

(No Model.)

L. H. WILSON.

CAR STARTER.

No. 358,999.

Patented Mar. 8, 1887.

Fig. 1.

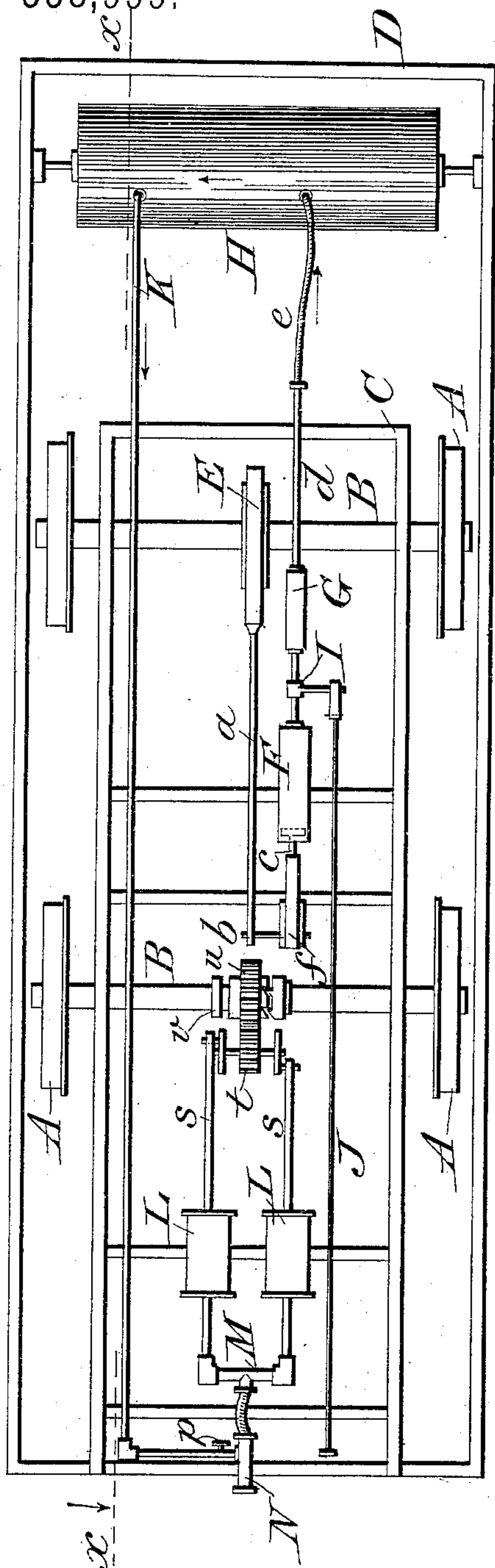


Fig. 3.

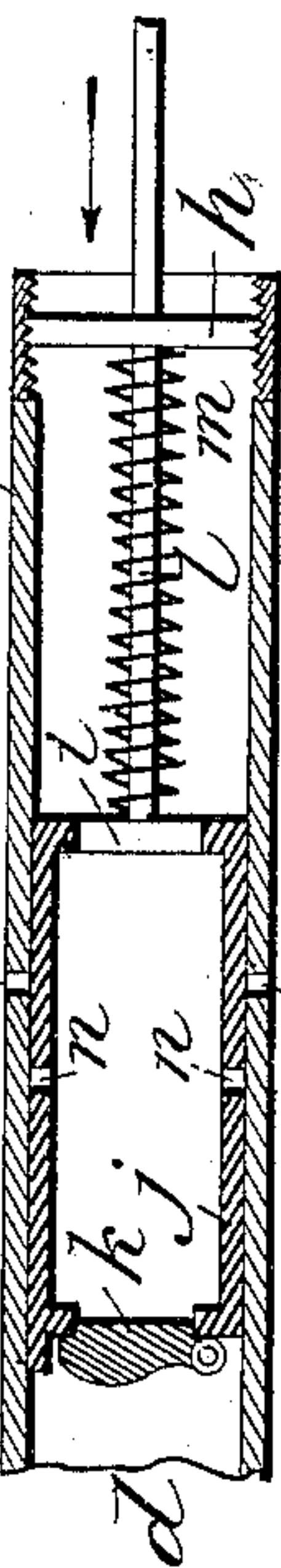
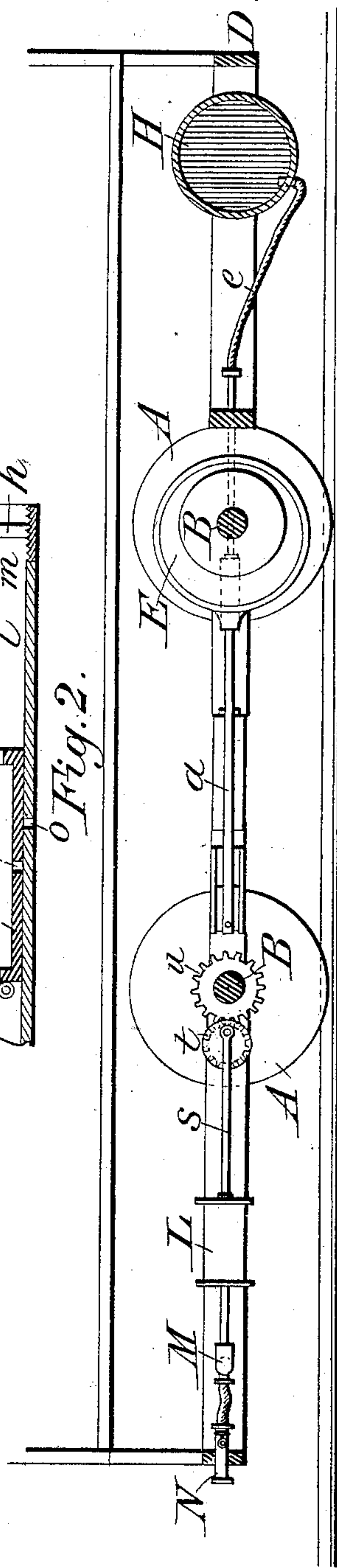


Fig. 2.



Attest:

H. H. Schott
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per John C. Tasker
att'y

UNITED STATES PATENT OFFICE.

LEVI HILES WILSON, OF ST. LOUIS, MISSOURI.

CAR-STARTER.

SPECIFICATION forming part of Letters Patent No. 358,999, dated March 8, 1887.

Application filed June 1, 1886. Serial No. 203,790. (No model.)

To all whom it may concern:

Be it known that I, LEVI HILES WILSON, a citizen of the United States, residing at St. Louis, in the county of St. Louis and State of Missouri, have invented certain new and useful Improvements in Car-Starters; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to that class of devices known as "car-starters," or devices for overcoming the inertia of cars; and it consists in the construction, arrangement, and combination of parts, as will be hereinafter fully described.

In the annexed drawings, illustrating my invention, Figure 1 is a bottom plan view of the running-gear of a street-car with the mechanism of my improved starter applied thereto. Fig. 2 is a sectional side elevation at about the line *x x* of Fig. 1. Fig. 3 is an enlarged sectional detail of the automatic valve.

Like letters of reference designate like parts in the several views.

A A represent the wheels, and B B the axles, of the car.

C designates the frame for supporting the machinery of my improved starter, and D is the bottom portion of the car.

One of the axles B—as, for instance, the rear one—is provided with an eccentric, E, rigidly mounted thereon. A pitman-rod, *a*, is secured to the eccentric E, and its opposite end connects, by means of a pin, *b*, or other suitable device, with a piston-rod, *c*, whose movements are properly guided and directed by an inclosing-frame, *f*, and said rod being provided with a piston working within an air-compressing pump, F. An air-passage establishes communication between the compressing-pump F and a storage-tank, H, fastened to the under side of the car near its rear end. This passage-way is preferably made in two parts, as *d* and *e*, the former being a rigid passage and the latter a flexible tube, to allow of the necessary and usual vertical movement of

the car-bottom, to which the air-tank is secured, with relation to the running-gear and the frame-work that carries the mechanism of my improvement. The portion *d* of the passage is provided with an automatically-operating valve, G, and also with a valve, I, interposed in the tube between the cylinder and the automatic valve, and adapted to be operated by a rod-and-lever connection, J, extending from the valve to the driver's platform, or by other convenient mechanical means.

It will thus be evident that the locomotion of the car will, through the agency of the eccentric attached to the axle, the reciprocating pitman-rod, and the piston, compress air within the air-compressing cylinder, which will pass thence into the storage-tank and be ready for use in overcoming the inertia of the car, as will be hereinafter described. The degree of compression, and consequently the effective power of the air within the tank, is regulated by means of the automatic valve G, the detailed construction of which is shown in Fig. 3. The valve consists of a cylinder, *g*, into one end of which is secured a skeleton nut, *h*, through which the air coming from the compressor in the direction of the arrow enters the cylinder.

Within the cylinder *g* is a tightly-fitting movable hollow cylinder or barrel-piston, *j*, provided at one end with a hinged check-valve, *k*, and to the other end, which is formed with openings *i*, is fastened a rod, *l*, which is held in place at its other extremity by passing through nut *h*, and is surrounded by a spiral spring, *m*, which bears against the nut and also the inner cylinder. It will be seen, therefore, that the inner cylinder is movable endwise within the outer casing, and when so moved is adapted to be replaced by means of the spring *m*. Said inner cylinder is provided with two or more openings, *n n*, which, when the cylinder is moved, will come into conjunction with the openings *o* in the casing *g*, and thus afford an outlet for the superfluous air.

The operation of the automatic valve will therefore be as follows: The compressed air passing through the skeleton nut will pass also into the inner cylinder, and then lifting the valve *k* proceed on into the storage-tank. This will continue until the desired pressure

of the air in the tank is attained, the amount of said pressure being dependent upon the adjustment of the skeleton nut with respect to the spring *m*, so that it may be adjusted to
 5 withstand a certain specified back-pressure—say forty pounds to the square inch of tank-surface. This pressure being reached, the inner cylinder will begin to move and the spring to be contracted until at length the openings
 10 *n* and *o* are coincident, when the air coming from the compressing-cylinder will no longer pass into the tank, but out at the outlet, and the check-valve will be completely closed. As soon, however, as the pressure within the
 15 tank is diminished by using the air the former state of things will be resumed. When the automatic valve is inoperative from any cause, or when for any reason it is desired to stop the passage of air to the tank, it can be done
 20 by means of valve I and connections J, above referred to.

I have now described the manner of obtaining my supply of compressed air. I will now describe the mechanism for making use of this
 25 supply.

A pipe, K, extends lengthwise of the car from the tank to the driver's platform, where it is furnished with a valve, *k*, operative by any suitable means that may be provided for
 30 the convenience of the operator, as a treadle or hand-lever. Underneath the platform or forward end of the car is located an air-engine consisting, essentially, of a pair of cylinders, L L, containing pistons, whose piston-rods *s s*
 35 are connected with a spur-wheel, *t*, in such a manner that their movement will revolve it. The spur-wheel meshes with another spur or gear, *u*, upon the forward axle, and a feather, *v*, is likewise fixed upon the forward axle for
 40 the purpose of sliding the spur-wheel in and out of gear. The cylinders L connect by pipes with a cross cylinder or tube, M, which in turn connects by a flexible connection with a tube, N, into which the air-passage K opens. Obviously, therefore, when the driver or opera-
 45 tor wishes to start the car, he has but to open the valve *p* and let air into the engine, and the operation thereof will give a rotative impulse to the forward axle and its wheels and
 50 start the car.

My improved device will not only be found serviceable in starting the car, but also in overcoming its inertia at various other times—
 55 as, for instance, in ascending a heavy grade or in rounding a short curve; also, it can be used in connection with the ordinary air-brake to supply air thereto, suitable mechanism being provided for the purpose.

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

1. The combination of the rotative axle, the eccentric secured thereon, the air-pump whose piston is operated by a connection with
 65 said eccentric, the storage-reservoir, the connecting-passage between the pump and the reservoir, and the automatically-operating

valve consisting of an outer casing, *g*, having side openings *o o*, an inner casing, *j*, having side openings *n n*, end opening, *i*, and a
 70 check-valve, *k*, the rod *l*, spring *m*, and nut *h*, said valve being located at a point in said passage whereby any desired pressure of the air within the reservoir may be attained, substantially in the manner shown and set forth.

2. The combination, with the air-compressor operated by a connection with the rotative axle, and a storage-tank connecting with the compressor, of an automatically-operating
 75 valve consisting of an outer casing having side openings, an inner casing having side openings, an end opening, and a check-valve, the rod *l*, spring *m*, and nut *h*, said valve being located in the tube between the compressor and
 80 the tank and adapted to regulate the pressure of the air in the tank, as shown and set forth.

3. The combination, with an air-compressor operated by a connection with the rotative axle and a storage-tank connecting with the compressor, of an automatic valve to regulate
 85 the degree of pressure to be attained within the tank, which consists of an outer casing, *g*, having openings *o o*, an inner casing, *j*, having side openings *n n*, end opening, *i*, and check-valve *k*, the rod *l*, spring *m*, and skeleton nut
 90 *h*, all arranged to operate substantially in the manner shown and described.

4. The combination of the car-axle, an eccentric or eccentrics secured thereon, an air-pump whose piston is operated by a connection
 95 with said eccentrics, a storage-reservoir for the compressed air, and an air-engine connecting with said reservoir by a tube having a supply-valve, the piston-rods of said engine being arranged to revolve a gear which meshes
 100 with a gear on the forward axle, all of said parts being so combined and operated that the admission of air to the engine will impel the car, substantially as represented and set forth.

5. The combination of the axle B, eccentric E, mounted thereon, air-compressor F, whose piston is operated by connection with the eccentric, reservoir H, connecting-tube *d*, having
 105 valves G and I, connecting-tube K, having valve *p*, the double-cylinder air-engine, and the intermeshing spur-gears *t* and *u*, actuated by the piston-rods *s s* of the engine to rotate the forward axle, substantially as shown and set forth.

6. The combination of air-supply and a double-cylinder air-engine connecting therewith and having piston-rods *s s*, adapted to operate a spur, *t*, which meshes with a spur,
 110 *u*, on the forward axle, and thus actuate the latter in starting or assisting the motion of the car, as specified and shown.

In testimony whereof I affix my signature in presence of two witnesses.

LEVI HILES WILSON.

Witnesses:

CHAS. S. BROWN,
 G. O. HALL.