(No Model.)

C. FORBES.

CAR BRAKE AND STARTER.

No. 371,883. Patented Oct. 18, 1887.

Fig 1.

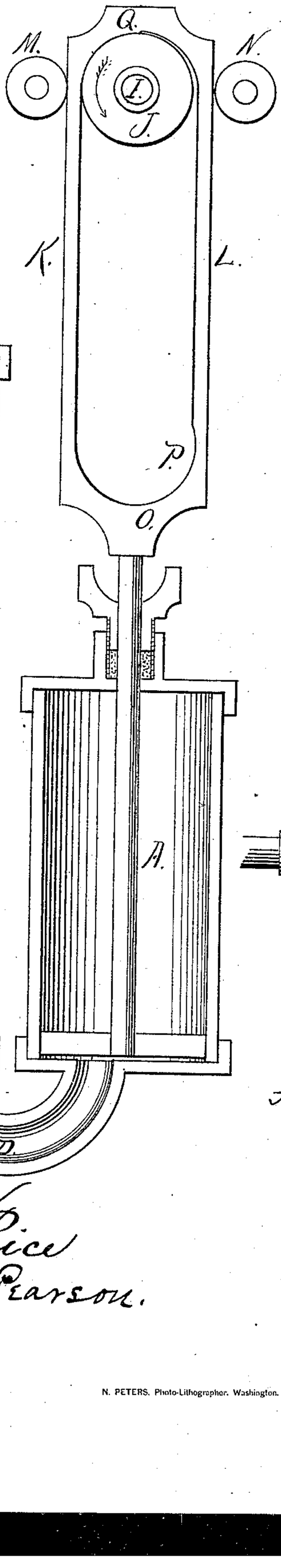


Fig 2.

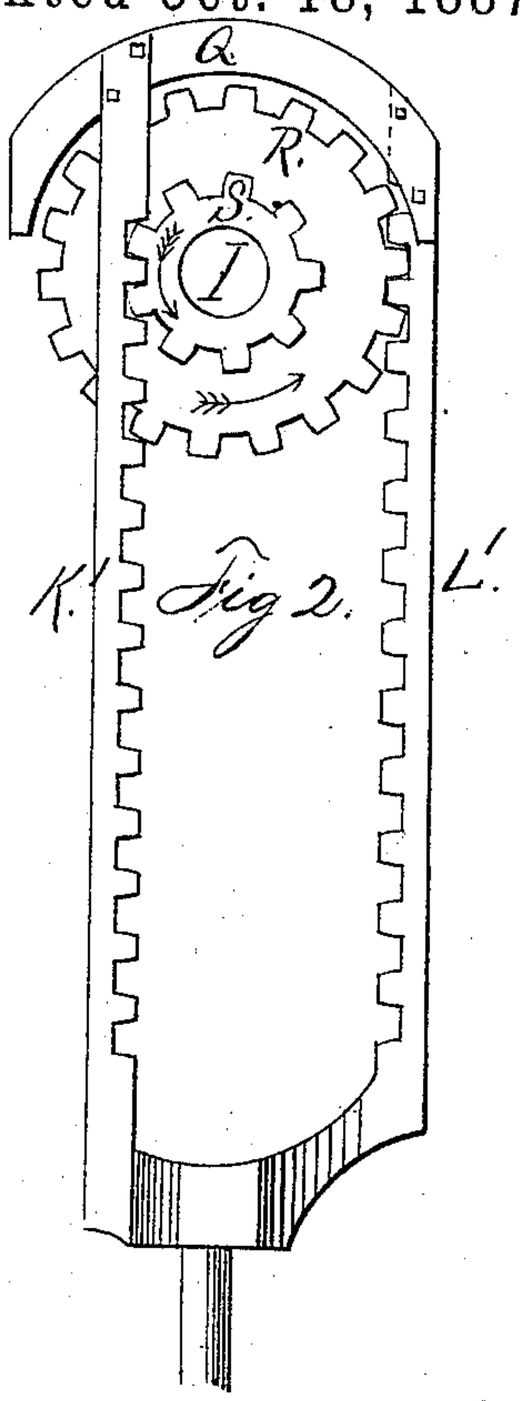


Fig 3.

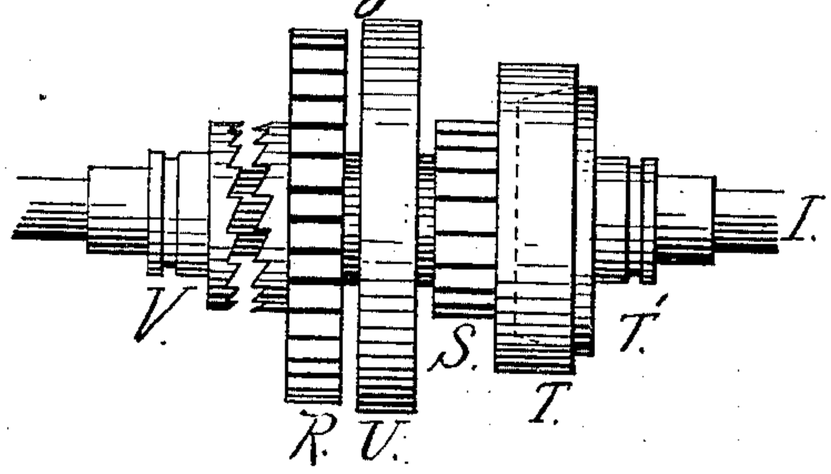
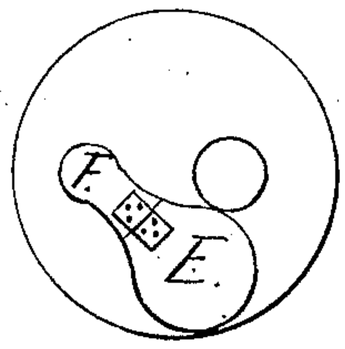


Fig. 4.



Witnesses
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CAR BRAKE AND STARTER.

SPECIFICATION forming part of Letters Patent No. 371,883, dated October 18, 1887.

Application filed December 1, 1886. Serial No. 220,423. (No model.)

To all whom it may concern.

Be it known that I, CHARLES FORBES, M. D., a citizen of the United States, residing at St. Paul, in the county of Ramsey, and the State of Minnesota, have invented a new and useful Improvement in Car Brakes and Starters, of which the following is a specification.

My invention relates to a device whereby the motion of a car may be arrested and renewed through the intervention of a pneumatic spring. In this device the spring becomes, in connection with the other parts of the apparatus, a car brake and starter.

The mechanism is illustrated in the accompanying drawings.

Figure 1 represents a vertical section of the apparatus; Fig. 2, a modification; Figs. 3 and 4, details of parts.

Similar letters refer to similar parts throughout the several views.

The description is as follows:

In Fig. 1 A is a cylinder constructed like the cylinder of an air-pump, having a movable piston. C B represents a hollow cylinder placed in communication with the cylinder A by means of the pipe D. At E there is a valve opening upward. This valve is hinged to F, so that the combination forms a slide-valve, which may be turned to one side by the lever G, thus leaving the opening into D from the cylinder B C partially or entirely clear. Fig. 4 represents the valve completely removed from the opening.

As the apparatus now stands, the space A is a vacuum, the space C is condensed air or gas, and the space B and D contains a liquid—an oil would be most suitable. The apparatus is now in a condition to impart motion in an upward direction to the piston, which motion is started, increased, decreased, or arrested at the will of the operator by opening the slide-valve F by means of the lever G. The upward movement of the piston is caused by the expansion of the compressed air at C, which forces the liquid at B through D into A. The vacuum in A above the piston assists in its ascension. When the piston has ascended to the top of the cylinder A, the space underneath it will be filled with the liquid; also the space D. There should be enough liquid to cover the valves E and F. The cylinder C B will now be filled with the expanded air. The accumulation of energy results from the forcible depression of the piston. As the piston is forced downward, the liquid below it will be crowded through D into B, condensing the air into the space C and leaving a vacuum at A. The piston is held at any point of its descent by the automatic closing of the valve E.

The tension of the pneumatic spring may be increased by forcing more than the normal quantity of air into B C. A variation in the size of B C will also result in a change of tension.

By means of the tube D the cylinder A may be placed in any position. As a rule, the cylinder B C should be upright. When it is necessary to have it horizontally placed, the liquid and the gas may be kept separated by a movable piston placed between them, (represented in Fig. 1 by the dotted lines at H.)

The mechanism by which the pneumatic spring is utilized as a brake and starter is represented in the portion of the apparatus surmounting the piston-rod in Fig. 1. I is an axle of the car-wheels, to which a friction-wheel, J, is rigidly attached. K and L are bars in communication with the piston-rod. M and N are pressure-wheels worked by a suitable lever. The direction of rotation is indicated by the arrow at J.

Motion is imparted to J by the pneumatic spring as follows: The bar L is brought in contact with the periphery of the friction-wheel J and held there by the pressure-wheel N. The ascent of the piston and the bar is then controlled by opening the valve F by the lever G. When the spring has accomplished its work, Q will be near J, and J will revolve freely in the depression P. To arrest the motion of J, the bar K is brought in contact with the periphery of J by the pressure of the pressure-wheel M. The descent of K will cause the downward movement of the piston with the formation of the vacuum at A and the pneumatic compression at C, heretofore described. Should the rotary motion of J not have been fully arrested at the completion of the descent of the piston, a supplementary brake, Q, will then be automatically applied to J or a companion friction-wheel.

It is quite evident that the motion of the axle I may be reversed by the reversal of the movements of the pressure-wheels M and N. It is to be understood that when one of the

wheels, M or N, is making pressure the other is released.

Figs. 2 and 3 represent a device by which the spring may be used through the instrumentality of the rack and pinion.

In Fig. 2 K′ and L′ are the rack. They correspond to K and L, Fig. 1. K′ has S for its pinioned wheel and L′ has R. These wheels have the axle I passing through them, but do not revolve with it, except when they are in action.

When the rotary motion of I is to be arrested, the pinioned wheel S is to be secured to the axle by means of a friction-clutch, as represented at T and T′, Fig. 3. The clutch here represented is a cone-clutch. The part T is attached rigidly to S, and T′ revolves with I. When thus engaged, the pinioned wheel S will revolve with I, and downward motion will be communicated to the rack K′, which will result, as heretofore, in the depression of the piston and the arrest of motion in I.

In case the motion of I is not fully arrested at the complete descent of the piston, the supplementary brake Q, Fig. 2, will be brought automatically in contact with the friction-wheel U, Fig. 3, which is rigid with the axle I. This wheel is not represented in Fig. 2, but is supposed to be between the wheels S and R. When motion is to be imparted to I by means of the spring, the clutch T T′ is to be disengaged and the pinioned wheel R secured to I by means of the ratchet V. The opening of the valve F, Fig. 1, by the lever G will cause the ascent of the piston and the rack L′, Fig. 2, thereby imparting rotary motion to R and I. A friction-clutch will work equally well in place of the ratchet V^2 Fig. 3. The ratchet V and clutch T T′ are actuated by a suitable lever.

The pinioned wheels S and R, Fig. 2, may be of equal size. The object in having the starting-wheel R larger than S—the brake-wheel—is that the spring may act more advantageously in overcoming starting-friction. A similar arrangement, if desired, may be adopted in Fig. 1 by substituting two friction-wheels of unequal size for the friction-wheel J.

The drawings represent the apparatus in the upright position. In actual practice the apparatus would be horizontal.

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

1. A mechanism for retarding and imparting motion, consisting of two pressure-cylinders with contained liquid, connected by a pipe, a valve for closing said pipe, a piston in one of the cylinders, and a gearing, such as described, for connecting the piston with a rotary shaft and adapted to receive motion from and impart motion to said shaft, substantially as described.

2. In a car brake and starter, the combination, with a pressure-cylinder, a piston therefor, and a gearing connected to said piston and adapted to engage with the axle, of a friction-surface on said axle, and a brake adapted to engage the friction-surface when the piston arrives at the end of its stroke, substantially as described.

3. In a car brake and starter, the combination, with a pressure-cylinder, a piston therefor, a piston-rod, and the racks K and L, of the axle I and the two gears R and S, the gear R being of greater diameter than the gear S, as and for the purpose described.

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