

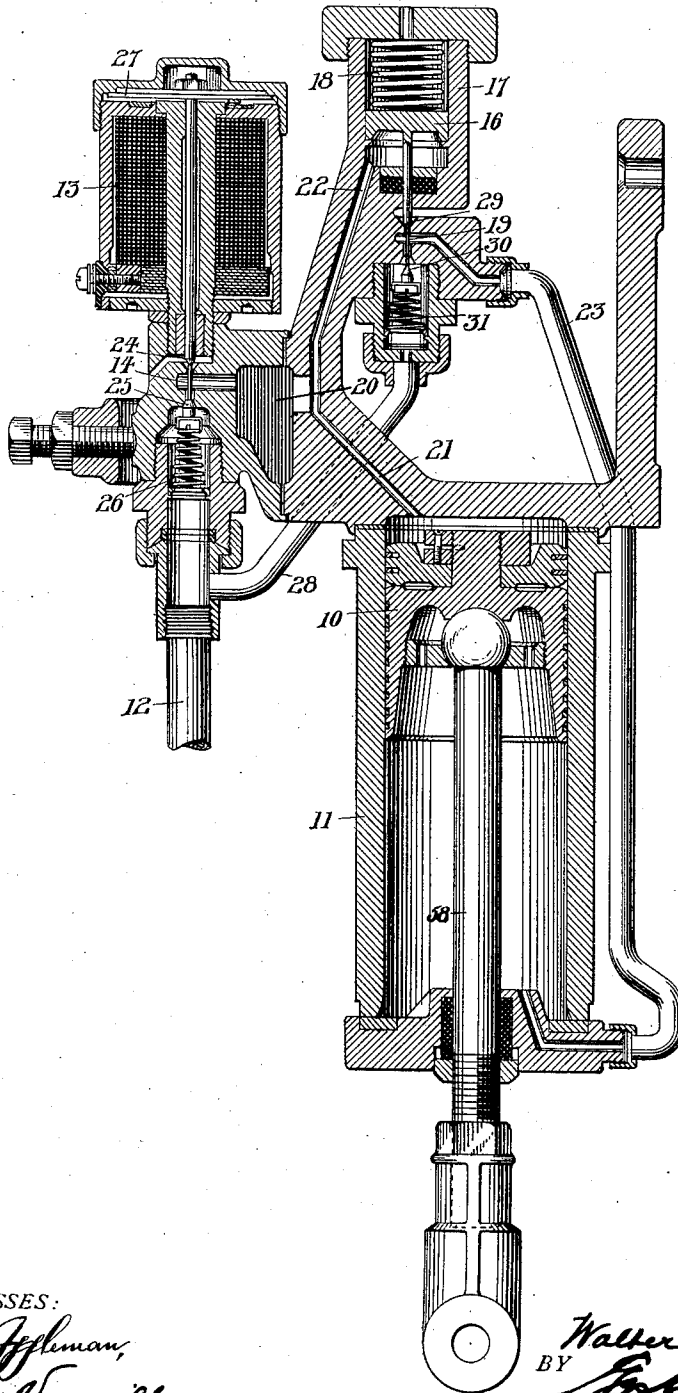
W. P. ALLEN.
RAILWAY SIGNAL.
APPLICATION FILED FEB. 4, 1911.

1,016,384.

Patented Feb. 6, 1912.

2 SHEETS—SHEET 1.

FIG. 1



WITNESSES:

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INVENTOR.

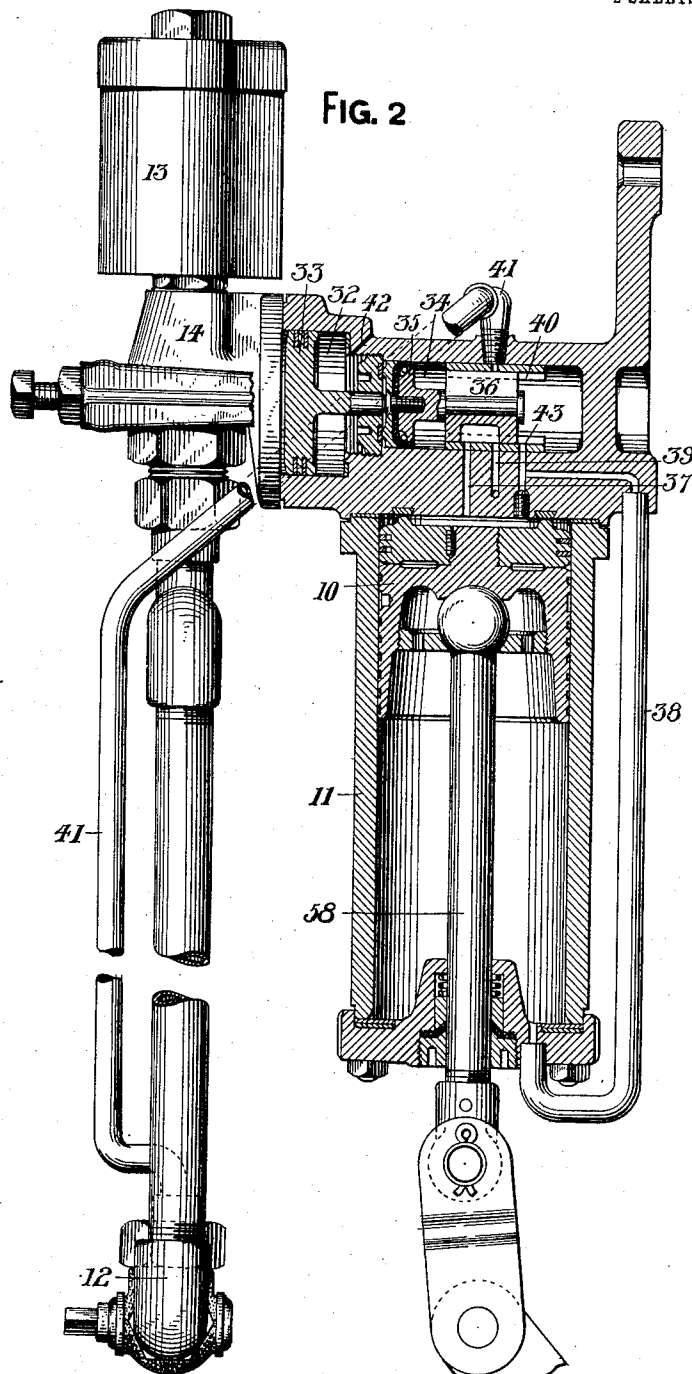
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2 SHEETS-SHEET 2.



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RAILWAY-SIGNAL.

1,016,384.

Specification of Letters Patent.

Patented Feb. 6, 1912.

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To all whom it may concern:

Be it known that I, WALTER P. ALLEN, a citizen of the United States, residing at Ardmore, in the county of Montgomery and State of Pennsylvania, have invented certain new and useful Improvements in Railway-Signals, of which the following is a specification.

My invention relates to railway signal mechanisms and particularly to railway signal mechanisms actuated by fluid pressure, as for example; by compressed air.

In the customary practice the signal devices (usually semaphores) of such mechanisms are biased to one position of indication, usually the "danger" position, and are moved to and are held in one or more other positions of indication by the fluid pressure.

In a railway signal mechanism embodying my invention, means are provided for assisting or effecting the movement of the signal device to its "danger" position by fluid pressure, and for thereby assuring such movement in case the force of gravity should be counterbalanced or overbalanced by any cause, such as by abnormal friction in the moving parts on account of sticking or freezing.

I will describe a railway signal mechanism embodying my invention, and then point out the novel features thereof in claims.

In the accompanying drawings, Figure 1 is a sectional view showing a railway signal mechanism embodying my invention; Fig. 2 is a similar view but showing a modification of my invention.

Similar reference characters refer to similar parts in each of the views.

Referring to the drawings, 10 designates a piston movable in a cylinder 11, which piston may be operatively connected with a railway signal device in any of the usual and well-known manners by means of a piston rod 58. Although I have here shown the cylinder as being fixed and the piston movable, I do not desire to limit myself to this specific arrangement, for the piston may equally well be fixed and the cylinder movable and operatively connected with the signal device.

12 designates a source of fluid pressure, usually compressed air, which is employed as motive power for the movement of the piston 10, and 14 designates a valve device

controlled by an electro-magnet 13, for governing the admission of the fluid pressure to the cylinder 11 on one side or the other of the piston 10.

It will be understood that the signal device operated by the piston 10 is biased to one of its positions of indication, and that it is to be moved by fluid pressure on one side of the piston to another position of indication. For example, as shown in the accompanying views, the moving parts of the railway signal mechanism are in the positions they occupy when the signal device (not shown) is in its biased position. Upon the admission of fluid pressure to the upper side of the piston 10 the signal device will be moved to and held in another position of indication. Upon the release of this fluid pressure and the opening of the upper end of the cylinder to atmosphere, the signal device will under normal conditions be moved back to its biased position by the action of gravity so that the piston again occupies the position shown in the accompanying views.

Referring now particularly to Fig. 1, 20 designates a chamber from which a port or passage 21 leads to one end of the cylinder 11. The admission of fluid pressure from the source 12 to this chamber 20, and the opening of the chamber to atmosphere are effected by the valve device 14. This valve device comprises two valves 24 and 25 which are rigidly connected and which are moved to one position by a spring 26, and to another position against the action of the spring 26 by an armature or plunger 27 of the magnet 13 when the latter is energized. The valve 25 opens and closes the passage through which the fluid from the source 12 passes to the chamber 20, and the valve 24 opens and closes the passage through which the fluid escapes from the chamber 20 to the atmosphere. It will be understood that when the valve 24 is unseated the valve 25 is seated, and vice versa. An electro-magnetically controlled valve device of this character is illustrated and described in United States Letters Patent No. 357,109, issued February 1st, 1887, to George Westinghouse, Jr., to which patent reference may be had.

The operation of the mechanism shown in Fig. 1 as thus far described will be readily understood. Upon the energizing of the magnet 13, the valve 25 will be unseated to permit the fluid pressure to flow into the

chamber 20 and thence through the port 21 to the upper end of the cylinder 11, where it will move the piston 10 to the lower part of the cylinder, thus moving the signal device connected therewith from its biased position. The piston 10 will be held in the position to which it is moved as long as its upper face is acted upon by the fluid pressure. When the magnet 13 is deenergized, the valve 25 is seated by the action of the spring 26, and the valve 24 is unseated at the same time, thereby allowing the fluid pressure in the cylinder and the chamber 20 to escape to the atmosphere, when under normal conditions the action of gravity will move the signal device to its biased position and the piston 10 will therefore be moved back to the upper end of the cylinder. Suitably supported on the framework of the mechanism is another chamber or recess 17 containing a movable or flexible member 16 adapted to operate a valve device 19. As here shown, this chamber is in the form of a cylinder in which moves a piston 16 having a piston rod operatively connected with the valve device 19. The piston 16 is normally held at one end of its stroke by a spring or other resilient medium 18, but may be moved to another position against the action of the spring 18 by means of fluid pressure from the chamber 20 through a duct or passage 22.

28 designates a passage leading from the main source 12 of fluid pressure to the valve device 19, and 23 is a passage leading from the valve device 19 to the lower end of cylinder 11.

The valve device 19 is similar to the valve device 14 hereinbefore described, and comprises a valve 30 which opens and closes a port between passages 28 and 23, and a valve 29 which opens and closes a port between the passage 23 and atmosphere. A spring 31 holds the valve 30 seated and the valve 29 unseated, but the action of this spring is overpowered by the action of the more powerful spring 18 when this latter spring is not compressed by the action of fluid pressure on the under side of the piston 16.

The operation of the entire mechanism will now be readily understood. When the parts are in the positions shown in the drawings, and the signal device therefore in its biased position, fluid pressure passes from the main supply 12 through the passage 28, valve 30, passage 23 to the under side of the piston 10, thereby adding to the action of gravity in holding the piston in the position shown. When now the magnet 13 is energized and the fluid pressure admitted to the chamber 20, this fluid pressure, passing through the port 22, raises piston 16 against the action of the spring 18, and the weaker spring 31 is thus able to seat valve 30 and unseat valve 29, thus cutting off the supply

of fluid pressure to the lower end of cylinder 11 and opening this end of the cylinder to atmosphere. The fluid pressure admitted through valve 25 is then free to move piston 10 and the signal device against the action of gravity, and to hold them in the position to which they are moved. When the magnet 13 is deenergized and the chamber 20 opened to atmosphere, the fluid pressure on the under side of piston 16 is removed, and this piston is moved downward by the spring 18, reversing the positions of valves 29 and 30 and thereby again admitting fluid pressure to the under side of piston 10. The action of gravity is thereby assisted in moving the signal device back to its biased position, or in case the action of gravity should be overbalanced by any cause, as by abnormal friction in the moving parts, the signal device will be moved back by the action of the fluid pressure on the under side of the piston 10.

Referring now to the modification of my invention shown in Fig. 2, the reference characters 32 and 34 designate two cylinders of relatively large and small cross-sectional area respectively, in which move two pistons 33 and 35 which are rigidly connected together and which are also connected with a D-valve 36 of the usual and well-known type, which valve travels in guides 40. This D-valve moves over a plate 43 having openings to ports 37, 38 and 39 which lead respectively to the two ends of the cylinder 11 and to atmosphere. The cylinder 32 on the left hand side of the piston 33 may be connected with the source of fluid pressure 12 or may be opened to atmosphere by means of the valve device 14 as hereinbefore explained in connection with Fig. 1. This cylinder on the right hand side of piston 33 is open continuously to atmosphere through a port or opening 42. The cylinder 34 on the right hand side of piston 35 is continuously connected with the source 12 of fluid pressure through a passage 41.

The operation of this mechanism will now be readily understood. Fluid pressure is constantly acting upon the right hand face of the piston 35, hence when there is no other force acting on either of the pistons 33 or 35, these pistons and the D-valve will rest at the left hand end of their stroke, as shown in the drawing, and the fluid pressure in the cylinder 34 will pass through port 38 into the lower end of cylinder 11, the upper end of this cylinder being open to atmosphere through the passages 37 and 39. When now the magnet 13 is energized, admitting fluid pressure into the cylinder 32 at the left hand side of piston 33, the fluid pressure per unit of area on the two pistons 33 and 35 will be equal and opposite; but since the area of piston 33 is greater than that of piston 35, the total pressure on

the former will be greater than that on the latter, hence the two pistons and the D-valve will be moved to the right hand end of their stroke. The lower end of cylinder 11 will thereby be opened to atmosphere and the upper end to the fluid pressure, and the piston 10 and the signal device connected therewith will be moved from the biased position, and will be held in the position to which they are moved as long as the fluid pressure is maintained on the left hand side of piston 33. When, however, this pressure is removed by opening the left hand side of cylinder 32 to atmosphere, as by the de-energizing of magnet 13, the pressure on the right hand side of piston 35 will move both pistons 33 and 35 and the D-valve back to the positions shown in the drawing, and the piston 10 and the signal device connected therewith will be moved, by the action of gravity and of fluid pressure on the under side of piston 10, to the position shown in the drawing.

From the foregoing, it will be evident that in both of the modifications of my invention shown herein, if the action of gravity tending to move the signal device from its clear position to its biased or "danger" position should be counterbalanced or overbalanced by abnormal friction in the moving parts or by other causes, the signal device will still be moved to its biased or "danger" position by fluid pressure.

Wherever I herein use the term "signal device" I mean a device of any character adapted to give indications to the driver of a train or car, such for example as a visual signal which by its color, or by its positions relative to its support, gives indication of the service condition of the railway track which it governs; or a train stop device adapted to engage a part on a moving train or car for the control of such train or car. Also wherever I herein use the term "fluid pressure," I mean either a liquid or a gas under pressure, although I preferably employ a gas, such for example as compressed air.

Having thus described by invention, what I claim is:

1. In combination with a railway signal device, a cylinder and a piston having relative movement, one of which is operatively connected with the signal device, a source of fluid pressure, an electro-magnetically controlled valve device adapted to connect one side of the piston with the source of fluid pressure or with the atmosphere, and means controlled by fluid pressure for connecting the other side of the piston with the source of fluid pressure or with the atmosphere according to whether the first mentioned side of the piston is connected with atmosphere or with the fluid pressure.

2. In combination with a railway signal

device, a cylinder, a piston movable therein, and which is operatively connected with the signal device, a source of fluid pressure, an electro-magnetically controlled valve device adapted to connect one side of the piston with the source of fluid pressure or with atmosphere, a second valve device controlled by the fluid pressure on said side of the piston and adapted to connect the other side of the piston with the atmosphere or with the source of fluid pressure.

3. In combination with a railway signal device, a cylinder, a piston movable therein and which is operatively connected with the signal device, a source of fluid pressure, an electro-magnetically controlled valve device adapted to connect one side of the piston with the source of fluid pressure or with atmosphere according to whether the valve-controlling magnet is energized or deenergized, a second valve device controlled by the fluid pressure on the said side of the piston and adapted to connect the other side of the piston with the atmosphere or with the source of fluid pressure according to whether the first mentioned side of the piston is connected with the source of fluid pressure or with the atmosphere.

4. In combination with a railway signal device, a cylinder, a piston movable therein and which is operatively connected with the signal device, a source of fluid pressure, an electro-magnetically controlled valve device adapted to connect one side of the piston with the source of fluid pressure or with atmosphere according to whether the valve-controlling magnet is energized or deenergized, a second valve device held normally in such position as to connect the other side of the piston with the source of fluid pressure, and a movable member operatively connected with said second valve device and in communication with the first mentioned side of the piston and adapted when acted upon by fluid pressure to operate the second valve device to connect the second mentioned side of the piston with atmosphere.

5. In combination with a railway signal device, a cylinder, a piston movable therein and operatively connected with the signal device, a source of fluid pressure, an electro-magnetically controlled valve device for admitting the fluid pressure to one side of the piston, a second valve device biased to such position as to disconnect the other side of the piston from the source of fluid pressure, and normally held in position to connect said other side with the source of fluid pressure, and means controlled by the pressure of the fluid on the first mentioned side of the piston for permitting the second valve device to disconnect the other side of the piston from the source of fluid pressure.

6. In combination with a railway signal device, a cylinder, a piston movable therein

and operatively connected with the signal device, a source of fluid pressure, a mechanically actuated valve device biased to such position as to disconnect one side of the piston from the source of fluid pressure and normally held in position to connect said side of the piston with the source of fluid pressure, an electro-magnetically controlled valve device for controlling the admission of the fluid pressure to the other side of the piston, and means controlled by the fluid pressure on the last mentioned side of the piston for permitting the mechanically actuated valve device to disconnect the first mentioned side of the piston from the source of fluid pressure.

7. The combination with a signal device having a normal bias to one position of indication, of a fluid pressure mechanism connected therewith, a source of fluid pressure, means for controlling the supply of fluid pressure thereto to move the signal device from its biased position, and to permit the signal device to again move to its biased position, and other means operated by the fluid pressure and for directing fluid pressure to the mechanism to have it assist in moving the signal device to its biased position.

8. In combination with a railway signal device, a cylinder, a piston movable therein and operatively connected with the signal device, a source of fluid pressure, a valve device adapted to connect one side of the piston

ton with the source of fluid pressure or with atmosphere according to the position of such valve device, means for controlling said valve device, and a second valve device controlled by the fluid pressure on the said side of the piston and adapted to connect the other side of the piston with atmosphere or with the source of fluid pressure according to whether the first-mentioned side of the piston is connected with the source of fluid pressure or with the atmosphere.

9. In combination with a railway signal device, a cylinder, a piston movable therein and operatively connected with the signal device, a source of fluid pressure, a valve device adapted to connect one side of the piston with the source of fluid pressure or with atmosphere according to the position of such valve device, means for controlling said valve device, and means controlled by the fluid pressure on the said side of the piston for connecting the other side of the piston with atmosphere or with the source of fluid pressure according to whether the first-mentioned side of the piston is connected with the source of fluid pressure or with atmosphere.

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

WALTER P. ALLEN.

Witnesses:

THEO. H. M'CALLA.

GEORGE R. SCATTERGOOD.