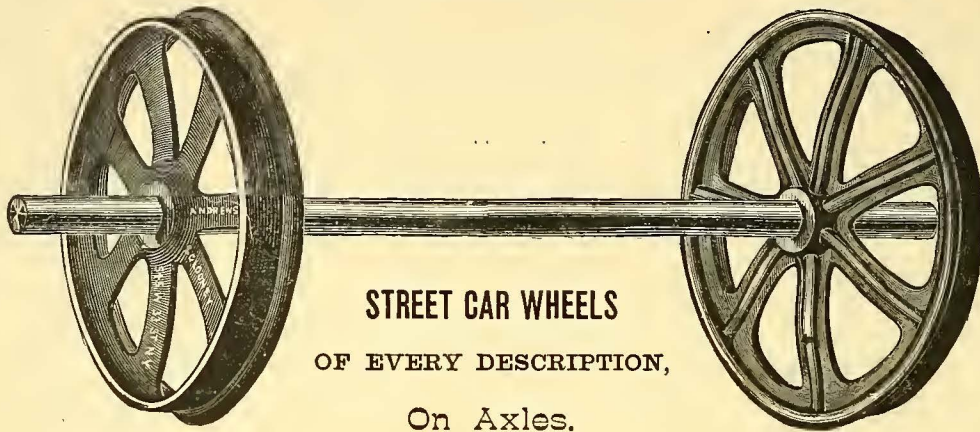
## LIST OF 115 RAILROAD COMPANIES USING "ALARM" PASSENGER REGISTER, CONTINUED.

Greenbush Horse Railroad Co.....	Greenbush, N. Y.
Hestonville, Mantua & Fairmount Park Railroad .....	Philadelphia, Pa.
Harlem Bridge, Fordham & Morrisania Railroad.....	N. Y. City.
Incline Plane Railroad Co.....	Cincinnati, O.
Interstate Rapid Transit Railroad.....	Wyandotte, Kansas
Jefferson Ave. Railroad Co.....	St. Louis, Mo.
Jersey City & Bergen Railroad Co.....	Jersey City, N. J.
Jackson Co. Railroad Co.....	Kansas City, Mo.
Jacksonville St. Railroad Co.....	Jacksonville, Fla.
Jamaica & Brooklyn Railroad Co.....	Brooklyn, N. Y.
Keokuk St. Railroad Co.....	Keokuk, Iowa.
Lindell St. Railroad Co.....	St. Louis, Mo.
Lombard & South St. Railroad Co.....	Philadelphia, Pa.
Long Island City & C. C. Railroad.....	L. I. City, N. Y.
Long Island Rapid Transit Railroad.....	Brooklyn, N. Y.
La Crosse City Railroad Co.....	La Crosse, Wis.
Metropolitan Railroad Co.....	Boston, Mass.
Mound City Railroad Co.....	St. Louis, Mo.
Missouri Railroad Co.....	St. Louis, Mo.
Minneapolis Ry. Co.....	Minneapolis, Minn.
Monumental Pass. Ry. Co.....	Baltimore, Md.
Metropolitan Railroad Co.....	Atlanta, Ga.
Manchester Horse Railroad Co.....	Manchester, N. H.
North Hudson Co. Railroad Co.....	Hoboken, N. J.
Northern Central Pass. Ry. Co.....	St. Louis, Mo.
Norfolk City Ry. Co.....	Norfolk, Va.
New Bedford & Fair Haven Railroad Co.....	New Bedford, Mass.
New Williamsburgh & Flatbush Railroad Co.....	Brooklyn, N. Y.
Naumkeag St. Ry. Co.....	Salem, Mass.
Niagara Falls & S. B. Railroad Co.....	Niagara Falls.
North Hudson Co. Elevated Railroad.....	Hoboken, N. J.
Oakland and East Liberty Railroad.....	Pittsburgh, Pa.
Oneida Railroad Co.....	Oneida, N. Y.
P. P. & Coney Island Railroad Co.....	Brooklyn, N. Y.
Pittsburgh & Birmingham Railroad Co.....	Pittsburgh, Pa.
Pittsburgh, Alleghany & Manchester Railroad Co.....	Pittsburgh, Pa.
Pavonia Horse Railroad.....	Jersey City.
Philadelphia & Grays Ferry Railroad.....	Philadelphia, Pa.
People's Pass. Railroad Co.....	Philadelphia, Pa.
Philadelphia Traction Co.....	Philadelphia, Pa.
People's Pass. Railroad Co.....	St. Louis, Mo.
Petersburg Horse Railroad Co.....	Petersburg, Va.
People's Pass. Railroad Co.....	Baltimore, Md.
Paterson & Passaic Horse Railroad.....	Paterson, N. J.
Pawtucket St. Railroad.....	Pawtucket, R. I.
Quebec St. Railroad Co.....	Quebec, Canada.
Richmond City Railroad Co.....	Richmond, Va.
Rochester City & Brighton Railroad.....	Rochester, N. Y.
St. Louis C. & Western Railroad.....	St. Louis, Mo.
Steinway & H. P. Railroad Co.....	Steinway, L. I.
Springfield City Ry. Co.....	Springfield, Ill.
South Brooklyn Central Railroad Co.....	Brooklyn, N. Y.
Second Ave. Railroad Co.....	N. Y. City.
St. Paul Ry. Co.....	St. Paul, Minn.
Syracuse & Geddes Railroad Co.....	Syracuse, N. Y.
Springfield City Railroad Co.....	Springfield, Mo.
Sixth Ave. Railroad Co.....	N. Y. City.
Wilmington City Railroad Co.....	Wilmington, Del.
Salem & Danvers Railroad Co.....	Salem, Mass.
Seventh Ward Railroad Co.....	Syracuse, N. Y.
South Side St. Pass. Ry. Co.....	Pittsburgh, Pa.
Transverse Railroad Co.....	Pittsburgh, Pa.
Topeka City Railroad Co.....	Topeka, Kan.
Trenton Horse Railroad Co.....	Trenton, N. J.
Twin City & Des Moines Railroad.....	Des Moines, Iowa.
Third Ave. Railroad Co.....	N. Y. City.
Union Pass. Ry. Co.....	Pittsburgh, Pa.
Union Pass. Ry. Co.....	Philadelphia, Pa.
Union Pass. Ry. Co.....	St. Louis, Mo.
Union Pass. Ry. Co.....	St. Joseph, Mo.
Union Depot Ry. Co.....	St. Louis, Mo.
Washington Herdic Phaeton Co.....	Washington, D. C.

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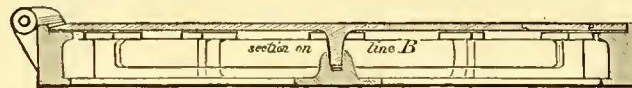
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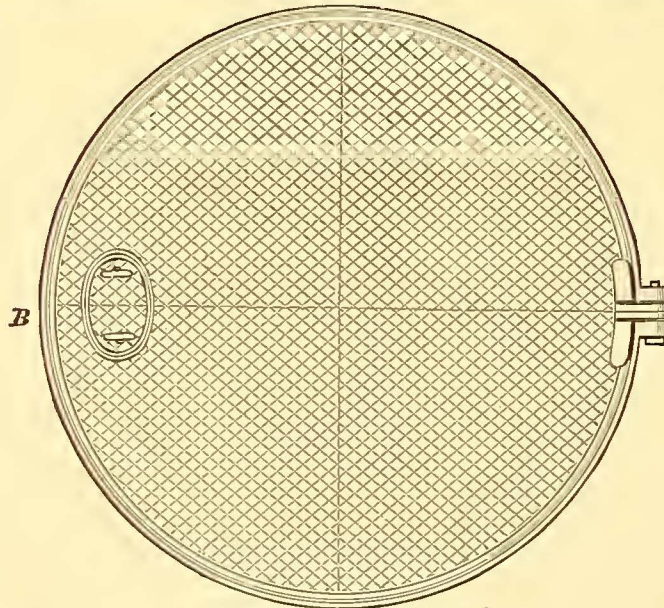
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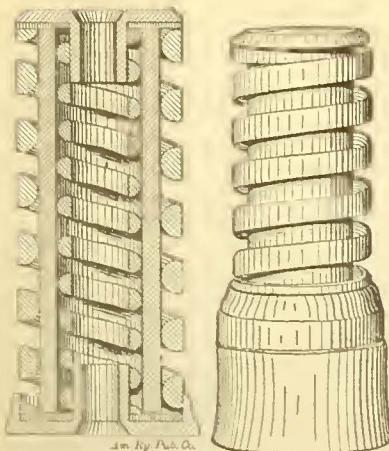
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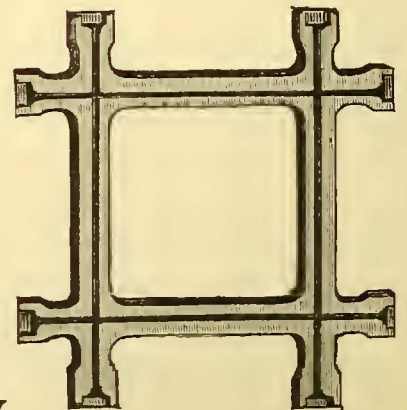
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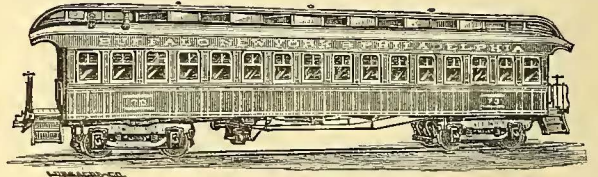
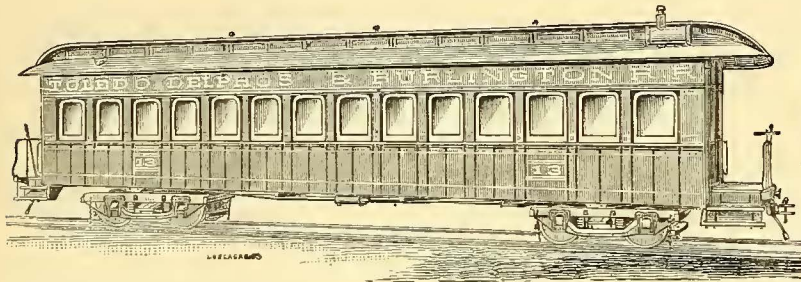
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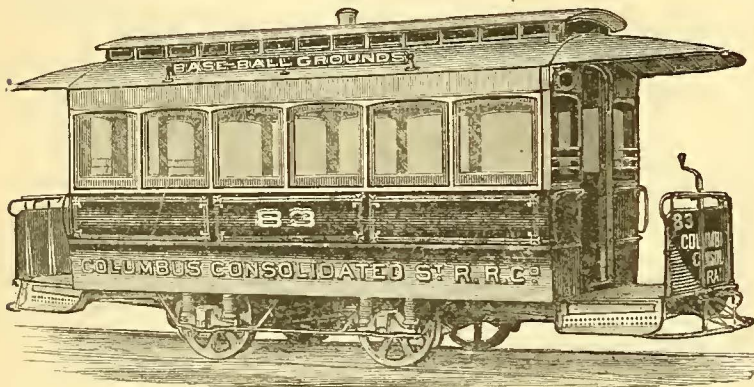
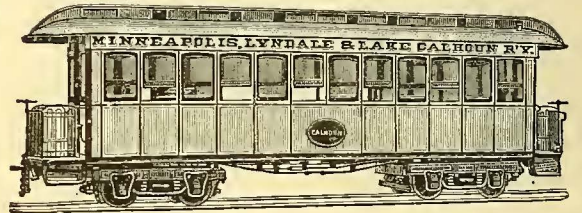
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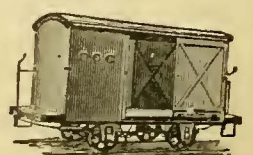
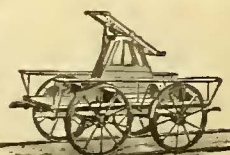
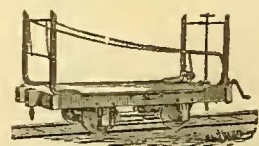
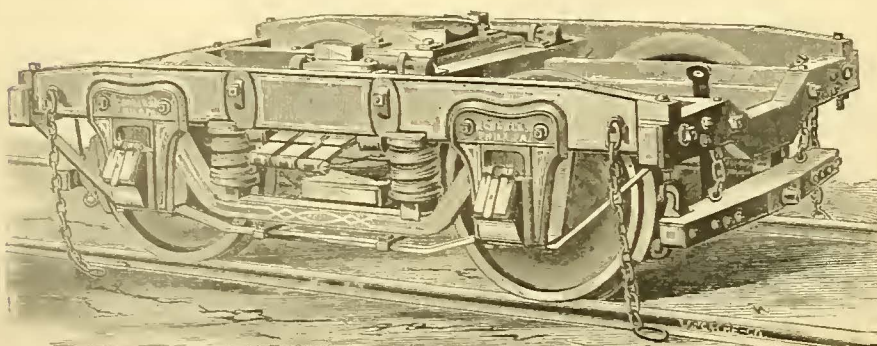
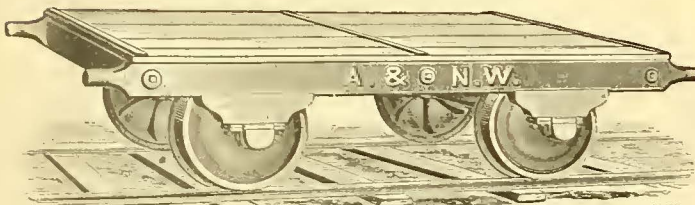
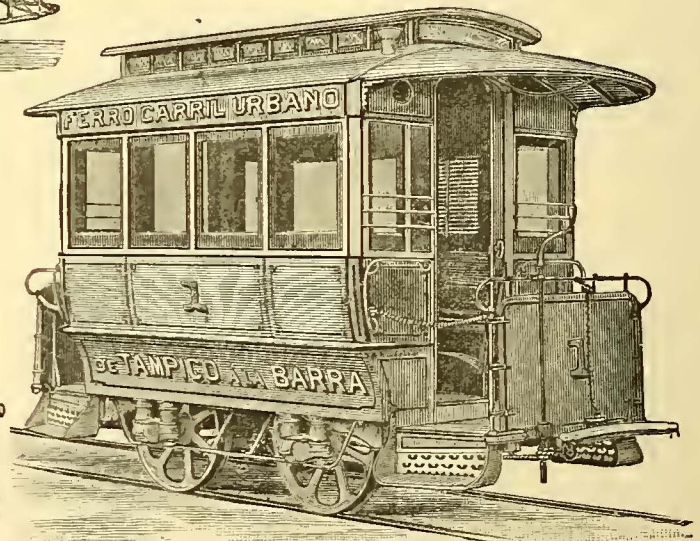


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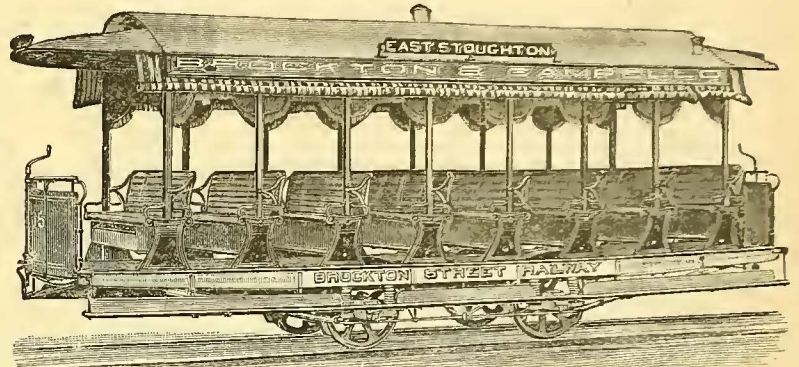
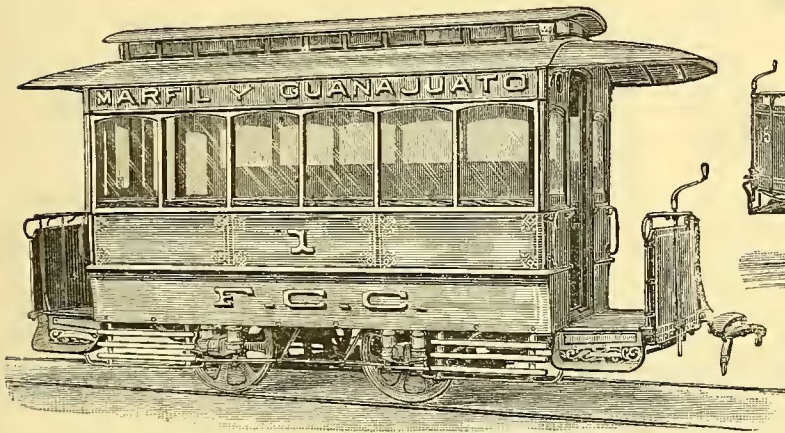


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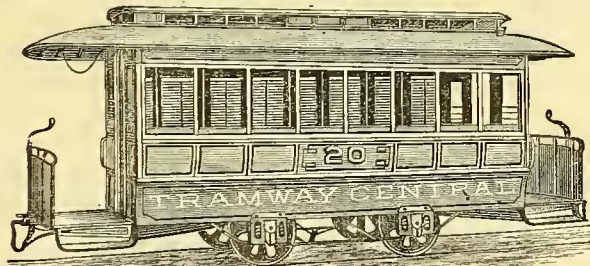
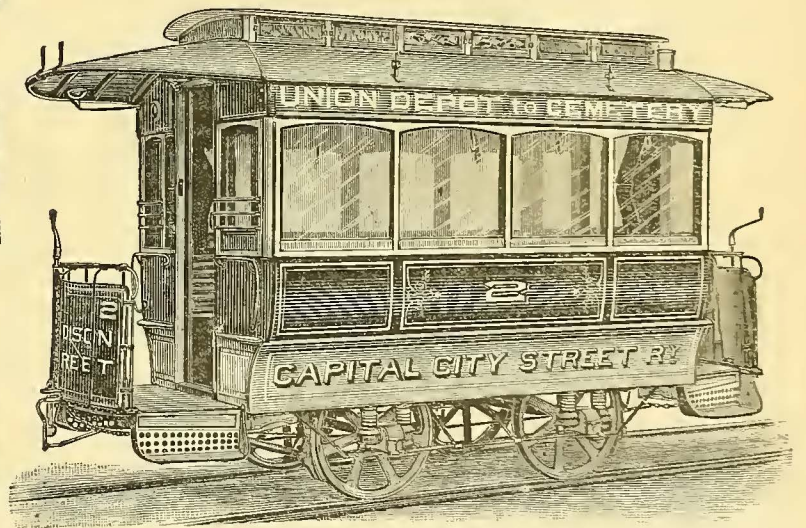
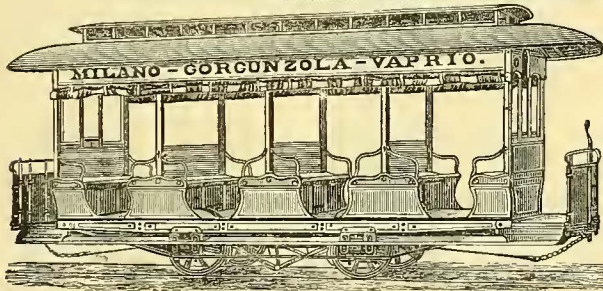
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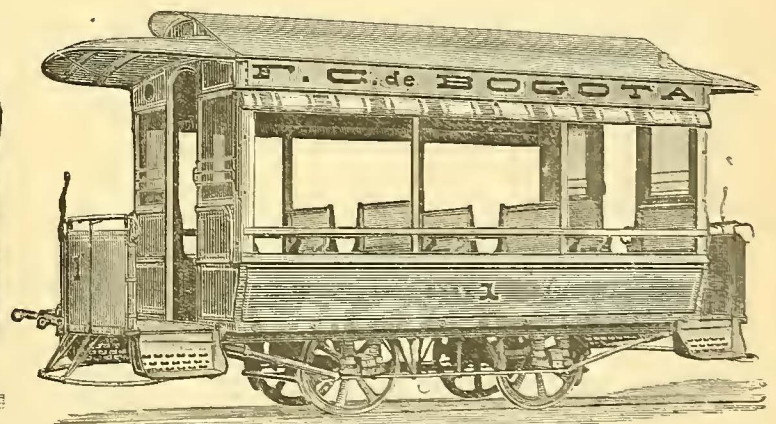
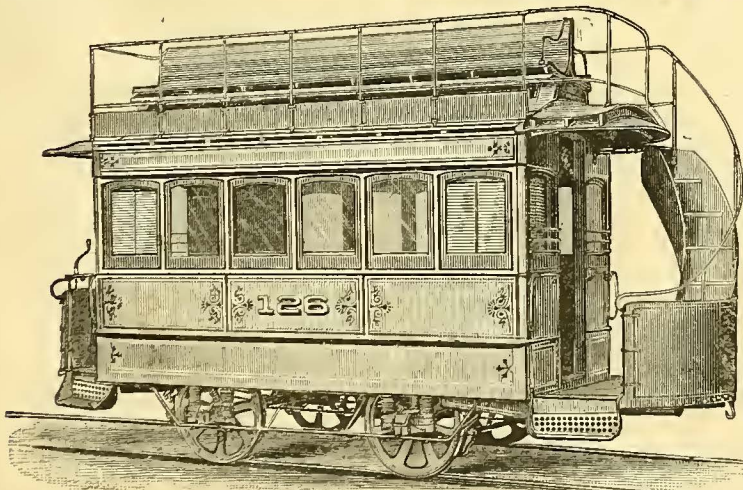
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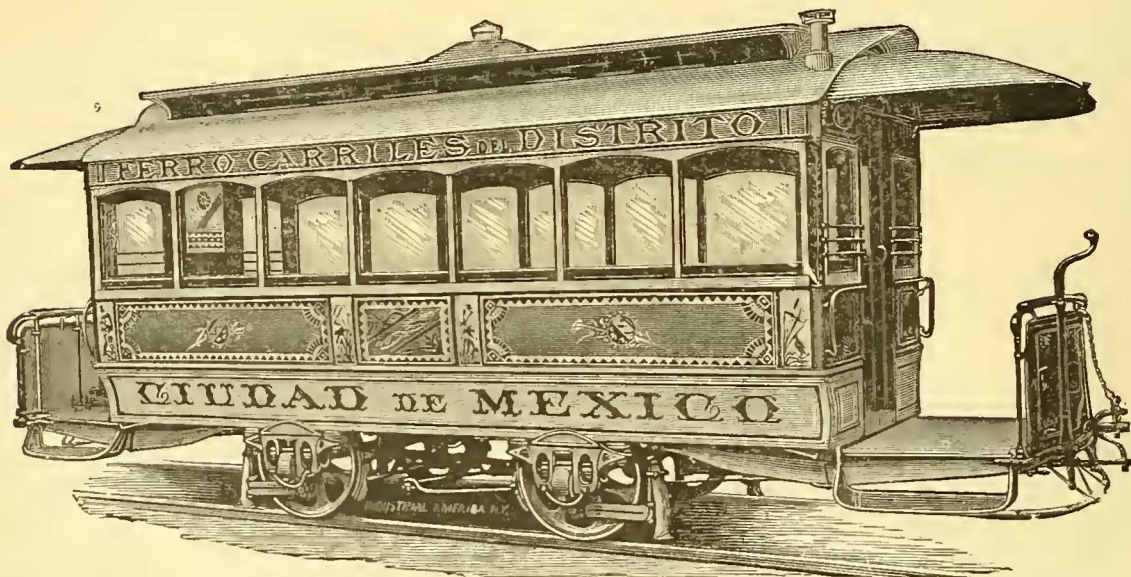
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