(No Model.) 3 Sheets—Sheet 1.

J. GRADY.

COMBINED WHEEL AND RAIL BRAKE FOR CARS.

No. 486,037. Patented Nov. 8, 1892.

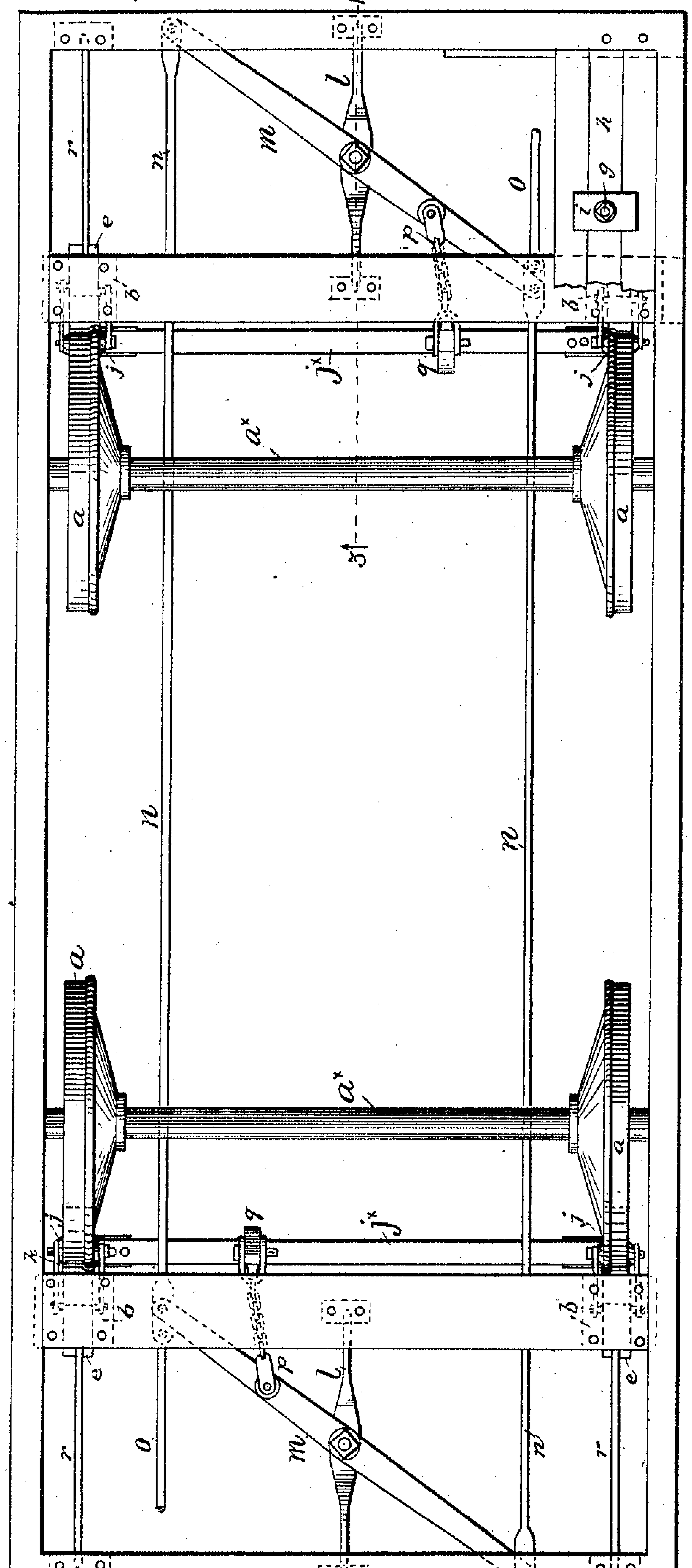

Fig. 1

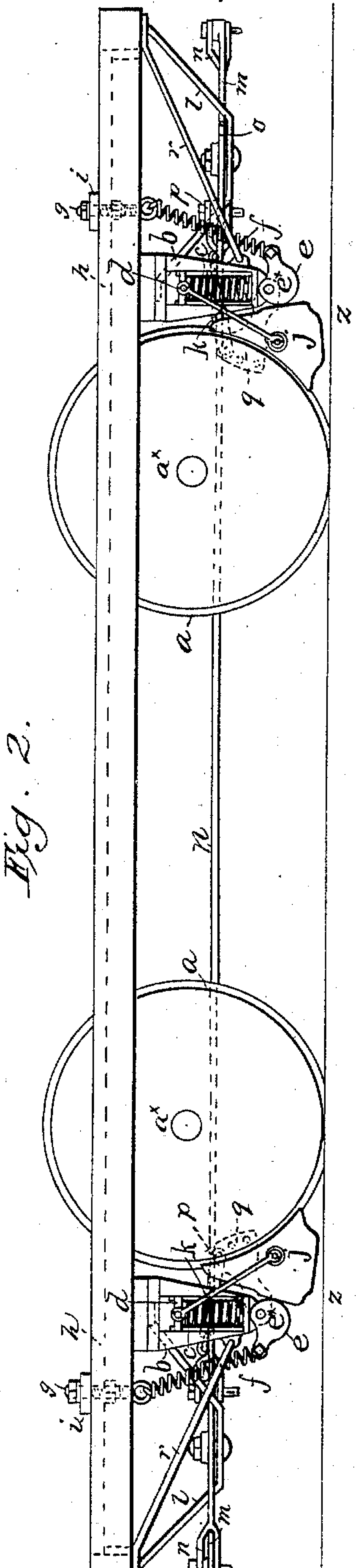

Fig. 2.

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(No Model.) 3 Sheets—Sheet 2.

J. GRADY.

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Fig. 3.

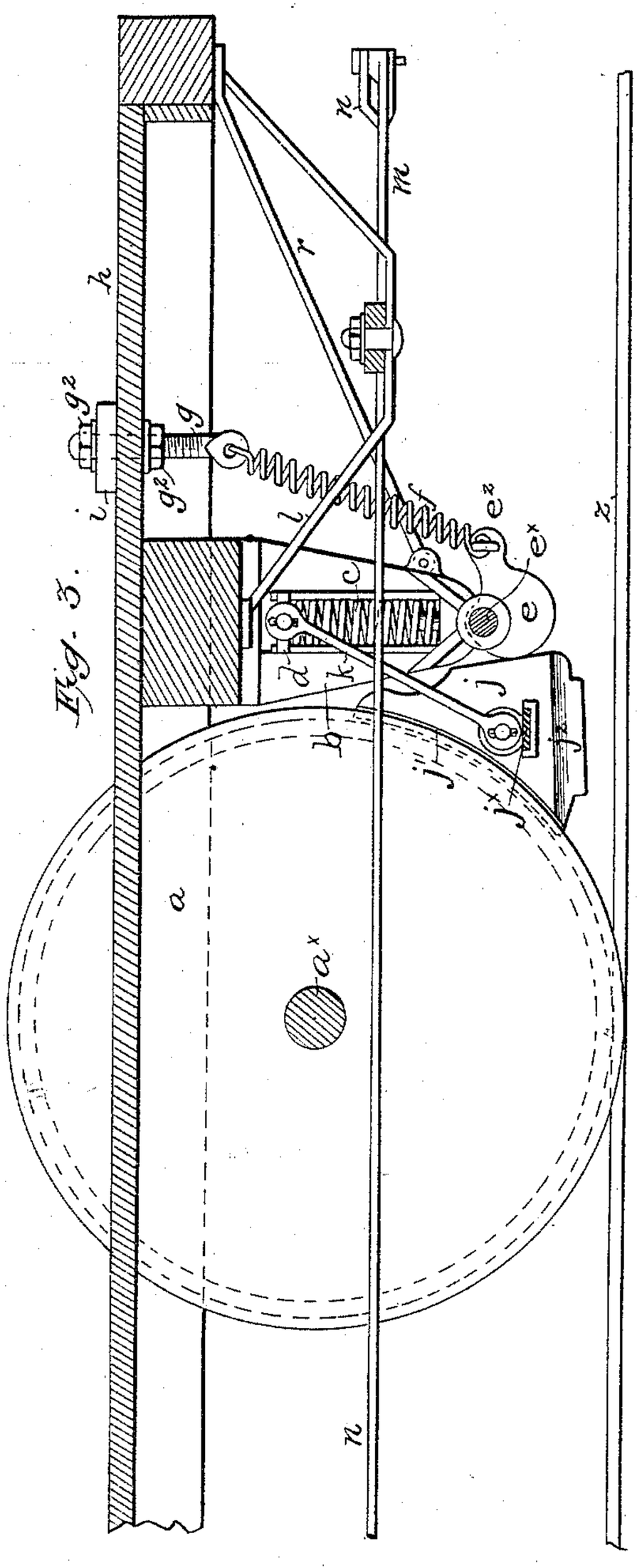
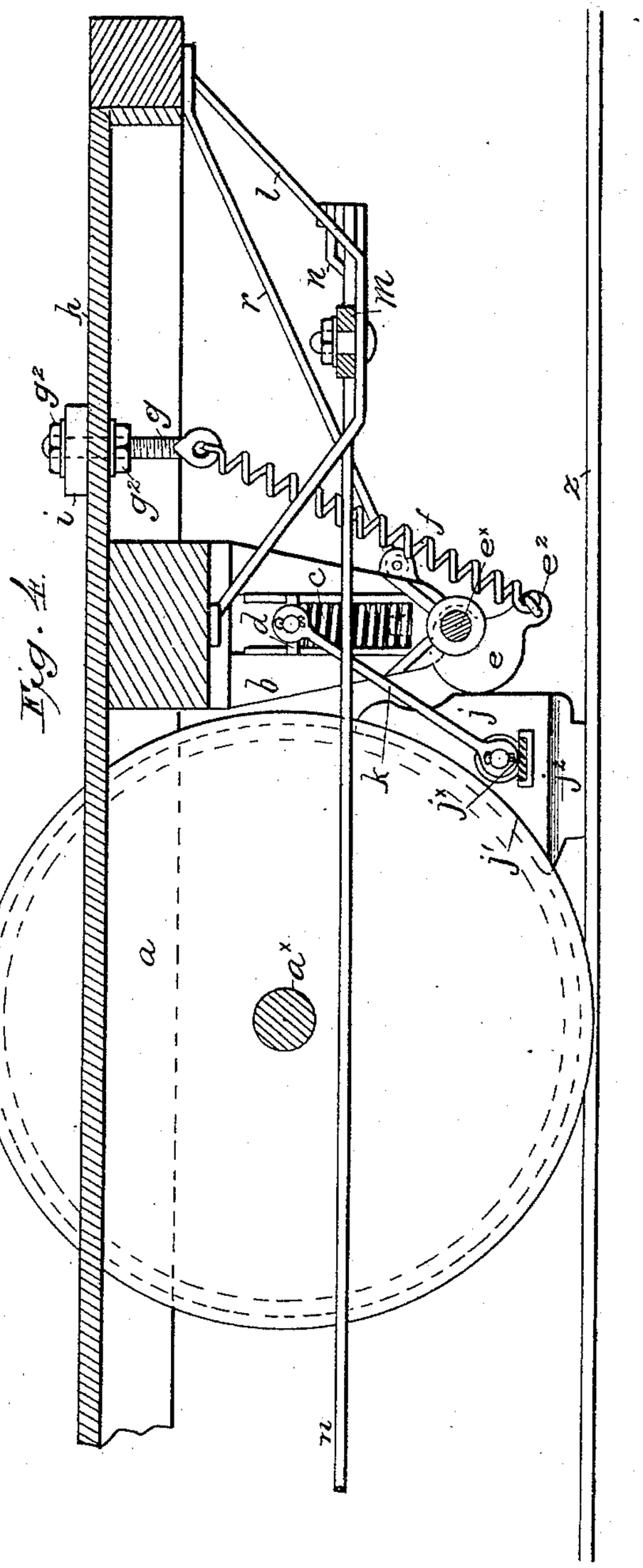


Fig. 4.



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(No Model.) 3 Sheets—Sheet 3.

J. GRADY.

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Fig. 12.

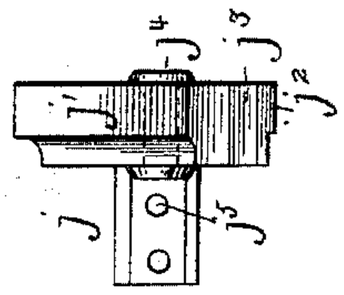


Fig. 14.

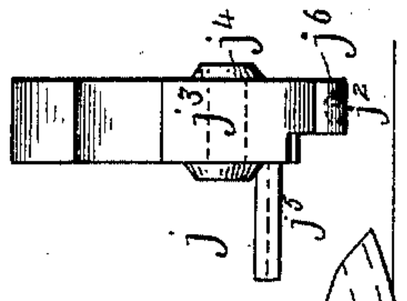


Fig. 16.

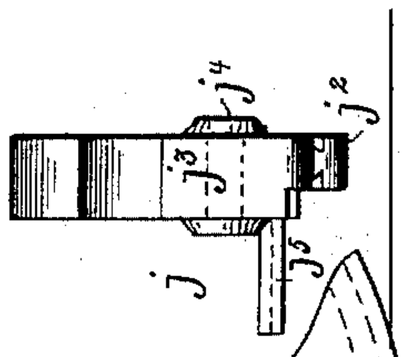


Fig. 11.

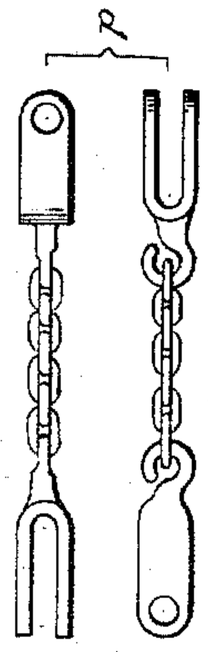


Fig. 13.

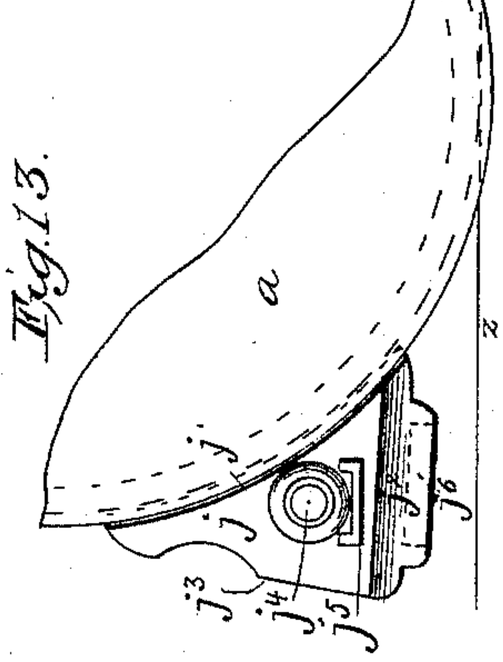


Fig. 15.

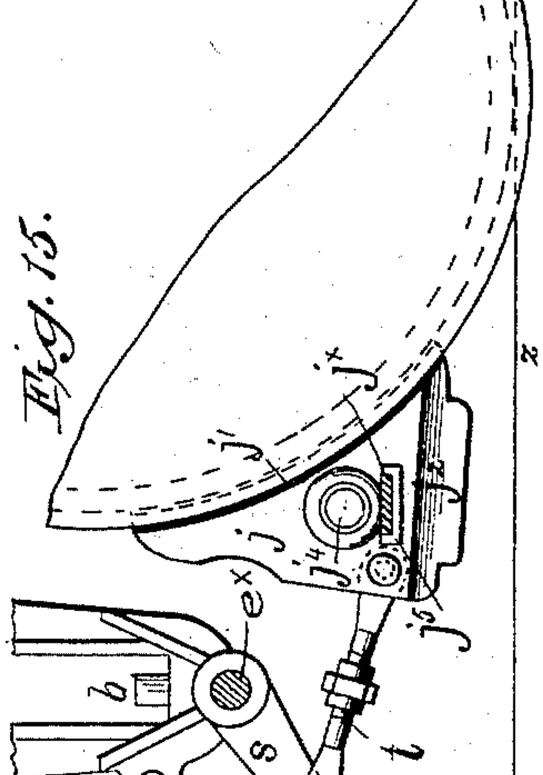


Fig. 10.

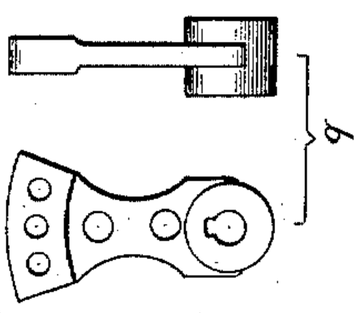


Fig. 7.

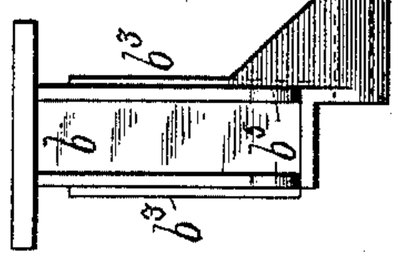


Fig. 9.

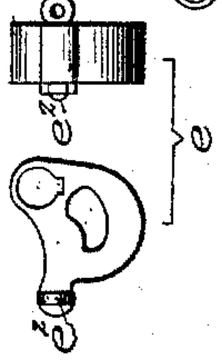


Fig. 5.

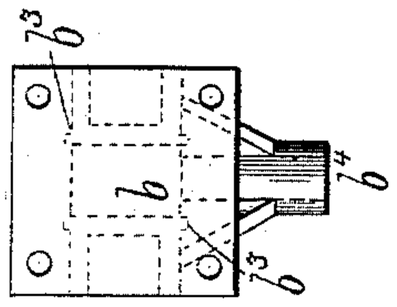


Fig. 6.

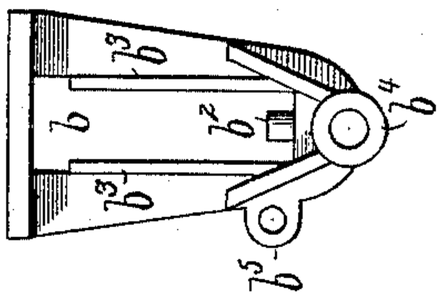
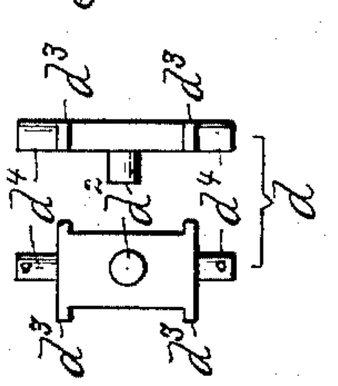


Fig. 8.



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UNITED STATES PATENT OFFICE.

JAMES GRADY, OF BROOKLYN, NEW YORK, ASSIGNOR OF ONE-HALF TO JOHN W. FOWLER, OF SAME PLACE.

COMBINED WHEEL AND RAIL BRAKE FOR CARS.

SPECIFICATION forming part of Letters Patent No. 486,037, dated November 8, 1892.

Application filed November 12, 1891. Serial No. 411,694. (No model.)

To all whom it may concern:

Be it known that I, JAMES GRADY, a citizen of the United States of America, and a resident of Brooklyn, in the State of New York, have invented a new and useful Improvement in a Combined Wheel and Rail Car-Brake, of which the following is a specification.

This invention relates, primarily, to brakes for street-cars, and to those car-brakes in which suitable brake-shoes are first brought into contact with the wheels and then, if need be, into contact with the rails, so as to increase the friction on the rails, and thus to save the wheels and to stop the car more quickly.

The present invention consists in several new combinations of parts, some of the parts being also of novel construction.

The objects of the respective combinations are, first, to support the shoes normally by means of spiral springs in such a way that the brake-shoes shall be free to move both toward and away from the wheels and toward and away from the rails, and so as to get the most direct pull on said springs for depressing the shoes into contact with the rails; secondly, to transmit motion to the several brake-shoes in the most effective manner in applying the brake, and, thirdly, to automatically restore the parts to their normal positions by simple and effective means.

Three sheets of drawings accompany this specification as part thereof.

Figures 1 and 2 of the drawings, on Sheet 1, are small-scale top and side views of the running-gear of a street-car, illustrating this invention. Figs. 3 and 4, Sheet 2, represent vertical sections on the line 3 4, Fig. 1, with the brake "off" and "on" in the respective figures; and Figs. 5 to 16, inclusive, Sheet 3, represent the details of construction and certain proposed modifications, Figs. 5, 6, and 7 being top and side views of one of the brake-pedestals; Fig. 8, top and edge views of a follower combined with each pedestal; Fig. 9, side and end views of one of the brake-applying cams; Fig. 10, side and edge views of one of the lever-arms through the medium of which said cams are turned in applying the brake; Fig. 11, top and side views of a flexible connection between each of said crank-arms and the long lever through which motion is transmitted thereto; Figs. 12, 13, and 14, respectively, top, side, and back views of one of the brake-shoes; Fig. 15, a fragmentary sectional view illustrating a modification; and Fig. 16, another back view of a brake-shoe, illustrating a modification. Figs. 3 to 14, inclusive, are enlarged one diameter from Figs. 1 and 2.

Like letters of reference indicate corresponding parts in the several figures.

In line with each car-wheel a and adjacent to its periphery in front or behind a brake-pedestal b of the construction clearly represented by Figs. 5 to 7 projects downward to a point about midway between the plane of the axles $a^{\times}$ and that of the track. Within the pedestal a strong spiral spring c is supported vertically, its lower end being kept in place by a stud b^2, Fig. 6, on the floor of the pedestal, and a follower d, having a like stud d^2, Fig. 8, on its bottom rests upon the spring and is guided by lugs d^3, Fig. 8, on each end of the follower, coacting with ways b^3, Figs. 5 to 7, on the pedestal. Immediately beneath said floor of the pedestal a cam e is arranged with its convex face toward the wheel, being carried by one end of a rock-shaft $e^{\times}$, for which a strong bearing b^4, Figs. 5 to 7, is formed on the lower end of the pedestal at that side which is toward the center of the car. The outer end of the cam e is provided with a transverse eyebolt e^2, Fig. 9, from which a retracting-spring f, Figs. 1 to 4, is stretched upward to an eyebolt g, which in the example passes through the floor h of the car and through a wooden clamp-bar i on top, taking hold of three floor-planks, and is provided with screw-nuts g^2 both above and below, so as to provide for adjusting said spring f.

A brake-shoe j of the peculiar construction represented by Figs. 12 to 14 is interposed between said cam e and the adjacent edge of the wheel a, this shoe having a concave face j', Figs. 12 and 13, fitted to the periphery of the wheel and concentric therewith, and a downward projection j^2, fitted to the tread, or it may be to the tread and groove, of the rail z and parallel with the track when the shoe is depressed, as in Fig. 4. Such projection is located toward the heel of the shoe and away from the tread of the wheel, so that when the

shoe is depressed as above, with said concave face j' in contact with the periphery of the wheel, the shoe will not become wedged under the wheel. An incline j^3, Figs. 12 to 14, on the back of the shoe is in contact with said convex face of the cam e, and its angle determines the effect of their coaction. With very little incline, as represented, the greatest pressure will be against the wheel before the shoe comes into contact with the rail. With a greater incline less pressure will be put on the wheel and the shoe will descend into contact with the rail more readily and exert the greatest pressure on the track. To provide for suspending the shoe, it is made with a transverse socket j^4, Figs. 12 to 14, at or about its center of gravity, which is occupied by a hanger-bolt, the ends of which are connected by hangers k with trunnions d^4, Fig. 8, on the laterally-projecting ends of the follower d. The hangers have eyes at both ends, and split cotters in each of said trunnions and in one end of said hanger-bolt keep the hangers from working off. The pair of shoes for the wheels on one axle are rigidly connected by a flat bar $j^\times$, the ends of which are bolted or riveted to inwardly-projecting "horns" j^5, Figs. 12 to 14, on the respective shoes. The said rock-shaft $e^\times$ is likewise common to such a pair of cams e. The pedestals b and shoes j are molded right and left for their respective positions. The other parts above named may be of one pattern for all the wheels.

In the arrangement represented by the drawings the mechanism above described is arranged between the wheels and the platforms at both ends of a street-car and all the brake-shoes are applied simultaneously. For so applying the brake-shoes in this arrangement through the medium of said rock-shafts $e^\times$ and cams e pivot-supporting brackets l are bolted to the bottom of the car-frame at both ends, and long levers m, extending transversely in a horizontal plane below that of the axles $a^\times$, are pivoted at mid-length to said brackets and are connected at both sides of the car by rods n with each other and at both ends by suitable connections o with the customary brake-spindles, and, finally, by flexible shackles p with lever-arms q, keyed fast to said rock-shafts $e^\times$. One of said shackles p is represented in detail by Fig. 11, as aforesaid. It consists of a long clip p' to connect with the adjoining long lever m, a longer clip p^2 to connect with the adjoining lever-arm q, and a chain p^3, connecting said clips. One of said lever-arms q is likewise represented in detail by Fig. 10, where it is seen that it has a series of holes q^2 to receive the pivot-bolt, which attaches the adjoining clip p^2 thereto. By using one or another of said holes q^2 the cams e are adjusted so as to support the shoes j normally as close as practicable to the wheels when the brake is off. The shoe-faces j' should not be more than one-sixteenth of an inch out of contact for the best effect. As soon as either brake-spindle is turned the connection o at that end of the car is shortened, and the connected levers m turn on their pivots and through the shackles p pull on the lever-arms q, which, being fast on the rock-shafts $e^\times$, that carry the cams e, as aforesaid, immediately transmit the motion through the latter to the brake-shoes j. These are pressed first against the car-wheels a to stop their revolution and then upon the rails z to prevent or reduce any slipping of the stopped wheels on the track. At one end of the car the motion of the wheels obviously tends to carry the brake-shoes into contact with the rails. At the other end the shoes turn the stopped wheels backward or slip on them, owing to the powerful pressure exerted by the cams e and the favorable inclination of the periphery of the wheel at that point where the shoe coacts therewith. Struts r, coupled to lugs b^5, Figs. 6 and 7, on the pedestals b, resist the back-pressure due to the action of the cams. When the brake is released, the cams e, rock-shafts $e^\times$, lever-arms q, shackles p, levers m, and connections n are immediately restored to their positions of rest by the retracting-springs f, and the shoes are simultaneously re-elevated by the main brake-springs c through the followers d and hangers k. Instead of cams e coacting with inclines on the backs of the brake-shoes j, the rock-shafts $e^\times$ may carry crank-arms s, Fig. 15, coupled by links t to the brake-shoes, as in the figure last referred to.

The rail-brake projections j^2 instead of being cast on the body of the brake-shoe, as represented in Figs. 1 to 15, may be formed separately of suitable metal and attached in any approved way, as represented in Fig. 16, or they may be reinforced by a piece of wrought-iron cast fast in the shoe, as represented at j^6 in Figs. 13 and 14.

Instead of being applied outside at the ends of the car, as above, the brake mechanism may be between the wheels and, as thus arranged, a single lever m, hung under the center of the car, as brake-levers are usually hung on horse-cars, may take the place of the two levers m and their connections n, or the brake can be operated by an upright lever on each side of the car instead of by horizontal levers. In the preferred arrangement represented by the drawings, Figs. 1 to 4, the brake can be operated from either end of the car in case any of the connections should break, or by simply omitting the connecting-rods n the brake may be operated from either end on one pair of wheels and the track.

On electric cars or other cars that have trucks the pedestals b may be fastened to the truck, so as not to be affected by the rise and fall of the car-body. Flat brake-springs of suitable length may press against the bars $j^\times$

to keep the brake-shoes in contact with the cams *e* when they are off the wheels, but have not been found to be necessary.

Other or like modifications will suggest themselves to those skilled in the art.

Having thus described the said improvement, I claim as my invention and desire to patent under this specification—

1. In combination with brake-shoes having concave faces to engage with the wheels and projections at bottom to engage with the rails, brake-pedestals projecting downward behind said shoes, vertical spiral springs inclosed within said pedestals, followers above said springs, and hangers connecting said followers with the brake-shoes, substantially as hereinbefore specified.

2. In combination with spring-supported brake-shoes having concave faces to coact with the pair of wheels on one axle and projections at bottom to coact with the rails and constructed with inclines at back, a horizontal rock-shaft parallel with the axle and in a lower plane, means for turning said rock-shaft, and cams carried by said rock-shaft and coacting with said inclines, substantially as hereinbefore specified.

3. In combination with brake-shoes having concave faces to coact with the wheels of a car and projections at bottom to coact with the rails and constructed with inclines at back and means for pressing such shoes first against the wheels and then against both wheels and rails, comprising cams which coact with said inclines, vertically-arranged spiral springs, followers above said springs, hangers connecting said brake-shoes and followers, and separate and distinct retracting-springs connected with said cams, respectively, substantially as hereinbefore specified.

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Witnesses:
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J. T. PRESTON, Jr.