(No Model.)

2 Sheets—Sheet 1.

J. T. BAIRD.

CAR STARTER.

No. 451,906. Patented May 12, 1891.

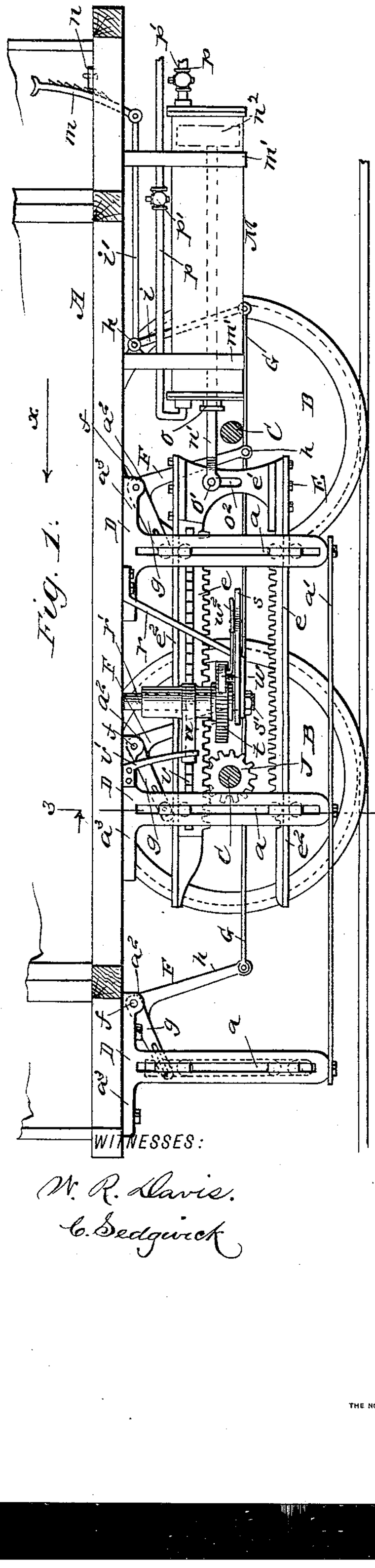

Fig. 1.

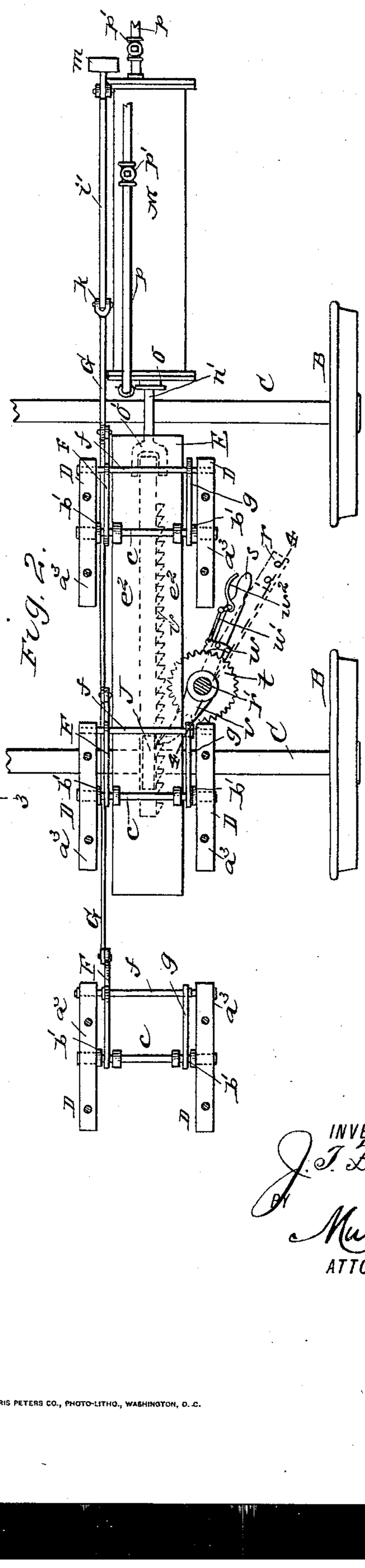

Fig. 2.

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

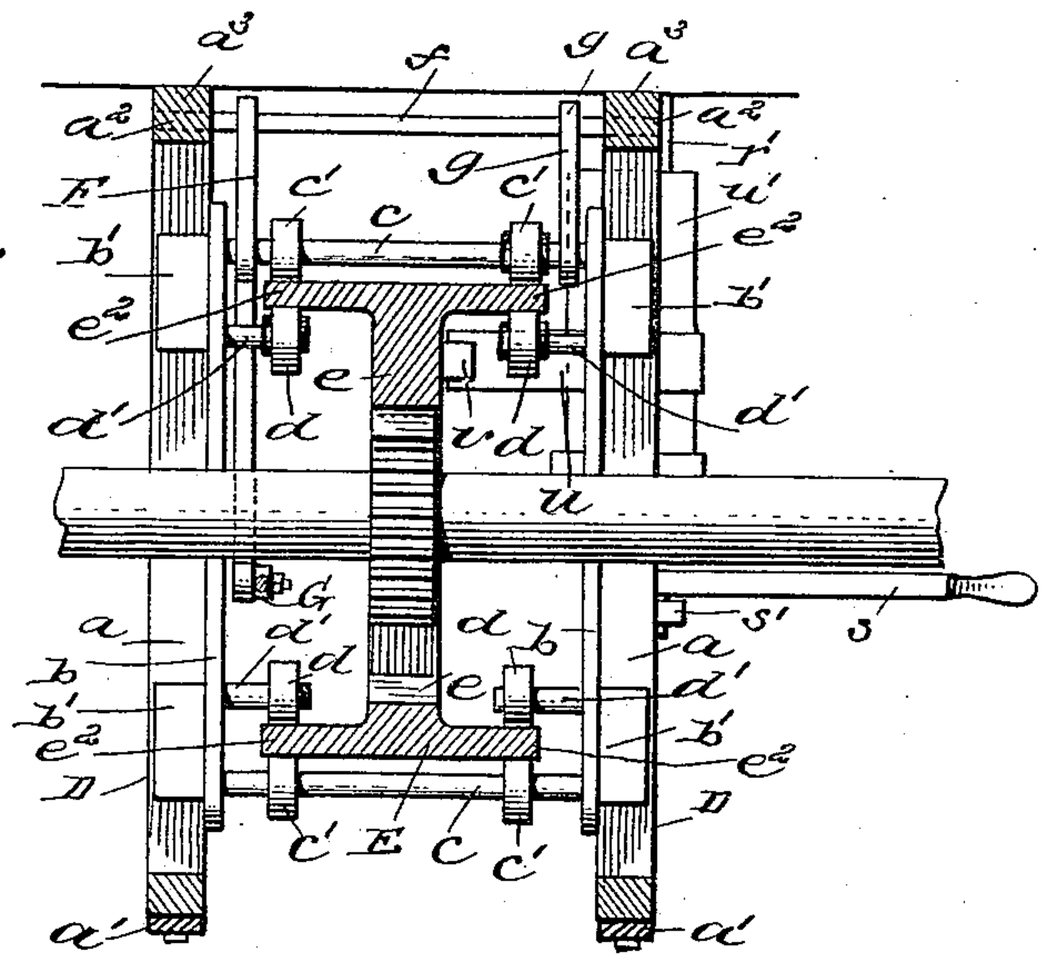


Fig. 4.

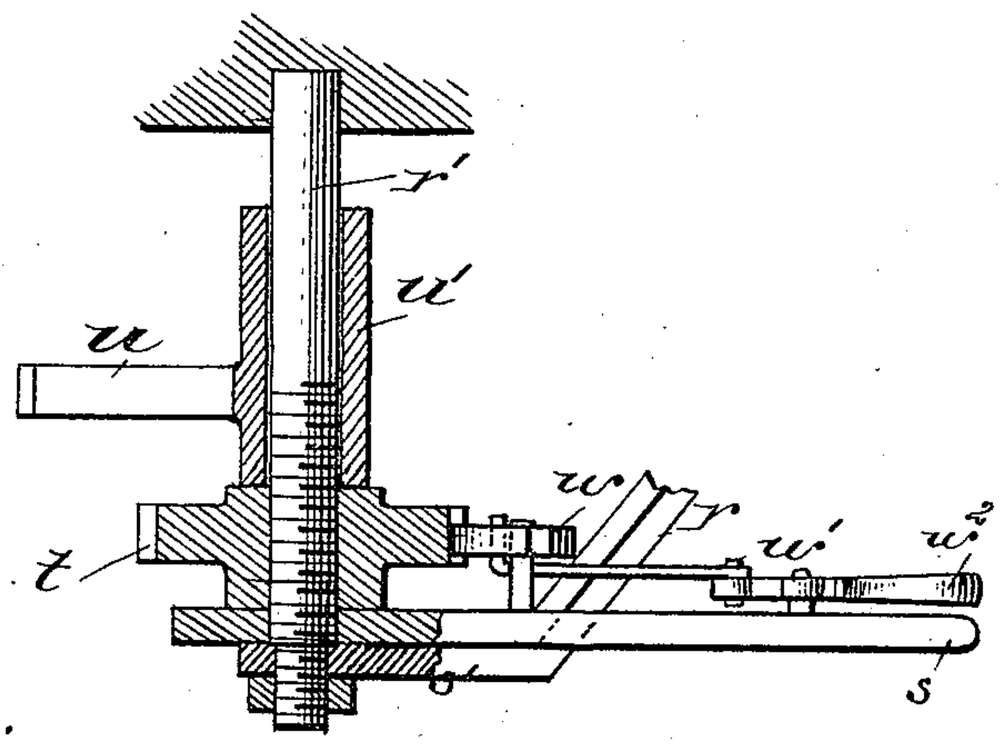
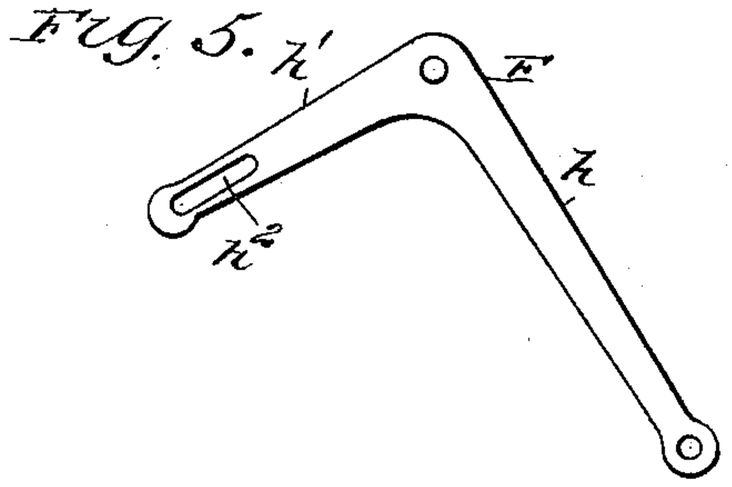


Fig. 5.



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UNITED STATES PATENT OFFICE.

JAMES T. BAIRD, OF ROSEDALE, KANSAS.

CAR-STARTER.

SPECIFICATION forming part of Letters Patent No. 451,906, dated May 12, 1891.

Application filed October 10, 1890. Serial No. 367,671. (No model.)

To all whom it may concern:

Be it known that I, JAMES T. BAIRD, of Rosedale, in the county of Wyandotte and State of Kansas, have invented a new and useful Car-Starter, of which the following is a full, clear, and exact description.

This invention relates to improvements in mechanism for storing power derived from the momentum of a street-railway car when draft force is relaxed, and has for its object to provide an efficient device of the type indicated, whereby the progressive movement of a street-car due to its momentum will be conserved to be afterward utilized as an auxiliary power to aid a resumption of motion of the car when desired.

To this end my invention consists in the construction and combination of parts, as hereinafter described, and indicated in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a sectional side elevation of a street-railway-car frame and its axles, with two wheels shown, the car-starter being in position on the car-frame. Fig. 2 is a plan view of the parts shown in Fig. 1. Fig. 3 is a transverse sectional elevation of the car-starter mechanism, taken on the line 3 3 in Fig. 1. Fig. 4 is an enlarged sectional elevation of parts of the car-starting device, taken on the irregular line 4 4 in Fig. 2; and Fig. 5 is a detached and enlarged view of one of a set of similar bell-crank levers which are a part of the device.

A represents a longitudinal section of a car-frame of the usual form, which may be altered to suit the demands of the service, as it is intended that the device which is the subject of the present invention be adapted for use on a railway-car moved by cable or horse power. Two wheels B are shown, also the axles C on which said wheels are secured, and to avoid confusion of parts in the drawings the ordinary revoluble supports, such as pedestals and axle-boxes, are omitted.

Upon two adjacent aligning longitudinal timbers or string-pieces of the car-frame, which are preferably those near the transverse center of the car-frame, a series of three similar guide-brackets D is secured to depend from each string-piece at opposite points in pairs, said pairs of brackets being properly and evenly spaced apart on the string-pieces, as shown in Fig. 1. The brackets D are given a proper length for their service and are each vertically slotted from points near the centers of width, which slots *a* are extended nearly from end to end of the brackets, so as to allow other parts to engage the slots as guides. The lower ends of each set of said aligning bracket-guides D are connected by the stay-bars *a'* to render them stable and avoid the necessity for objectionable weight.

For each pair of bracket-guides D a hanger-frame is provided. These frames each consist of two elongated flat bars *b*, (see Fig. 3,) which have two slide-blocks *b'* formed on or secured to one side of each bar near its ends, said blocks *b'* in pairs having a sliding engagement with one of the depending guide-brackets D by loose insertion of the blocks in the slot *a* of the bracket. The opposite bars *b* of the hanger-frames are joined near their top and bottom ends by the transverse shafts *c*, which are secured in aligning perforations in the end portions of the bars, and on each shaft anti-friction rollers *c'* are loosely secured at a proper and equal distance from the shaft ends.

A mating anti-friction roller *d* is loosely supported upon a fixed stud *d'* at a proper distance from each roller *c'*. The rollers *d* and *c'* being of equal diameter are aligned in series on each side of the three hanger-frames, longitudinally and vertically considered.

A rack-frame E constitutes an important portion of the car-starter, and consists of two similar cogged racks *e*, which are retained parallel to each other and properly spaced apart with their teeth in alignment and oppositely located by the spacing web-plate *e'*, that is formed integral with the racks, or preferably made separate and secured to them, as shown in Fig. 1. The racks *e* have laterally-projecting flanges e^2, (see Fig. 3,) which are of such width and thickness as will

permit them to slide between the pairs of rollers c' and d, the length of the racks being proportioned to the space between the pairs of bracket-guides D, so that the flanges e^2 will be engaged simultaneously by the anti-friction rollers of two of the hanger-frames, which are loosely connected with the guides D, as before stated.

There are pads a^3 formed on the upper portions of the bracket-guides D, which afford a good bearing therefor upon the string-pieces of the car-frame A, and on one end of each pad a depending boss a^2 is integrally produced, these latter being transversely perforated to receive the rods f, which extend between and are secured to opposite pads of the bracket-guides. Upon one end portion of each of the rods f, near to a bracket-guide D, an arm g is mounted and secured by one of its transversely-perforated ends, the other ends of said arms g being each loosely mounted upon an adjacent upper shaft c of the hanger-frames before mentioned, the arms g having each a location on its respective shaft between the anti-friction roller c' on the shaft and the side of an adjacent bracket-guide D.

The similar bell-crank levers F (shown in Figs. 1 and 5) are each formed with one limb h, longer than the integral limb h', the limb h having a lateral perforation near its free end, while an elongated slot is formed at h^2 in the free-end portion of the shorter limb h'. A transverse perforation is formed in each bell-crank lever F at the angular junction of its limbs for the loose connection of one of the rods f with each bell-crank near the opposite ends of the rods from the ends engaged by the arms g. The slotted portions h^2 of the short limbs h' on the bell-cranks F are loosely engaged with the shafts c near the ends that are opposite to those similarly connected to the arms g, which connection of parts serves to suspend the rack-frame E from the bracket-guides D, that it may move vertically and reciprocally.

An elongated pusher-bar G is provided for the simultaneous rocking movement of the three bell-crank levers F, said levers being pivoted to the side and end of the pusher-bar by their long limbs h, which limbs having a similar inclination in the same direction will be moved together, so as to rock the shorter limbs h' of the bell-cranks and elevate or depress the rack-frame E in an obvious manner.

To facilitate the movement of the rack-frame E in a vertical plane, and retain it at any desired point, one end of the pusher-bar G is pivoted to the bell-crank arm i, said bell-crank being pivoted to the car-frame at k, so that its other limb i' will extend in a nearly horizontal plane, having its outer end loosely secured to the lower end of the upright sliding lever m, which works in a slot in the car-frame A, the edge of the lever m having serrations formed on it for the adjustable engagement therewith of the pivoted latch-dog n.

The position of the rack-frame E is such with regard to the diameter of the wheels B and axles C that a pinion J on one axle will be adapted to have a meshing engagement with the upper or lower rack of the rack-frame when the lever m is depressed or permitted to rise by the force of gravity actuating the frame E and attached parts, as it will be apparent that the downward movement of the lever m, effected by the weight or manual exertion of an operator, will raise the rack-frame, while a release of the lever will allow the rack-frame to slide downwardly until the pinion J meshes with the upper rack of the frame E.

As a means for storing power it is preferred to use the cylinder M, which is hung by the loops m' or other means, so that it will lie horizontally below the car-frame A, having its axial center laterally aligned with the rack-frame E, the piston-rod n' and piston-head n^2, having a sliding movement in the cylinder in the usual manner. The rod is rendered air-tight in the cylinder-head it slides through by a stuffing-box o, and at o' is furcated to straddle the web-plate e', to which it is loosely connected by a cross bolt or pin that has a limited vertical movement in the slot o^2, thus permitting the rack-frame E to be vertically adjusted, as before stated.

At each end of the cylinder M air-induction pipes p are connected. These pipes are shown broken off, but are intended to be extended for connection with a compressed-air-storage tank that may be situated at any convenient point on the car, and is not shown, as the form of construction is well known. Each pipe p is provided with a stop-valve p'. Upon a strong depending bent arm r a ratchet-rigging is supported, which device is shown enlarged in Fig. 4, and consists of an upright shaft r', that engages with its diametrically-reduced lower end the free lower end of the arm r, which is suitably perforated for its introduction. A horizontal lever s engages the depending end portion of the shaft r' above the arm r, and is there retained free to vibrate in a horizontal plane by a nut s'. The body of the shaft r' is threaded from its lower end upwardly a proper distance, and on it is located the ratchet-wheel t, which is perforated and threaded for engagement with the thread of the shaft. Upon the top face of the hub of the ratchet-wheel t the elongated hub u' of a detent-arm u is located, said hub being loosely fitted upon the body of the shaft r', so that it, with the detent-arm on it, may be elevated on the shaft when the wheel t is rotated in the proper direction.

The upper rack e of the rack-frame E has a rack v formed on its side surface that is adjacent to the arm u, with which rack the free end of said arm is adapted to interlock, and to enforce such an engagement of parts a spring v' is attached by one of its ends to the pad of one bracket-guide D, its free depend-

ing elastic body having contact with the outer side of the detent-arm *u*, pressing it toward the rack *v*, so that the arm will yield and retain engagement with the rack when the upper rack-frame E is moved endwise and also maintain such an engagement with the rack when the rack-frame is vertically adjusted. A pawl *w*, lever *w'*, and tripping-handle w^2, such as is usually employed in ratchet-reversing gear, are provided, the pawl being pivoted at a proper point on the lever *s*, to permit the toes of the pawl to mesh with the V-shaped teeth of the ratchet-wheel *t*, which wheel may be moved to raise or lower the arm *u* by reversing the direction of rotation of the same. The reversal of motion in the wheel *t*, as indicated, is effected by an obvious manipulation of the tripping-handle w^2, so as to bring into meshing engagement the proper toe of the pawl *w* with the wheel, and then vibrating the lever *s*.

In operation, the cylinder M being charged with compressed air from a proper source, for illustration, let it be assumed that the air has been introduced into the forward portion of the cylinder, so as to push the piston-head n^2 into the position shown in Fig. 1, which will draw the rack-frame E toward the cylinder and locate the pinion J near the opposite end of the rack-frame. Should the car be moving in the direction of the arrow *x* in Fig. 1, the pinion J will be on the forward axle. Normally the pinion named will be retained from engagement with either rack *e* by a proper adjustment of the lever *m* and pawl *n*. When the car is in motion, if the pinion J is made to clear the racks, as stated, no impediment will be offered to progressive movement of the car; but should the rack-frame E be lowered to the position shown in Fig. 1, the momentum of the car alone (draft power being relaxed) will draw the rack-frame forwardly and forcibly compress the partially-compacted air in the cylinder M. The engagement of the detent-arm *u* with the rack *v* will retain the rack-frame and attached piston-head n^2 in forward adjustment with the power absorbed by the air-compression stored ready for use when motion is to be resumed, which can be effected and the car started if the meshed engagement is released and the draft-power applied, when the stored power in the cylinder will serve as an auxiliary force to aid in overcoming the inertia of the arrested car.

It will be apparent that if the end of the car whereon the cylinder M is secured is made the front of the car, thus reversing the progressive movement of said car when draft force is applied, the rack-frame E must be raised by the means described to cause the lower rack on the frame to mesh with the pinion J when the car is to be stopped. The reversal of rotative movement of the pinion J will adapt it to properly draw the rack-frame toward the pinion and store the power, as before explained, for subsequent use in starting the car.

When the rack-frame E is raised to mesh the lower rack *e* with the pinion J, the lever *s* must be vibrated and pawl *w* properly set to rotate the wheel *t* and raise the detent-arm *u*, so that this arm will resume engagement with the rack *v*, this adjustment of parts being only needed if there is no turn-table provided for reversing the position of the car at the end of a track on a single line of road. Where a belt-line is provided for travel or a turn-table furnished, the direction of travel of the car may be continuously one way and a vertical movement of the rack-frame be limited to throw one rack into or out of mesh with the pinion J, as may be required.

If the cylinder M is made of sufficient dimensions in proportion to the weight of the car and its load, the use of compressed air supplied by auxiliary tanks may be dispensed with and the pipe *p* also, in which case the compression of contained air at one end of the cylinder and vacuum produced at the opposite side of the piston-head will afford the necessary power to start the car or assist said operation.

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

1. The combination, with a rack-frame movable longitudinally and adjustable vertically on a car-frame, and a pinion on one of the car-axles adapted to engage racks on the rack-frame, of an air-holding cylinder in alignment with the rack-frame and having its piston-rod connected with the rack-frame, substantially as set forth.

2. The combination, with a car-frame and a pinion on one of the car-axles, of a rack-frame adjustable vertically and movable horizontally on the car-frame and having a rack on one side, a detent-arm adapted to engage said rack, means, substantially as shown and described, for altering the vertical position of said arm, and an air-holding cylinder having its piston-rod connected with said rack-frame, substantially as set forth.

3. The combination, with a car-frame, a rack-frame supported to slide horizontally and move vertically on the car-frame, and means, substantially as shown and described, for moving the rack-frame in a vertical plane and retaining it vertically adjusted, of a pinion on one of the car-axles adapted to engage vertical racks on the rack-frame, a detent-arm adapted to engage a rack on the side of the rack-frame, and an air-holding cylinder aligned with the rack-frame and having its piston-rod connected with said rack-frame, substantially as set forth.

4. The combination, with a car-frame and a toothed pinion on one of the car-axles, of a rack-frame having two opposite toothed and spaced racks, between which the pinion is adapted to travel and engage either one of

said racks, a device for raising, lowering, and retaining the rack-frame at a desired point of vertical adjustment, a rack on the side of the rack-frame, a detent-arm held by a spring in engagement with said rack, means, substantially as shown and described, for vertically adjusting the detent-arm, and an air-holding cylinder having its piston-rod loosely connected with the rack-frame, substantially as set forth.

JAS. T. BAIRD.

Witnesses:
WM. FAIRLIE,
JOHN LYON.