2 Sheets—Sheet 1.

W. H. PAINE.

DEVICE FOR CONNECTING CARS WITH MOVING ROPES.

No. 173,329. Patented Feb. 8, 1876.

FIG. 1.

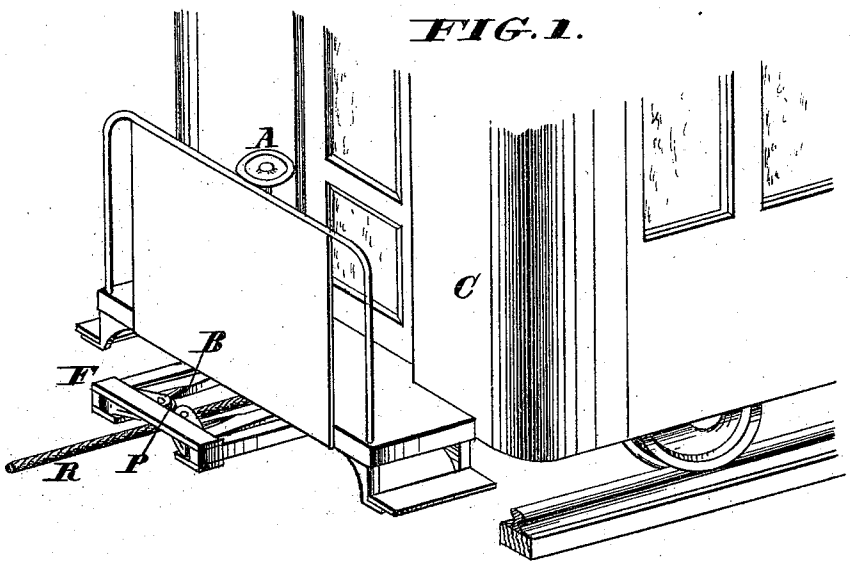


FIG. 2.

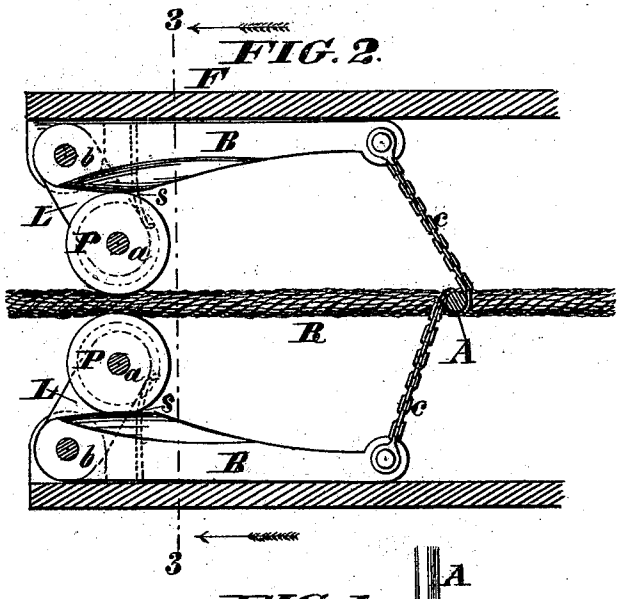


FIG. 3.

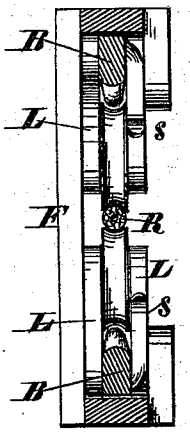
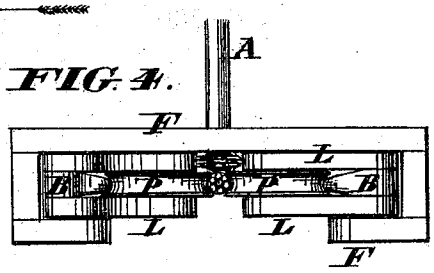


FIG. 4.



WITNESSES

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William H. Paine.

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2 Sheets—Sheet 2.

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FIG. 5.

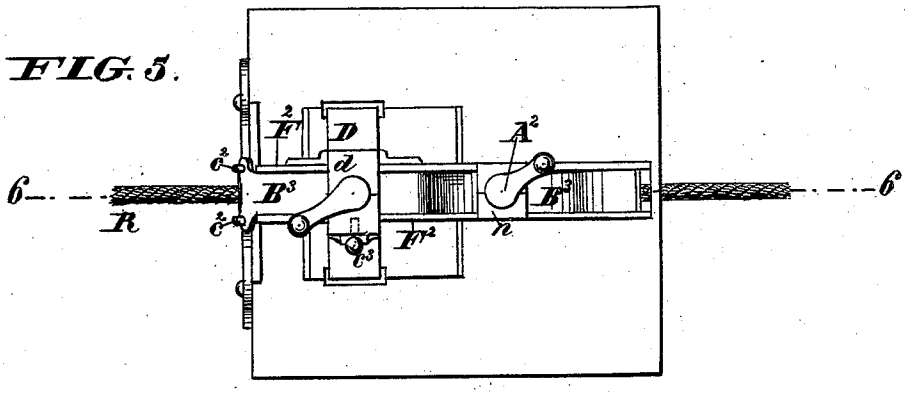


FIG. 6.

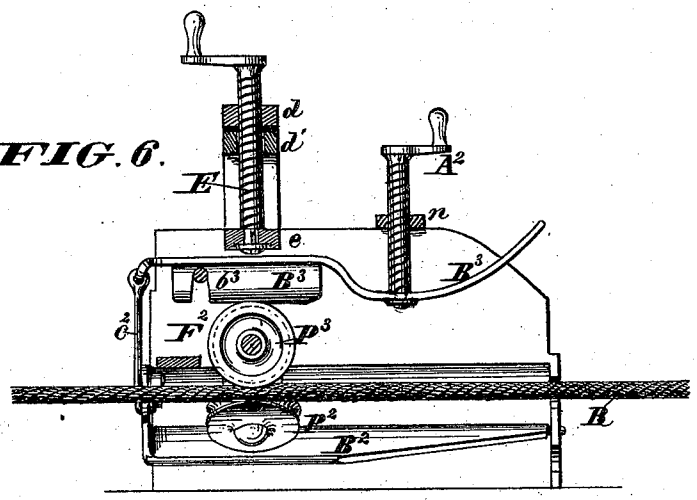


FIG. 7.

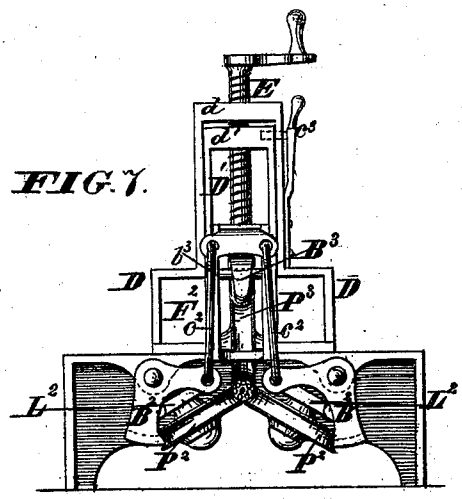
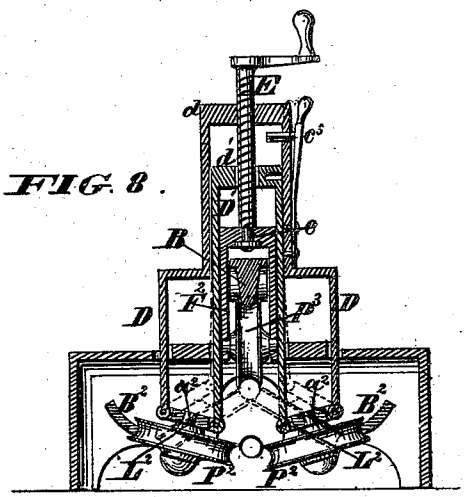


FIG. 8.



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UNITED STATES PATENT OFFICE.

WILLIAM H. PAINE, OF BROOKLYN, E. D., NEW YORK.

IMPROVEMENT IN DEVICES FOR CONNECTING CARS WITH MOVING ROPES.

Specification forming part of Letters Patent No. **173,329**, dated February 8, 1876; application filed December 1, 1875.

To all whom it may concern:

Be it known that I, WILLIAM HENRY PAINE, of the city of Brooklyn, E. D., and county of Kings, in the State of New York, have invented a new and useful Improvement in Devices for Connecting Cars, &c., to Moving Ropes, &c., of which the following is a specification:

This invention relates, primarily, to the propulsion of cars on bridges and elevated railways, and of canal-boats and other vessels in canals by means of endless wire ropes which are driven continuously by stationary engines, the cars or boats being attached thereto or detached at will. The invention is applicable also to the carriage or propulsion of surface-line cars, and of buckets and loads of different descriptions, wherever a continuously-moving rope, chain, or band is or can be employed.

The present device is an improved gripe for application to the car or other vehicle. The novelty consists, primarily, in so arranging and attaching one or more brakes in combination with one or more sets of sheaves or rollers as that the latter only come in contact with the moving rope, and while embracing this, and rotated thereby, the sheaves or rollers can be retarded or stopped in their rotations without any slip occurring between them and the rope. The car or other vehicle can thus be made to move at any desired rate of speed, less than or equal to that of the rope, without injury to the vehicle or excessive wear on the rope.

The invention consists, further, in certain means for simultaneously applying brakes to each sheave or roller in a set of three, and in simple and effective means for taking up the rope upon the bottom sheaves or rollers, and then re-elevating the latter with the rope between them.

Figure 1 is a perspective view of the front of a car provided with a griping attachment illustrating this invention. Fig. 2 is a sectional plan view of the gripe on a larger scale. Fig. 3 is a transverse section on the line 3 3, Fig. 2, showing the brakes out of contact, as in the former figure. Fig. 4 is a front elevation, showing the brakes applied. Fig. 5 is a plan view of a gripe having three sheaves in a set. Fig. 6 is a longitudinal section on the line 6 6, Fig. 5, showing the sheaves in position to embrace the rope and the brakes out of contact. Fig. 7 is a front view of the same, showing the brakes applied. Fig. 8 is a transverse section on the line 8 8, Fig. 5, showing the bottom sheaves in different lowered positions by full and dotted lines.

Like letters of reference indicate corresponding parts.

The form of this improved gripe may be very simple, as illustrated on Sheet 1, where provision is not required for dropping and re-elevating the rope, band, or chain at different points along the route, but only for slowing, stopping, and starting the car, vessel, or load; and the mechanism for doing this is the principal part of the present invention.

The application of the invention to an ordinary car, C, which is drawn by a wire rope, R, on an elevated railway is illustrated in Fig. 1, and, for perspicuity, the mechanism will be described as in use in this connection.

In lieu of the ordinary guide pulleys or sheaves, which simply embrace and support the moving rope, one or more sets of sheaves or sheave-pulleys, P, are so applied in the present invention as to embrace the rope, and also to receive the pressure of brakes B B for retarding or stopping their rotations. When the sheaves are simply retarded the car is carried by the rope at a reduced speed, as is required in stopping and starting. When the sheaves are stopped the rope draws the car at full speed.

In order to prevent undue wear on the rope, and uneven wear of the peripheries of the sheaves, as also to relieve the pivots or trunnions *a* of the sheaves from excessive strain, the brakes B are applied opposite, or nearly opposite, the points of contact between the sheaves and the rope, as clearly illustrated in Fig. 2, the direction of the pressure of the brakes being also that of the movement of the sheaves in griping and releasing the rope.

A preliminary tractional contact of the sheaves with the rope may be secured by springs *s*, serving also to retract or force back the brakes, as illustrated on Sheet 1; or more positive means may be employed, as illustrated on Sheet 2.

In the first illustration, Sheet 1, the mech-

anism is mounted in a flat, bottomless frame, F. Two sheaves, P, constitute the set, and are journaled at the inner extremities of pairs of links L L, which are pivoted at their outer ends in front of the line of the sheave pivots or trunnions *a* by means of parallel pins or bolts *b*, and the latter serve also as fulcrums for the brakes B, which are made in the form of levers, with bearing-surfaces adapted to the peripheries of the sheaves. This mode of mounting the sheaves causes them to be drawn into closer contact with the rope by the traction of the latter as soon as the rotation of the sheaves is stopped or retarded, and thus aids in confining the slip to the brakes, so as to relieve the rope. The outer ends of the links and brakes or the backs of the knuckles formed thereby are intended to be made concentric with the pivots *b*, and in contact with the sides of the frame or equivalent supports, as shown in Fig. 2, so as to relieve these pivots from undue strain. In this illustration the rear ends of the brake-levers are simply connected by chains *c* to a hand-wheel shaft, A, after the manner of common car-brakes, and the gripe is readily controlled by an ordinary brakeman.

In the second illustration, Sheet 2, the counterparts P^2 P^2 of the pair of sheaves previously described are employed in combination with a third sheave, P^3, mounted above them in fixed bearings in the frame F^2, and the said bottom sheaves are attached by stud-shafts or pivots a^2 to short links L^2, which normally support them in inclined position, and at a proper height to support the rope in contact with the upper sheave P^3, as illustrated in Figs. 6 and 7.

To provide for simultaneously retarding or stopping each of three sheaves thus arranged, and at the same time to insure the existence at all times of a superior pressure between the rope and the sheaves over that between the latter and the brakes, as in the first illustration, the power is applied by a hand-wheel or crank-shaft, A^2, to a brake-lever, B^3, fulcrumed on the top of the upper sleeve P^3, and is transmitted by rods c^2 c^2 to brakes B^2 B^2, which are thus drawn against the peripheries of the bottom sheaves P^2 P^2 opposite their points of contact with the rope. A transverse pin, b^3, occupying a notch in the upper brake-lever B^3 supports its transmitting end when the brakes are out of contact; but as soon as this upper brake touches the top sheave the latter becomes its fulcrum. The shaft A^2 is, in this illustration, a screw swiveled to the brake-lever B^3, and working through a fixed nut, *n*, at the top of the frame, at a point behind the plane of the sheaves. The front end of the brake-lever B^3 projects and is enlarged and perforated for the attachment of the connecting-rods in front of the frame. The lower brakes B^2 B^2 oscillate and have lever-arms to which the rods are attached.

The links L^2 L^2, on which the bottom sheaves are mounted, are the feet of a double vertical slide, D D′, the legs of which extend upward from the respective extremities of these links to horizontal connecting portions or heads *d* *d′* above the top of the frame. The slide straddles that portion of the frame in which the upper sheaf is mounted, and is guided by ways formed on and in the frame, as clearly shown in Figs. 7 and 8. The parts D′ D of the slide are one within the other, and so the connecting portions or heads *d* *d′* lie one above the other. The upper has an internally-threaded vertical bore, and that beneath has a larger concentric bore, unthreaded, for the reception of a vertical screw-shaft, E, which is swiveled in a step, *e*, at the top of the frame. A spring-catch, c^3, unites the parts in their normal position, being attached to the part D and adapted to engage automatically with a notch in the head *d′*.

To drop the rope after the brakes are retracted it is only necessary to trip this catch, which will permit the part D′ of the slide to drop so as to reverse the angles of the links L^2, and the bottom sheaves attached thereto. These sheaves are shown thus reversed, in full lines in Fig. 8, but after having been lowered to take up the rope. This is accomplished by simply backing the screw E until the head *d′* of the slide touches the step *e*, when the bottom sheaves will be below the lowest point of the rope. The sheaves are now brought together beneath the rope by continuing to back the screw E until the head *d* comes in contact with *d′*. The catch c^3 then springs into mesh and holds the heads together, and the slide, sheaves, and rope are elevated by reversing the motion of the screw by which the rope is also clamped between the sheaves P^2, P^2, and P^3 to the required extent.

Frames of different shapes and constructions will be employed according to particular applications of the invention, and the arrangement of parts and details of shape and proportions will also vary. When chains are employed in lieu of ropes, for example, sprocket-wheels having brake-flanges may be employed. For ropes of vegetable fiber, wooden sheaves may be preferable, and for flat bands cylindrical rollers will be required, the brakes being modified correspondingly.

Where one set of sheaves is insufficient or objectionable for any reason, a series of two or more sets may be employed, and the brakes need not be multiplied correspondingly, but one and the same brake may serve for two or more sheaves. The sheaves and brakes may also be so mounted as to permit them to accommodate themselves to inequalities in the rope, and the former may be so arranged as to indent or bend the rope, if preferred, but this last is considered an inferior arrangement.

The following is claimed as new, and of this invention, namely—

1. One or more sets of sheaves or rollers so arranged as to embrace a moving rope, band,

or chain, and at the same time be acted upon by brakes to retard or stop their rotations, and thus impart motion to the car, vessel, or load, to which they are attached, substantially as herein described.

2. In a device for griping a moving rope, band, or chain, one or more brakes applied through the medium of sheaves or rollers, substantially as herein illustrated and described, for the purpose set forth.

3. The combination of two or more sheaves or rollers, and brakes applied thereto, when the pressure of the brakes is so applied as to increase the preliminary tractional contact of the sheaves or rollers and thus insure the existence at all times of a superior pressure between the latter and the rope, band, or chain, over that between them and the brakes, as herein specified.

4. The combination with a set of three sheaves or rollers of the brakes B^2 B^3 with their connecting-rods c^2 and controlling-screw A^2, arranged and operating substantially as herein described, for the purpose set forth.

5. The combination of the double slide D D′, with its movable feet L^2, carrying the bottom sheaves or rollers P^2 P^2, and the vertical screw E and coupling-catch c^3, substantially as shown and described, for taking up a moving rope or chain in the manner specified.

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Witnesses:
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JAS. L. EWIN.