(No Model.) 3 Sheets—Sheet 1.

M. B. MILLS.

RAILROAD PNEUMATIC SWITCH AND SIGNAL APPLIANCE.

No. 419,786. Patented Jan. 21, 1890.

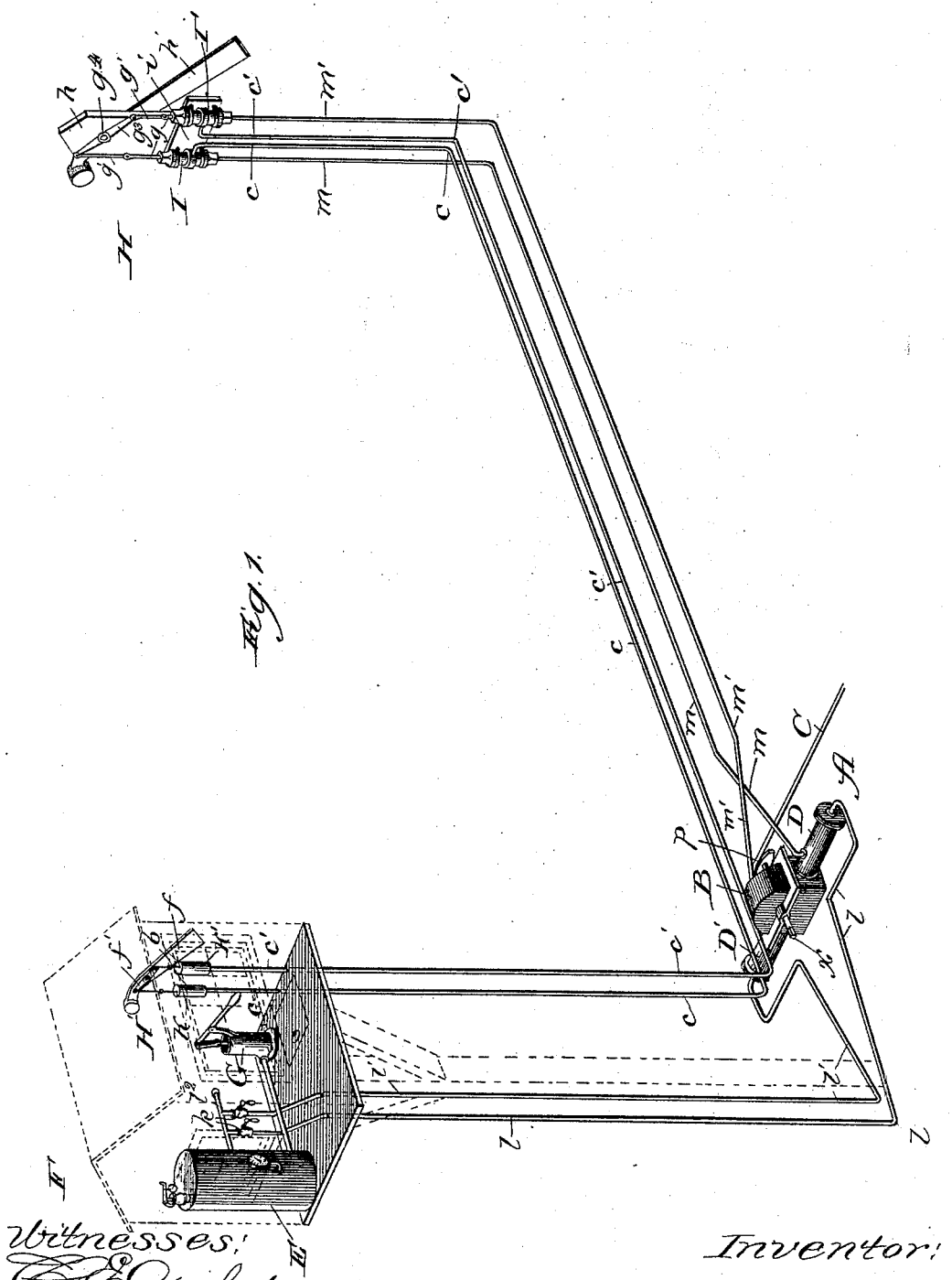

Fig. 1.

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Fig. 2.

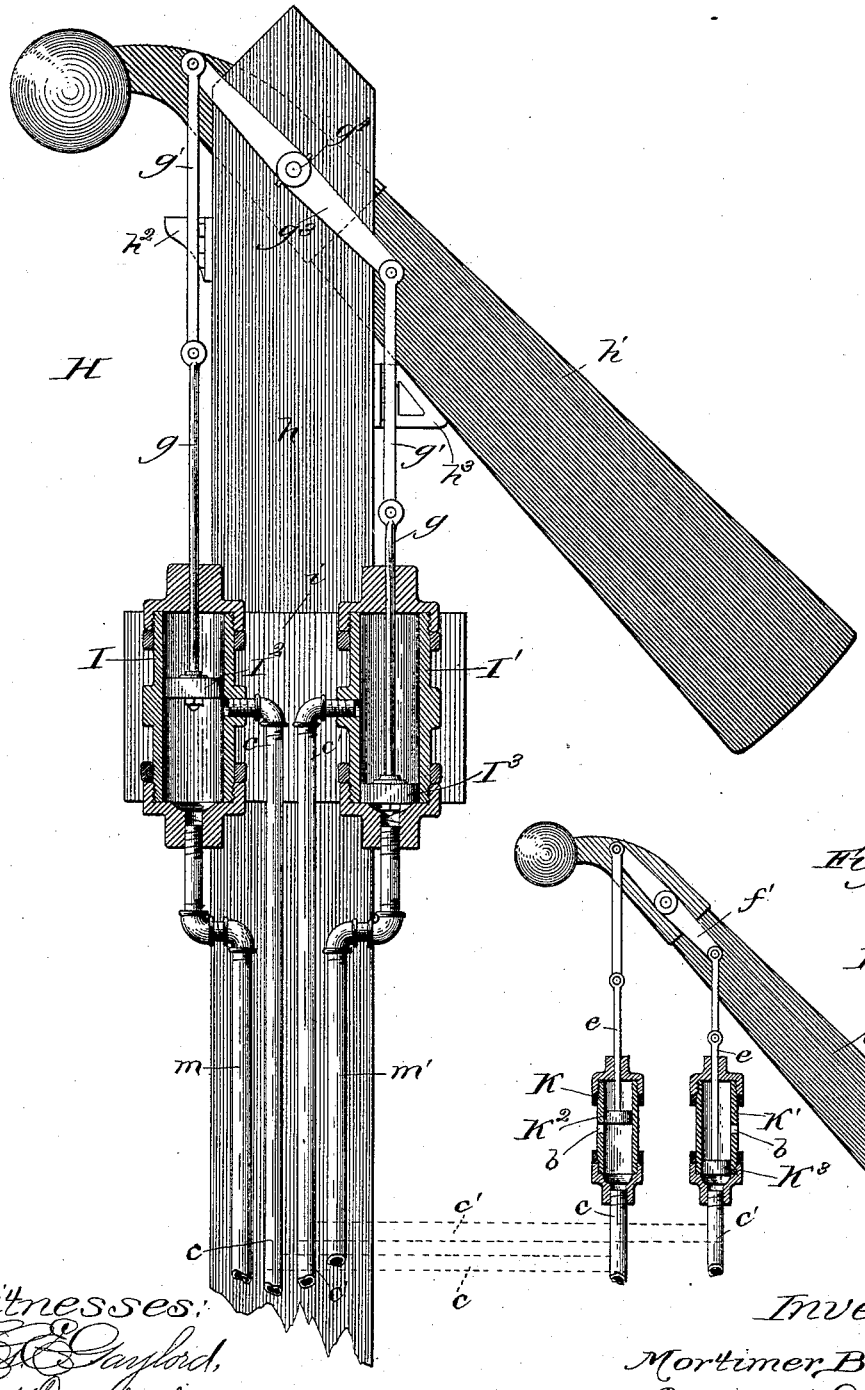

Fig. 3.

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(No Model.) 3 Sheets—Sheet 3.

M. B. MILLS.

RAILROAD PNEUMATIC SWITCH AND SIGNAL APPLIANCE.

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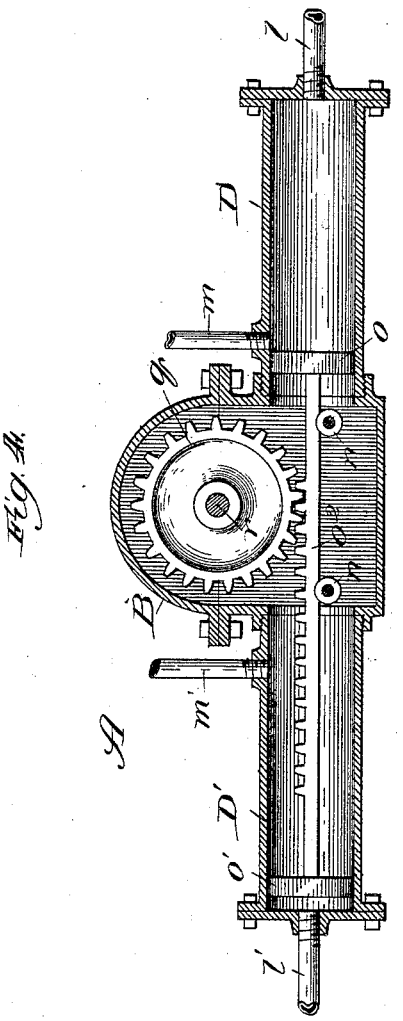

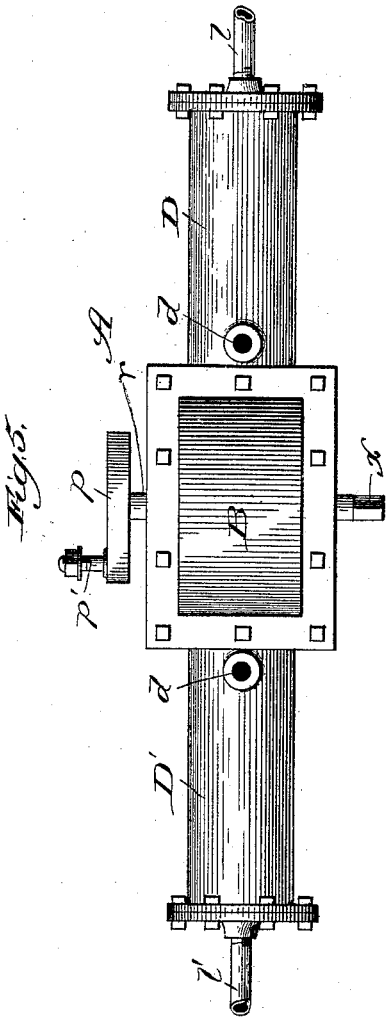

Witnesses:
Chas. E. Gaylord.
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UNITED STATES PATENT OFFICE.

MORTIMER B. MILLS, OF CHICAGO, ILLINOIS, ASSIGNOR TO MILTON WESTON, TRUSTEE, OF SAME PLACE.

RAILROAD PNEUMATIC SWITCH AND SIGNAL APPLIANCE.

SPECIFICATION forming part of Letters Patent No. 419,786, dated January 21, 1890.

Application filed September 25, 1889. Serial No. 325,056. (No model.)

To all whom it may concern:

Be it known that I, MORTIMER B. MILLS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in a Combined Railroad Switch and Signal Appliance, of which the following is a specification.

My invention relates to improvements in means for operating a railroad-switch, and thereby also actuating semaphore mechanism to indicate the condition of the switch.

The object of my invention is to provide a railroad-switch with mechanism for operating it by pneumatic force, a semaphore so connected with the switch-operating mechanism that it will be set by the throwing of the switch or remain stationary unless the throw of the switch is effected, and a detector or other semaphore located at or near the operating station and so connected with the distant semaphore that it will show or assume the position of the latter after it has been set.

My invention is illustrated in the accompanying drawings, in which—

Figure 1 shows my improvement by a perspective view in the nature of a diagram. Fig. 2 is a broken view, in elevation, showing the distant semaphore and the air-pressure mechanism through which it is operated. Fig. 3 shows, by a similar view, the home semaphore or detector and the air-pressure mechanism through which to operate it, the view being presented in juxtaposition with relation to the preceding figure, the more readily to identify the connections indicated by dotted lines between the air-pressure mechanism of the two. Fig. 4 is a view in sectional elevation of the switch-operating mechanism; and Fig. 5 a plan view of the same.

A is the switch-operating device, comprising a box or case B, (which should be located near the railroad-switch to be controlled,) and containing a rotary shaft r, having its bearings in opposite sides of the box and a gear-wheel q, Fig. 4, secured upon the shaft. The shaft projects at opposite ends beyond the box, where it may be formed at one end, as shown at x, to permit application to it of a crank, and carries at the other end a head p, provided eccentrically with a stud p', at which to attach one end of a switch-connecting bar C, affording the connection between the shaft r and a switch. (Not shown.)

Cylinders D and D′ lead, respectively, into opposite ends of the box B and contain the pistons o and o', having a common rod connecting them rigidly together through the box in the form of a rack o^2, which should be supported on rollers n, as shown in Fig. 4.

Near the junction of the cylinders D and D′ with the box B they are provided with openings d, from which lead, respectively, the air-pipes m and m'. The cylinders are also provided with end openings, into which lead, respectively, the air-pipes l and l', from a manifold l^3, near which they are provided with valves k, Fig. 1, and the manifold communicates with a compressed-air reservoir E, which should be located at the operating-station F, and which is supplied from an air-pump G.

H is a semaphore, distant from the operating station and comprising the ordinary post h, supporting, as usual, near its upper end the pivotal arm h', and stops h^2 and h^3 should be provided at opposite sides of the post, respectively, for the rear end of the arm h' in its horizontal position and for the forward portion thereof when lowered. On the post near its opposite edges, and preferably on a cross-piece i, secured to the post, are supported cylinders I and I′, extending vertically, and communicating from their bases, respectively, through the pipes m and m', with the openings d in the cylinders D and D′. The cylinders I and I′ contain pistons I^2 and I^3, the rods g of which have links g' extended from their upper ends, and are connected together through the medium of a beam g^3, rigidly fastened at its center to the pivot g^4, supporting the arm h'.

In the operating station, as shown, (or near it,) is the "detector," preferably in the form of a semaphore H′, involving the same construction as the semaphore H—namely, a pivotally-supported signal-arm f—having a beam f', secured to its pivotal support, the

opposite ends of the beam being linked to the rods *e* of pistons K^2 and K^3, respectively, in cylinders K and K′, secured in vertical position to a suitable support. The cylinders I and I′ communicate from their sides and from near their centers through pipes *c* and *c′*, respectively, with the bases of the cylinders K and K′, and the last-named cylinders are provided laterally near their centers with openings *b*, leading to the open air.

The operation is as follows: The pump G is actuated from time to time to maintain pressure in the reservoir E sufficient to operate the apparatus; though, instead of providing the reservoir, the apparatus may be actuated directly from the pump. It is preferred, however, to employ the reservoir. Depending on the direction in which the switch is to be thrown, the valve *k* in the pipe *l* or that in the pipe *l′* is opened, the other of course being shut. The position of parts represented in Fig. 4 shows them to have been operated to throw the switch to the position of safety, whereby the arms of the semaphores H and H′ are lowered to present the safety-signal, as shown. To throw the switch to the opposite position, the tap *k* in the pipe *l′* is opened. This admits air-pressure from the reservoir against the outer surface of the piston o' in the cylinder D′, and moves the rack o^2 to turn the wheel *q*, and through it the shaft *r*, to produce the desired throw of the switch.

Although I prefer to use means like the present for operating the switch, I do not wish to be understood as necessarily limiting my present improvement to such means, for it is advantageously operative in connection with other forms of switch-operating mechanism.

It should be stated that the arrangement is such as to cause the arms of the two semaphores H and H′ to indicate almost simultaneously by the same signal the condition of the switch—that is to say, when the switch is removed from the main track the semaphore-signals are at "safety," and at "danger" with the switch at the end of its opposite throw; hence, with the switch adjusted as indicated by the relative positions of parts presented in Fig. 4, the semaphore-arms are both down.

The introduction of pressure against the piston o' effects throwing of the switch, as described, by moving that piston toward the outlet *d* in its cylinder; and the arrangement is such that when the piston passes the opening *d* the throw of the switch is completed. The pressure is then continued; but instead of operating against the piston o' to move it, it passes through the opening *d* by way of the pipe *m′* into the cylinder I′ at its base and against the piston I^3 therein, raising the latter and with it the semaphore-arm *h′* to "danger," which position it reaches with the movement of the piston I^3 beyond the lateral opening in its cylinder. From the lateral opening in the cylinder I′ the air under pressure proceeds through the pipe *c′* into the base of the cylinder K′, against the piston K^3 therein, raising the latter and with it the semaphore-arm *f* to "danger" until the piston passes the respective cylinder-opening *b*, through which the air may escape to remove impediment against the subsequent movement of the various said pistons in the opposite direction. To produce the opposite throw of the switch, the tap *k* in the pipe *l* is opened, admitting air-pressure against the piston *o*, which, when it has passed the opening *d*, leading into the pipe *m*, will have completely thrown the switch, and admits the pressure to the cylinder I, raising the piston I^2 therein, and thus effecting lowering of the arm *h′*, and opening the passage through the pipe *c* to the cylinder K, to permit the pressure to proceed against the piston K^2 therein and lower the arm *f* to the position corresponding with that to which the arm *h′* was precedently moved.

The valves *k* and *k′* need be only ordinary shut-off valves, since the pressure caused by the condensation of one atmosphere behind the piston K^2 or K^3 is not sufficient to throw back such piston upon the escape of pressure before the other piston. However, three-way valves may be used instead of the valves *k* and *k′*, if desired.

From the foregoing description it will be seen that the throwing of the switch being succeeded in order by the setting of the semaphore H to indicate the condition of the switch, and by the setting of the semaphore H′ to correspond with the signal presented by the other semaphore, the operator has presented to him at all times reliable indication of the condition of the switch and distant semaphore. The semaphore H′ thus serves as a detector, since, if the mechanism be out of order or if the switch be obstructed against complete or partial throwing by an impediment, on opening a tap *k* the semaphore H′ will not, as it should, be actuated; hence the failure will lead to investigation, permitting the cause to be discovered and remedied, and thus liability to accident as the result of false signaling be obviated.

Obviously any other form than that shown and described of a detector H′ which will accomplish the purpose of notifying the operator, whether visually or by sound or otherwise, of the condition of the switch and distant semaphore, and thus enable him to avoid error, will serve my purpose, and is, therefore, intended to be included as within the spirit of my invention.

The adaptation of the shaft *r* to be turned by a crank is intended merely to afford means independent of the air-pressure and semaphore mechanism for throwing the switch to be used when desired.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a combined railroad-switch and signal appliance, the combination of piston mech-

anism to be connected with the switch and actuated by air-pressure to throw the switch, a semaphore H, having piston mechanism connected with its signal and communicating with the cylinder of the switch-piston mechanism behind and near the limit of forward play of the piston thereof, whereby the semaphore-signal is actuated by the air-pressure after throwing of the switch, and a detector H′, connected with the semaphore to be actuated after the latter by the said air-pressure, substantially as described.

2. In a combined railroad-switch and signal appliance, the combination of cylinders D and D′, communicating with an air-pressure supply and containing pistons *o* and *o′*, to be connected with the switch, a semaphore H, supporting cylinders I and I′, communicating, respectively, with the cylinders D and D′, near and behind the limit of movement under direct air-pressure of the respective pistons *o* and *o′*, and containing pistons I^2 and I^3, connected with the semaphore-signal, and a pneumatic detector H′, communicating with the cylinders I and I′, substantially as described.

3. In a combined railroad-switch and signal appliance, the combination of cylinders D and D′, communicating with an air-pressure supply, and containing pistons *o* and *o′*, to be connected with the switch, a semaphore H, supporting cylinders I and I′, communicating, respectively, with the cylinders D and D′ near and behind the limit of movement under direct air-pressure of the respective pistons *o* and *o′*, and containing pistons I^2 and I^3, linked to the signal-arm *h′* of the said semaphore at opposite sides of its pivotal support, and a pneumatic detector H′, communicating with the cylinders I and I′, substantially as described.

4. In a combined railroad-switch and signal appliance, the combination of cylinders D and D′, communicating with an air-pressure supply and containing pistons *o* and *o′*, to be connected with the switch, a semaphore H, supporting cylinders I and I′, communicating, respectively, with the cylinders D and D′, near and behind the limit of movement under direct air-pressure of the respective pistons *o* and *o′*, and containing pistons I^2 and I^3, linked to the signal-arm *h′* of the said semaphore at opposite sides of its pivotal support, and a detector H′, comprising a pivotal signal-arm *f*, and cylinders K and K′, communicating, respectively, with the cylinders I and I′ behind and near the limit of movement under direct air-pressure of the pistons therein, and containing pistons K^2 and K^3, linked to the signal-arm *f* at opposite sides of its pivotal support, substantially as described.

5. A combined railroad-switch and signal appliance comprising, in combination with a switch and an air-pressure supply, a box B, containing a rock-shaft *r*, having connected with it eccentrically the switch-rod C and carrying a cog-wheel *q*, cylinders D and D′, communicating with the air-pressure supply and leading into opposite sides of the box and containing pistons *o* and *o′*, to be connected by a rack-bar o^2, engaging with the wheel *q*, a semaphore H, provided with cylinders I and I′, communicating, respectively, with the cylinders D and D′ at openings *d* provided therein, and containing pistons I^2 and I^3, linked to the semaphore-arm *h* at opposite sides of its pivotal support, and a detector H′, having a pivotal signal-arm *f*, cylinders K and K′, containing pistons K^2 and K^3, linked to the arm *f* at opposite sides of its pivotal support and communicating, respectively, with the cylinders I and I′ behind and near the limit of movement under direct air-pressure of the pistons therein, the whole being constructed and arranged to operate substantially as described.

MORTIMER B. MILLS.

In presence of—
J. W. DYRENFORTH,
M. J. FROST.