

(No Model.)

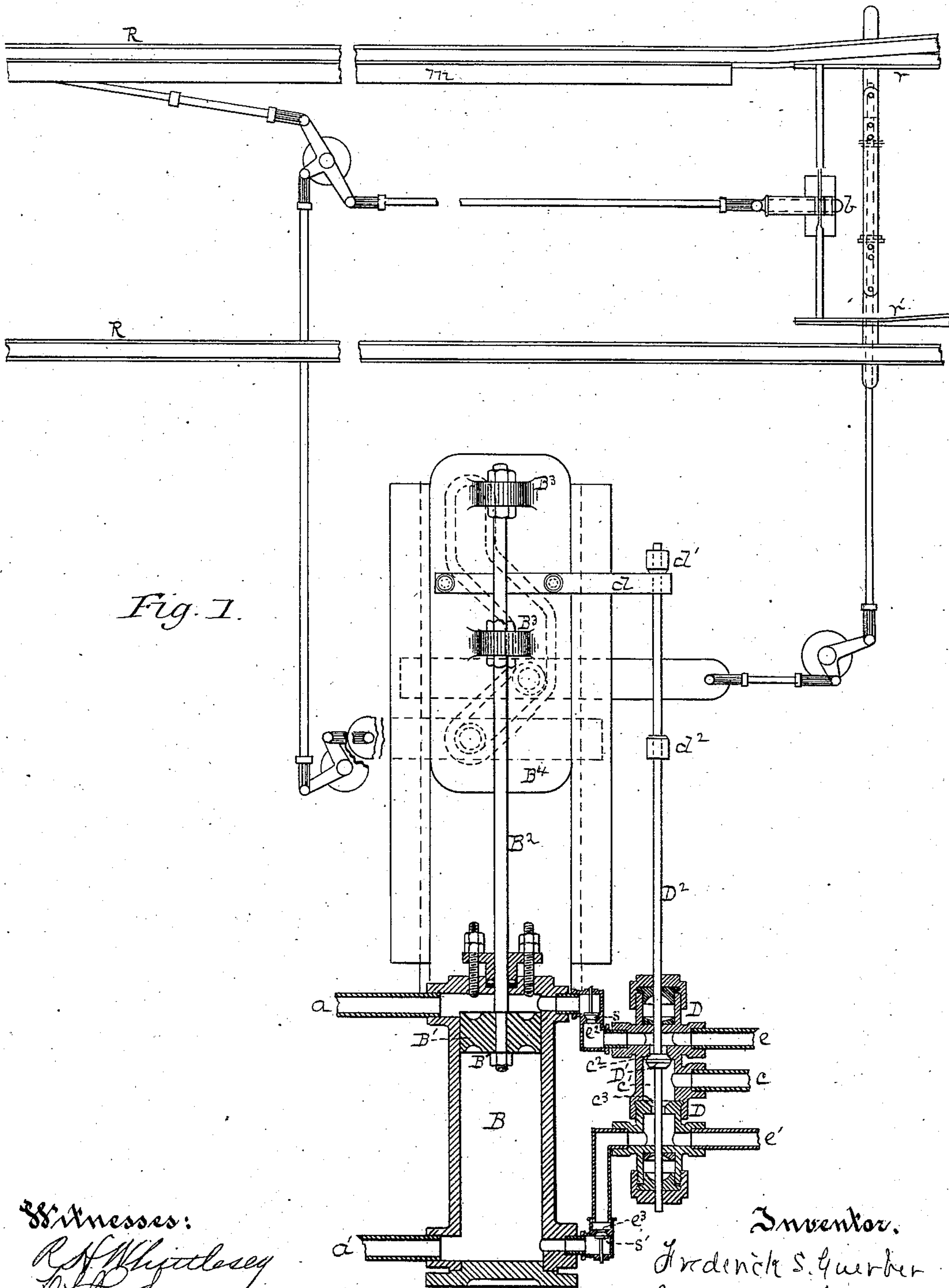
2 Sheets—Sheet 1.

F. S. GUERBER.

FLUID PRESSURE SIGNALING APPARATUS.

No. 292,748.

Patented Jan. 29, 1884.



Witnesses:

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Inventor.

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(No Model.)

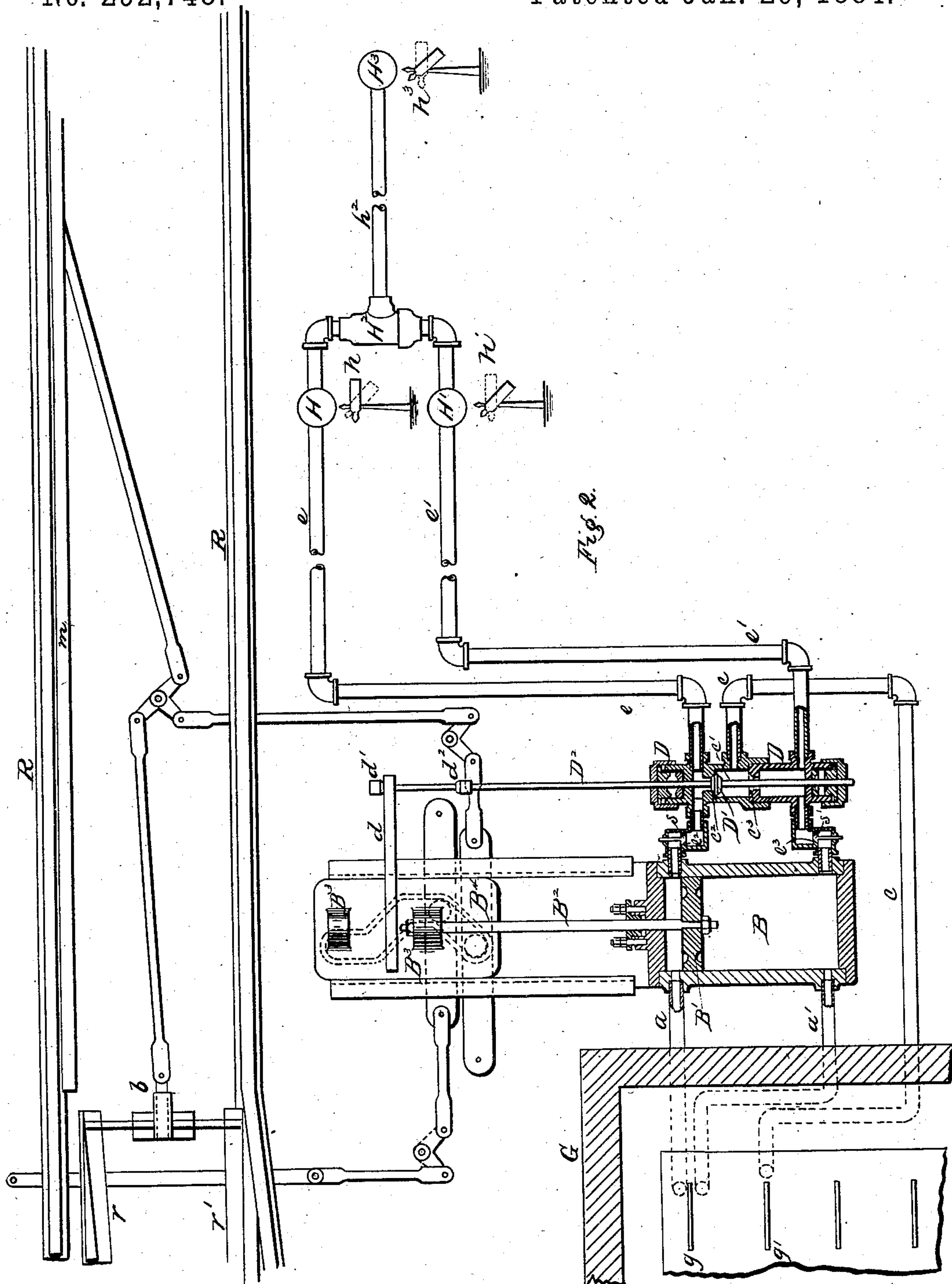
2 Sheets—Sheet 2.

F. S. GUERBER.

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No. 292,748.

Patented Jan. 29, 1884.



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UNITED STATES PATENT OFFICE.

FREDERICK S. GUERBER, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO THE UNION SWITCH AND SIGNAL COMPANY, OF SAME PLACE.

FLUID-PRESSURE SIGNALING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 292,748, dated January 29, 1884.

Application filed June 24, 1882. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK S. GUERBER, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented or discovered a new and useful Improvement in Fluid-Pressure Signaling Apparatus; and I do hereby declare the following to be a full, clear, concise, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1, Sheet 1, represents a plan view of a switch and one style of construction of mechanism for operating the same, and showing my present invention embodied therein; and Fig. 2, Sheet 2, further illustrates, by a plan view, partly in section, the manner of embodying the present improvements in a complete operative system.

The present invention relates in a general way to certain improvements in fluid-pressure apparatus designed for operating railway switches and signals; and for purposes of illustration I have shown it as embodied in or applied to the mechanism of the Tilden Patent No. 237,786, in which mechanism the stroke of the plunger or piston, acting through a grooved or slotted sliding plate, actuates the switch; and also by moving a valve-stem shifts a valve in such manner as to apply fluid-pressure to clear one or the other of the signals on two conflicting lines and let the signals on the opposite line go to "danger." Such an apparatus, organized and constructed as described by Tilden, works well and performs in regular succession all the functions assigned to it; but it has been found that it fails to make provision for one class of accidents which in its operation are liable to arise, as will presently be explained.

The devices thus far referred to—that is, the cylinder B, piston B', piston-stem B², ports B³, slotted or grooved plate B⁴, valve-case D, valve D', and valve-stem D²—are substantially the same in function and operation as the similarly-lettered devices of the Tilden Patent No. 237,786, and need not be further described, except in their relation to the features of construction which I have added.

The accompanying drawings represent an ordinary track, R R, and movable switch-

rails *r r'*, provided with the Saxby and Farmer locking-bolt *b* and safety-rail *m*, and these devices are operated by fluid-pressure applied in the cylinder B, so as to actuate its piston B' in any suitable way—as, for example, in the manner described in said Tilden patent. The fluid-pressure is supplied alternately to and exhausted from the cylinder B through pipes *a a'* by the proper setting of valves in the operator's cabin G, which work is done by the working of what is termed the "switch-lever" *g*; also, another lever, termed a "signal-lever," *g'*, is employed to turn on or let off fluid-pressure through a pipe, *c*, which opens into the valve-case D. The chamber *c'*, into which this pipe opens, communicates through valve-ports *c² c³* with pipes *e* and *e'*, which lead to the signal-cylinders H H', which actuate the signals *h h'* of the opposing tracks or lines. Assuming these to be home-signals, provision may be made in the manner described in said Tilden patent for operating distant signal *h³* by extending the pipes *e e'* to a valve-case, H², containing an automatically-operating valve, and running a pipe, *h²*, therefrom to the cylinder H³ of said distant signal, so that hydraulic pressure may be applied through either line of pipes *e* or *e'* to clear such distant signal. The pipe *e* also opens through a port, *e²*, on which is a check-valve, *s*, into one end of the cylinder B, and the pipe *e'* opens through a port, *e³*, on which is a check-valve, *s'*, into the opposite end of the cylinder B. Each valve *s s'* is arranged to be opened by an excess of pressure toward the cylinder B, but is closed by excessive pressure in the opposite direction. The ports *e²* and *e³* are alternately closed and opened by the valve D', arranged on the valve-stem D², and which takes its motion from a tappet-arm, *d*, which is actuated by the sliding plate B⁴, said arm, when nearing the ends of its stroke, engaging one or the other of two knockers, *d' d²*.

With the devices in the position shown the main track is open and the switch is held in that position by fluid-pressure through pipe *a'* and by the locking-bolt; also, fluid-pressure, acting through *c*, *c³*, and *e'*, clears the appropriate signals *h' h³*. The port *e²* is closed by the valve D', so that fluid-pressure cannot pass

through such port from c to e , and the signals which depend for their position or pressure in e are already at "danger," as provided by Tilden, they having been set to "danger" by the escape of pressure through c before the switch was set to the position shown; but in any case they must remain at "danger," since excessive pressure therein would lift the valve s and escape through a , which is now a waste-pipe.

In order now to reverse the switch, the operator shifts his signal-lever so as to allow the fluid-pressure acting from c through e' to escape and so let the corresponding signals go to "danger." He then shifts his switch-lever so as to let on pressure through a and turn a' into the waste. The switch-motions follow, presumptively at least, in the order described by Tilden, after which the signal-lever is again shifted so as to turn on pressure again through c , and thereby to clear the appropriate signals for the newly-formed line of tracks. Now, in illustration of one of the accidents which are liable to occur in the shifting of the switch, and for which I am now making provision, suppose a small stone gets caught between the point-rail r' and the adjacent main rail, so that the point-rails cannot receive their full throw. Such fact would not ordinarily be known at the cabin, which frequently is at a considerable distance. If, then, the pipes e e' did not communicate with the cylinder B, (which is the construction shown in the Tilden Patent No. 237,786,) the valve D' would then stand clear of both seats, and all signals would be cleared by pressure acting from c through both e and e' ; whereas only one set of signals ought to be cleared, and this should not be done until the switch is fully moved over so as to make a safe track. Now, it will be seen, with the present apparatus, in the case supposed, that if the switch-rails do not come entirely over, the valve D' will stop at a point intermediate between both seats or ports c^2 c^3 . As a result of this all signals will remain at "danger," and it will be impossible to clear any signal or signals so long as the valve D' remains in that position, since pressure applied through c , or any operative pressure already acting in e or e' , will operate backward to unseat the valve s' and escape through e^3 to the cylinder B, which at that end is, on the supposed reversal of the switch, put in communication with the waste. The operator in the cabin, either having his accumulator in sight or having a pressure-gage connected therewith, will at once see that his pressure is wasting away, and will know that something is wrong. He will then shut off the pressure by the use of a suitable valve provided for the purpose, and will leave all signals at "danger" until the switch obstruction is removed. As soon as this is done the switch will complete its throw and the valve D' will go to its seat on the port c^3 . Then the shut-off valve being re-opened, the fluid-pressure entering at c will go by port c^2 and pipe e to clear the proper signal or signals, and the

train may proceed with a certainty that the switch is completely shifted.

It will be observed that while fluid-pressure is acting through a to move the piston B', which is the condition last supposed, such pressure prevents the opening of the valve s ; and hence the pressure applied through e to clear certain signals cannot escape through port e^2 . In again shifting the switch to the position shown (the valve D' then being on the seat or port c^3) the operator will first shift his signal-lever to open pipe c to the waste, and so let the signals actuated through e go to "danger." This will unlock the switch-lever. The latter is then shifted so as to put a in communication with the waste and let on pressure through a' . If for any reason the switch fails to move fully over, or so far over as to make it safe for a train to proceed, the valve D' will fail to reach its seat on the port c^2 , and then when fluid-pressure is again turned on through c to act through e' to clear the signals, instead of doing this it will pass through port c^2 , lift the valve s , and escape through a to the waste. The operator will, as before, know that something is wrong, and will act as above described. Hence, it will be seen that with an apparatus thus constructed it will be impossible to clear a signal at all until the movable rails of the switch are fully in position, or so nearly so that a train may safely proceed.

The described connection of the signal-pipes e e' with the opposite ends of any suitable main operating-cylinder may be embodied in other fluid-pressure apparatus having a substantially like operation, either as applied to this or to other kindred purposes—such as operating two signals alternately—or, in fact, for any purpose where a positive and complete motion is required in two opposite directions; and all such uses and modifications are included herein; and forms of valves, ports, &c., may be changed at pleasure, as also the structure of the switch-shifting connections, without any material departure from the scope of the present invention, provided the mode of operation remains substantially the same. I also include herein the mechanical equivalents of the devices described as within the scope of the invention in the combinations hereinafter recited. Where only one signal or only one line of signals is necessary, only one of the pipes e or e' will be required, the remaining signal-pipe having the described connection with the main operating-cylinder B.

In case the obstruction to the shifting of the switch should be such that the movable switch-rails will be stopped at such point that the valve D' will not be unseated, or will not start on its motion—say from port c^2 to port c^3 —the result will be the same as regards the signal, because the signals on the line e are already at "danger," and will remain so, and the other port, c^3 , being open, the pressure applied through c to clear the signals on the line e' will go to the waste, as before described; and, as

an additional element of safety, it may be stated that in the case last supposed, if any pressure from *a* should accidentally leak past the check-valve *s*, it would unseat the valve *D'* and escape, as before, without clearing the signals, and this condition of things would continue until the valve *D'* was fully seated on the port *e'*; and the same would be true of the opposite line under reverse conditions.

10 I claim herein as my invention—

1. In an apparatus of the class referred to, the signal-pipes *e e'*, connected with the opposite ends of the main operating-cylinder *B*, in combination with check-valves arranged in
15 such connection, substantially as set forth.

2. The valve *D'*, seating in either direction at and only at the completion of the piston-stroke, in combination with a valve-governed escape-port, *e²* or *e³*, leading through the main
20 cylinder to the waste, substantially as set forth.

3. The valve-case *D*, having in combination

a valve, *D'*, a pipe-connection, *e*, for alternately supplying and discharging fluid-pressure, a signal-pipe connection, through which
25 to operate a signal or signals, and a connection from such signal-pipe through the port of a check-valve and through the main cylinder to the waste, substantially as set forth.

4. The valve-case *D*, having in combination
30 a pipe-connection, *e*, for alternately supplying and discharging fluid-pressure, two signal-pipe connections, *e e'*, through which to operate the signal or signals of different track-lines, and valve-governed connections from such sig-
35 nal-pipes to the main cylinder, substantially as set forth.

In testimony whereof I have hereunto set my hand.

FREDERICK S. GUERBER.

Witnesses:

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