2 Sheets—Sheet 1.

T. M. BRINTNALL.

CAR STARTER.

No. 181,555. Patented Aug. 29, 1876.

Fig. 1.

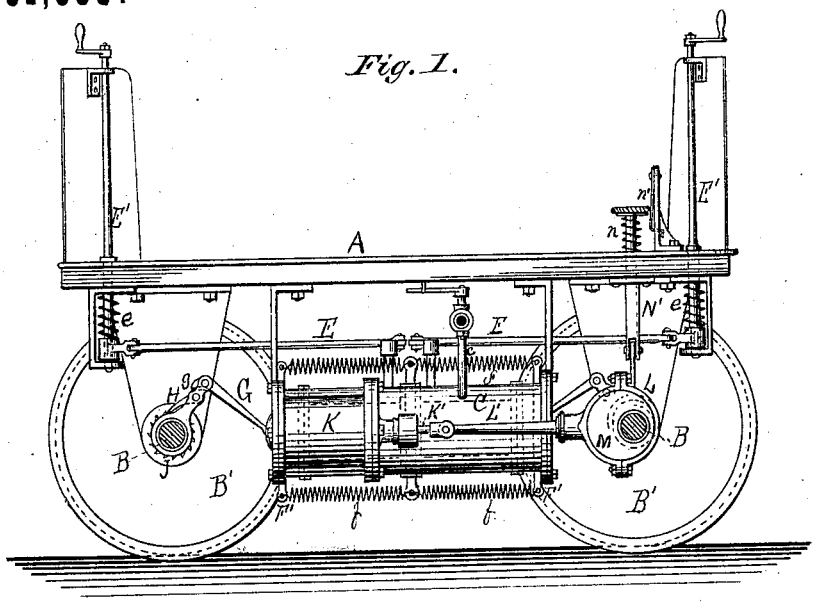
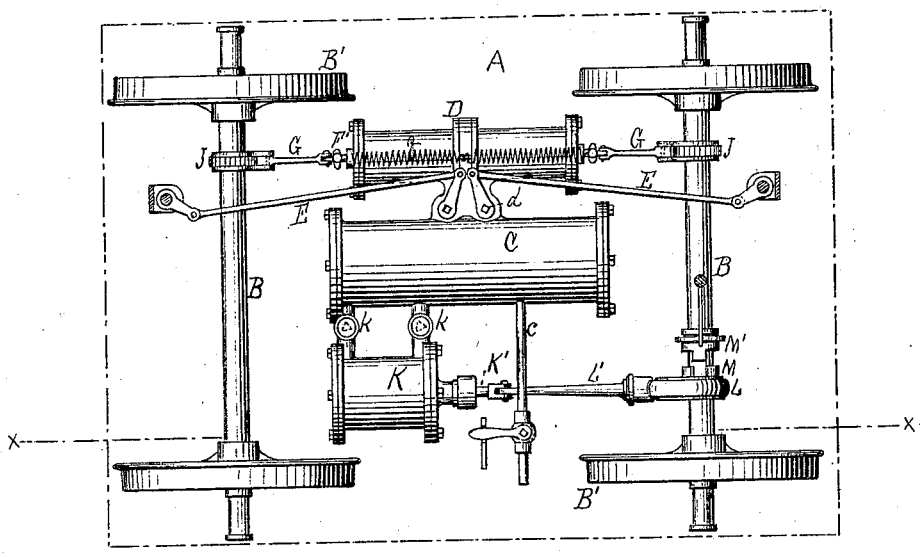


Fig. 2.



Witnesses:
Edwin James.
John R. Jones.

Inventor:
Thomas M. Brintnall.
per J. & J. Holmead.
Attorney.

2 Sheets—Sheet 2.

T. M. BRINTNALL.

CAR STARTER.

No. 181,555. Patented Aug. 29, 1876.

Fig. 3.

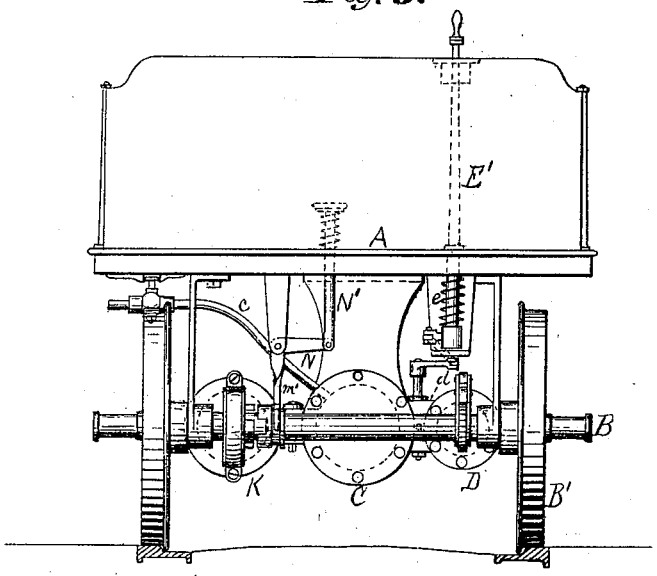


Fig. 4.

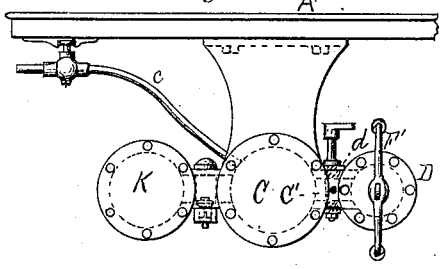
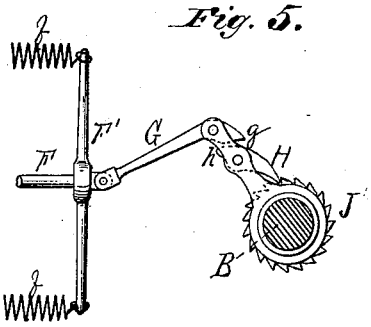


Fig. 5.



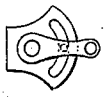


Fig. 6.

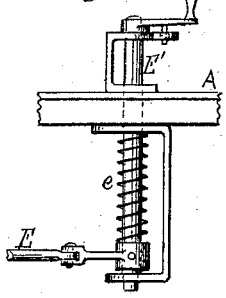
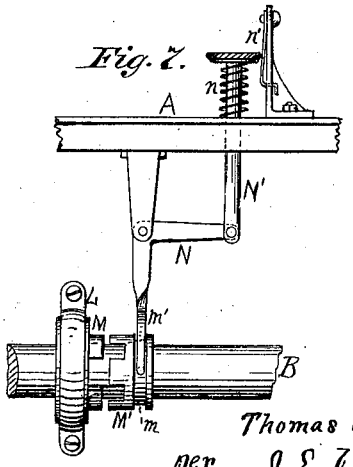


Fig. 7.



Witnesses:

Edwin James.

John T. Jones.

Inventor:

Thomas M. Brintnall.

per J. E. I. Holmead.

Attorney.

UNITED STATES PATENT OFFICE.

THOMAS M. BRINTNALL, OF NEW YORK, N. Y.

IMPROVEMENT IN CAR-STARTERS.

Specification forming part of Letters Patent No. **181,555**, dated August 29, 1876; application filed July 11, 1876.

To all whom it may concern:

Be it known that I, THOMAS M. BRINTNALL, of the city and State of New York, have invented an Improved Pneumatic Car-Starter, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing, and the letters of reference marked thereon, making part of this specification, in which—

Figure 1 is a longitudinal sectional view on the line *x x*, Fig. 2. Fig. 2 is a bottom-plan view. Fig. 3 is an end view, parts being removed. Fig. 4 is an end view of the pump-cylinder and reservoir. Figs. 5, 6, and 7 are detached views of portions of the working mechanism.

The object of my invention is to provide a reliable and practical means by which compressed air can be successfully employed as a motor in starting street-cars, and one in which the power from the reservoir through an exceedingly simple mechanism is applied and exerted directly on the axle, and is, under all circumstances, under the control of the driver or other operative, who, simply by depressing a lever or arm, can turn on the power at pleasure, and thus impart such rotation to the axle as will start the car without any labor to the animals, as the car will be in motion when, through their movement, their traces become taut, and therefore the labor now required of them, instead of that necessary to start a car, is simply to keep a car in motion that has been previously started by other power, which is, as is well known, comparatively light.

To accomplish this, the cylinders may be two independent cylinders, or a cylinder so divided as to provide double or independent chambers, in each of which is a piston, which is operated by means of compressed air fed from the reservoir through three-way cocks or valves, the same being so arranged that simply by working a crank through a connecting-rod the valve shall be so moved as to open a port, which shall cause the air to rush in with its full force from the reservoir, driving out the piston, and, of course, its rod, which, being pivoted to a lever, causes a pawl, with which the latter is connected, to engage in such a manner with a ratchet permanently keyed on the axle as to rotate the same, and thus imparting motion to the car. The operator then instantly releases the crank, when, through spring mechanism, the valve is closed, and the piston returned, and any excess of compressed air in the cylinder escapes through a safety-aperture, which now registers with an escape port provided in the valve or cock for this purpose.

The pump is operated by means of a band fitting over a loose clutch on the axle, and connecting and piston rods. When the pump is designed to be operated, the eccentric clutch is caused to engage with a sliding clutch having permanent bearings on the axle, or such bearings as will cause it to operate therewith. Thus, simply by causing the clutches to engage, the pump can be brought into operation so as to supply the reservoir, or, when the reservoir is to be supplied by other means, the pump, simply by disconnecting the clutches, can be rendered idle.

The construction and operation of my invention are as follows: A is the floor or platform of a truck of an ordinary street-car. B are the axles, and B′ the wheels, each constructed and secured in the usual manner. C is the reservoir for containing the compressed air, and is secured in suitable bearings on the under surface of the floor or platform. This reservoir is supplied with air from a suitable compressing pump or apparatus by means of a pipe, *c*, Figs. 2 and 3, independent of the car, or by a pump connected with the same, and which is worked directly through the rotation of the axle, as hereinafter described. D D are air cylinders or chests, and may be two independent cylinders, or one continuous cylinder divided by an air-tight partition at the center. The independent cylinders or chests, or the double divided cylinder D D, are so arranged that they shall operate on the axles at the opposite ends of the cars, one or a division of one being arranged in connection with each. These chests or cylinders D D are provided with pistons and piston-rods, which operate in a manner common to steam, air, and gas engines. The air is supplied to the cylinders D D from the reservoir C by means of three-way cocks or valves *d d*, one leading into each cylinder or division. These valves or cocks are opened by means of con-

necting-rods E E, which are attached to vertical arms or levers E′ E′, which project through the opposite platforms of the car, and are under the immediate control of the driver or other operative. These arms or levers E′ E′ are provided with springs *e e*, whose tension is constantly exerted to close or to retain in a closed position the valves or cocks *d d*. To the piston-rods F of the respective cylinders or chests, Figs. 1, 2, and 5, are secured vertical arms F′ F′, to which are attached springs *f f*, the same, at their opposite ends, being secured in suitable bearings on the cylinders D D. To these vertical arms F′ F′ are pivoted motor-levers G G, which terminate in cam-shaped toes *g g*, the cam-faces of which rest on and act in connection with ratchet-pawls H H, and which also have cam shaped heads *h h*, Fig. 5, so that when the piston, through the entrance of compressed air in either of the cylinders D, is driven forward, the cam-shaped toe of the lever shall so act on its respective pawl H as to cause it to engage with the ratchet-wheel J, which rotates the axle, imparting the necessary momentum to the car, thus freeing the animals from all strain in starting the same.

The operation of this portion of my invention being complete in itself, and its successful operation in no manner depending on the fact whether the air is supplied from mechanism attached to the car or independent therefrom, I will proceed to describe the same.

The reservoir C being properly charged with compressed air, and it being desirous to start the car, the driver simply depresses the lever or arm E′ in the direction which the car is desired to move, and which overcomes the tension of the spring *e*, forcing back the connecting-rod E, which so moves one of the valve-ports of the cock *d* as to cause it to register with an outlet-opening, C′, in the reservoir, and an inlet-opening in the chest or cylinder, so as to insure an inrush of air, which, acting on the piston, overcomes the tension of the springs *f f*, driving out the arms F′ F′, and which of course operate the motor levers G G, their cam-toes *g g* so acting on the cam-heads of the pawls H H as to cause them to engage with the ratchet J on the axle, and of course this causes the full force of the compressed air to be immediately and instantaneously exerted in propelling or starting the car, and its full force continues to be thus exerted until the pressure is removed from the lever E′, when the tension of the springs *e e* will instantly return the connecting-rod, bringing another port of the three-way valve, which, in this case, is in reality an escape-valve, in contact with the cylinder D, thus providing for the escape for all excess of compressed air in the cylinder.

The pump which I propose to use is a double-acting cylinder or force-pump, (shown at K,) which is provided with suitable check-valves, or check and pressure valves *k k*, Fig. 2. This pump is secured in suitable bearings on the under side of the platform or truck, and is operated by means of a band, L, and connecting-rod L′, attached to its piston-rod K′. This band L fits on a loose eccentric, M, secured to one of the axles. The eccentric M is provided with a clutch-hub, which, when the pump is to be operated, is caused to engage with a sliding clutch, M′, and which, while it has a free horizontal movement on the axle, permitting it to be engaged and disengaged with the eccentric at pleasure, yet it always rotates with the same. The clutch M′ is provided with an annular groove-bearing, *m*, in which are secured the arms of a bifurcated lever, *m′*. To this lever *m′* is secured a bell-crank-shaped lever, N, the vertical arm N′ of which passes up through the platform, and is provided with a return spring, *n*. On the platform is secured a stop or lock arm, *n′*, so that when the lever is depressed the stop engages the same, retaining it until released by the driver. Of course so long as thus retained the pump is being operated through the rotation of the axle.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In combination with an air cylinder or chest and piston and piston-rod, the ratchet-wheel J, secured on the axle B, the lever G, having a cam-toe, *g*, and the pawl H, having a cam-head, *h*, the whole so constructed and arranged that the lever shall engage the pawl with the ratchet when pushed forward and free it on its return movement, substantially as described.

2. The cylinder or chest D, piston and piston-rod F, arm F′, with spring attachment, a lever, G, pawl H, and ratchet J, secured to the axle B, the whole combined and arranged to operate substantially as described.

3. In a car-starter, the combination of the pump K, piston-rod K′, band L, eccentric M, having a clutch-hub, the sliding clutch M′, and axle B, the whole constructed and arranged to operate substantially as described.

4. In a car-starter, the clutch M′, bifurcated lever *m′*, foot-lever N, return spring *n*, and stop or lock N′, the whole combined and arranged in connection with an air-pump, to operate substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

THOMAS M. BRINTNALL.

Witnesses:

EDWIN JAMES,

PHILIP F. LARNER.