(No Model.)

A. B. ARNOLD.

CAR BRAKE AND STARTER.

No. 301,423. Patented July 1, 1884.

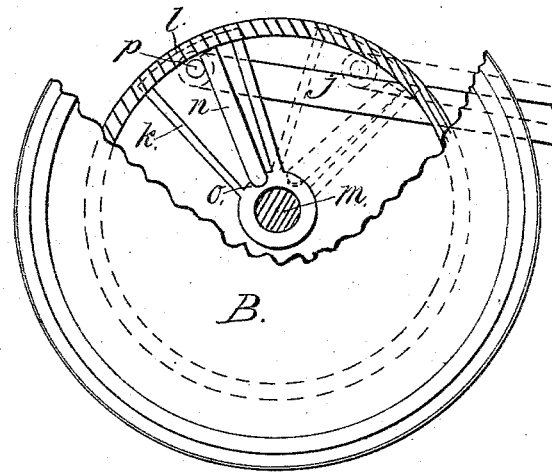

Fig. 3.

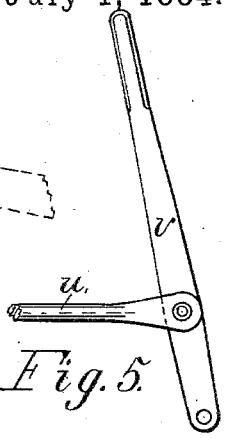

Fig. 5.

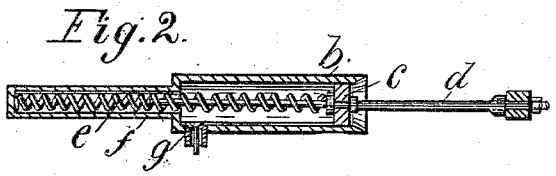

Fig. 2.

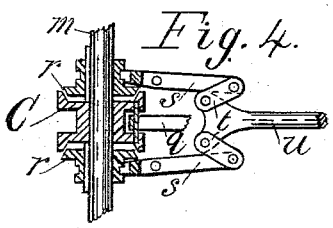

Fig. 4.

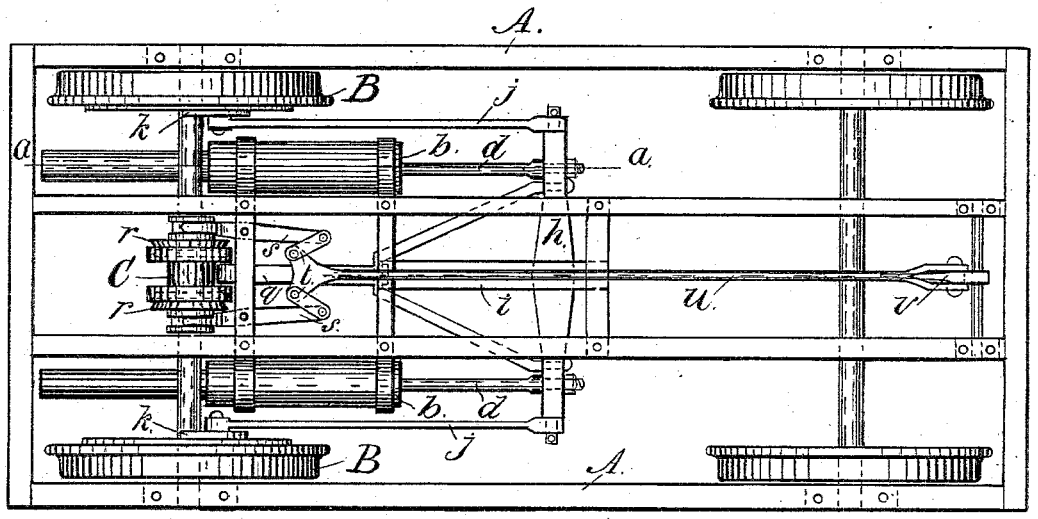

Fig. 1.

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UNITED STATES PATENT OFFICE.

ALFRED B. ARNOLD, OF COLUMBUS, INDIANA, ASSIGNOR OF TWO-THIRDS TO REINOLD B. BUSCH AND ALBERT H. BUSCH, BOTH OF SAME PLACE.

CAR BRAKE AND STARTER.

SPECIFICATION forming part of Letters Patent No. 301,423, dated July 1, 1884.

Application filed December 31, 1883. (No model.)

To all whom it may concern:

Be it known that I, ALFRED B. ARNOLD, a citizen of the United States, residing at Columbus, in the county of Bartholomew and State of Indiana, have invented a new and useful Improved Car Brake and Starter, of which the following is a specification.

My invention relates to an improved car brake and starter of that class in which a portion of the force required to overcome the momentum of the moving car is caused to react to start the car.

The objects of my improvements are, first, to provide means to connect at will one of the axles of a car-truck with one or more pistons adapted to move in corresponding air-tight cylinders, so that the forward revolution of said truck will cause said piston or pistons to compress the air in their respective cylinders, and thereby check the revolution of the truck and the consequent forward movement of the car to which it is attached; second, to provide means for automatically connecting the above-mentioned piston or pistons with one or more of the car-wheels, whereby the reaction of the air compressed in the said cylinder or cylinders shall operate to turn said wheels forward, and thereby start the car; third, to provide means for insuring the complete forward stroke of the above-mentioned pistons.

The accompanying drawings illustrate my invention.

Figure 1 is a plan. Fig. 2 is a vertical longitudinal section through *a a*. Fig. 3 is an enlarged view of one of the wheels with a portion of the side broken away to show the clutch. Fig. 4 is a plan and partial section of the brake-clutch. Fig. 5 is an elevation of the brake-lever.

Like letters refer to the same parts in all the figures.

A represents the floor-frame of a car, mounted on a pair of trucks.

b b are cylinders suitably secured to the under side of frame A.

c, Fig. 2, is a piston; *d*, the piston-rod; *e*, a spiral spring inclosed in an air-tight casing, *f*, and resting against piston *c*, for a purpose hereinafter explained.

g is a valve opening inward. Both cylinders and their associated parts are alike.

h is a cross-head to which piston-rods *d d* are connected.

i is a guide for said cross-head.

j j are connecting-rods attached to the ends of cross-head *h*, and to a pair of automatic clutches, *k k*, which engage the car-wheels B B. The construction and operation of said clutches are shown in Fig. 3, in which B is the car-wheel. *l* is an annular flange projecting from the inner side of the wheel. *k* is a hollow segmental arm open on the inside and adapted to swing loosely on the axle *m* and inside of the flange *l*.

n is a pawl, one end of which rests in a bearing, *o*, in said segmental arm *k*, and the other end vibrates between one side of arm *k* and a stud, *p*, on the arm.

C is a spool turning loosely on axle *m* and connected with cross-head *h* by a strap, *q*.

r r are friction-clutches adapted to slide longitudinally on axle *m* and to engage the ends of spool C. Said friction-clutches slide on keys inserted in the axle, so that they turn with the axle, and they are caused to simultaneously engage the ends of spool C by means of levers *s s*, toggle-joint *t*, rod *u*, and lever *v*.

The operation of my device is as follows: The car being in motion in the direction indicated by the arrow, Fig. 1, when brake-lever *v* is thrown forward, the clutches *r r* are simultaneously forced against spool C, and said spool is thereby caused to revolve with the axle on which it and the clutches are mounted. Strap *q* is thereby wound upon said spool, and cross-head *h* and the pistons connected thereto are drawn toward the axle and the air in cylinders *b b* is compressed. The resistance of the air in the cylinders overcomes the momentum of the car, and it stops. At the same time connecting-rods *j j* have turned clutches *k k* backward into the position shown in full lines in Fig. 3. When in this position, the pawl *n* swings by the force of gravitation toward the stud *p*, and its free end comes in contact with the inside of flange *l*. When the car is to be started, lever *v* is thrown backward, thereby releasing spool C from the clutches *r r*. The reaction of the compressed air in the cylinders now operates to force the pistons and the

clutches *k k* connected therewith forward. The least movement of the segmental arms of said clutches forward forces their respective pawls strongly outward against the flanges *l* of the car-wheels, and said wheels are therefore turned forward and the car started. As the car moves forward and the pistons complete their outward movement arm *k* assumes the position shown in dotted lines, Fig. 3, and pawl *n* swings forward against the side of its case, and is withdrawn from contact with the flange *l*.

I have found in practice that some of the air in the cylinders *b* is lost at each compression, and in consequence the expansion of the air remaining in the cylinder fails to carry the piston forward quite to its normal position.

For the purpose of insuring the full completion of the forward stroke of the piston, I use a spiral spring, *e*, which rests against the piston and is of sufficient strength to insure the complete forward movement of the piston at every stroke.

For the purpose of renewing the supply of air in the cylinder, I provide the valve *g*, which admits air to the cylinder whenever the pressure in the cylinder is less than that of the surrounding atmosphere.

I claim as my invention—

1. A car-brake consisting of the following elements, namely: a cylinder secured to the frame of the car, a piston adapted to move longitudinally in said cylinder, a spring contained within said cylinder and arranged to force said piston outward, a valve arranged to admit air into said cylinder, a cross-head connected to and moving with said piston, a spool turning loosely on the axle of a car-truck, a strap secured to said spool and to said cross-head, a clutch mounted on said axle, arranged to turn therewith, to slide thereon, and to engage said spool, and means for sliding said clutch, all combined substantially as and adapted to co-operate for the purpose specified.

2. A car-starter consisting of the following elements, namely: a cylinder secured to the frame of the car, a piston adapted to move longitudinally within said cylinder and to compress the air contained therein, a cross-head connected to and moving with said piston, means, substantially as described, for connecting said cross-head with the axle of the car-truck, whereby the air in said cylinder is compressed by the revolution of said axle, a clutch adapted to engage, when moving in one direction only, with one of a pair of wheels on said axle, and a connecting-rod attached to said clutch and to said cross-head, all combined and arranged to co-operate substantially as and for the purpose specified.

3. In a car brake and starter, the combination, substantially as shown and described, of cylinder *b*, piston *c*, cross-head *h*, connecting-rod *j*, arm *k*, and pawl *n* with wheel B, having annular flange *l*, and axle *m*, for the purpose specified.

4. In a car brake and starter, cylinders *b b*, cross-head *h*, a pair of pistons arranged to move longitudinally in said cylinders, axle *m*, spool C, strap *q*, clutches *r r*, levers *s s*, toggle-joint *t*, rod *u*, and lever *v*, all combined substantially as and for the purpose specified.

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