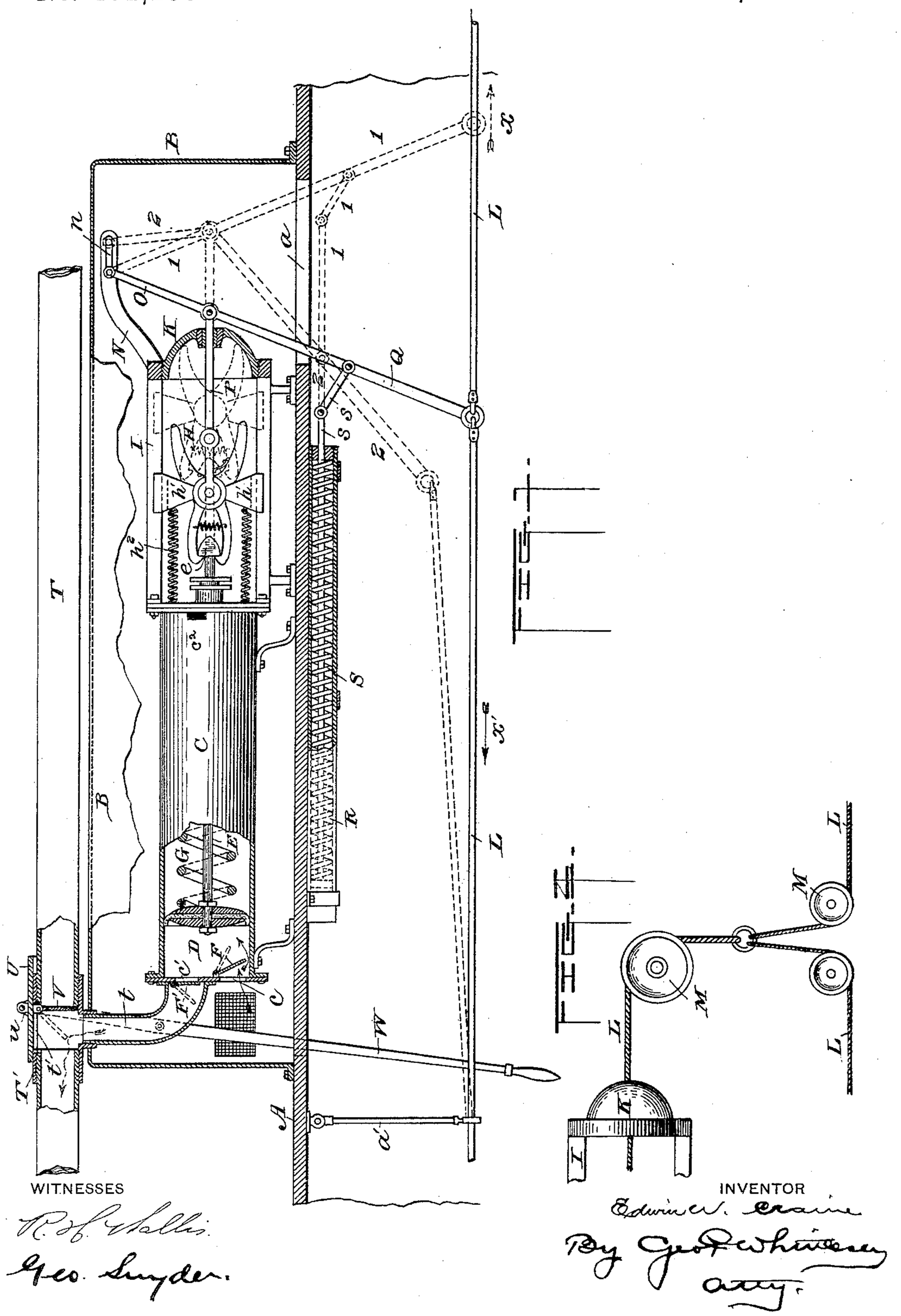
(No Model.) 2 Sheets—Sheet 1.

E. W. CRAINE.

PNEUMATIC TRAIN SIGNALING APPARATUS.

No. 462,239. Patented Nov. 3, 1891.



(No Model.) 2 Sheets—Sheet 2.

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FIG. 2.

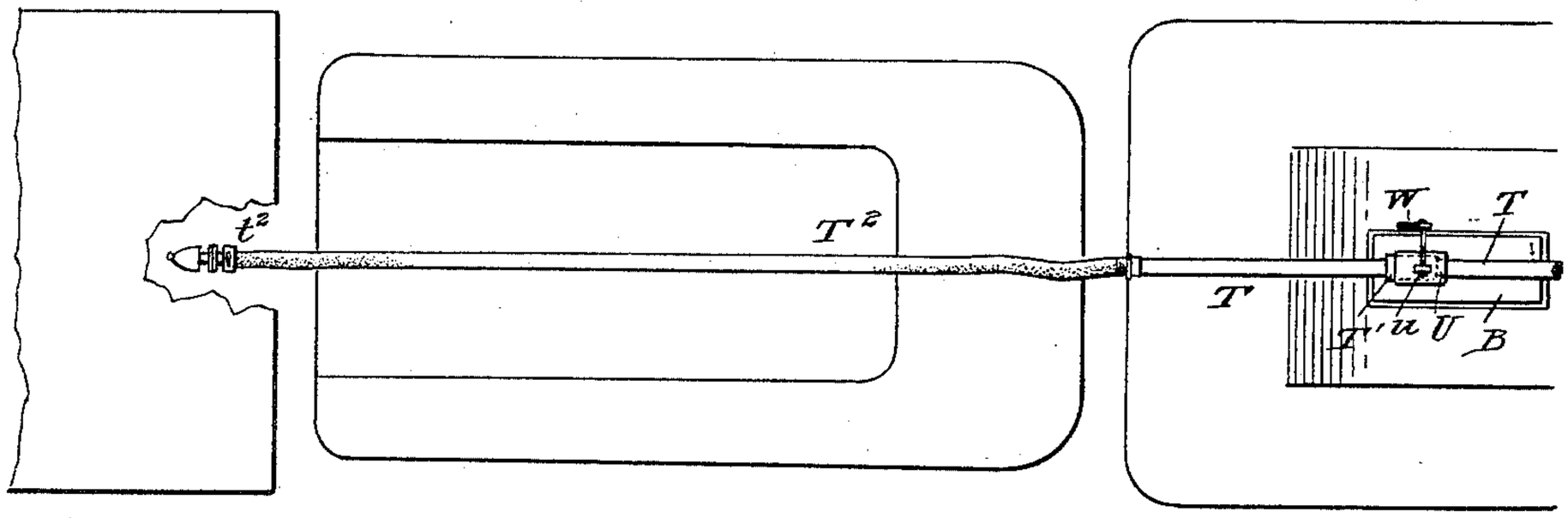
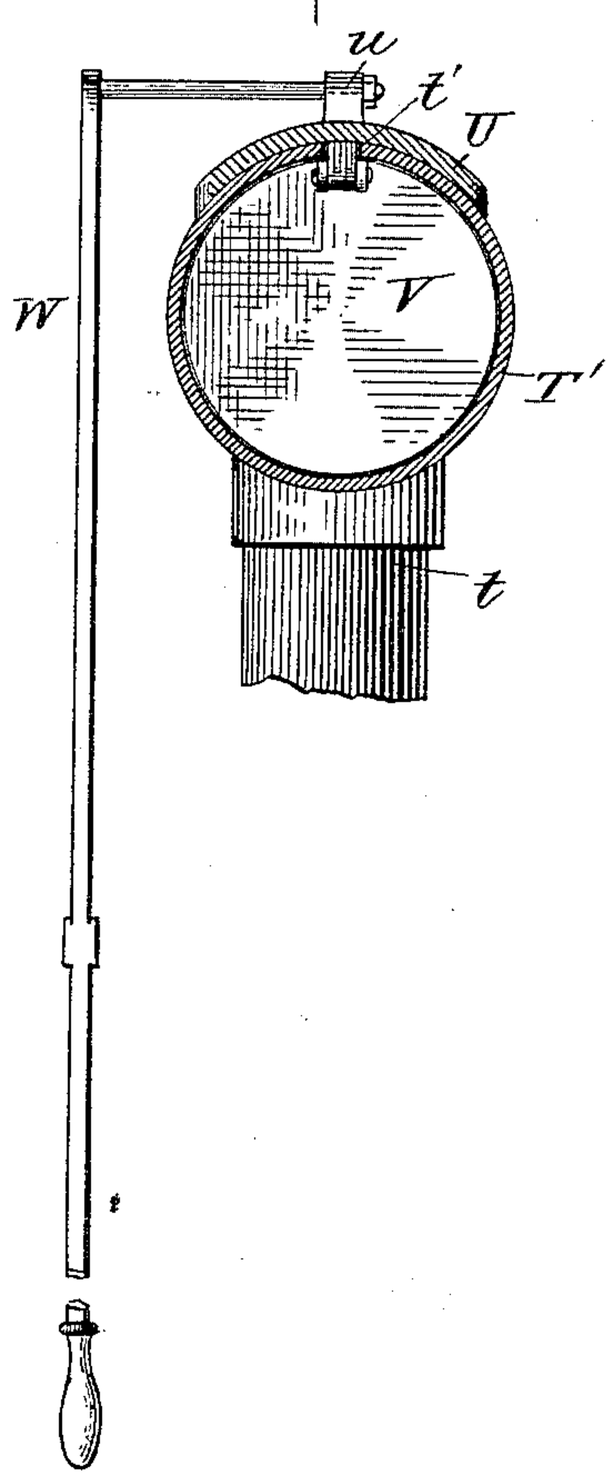


FIG. 3.



WITNESSES

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UNITED STATES PATENT OFFICE.

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PNEUMATIC TRAIN SIGNALING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 462,239, dated November 3, 1891.

Application filed April 17, 1891. Serial No. 389,307. (No model.)

To all whom it may concern:

Be it known that I, EDWIN W. CRAINE, a citizen of the United States, residing at Missouri Valley, in the county of Harrison and State of Iowa, have invented certain new and useful Improvements in Pneumatic Train Signaling Apparatus; 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 devices for signaling from any part of a railroad-train to the engineer.

The object of my invention is to relieve the air-brake system of the drain upon it caused by the ordinary pneumatic signal, and to provide an apparatus which is operative on trains or engines not provided with air-brake appliances.

My invention comprises an air-pump on each car, communicating by branches with a main pipe running the length of the train, with flexible coupled sections between the cars, a flexible hose extending from the forward end of the main pipe to the cab of the engine, and a whistle attached to the end of the hose.

In the accompanying drawings, Figure 1 is a longitudinal vertical section of my air-pump. Fig. 2 is plan view of the connections with the whistle. Fig. 3 is a cross-section of the reversing-valve, and Fig. 4 is a modification.

The air-pump can be located at any convenient part of the car; but I prefer to place it on the roof A, inclosed in a suitable case B. The pump comprises a cylinder C, in which is a packed piston D, secured to a piston-rod E, which projects through one head of the piston and is provided with a conical head *e*. In the opposite head of the cylinder is an air-inlet port *c*, provided with an inwardly-opening check-valve F. In this head also is an outlet-port *c'*, which has an outwardly-opening valve F'. The piston is normally kept at the inner end of its stroke by a strong helical spring G, one end of which abuts against the piston and the other end against the head of the cylinder. When the piston-rod is drawn out, compressing the spring, air is drawn into the cylinder through the port *c*. Upon releasing the piston-rod the spring drives the piston back again, forcing the air out through the port *c'*. Openings c^2 in the cylinder or its head permit the air to escape from or enter freely behind the piston.

To pull the piston-rod out, I provide a grapple H, resembling a pair of tongs or nippers and adapted to engage with or release the head *e* of the rod. I prefer the construction shown, wherein two hooked levers or dogs *h* are pivoted to a cross-head *h'*, the tails of the dogs being thrown apart by a light spiral spring, so that their jaws tend to close upon the head *e*. The cross-head slides between parallel guides I, to the outer ends of which is fastened a cup K, concentric with the cylinder. In the center of the cup is a hole, through which a rod or cord can be passed to connect with the grapple H. One or more light springs h^2 are attached to the cross-head and tend to keep it normally near the head of the cylinder C. When it is pulled outwardly, it carries the piston-rod with it until the tails of the dogs strike the inside of the cup K, the inclined surface of which causes them to shut together, as shown in dotted lines, thereby opening the jaws of the grapple and releasing the piston-rod, which is immediately driven back by the spring G.

The cord L for operating the grapple runs through the car to a fixed fastening at one or both ends thereof. When the pump is placed inside the car or in the closet, one end of the cord is attached directly to the grapple. The pump is operated by pulling on the cord; but when the pump is on the roof an intermediate connection becomes necessary to transmit the pull on the cord to the grapple. This may be done by running the cord around suitable sheaves M, as shown in Fig. 5. I prefer, however, the arrangement shown in Fig. 1. An arm N projects from the upper guide I beyond the cap K, and in a slot *n* in said arm is loosely pivoted a hanger O, the lower end of which is pivoted to a rod P, which passes through the cap K and is connected with the cross-head. A lever Q also is pivoted to the end of the hanger O by a joint which permits it to bend in one direction only—viz., toward

the cylinder C. This lever depends through a slot *a* in the roof of the car and terminates in the line of the bell-cord hangers *a'*. The cord L is attached to the end of the lever.

Secured to the roof of the car is a casing R, in which a helical spring S surrounds a rod *s* and bears against a collar at one end of the same. The other end of the rod projects through one end of the casing and is connected by link *s'* with the lever Q. The spring thus acts to hold the lever in the position in which it appears in full lines in Fig. 1. When the cord L is pulled in the direction of the arrow *x*, the lever Q, hanger O, rod *s*, and link *s'*, assume the position 1 1 1, and impart the requisite movement to the rod P to operate the pump. The hanger here forms practically a part of the lever with its fulcrum at the slot in the arm N. Should the cord be pulled in the opposite direction, (indicated by the arrow *x'*,) then the lever Q fulcrums on the link *s'* and assumes the position 2 2 2, which gives the proper movement to the rod P.

In case a car not equipped with my air-pump should be in the train a cord can be run from said car into one having this arrangement of pump and operating devices, and whether the unequipped car is in front or behind the pump can be readily worked.

The air forced out by the pump through the port *c'* is conveyed through a branch pipe to the main pipe T, which runs along the car from end to end, preferably on the roof. At the junction of the branch and main pipe a T-coupling T is used, in the upper side of which is a slot *t'*. A slide U covers the slot, the latter serving to receive and guide a lug *n*, depending from the inner surface of the slide. The casing B may be arranged to cover the T-coupling and adjacent pipe T. A flap-valve V is hinged to said lug and is arranged to close one of the pipes T, projecting into the coupling T', and thereby prevents the air from entering it. With the valve set as shown the air can flow in one direction only through the main pipe, as indicated by the arrow. Air coming from a car behind can lift the valve V and pass on. When the car runs the other end first, the valve V is reversed by shifting the slide U, so that the valve hangs on the other side of the branch pipe *t* and against the other section of the pipe T. A lever W, pivoted to the slide U and extending down into the car, is a convenient means for reversing the valve.

The main pipes T are united between the cars by flexible hose and detachable couplings. From the front end of the main pipe T a flexible hose T^2 extends over the tender to the engine-cab, where it is provided with a whistle t^2, which can be hung on a hook in the cab. This enables me to use my signal on any locomotive, since the apparatus is complete in itself.

Whenever it is necessary to change engines, the whistle is unhooked in the cab and the hose T^2 thrown back on the platform of the forward car until the fresh engine is coupled on, when it can be led into the cab and hooked up again as before.

In order to maintain the continuity of the pipe T when an unequipped car is made a part of the train, every train should carry one or more lengths of flexible hose long enough to reach over the unequipped car and provided with suitable couplings to connect with the pipes on the adjacent cars. The hose can be detachably secured to the car by clamps.

The main pipe T may be used as a speaking-tube by the conductor or other train-men to carry on conversations with the engineer. A special flexible tube furnished with a mouth-piece for this purpose may be connected with the pipe forward of the pump in the baggage-car or elsewhere.

It should be remarked that the lever can be used when the pump is located inside of the car or in the closet, being arranged with its end in line with the cord-hangers. The lever enables a strong spring to be used in the pump, whereby a quick action of the piston is obtained.

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

1. A pneumatic signaling system for a railway-train, comprising an air-pump on one or more of the cars, a main pipe connected with each pump by a branch pipe, a check-valve in the main pipe adjacent to each branch pipe, a flexible hose attached to the forward end of the main pipe and leading into the engine-cab, and a whistle secured to the end of said hose, substantially as described.

2. A pneumatic signaling system for railway-trains, comprising an air-pump on one or more of the cars, a main pipe connected with each pump by a branch pipe, a check-valve in the main pipe adjacent to each branch pipe, a flexible hose attached to the forward end of the main pipe, and a whistle secured to the end of the hose and removably fastened to the cab, whereby several locomotives may be successively used with the same signaling apparatus, substantially as described.

3. The combination, with a railway-car, of a cylinder having an air-inlet provided with an inwardly-opening valve, an air-outlet controlled by an outwardly-opening valve, a branch pipe communicating with said outlet, a main pipe connected with the branch and with a signaling apparatus, a piston in said cylinder, a piston-rod for moving the piston in one direction to fill the cylinder with air, and a helical spring to drive the piston in the other direction to expel the air through the branch pipe, substantially as described.

4. The combination, with a railway-car, of an air-pump cylinder and piston, a spring for forcing the piston toward one end of the cylinder, a movable grapple engaging automatically with the piston-rod, means for moving said grapple to draw out the piston-rod and

compress the spring, and a retracting device to return the grapple to its normal position, substantially as described.

5. The combination, with an air-pump and piston, of a spring for driving piston to expel the air, a movable grapple engaging automatically with the piston-rod, means for moving the grapple to compress the spring, a releasing device to detach the grapple from the rod when the spring is compressed, and a retracting device to return the grapple to its normal position, substantially as described.

6. The combination, with an air-pump cylinder and piston, of a cross-head movable on suitable guides, a pair of hooked dogs pivoted to said cross-head and adapted to engage with the piston-rod, a cam against which the dogs strike at the outer end of their stroke and whereby they are disengaged from the piston-rod, a spring adapted to drive the piston back upon the release of the piston-rod, and a retracting device to return the cross-head to its normal position, wherein the dogs are again engaged with the piston-rod, substantially as described.

7. The combination, with a cylinder provided with suitable inlet and outlet ports, of the piston and its rod, the helical spring acting on the piston, the cross-head sliding in guides and carrying the pivoted dogs adapted to engage with the piston-rod, the cup into which the tails of the dogs are forced at the outer end of their stroke, the springs for returning the cross-head to its normal position, and means for operating the cross-head, substantially as described.

8. The combination, with a railway-car, of a cylinder and spring-actuated piston, a movable grapple adapted to automatically engage with the piston-rod at one end of its stroke, means for automatically disengaging the grapple at the other end of its stroke, and a cord attached at one end to the car-body and having its other end connected with the grapple, substantially as described.

9. The combination, with a railway-car, of an air-pump having a spring-actuated piston, a movable grapple adapted to engage with the piston-rod, a lever connected with the grapple and having two fulcrums, whereby it is adapted to actuate the grapple when moved either way from its normal position, substantially as described.

10. The combination, with a railway-car, of an air-pump having a spring-actuated piston, a movable grapple adapted to engage with the piston-rod, a slotted arm, a hanger pivoted in the slot at one end and connected with the grapple at the other, a lever pivoted to the hanger, and a spring-actuated rod connected with the lever by a link, substantially as described.

11. The combination, with an air-pump and a main air-pipe connected therewith by a branch, of a reversible check-valve located at the junction of the main and branch pipes, whereby the air delivered from the pump can be caused to flow in either direction through the main pipe, substantially as described.

12. The combination, with the sections of the main air-pipe and the branch united by a T-coupling, of the slide having a lug projecting through a slot in the coupling and a flap-valve hinged to said lug and adapted to be moved so as to close either of the main-pipe sections, substantially as described.

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

EDWIN W. CRAINE.

Witnesses:

J. S. DEWELL,

W. J. LLOYD.