2 Sheets—Sheet 1.

A. E. BEACH.

Street Railroad.

No. 42,039. Patented Mar. 22, 1864.

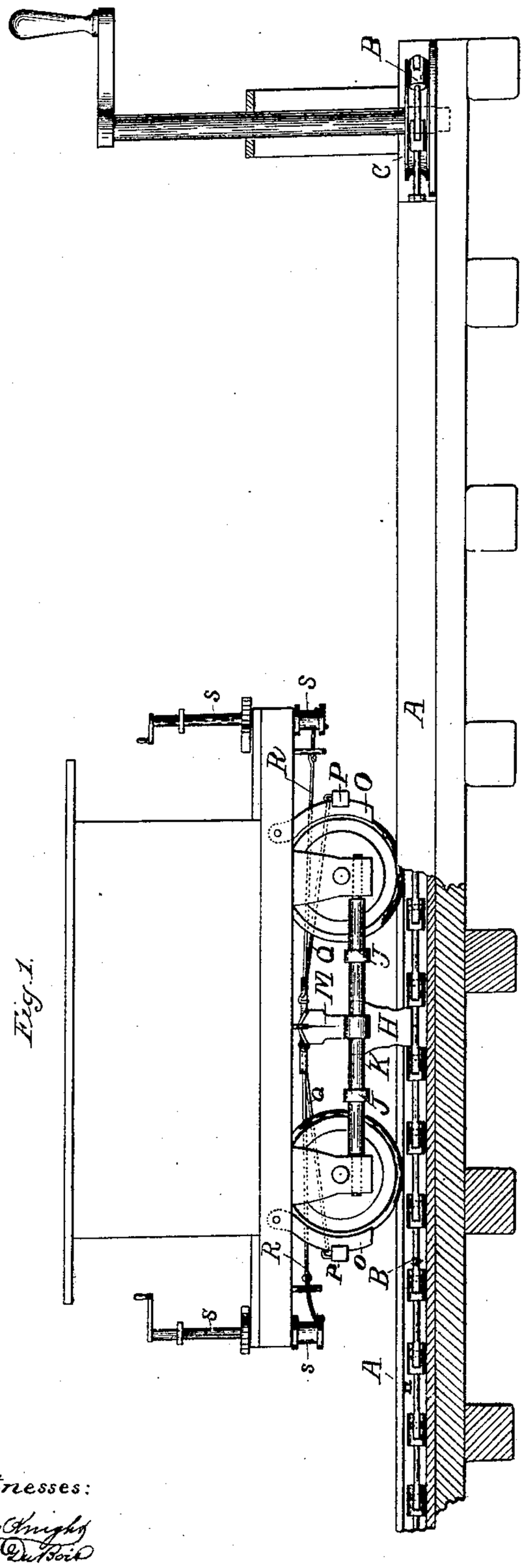

Fig. 1.

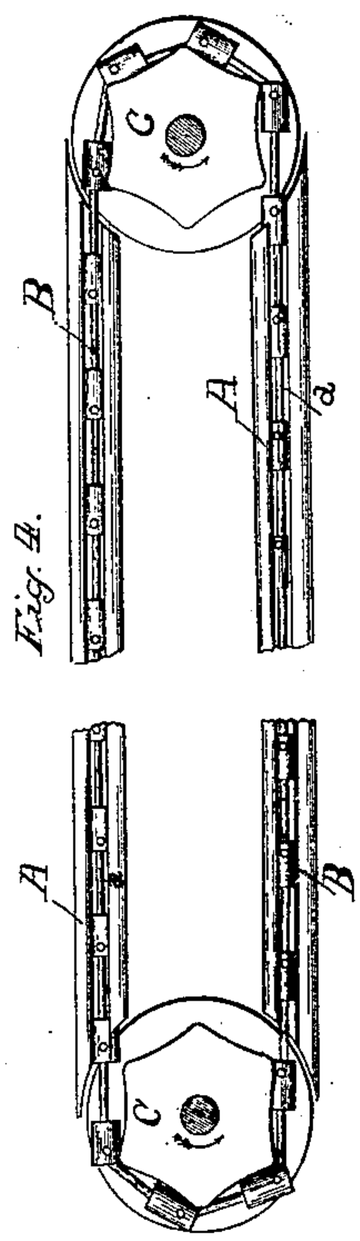

Fig. 4.

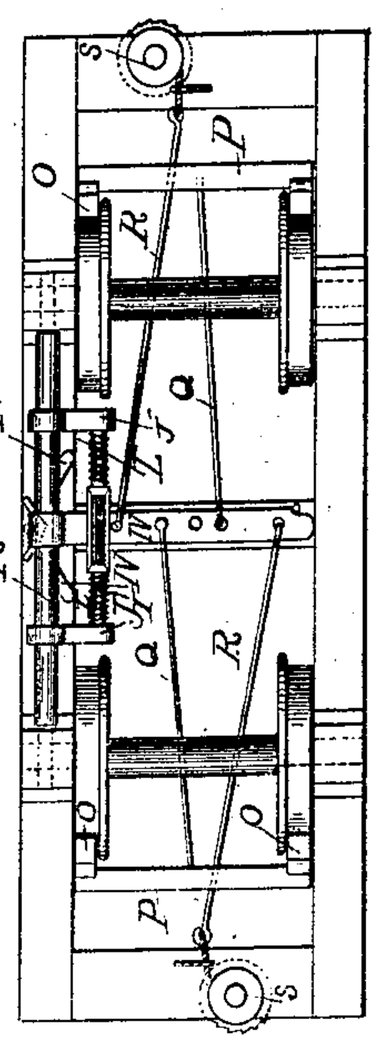

Fig. 2.

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Fig. 6.

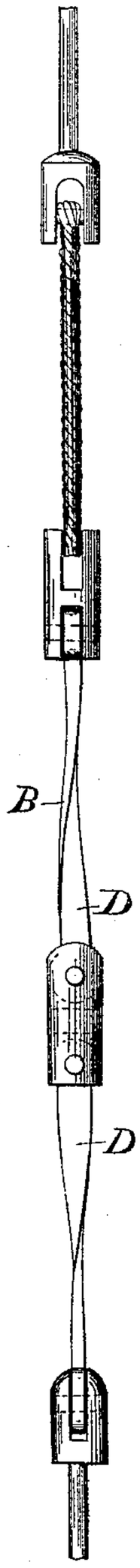


Fig. 3.

Fig. 5.

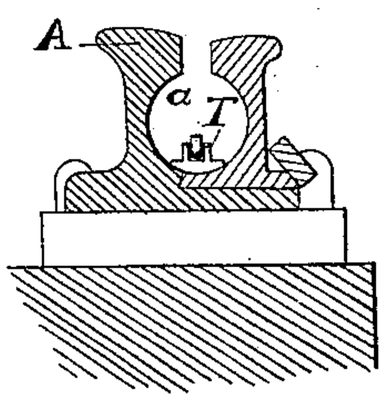


Fig. 7.

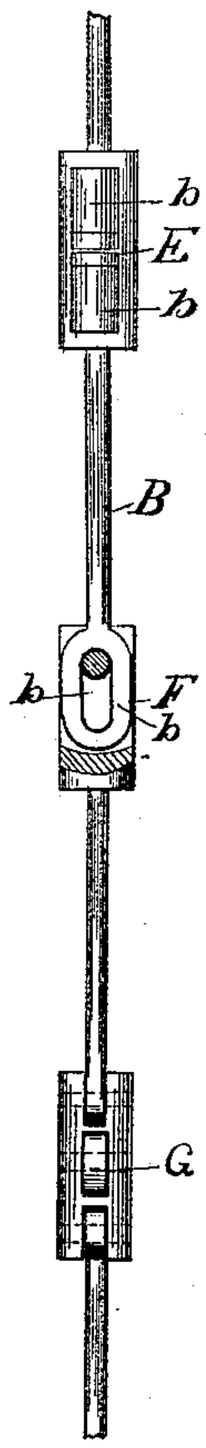
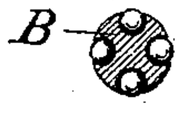


Fig. 8.



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UNITED STATES PATENT OFFICE.

A. ELY BEACH, OF STRATFORD, CONNECTICUT.

IMPROVEMENT IN STREET-RAILROADS.

Specification forming part of Letters Patent No. **42,039**, dated March 22, 1864.

To all whom it may concern:

Be it known that I, A. ELY BEACH, of Stratford, Fairfield county and State of Connecticut, have invented certain new and useful Improvements in Street-Railroads; and I do hereby declare that the following is a full and correct description of my said improvements, which will enable any person skilled in the art to make and use the same.

Reference is to be made to the accompanying drawings, which form a part of this specification, and on which—

Figure 1 is a side elevation of my improvement, in part sectional. Fig. 2 is a plan of the attachments used upon the bottom part and running-gear of the car. Fig. 3 is an end elevation. Fig. 4 is a plan of the propelling-cable and its driving-drums. Fig. 5 is a sectional elevation of one of the rails. Figs. 6, 7, and 8 are views of different methods of constructing the cable.

Similar letters of reference indicate corresponding parts in all the figures.

The propulsion of railroad-cars by means of stationary steam engines and moving cables is a well-known device, and is extensively practiced in this country, especially in the coal regions.

Some attempts have been made to introduce this method in cities with a view to dispense with the use of horses in crowded thoroughfares, and also to reduce the cost of moving the cars; but so far as I am aware no practical method for accomplishing these desirable results has as yet been devised.

A patent has been granted for a tube containing the propelling-cable, and placed midway in the street between each pair of rails. Another patent has been granted in which the propelling-cable is placed upon poles above the car, like a telegraph-wire, with a clutching device upon the top of the car.

Although my invention relates to the propulsion of the cars by means of a moving cable, I disclaim the invention of any of the devices contained in the above-recited patents.

My improvement consists, first, in having the rail or track upon which the car-wheels run so grooved, made, or arranged that the rails shall form a receptacle or protection for the propelling-cable; second, in having an arm so placed, arranged, or hung upon the bottom of the car or the running-gear thereof that it (the said arm) may be conveniently made to enter the aforesaid receptacle for the cable and grasp the cable, thus giving motion to the car, and so that the said arm may be conveniently withdrawn from the said receptacle and cable to permit the stoppage of the car; third, in having the device by which the car is stopped or started so combined with the axles or wheels of the car that it will always maintain the same plane of action with the said wheels or axles, so that the car-body may sway laterally or rise and fall upon its springs without interfering with or disturbing the action of the aforesaid device for starting or stopping; fourth, in the employment for the propulsion of street-cars of a cable composed of a series of jointed bars, made either with or without springs between the bars, or in the bars themselves, and with or without friction-rollers between the bars; fifth, in the combination of the device used to connect and disconnect the car and cable with the brake-gear in such a manner that the act of turning or operating the brake rod or lever by the driver of the car or train will also actuate the arm or device by which the car and cable are connected, so that when or before the brakes begin to press upon the car-wheels the car will be separated from the cable, and when the brakes are released from the wheels the car will become connected with the cable.

In carrying out my improvement the rails are to be laid upon sleepers and depressed in the ground to an even level with the pavement, in the manner common to all the best street-railroads.

The rails are intended to be of about the same width upon their face or tread as the ordinary rails; but instead of having the groove shallow, as at present constructed, I propose to deepen the groove somewhat, and enlarge the bottom of the groove, so as to form a cavity or receptacle for the propelling-cable. A shows the rail, and *a* the receptacle therein for the cable.

The rail may be rolled in one piece, like the ordinary rails, or it may be composed of more than one piece, as shown in figure, or two rails may be set together so as to form a suitable receptacle for the cable.

The cable B, I compose of steel bars, having a small body and an enlarged head, the extremity of one bar being jointed by a pivot to

the head of its adjoining bar, and in this manner I construct an endless propelling-cable. The enlarged heads serve as bearers to support the cable as it passes through the rail, said heads receiving the friction. Owing to the wearing tendency of this friction, it would not answer to employ a wire rope as the propelling medium.

At each end of the route, or at such intervals as may be deemed requisite, I have a revolving drum, C, with angular surfaces, to receive and propel the cable. The drums are to be driven by steam or other convenient motor. The drums C are to be so arranged and located that they can, together with the cable as it passes them, be examined by the engineer in charge with a view to the repair of any defect or damage which may occur while they are working.

Instead of having the links made straight and plain, they may be composed of twisted bars, thinner in one direction than the other, as indicated at D D. This plan of construction would give to them the effect of torsion-springs and prevent rupture when any great weight was suddenly thrown upon the cable; or, for the same purpose, the heads of the links may be so constructed as to receive springs of rubber *b b*, against which the ends of the links may find relief from any sudden strain, as shown at E and F.

In order to relieve the cable from friction, the links may be provided with friction-rollers, as shown at G, a slight groove or depression being in that case made in the bottom of the cable receptacle to receive the wheel and guide the cable. This groove is not, however, indispensable. Another method of diminishing the friction is to have the heads of the links provided with friction-balls, as shown in Fig. 8, which balls project from the surface of the heads or links.

At suitable distances along the line of the track there are to be openings or separations in the rails to allow the discharge of the mud, dirt, or other obstructions that may enter the cable-receptacle. These openings will connect with the street-sewer or with any suitable reservoir made in the ground to receive the accumulations from the rails.

In order to afford lubrication to the cable, I arrange oil-drips at suitable intervals along the route, said drips being so made as to pass a suitable quantity of oil upon the cable. Said drips are depressed in the ground. Portions of the cable may be lubricated and cleansed by causing the cable and its receptacle to pass through pools of water arranged at convenient points.

The device which connects and disconnects the car and cable is composed of an arm, H, which projects from underneath the car, and has its lower end made of such form as to enter the groove in the rail and come in contact with the moving cable.

The upper end of the arm H swings upon a horizontal bar, I, which is hung between two fixed arms, J J, which are attached to a rock shaft, K. The latter extends between the axle-boxes of the car, and has its bearings in the frames which support the axle-boxes.

When the rock-shaft K is moved or turned in one direction, the arm H is depressed, and presses upon the cable, and the car immediately begins to move; but the starting of the car is done in a gentle or yielding manner in consequence of the action of the springs L L, which are arranged one upon each side of the arm H upon the bar I, upon which bar the arm H both swings and slides. The said springs L L serve to resist the sliding of the arm H in which ever direction it moves, and thus relieves the car from the sudden shock or start which it would receive were said springs not interposed. The said springs also serve to relieve the cable from the sudden strain which the connection with it of the car would otherwise produce. If, however, the cable is provided with springs in its links or bars, as before described, the springs L L would become less necessary. The rock-shaft K is connected with the brake-gear and operated from the car-platforms by means of an arm, M, which rises from the shaft K and bears against the curved end of a horizontal pivoted or swinging bar, N, which is pivoted to the bottom of the car.

The brake-shoes O and their connecting-bars P are of the usual construction. The brake-bars P are connected by rods or chains Q with the swinging bar N, and this bar N is connected, by means of rods or chains R R, with the usual lever or ratchet-rod or brake-shaft *s s* upon the platforms of the car.

By so turning the brake shaft or rod S as to wind up the chain R the bar N will be moved laterally and the curved head of the bar N will strike against the upper end of the arm M and cause it to turn the rock-shaft K, and thereby lift the bottom of the arm H out of contact with the cable, while the same lateral motion of the bar K will pull the brake-bar P so as to press the brake-shoes O against the car-wheels, and thus check the motion of the car and bring it to a stop. When the brake-rod S is unwound, the arm H descends into contact with the cable and the car starts.

The respective lengths of the rods or chains Q R are to be so adjusted that the arm H will be disconnected from the cable before the brakes begin to press upon the wheels. This will enable the driver of the car to bring the car to a sudden halt if necessary, by a quick working of his brake-shaft S, with his full force, or he may allow the car to diminish its speed slowly by turning the shaft S to so slight an extent that it will disconnect the arm H from the cable without causing the brakes to press upon the wheels. Thus the car will run by its own momentum for some distance, or the driver may apply a gentle pressure of the brakes upon the wheels at pleasure.

It will thus be seen that the stopping and starting of the car can be placed under the complete control of the car-driver.

The arm H is so arranged or combined with the car-wheels and their axles as to operate on the same plane with them. If the arm H, or whatever cable-connecting device were used, were to operate from the plane of the car-bottom, it is obvious that the surging of the car upon its springs, or the uneven loading of the car at its ends, would render it very difficult to place or keep the arm H in the groove of the rail or in contact with the cable.

The form of the arm H, or device which connects the car and cable, is immaterial. As shown here, it is forked at its lower end and fits between the links of the cable. The lower end of the arm may be made to resemble a claw, if preferable.

The intended location of the connecting device H is near the wheels of the car, so that in passing around the corners of streets, or on other short curves, the arms H will still remain in contact with the cable. The rise and fall of the connecting device H should be located or arranged on or near to a line drawn perpendicularly through the car wheel and axle; but for present convenience I have shown the device H arranged midway between the car-axles.

The rails which pass around sharp curves are intended to be interiorly enlarged, so as to receive stationary friction-wheels within them, for the cable to press against, and thus reduce the friction.

On double-track roads I propose to have two cables, so that when one cable is moving the other may be overhauled and repaired.

Long trains of cars may be moved in and out of cities by my improvement by having a connecting device upon one of the cars to connect with the cable, or by having a special car thus provided to which the whole train may be attached.

Upon the ordinary city passenger-cars there may be one of the cable devices H arranged upon each side of the car to connect with either of the cables, it being intended to have a cable arranged in each rail.

Those portions of the rails which pass over the summits of elevations in the ground, and also those portions at the foot of the descents, are intended to be interiorly enlarged and to receive fixed friction-wheels, in order that the cable may ride upon or press upon the said rollers so as to diminish friction. Indeed, if desirable, fixed friction-rollers may be introduced at suitable intervals through all the rails, as shown at T, Fig. 5.

In order to assist further in the starting of the car, I propose to use one of the patented spring devices by which the momentum of the car, lost by stoppage, is converted into a starting-power or made to assist in starting. This will assist in relieving the cable from undue straining when the car starts.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. Having the rail or track upon which the car-wheels run so grooved, made, or arranged, whether in one or more parts, that the said rail or track shall form a receptacle or protection for the propelling-cable, substantially as herein shown and described.

2. The combination, with one or both of the rails of a railroad track, of a propelling-cable, in the manner substantially as herein shown and described.

3. The employment between the bottom of the car and the propelling-cable, of the connecting device H, or its equivalent mechanism, operating substantially as herein shown and described.

4. The combination of the cable-connecting devices, or their equivalent mechanisms, with the axles or truck parts of the car, so that the said cable-connecting devices will not be affected by the movement of the car-body upon its springs, substantially as herein shown and described.

5. The combination of the cable-connecting device with the brake of the car, so that on the movement of the brake the cable-connecting device will be operated, and vice versa, substantially as herein shown and described.

6. The combination of the cable-connecting device with the ordinary brake lever or shaft P, which operates the brake, so that the said shaft will serve the double function of operating the brakes and also the cable-connecting device, substantially as set forth.

7. The employment, for the propulsion of street-cars, of a cable composed of jointed bars, having heads of larger size than the body of the bars, substantially as herein shown and described.

8. The arrangement or construction of the propelling-cable with friction-rollers in or upon it, substantially as herein shown and described.

9. The construction of the links of the cable in the form of torsion-springs, substantially as herein shown and described.

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