(No Model.)

3 Sheets—Sheet 1.

P. WUELFING.

CAR STARTER AND BRAKE.

No. 486,520. Patented Nov. 22, 1892.

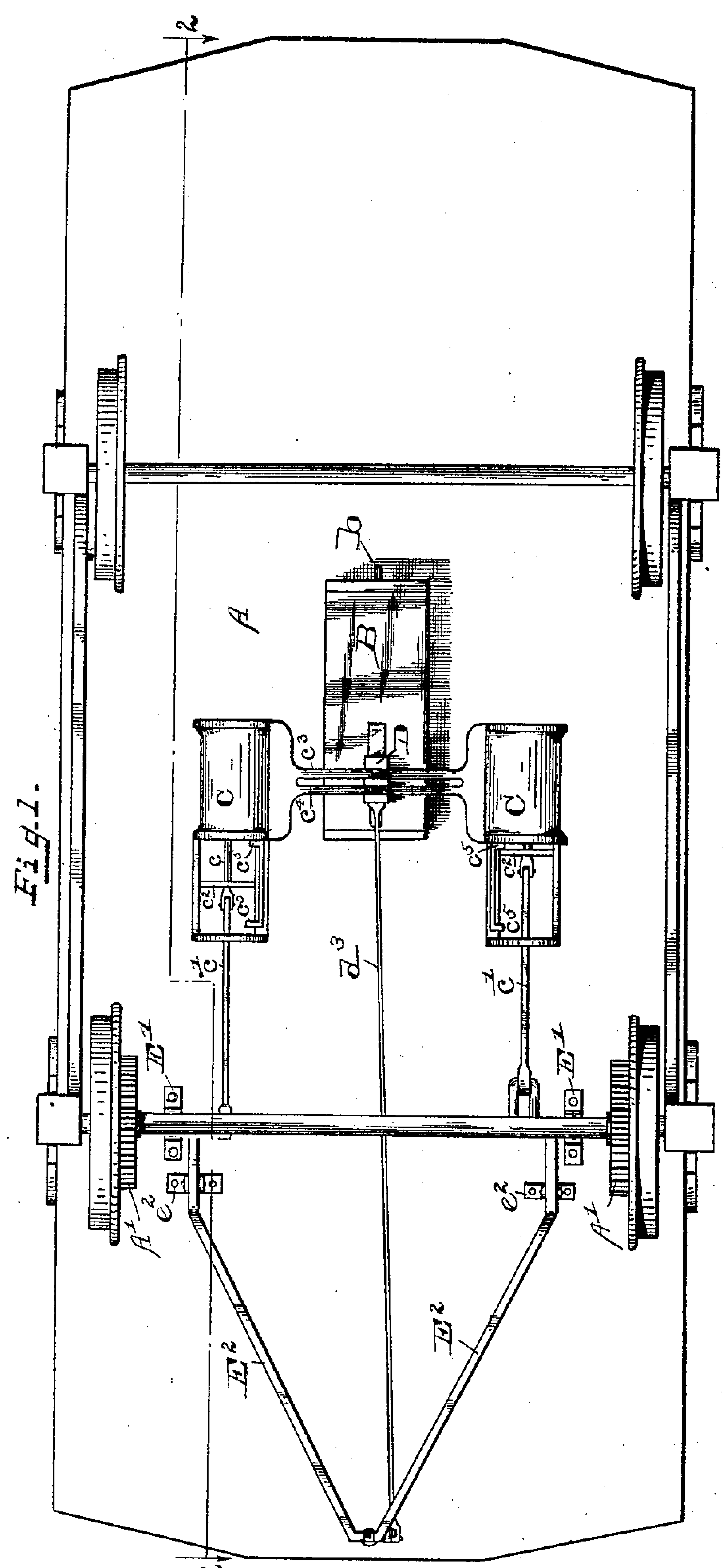


Fig. 1.

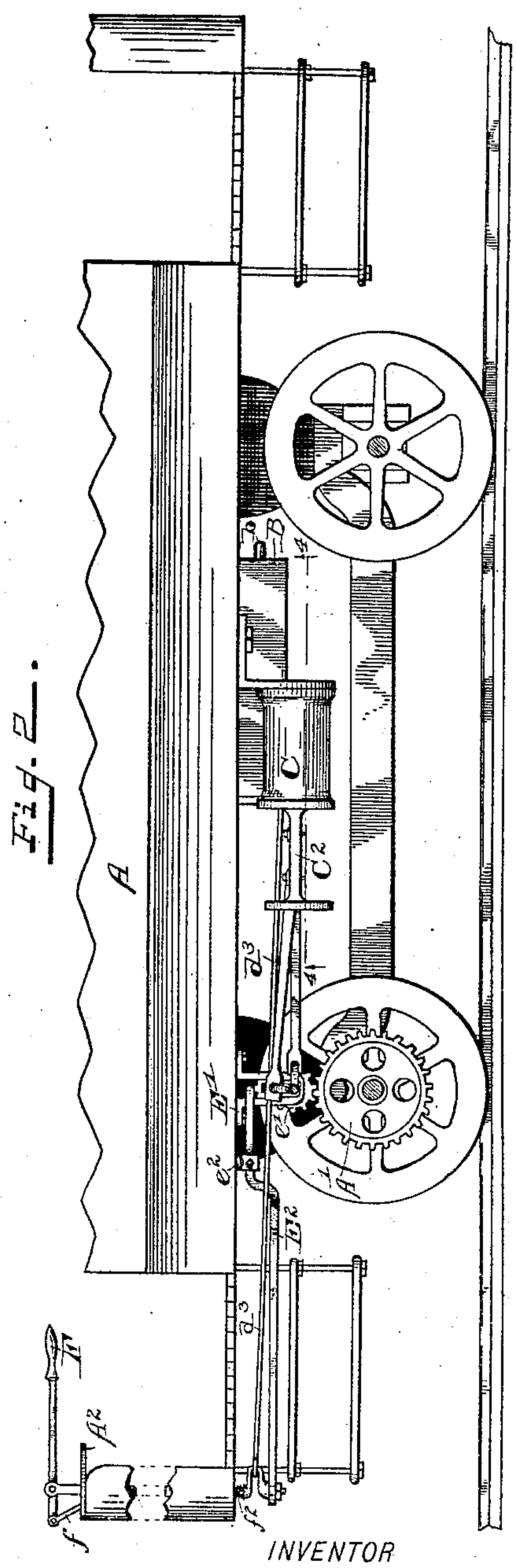


Fig. 2.

WITNESSES:

F. W. Kamer.
J. A. Walsh.

INVENTOR

Paul Wuelfing,
per
C. A. E. W. Bradford
ATTORNEYS.

(No Model.) 3 Sheets—Sheet 2.

P. WUELFING.

CAR STARTER AND BRAKE.

No. 486,520. Patented Nov. 22, 1892.

Fig. 3.

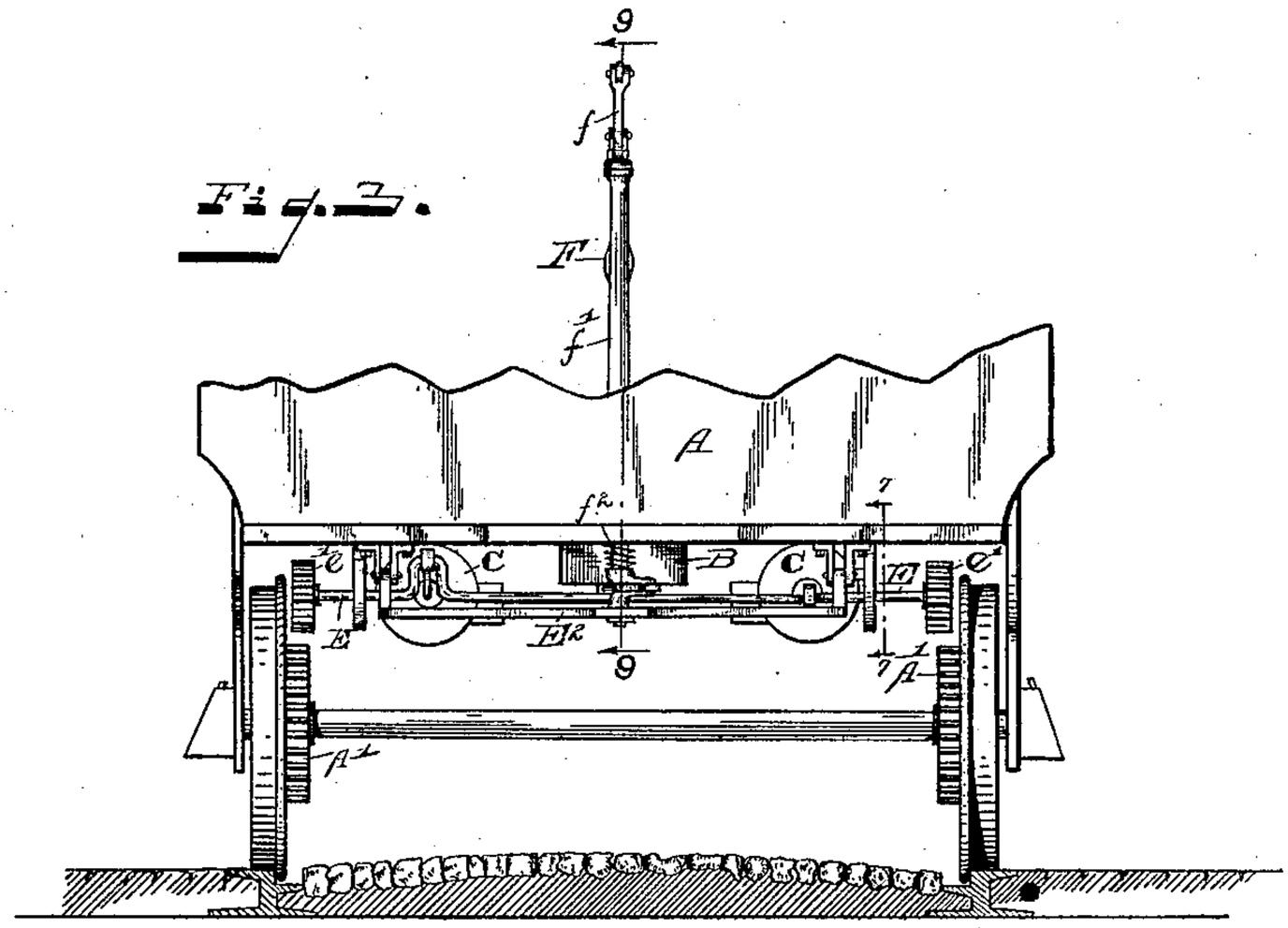
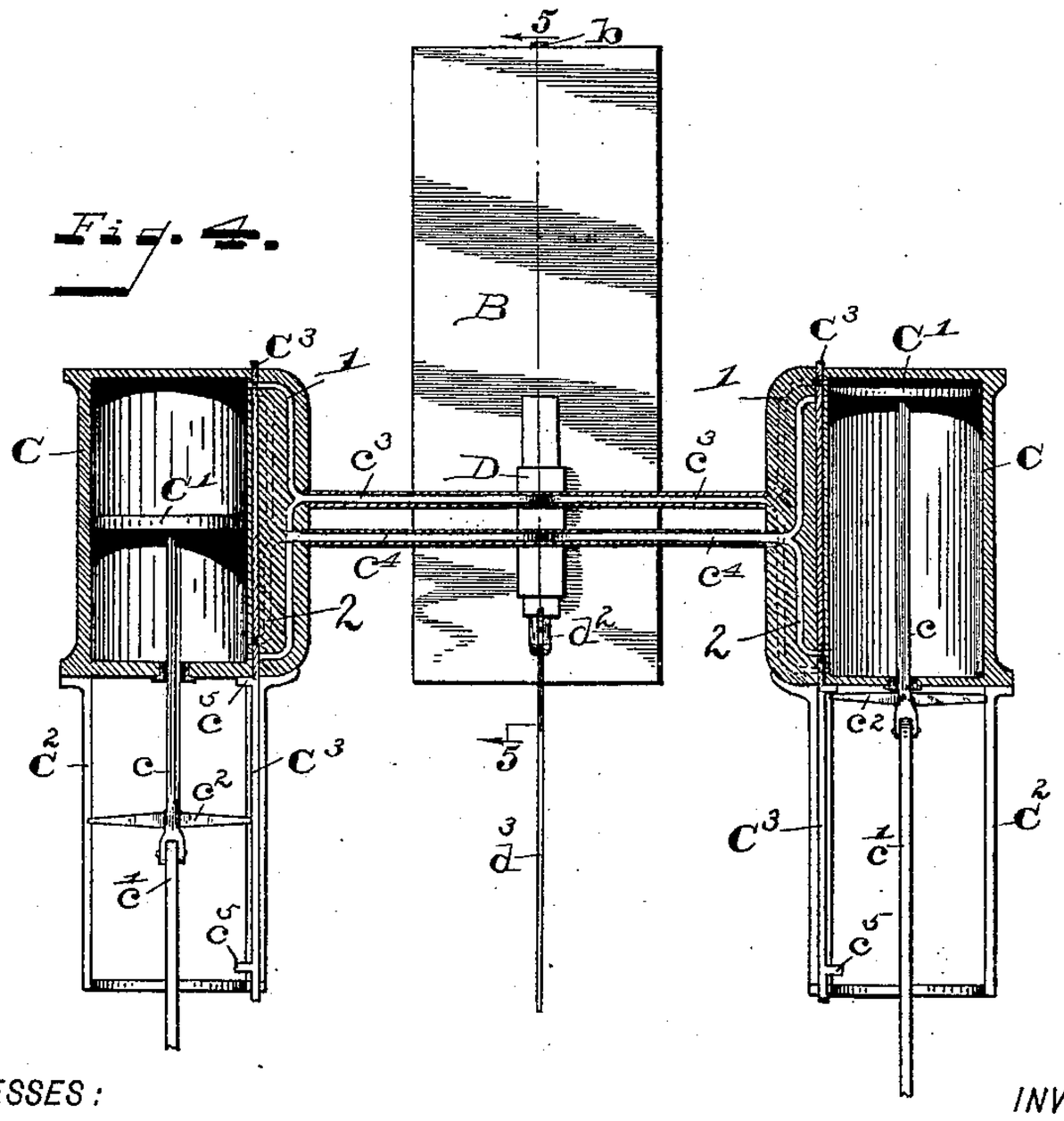


Fig. 4.



WITNESSES:

F. W. Warner.
J. A. Walsh.

INVENTOR

Paul Wuelfing,
per
C. F. & C. W. Bradford.
ATTORNEYS.

(No Model.) 3 Sheets—Sheet 3.

P. WUELFING.

CAR STARTER AND BRAKE.

No. 486,520. Patented Nov. 22, 1892.

Fig. 5.

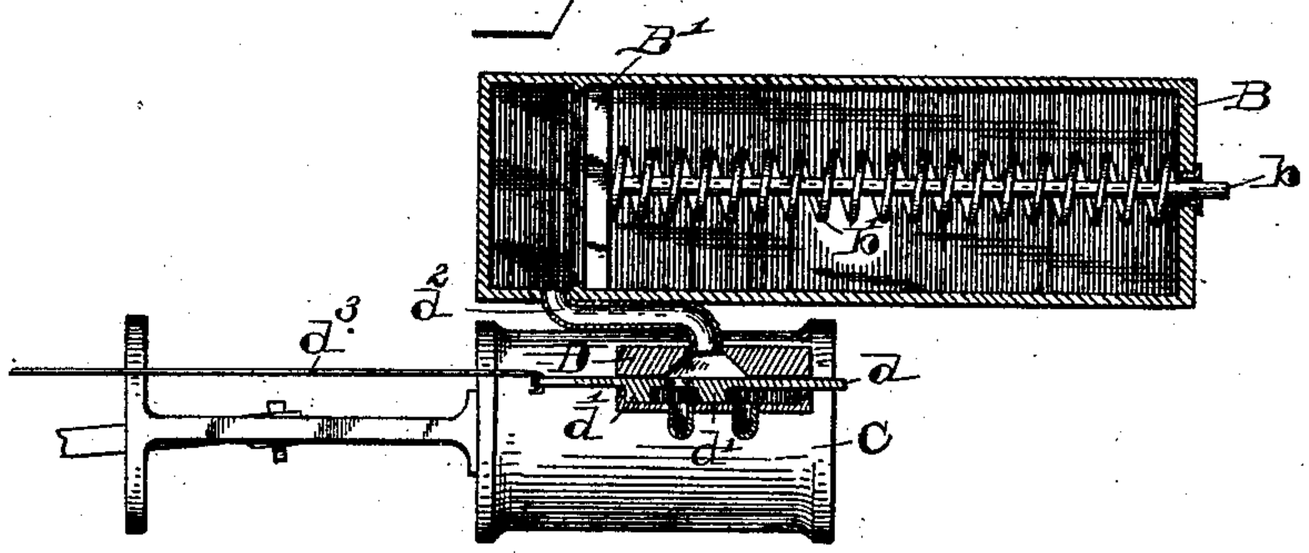


Fig. 6.

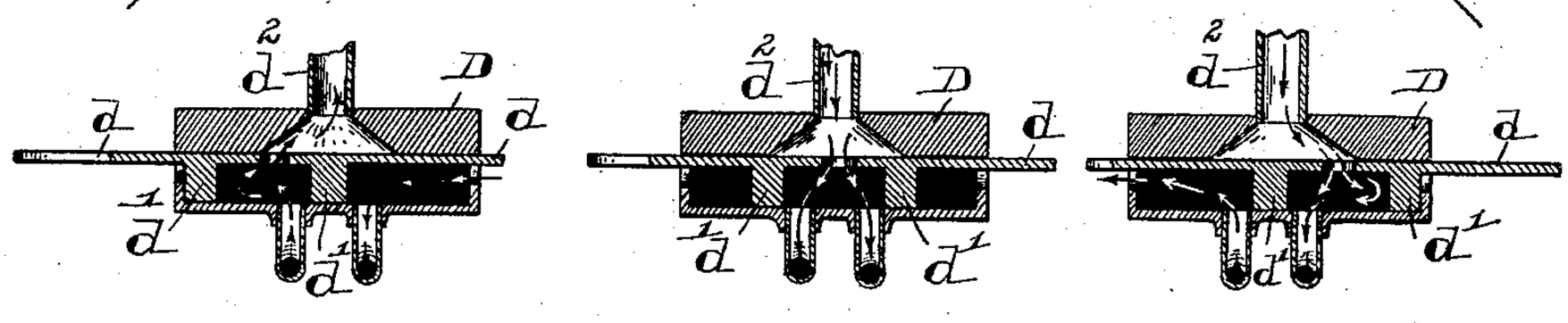


Fig. 7.

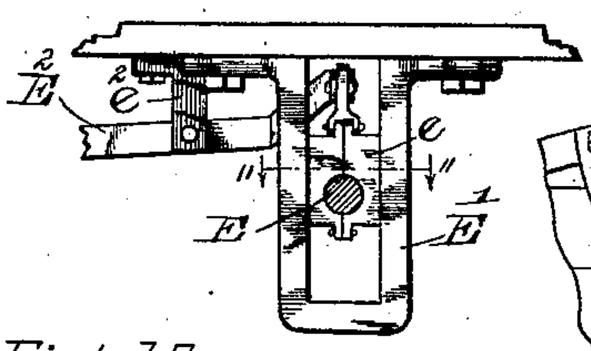


Fig. 8.

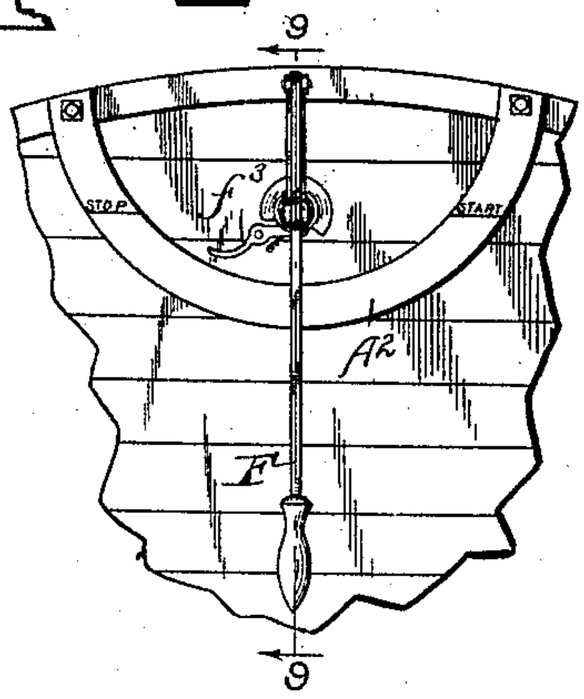


Fig. 9.

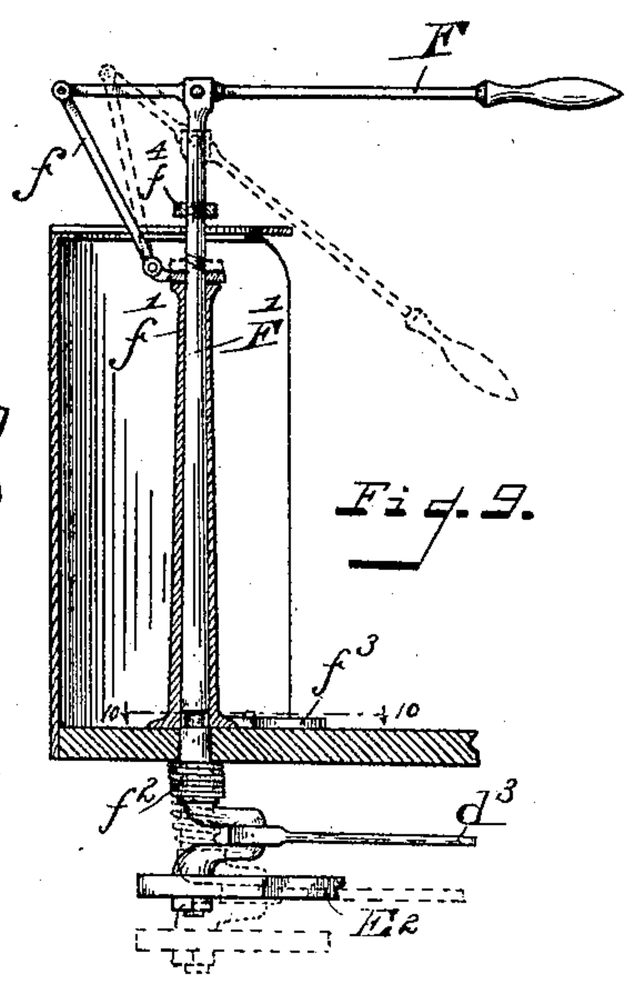


Fig. 10.

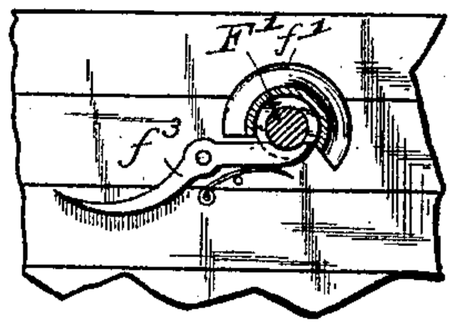


Fig. 11.

WITNESSES:

F. W. Harner.

J. M. Walsh.

INVENTOR

Paul Wuelfing,

per C. E. V. Brodford,

ATTORNEYS.

UNITED STATES PATENT OFFICE.

PAUL WUELFING, OF INDIANAPOLIS, INDIANA.

CAR STARTER AND BRAKE.

SPECIFICATION forming part of Letters Patent No. 486,520, dated November 22, 1892.

Application filed February 23, 1892. Serial No. 422,551. (No model.)

To all whom it may concern:

Be it known that I, PAUL WUELFING, a citizen of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented certain new and useful Improvements in Apparatus for Stopping and Starting Cars, of which the following is a specification.

The principal object of my said invention is to provide an efficient and convenient means for storing the power of the momentum of moving bodies and stopping the same—such as cars and motors of different kinds—in such a manner and by such a means that the same power may be used to again start the body in motion when desired, thus avoiding the loss of such power and the wear and tear upon the car caused by the use of friction-brakes, all as will be hereinafter more particularly described and claimed.

Referring to the accompanying drawings, which are made a part hereof and on which similar letters of reference indicate similar parts, Figure 1 is an under side plan of a car—such as a street-car—equipped with my invention; Fig. 2, a view of the lower portion of the car as seen when looking in the direction indicated by the arrows from the dotted line 2 2 in Fig. 1; Fig. 3, a front elevation; Fig. 4, a horizontal section looking in the direction indicated by the arrows from the dotted line 4 4 in Fig. 2; Fig. 5, a vertical section looking in the direction indicated by the arrows from the dotted line 5 5 in Fig. 4; Fig. 6, a central vertical section through the valve D, showing the different positions for the different operations, as will be presently described; Fig. 7, a detail view of the journal-bearings and supports for the shaft as seen when looking in the direction indicated by the arrows from the dotted line 7 7 in Fig. 3; Fig. 8, a top or plan view of the portions shown in Fig. 9; Fig. 9, a sectional view looking in the direction indicated by the arrows from the dotted lines 9 9 in Figs. 3 and 8; Fig. 10, a horizontal detail section looking in the direction indicated by the arrows from the dotted line 10 10 in Fig. 9; and Fig. 11, a detail cross-section looking in the direction indicated by the arrows from the dotted line 11 11 in Fig. 7.

In said drawings the portions marked A represent the body of the car; B, a compressed-air chamber; C, air pumps or cylinders; D, a shifting-valve between the pumping-cylinders and the storage-chamber; E, a crank-shaft for driving the pistons of said pumping-cylinders, and F a lever for controlling the various mechanism.

The car A may be any car—such as an ordinary street-car—propelled by whatever motive power is convenient, or a locomotive or other wheeled vehicle. No means for applying motive power is shown, as it is evident that the invention may be used in connection with cars operated by any motive power whatever.

The chamber B is secured to the under side of the body of the car and is designed to receive the air from the pumps or cylindesr and store the same under pressure. It is provided with a follower B′, mounted upon a stem *b*, around which is mounted a coiled spring *b*′, which normally holds said follower forward to a point near the front end of said chamber, as shown most plainly in Fig. 5, in front of which point the air from the pumps or cylinders is received, thus securing an immediate resistance to the pumping-cylinders when they begin to operate.

The cylinders C are duplicates in construction and arrangement, one being mounted upon each side of the chamber B and secured by hangers or other convenient means to the bottom of the car. Each is provided with a piston C′, mounted upon a piston-rod *c*, which is connected to a crank of the driving-shaft by a connecting-rod *c*′. Upon the outer end of said piston-rod is mounted a cross-head c^2, arranged to slide in a guiding-frame C^2, extending forward from the front cylinder-head a sufficient distance to provide for the stroke of the piston. On the inner side of each of said cylinders is provided a casing or plate containing ports 1 and 2, which communicate with said cylinder at each end, being also connected to the valve D by means of pipes c^3 and c^4. A sliding valve C^3 is mounted under said ports and extends to and rests upon the guiding-frame C^2. It is provided with a perforation in each end arranged that distance apart that one will register with one of said ports, while the other registers with the other port at the opposite end of the cylinder. Said valve is operated by means of the cross-head

c^2 on the piston-rod c, which strikes the projections c^5 on the projecting end of said valve C^3 as it reaches the limits of its stroke.

The valve D consists of a hollow casing having a sliding horizontal partition d therein, which is formed with two vertical partitions d' on its under side, between which a port in said partition d is formed. The pipes c^3 and c^4 from the two cylinders C join and enter the chamber beneath said horizontal partition d, while the upper chamber communicates with the compressed-air chamber B by means of a pipe d^2, which leads to the forward end of said chamber B in front of the follower B', as shown in Fig. 5. The sliding partition d is operated and regulated from the lever F through a connecting-rod d^3 and connecting mechanism, as will be presently described.

The crank-shaft E is journaled in adjustable bearings e, mounted in suitable ways in a hanger E', secured to the under side of the car near each end and substantially above one of its axles. On each end it is provided with a gear-wheel e', adapted to mesh with a gear-wheel A', provided on the main axle just inside the main wheel, being preferably cast integrally with said wheel. It is formed with two cranks projecting in different directions, one of which is connected to each of the connecting-rods c' for driving the piston-rods c and the pistons C' thereon. The bearings e are each hung by pivotal connections and a link to the outer end of a bar E^2, which is pivoted near its end in a housing e^2, secured on the under side of the bottom of the car. The other end of each of said bars is bent and extends forward at an angle to a point near the front end of the platform, where they are joined together and connected to the lower end of the post F'.

The operating-lever F is pivoted at its outer end to a pivoted bracket f, secured to revolve freely on the top of a stationary hollow post f'. A short distance from said outer end it is connected by a pivot to the upper end of a vertical adjustable post F', which post is mounted in said hollow stationary post f' and adapted to slide therein. To this lower end is attached the ends of the bars E^2, as before described. It is also formed with a crank near its lower end, to which is attached the connecting-rod d^3 for operating the sliding partition d of the valve D. A coiled spring f^2 is interposed between said crank and the under side of the car-floor and tends normally to hold said post to its lower adjustment, which is limited by a collar f^4 near its upper end coming in contact with the upper end of the post f'. A circumferential groove is formed in said post F' at that point, which will be just above the floor when said post is lifted to its highest adjustment, and a spring-pawl f^3, formed with a concave face, is pivoted to the floor and adapted to engage with said circumferential groove when said post is lifted up and retain it in this position.

The operation of my said invention is as follows: The parts being located as shown in the drawings and in the adjustment shown in Fig. 3 and the car being in motion, when it is desired to stop the operating-lever F' is lifted from the position indicated by dotted lines in Fig. 9 to the position shown in whole lines in Figs. 2 and 9, which lifts the post F' and through the bars or levers E^2, attached to its lower end, throws the bearings e of the shaft E down and the gear-wheels e' into engagement with the gear-wheels A' on the car-axle, which sets the crank-shaft E in motion and through it starts the pistons C' in the cylinders C. As soon as the post F' is raised the spring-pawl f^3 engages with the circumferential groove therein and supports it in this position until released. At the same time the lever F and post F' are turned to the point marked "stop" on the segment A^2, attached to the front rail of the platform, which through the crank on the lower end of said post F' and the connecting-rod d^3 adjusts the partition d of the valve D to the position shown at the left in Fig. 6. The piston being in motion, air from the outside is drawn in through the port in the right-hand end of said valve D, as indicated by the arrows, down through the pipe c^3 and the port 1 in the cylinder, the valve C^3 being adjusted to a position so that the port 1 will be open behind said piston and closed in front of it, and the port 2 being open in front of it and closed behind it, thus forcing the air in front of the piston through the port 2 and the pipe c^4 and the perforation in the partition d, between the vertical partitions d' out into the pipe d^2, and into the storage-chamber B. As the piston C' reaches the limit of its motion the cross-head c^2 strikes one of the projections c^5, which shifts the valve C^3 just before said piston begins its return movement, thus always maintaining the port 1 open behind said piston and the port 2 open in front of it, continuing the operation of pumping air from the outside and forcing it into the chamber B in front of the follower B'. As will be readily understood, the small portion of said chamber in front of said follower is very quickly filled with air, which as the operation of pumping is continued begins to compress, which is continued until the resistance is sufficient to overcome the momentum and stop the car, the spring b' compressing as may be required to accomplish this result. As the car stops, the operating-lever F is changed to the position shown in Fig. 8, which shifts the partition d of the valve D to the position shown at the middle of Fig. 6, which permits the air which has been compressed to pass down into the cylinders C and in each end thereof, equalizing the pressure on the opposite sides of the piston and permitting the car to stand until it is desired to ~~start it~~ again, when the lever F is turned to the point marked "start" on the segment A^2, (see Fig. 8,) which throws the partition d of the valve D to the position shown at the right

in Fig. 6, which throws the pipe c^4 and the port 2 into communication with the outside through the port in the left-hand end of said valve D, allowing the air upon one side of the piston to escape, as indicated by the arrows at the right in Fig. 6, and permitting the compressed air to rush down into the opposite end of the cylinder, forcing the piston into motion and exerting the power thus stored through the crank-shaft E and the connecting mechanism upon the wheels of the car to start it in motion, the operation continuing until the force of the compressed air is spent, when the operator releases the pawl f^3 and permits the spring f^2 or the gravity of the mechanism, if sufficient, to lift the bearings in which the crank-shaft E is journaled and the gear-wheels e' out of engagement with the gear-wheels A′ on the main axle. By this means, as will be readily seen, a car or any body moving on wheels can be stopped by its own momentum and the stopping power stored and used again to start it or assist in starting it.

It will be understood, of course, that instead of storing the air the valves may be so arranged as to pump the air from the chamber B instead of into it, and thus create a vacuum instead of compressing the air, which will also accomplish substantially the same result and be no departure from my invention.

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

1. In a car attachment for storing the pow r required to stop the same and utilizing it to start again, the combination of the chamber B, cylinders C, provided with the pistons C′, the shifting-valve C^3, the ports 1 and 2, the pipes c^3 and c^4, leading, respectively, from said ports 1 and 2 to the valve D, said valve D divided by the horizontal partition d, having the pipes c^3 and c^4 connected with its lower side and a pipe d^2 connected with the chamber B, the crank-shaft E, mounted in adjustable bearings and provided with gear-wheels, the cranks of which shaft are connected by connecting-rods c' to the piston-rods of the piston C′, said adjustable bearings hung upon the ends of the pivoted rods or levers E^2, the turning and vertically-adjustable post F′, having the forward ends of said bars or levers E^2 secured to its lower end and formed with a crank near its lower end, from which a connecting-rod d^3 leads to the projecting end of the partition d of the valve D, and the operating-lever F for operating said post F′, all substantially as set forth.

2. The combination, with a car A, of the storage-chamber B, the cylinders C, containing the pistons C′, the valve D, the pipes c^3 and c^4, leading from the respective ports of said cylinders to said valve D, the shifting partitions d, the pipes d^2, running from said valve to the storage-chamber, the crank-shaft E, mounted in adjustable bearings hung upon the ends of the pivoted levers E^2 in suitable housings, said crank-shaft being provided with gear-wheels adapted to mesh with gear-wheels on the main axle, its crank being connected by connecting-rods to the piston-rods of the pistons C′, an operating-lever, the post F′, attached at its upper end to said lever and having the ends of the levers E^2 attached to its lower end, and a rod d^3, connected at one end to a crank formed near its lower end and to the sliding partition d of the valve D at its other end, said several parts being arranged and operated substantially as shown and described.

3. In an apparatus for storing the power of the momentum of cars and utilizing the same to start the car, the combination of the operating shafts and levers, the pumping-cylinders, the connecting valves and pipes, and a storage-chamber having a follower therein which normally divides the main portion of said chamber from the end connected to the pumping mechanism, but which is adapted to be forced back when required, all substantially as set forth.

4. The combination, with a car, of an apparatus for storing the power of its momentum, whereby the car may be stopped, and again utilizing said power for starting the car, which consists in an air-storage chamber, an air-pump connected therewith, suitable valves for controlling the inflow and outflow of air, said air-pump being connected with an axle of the truck by which it is driven, and a shifting-valve interposed between said storage-chamber and said pump, whereby its operation may be reversed and the power thus utilized in both directions, substantially as set forth.

In witness whereof I have hereunto set my hand and seal, at Indianapolis, Indiana, this 17th day of February, A. D. 1892.

PAUL WUELFING. [L. S.]

Witnesses:
E. W. BRADFORD,
J. A. WALSH.