No. 647,719. Patented Apr. 17, 1900.

F. L. DODGSON.

SIGNAL.

(Application filed Oct. 29, 1897. Renewed Mar. 22, 1900.)

(No Model.)

Fig. 1.

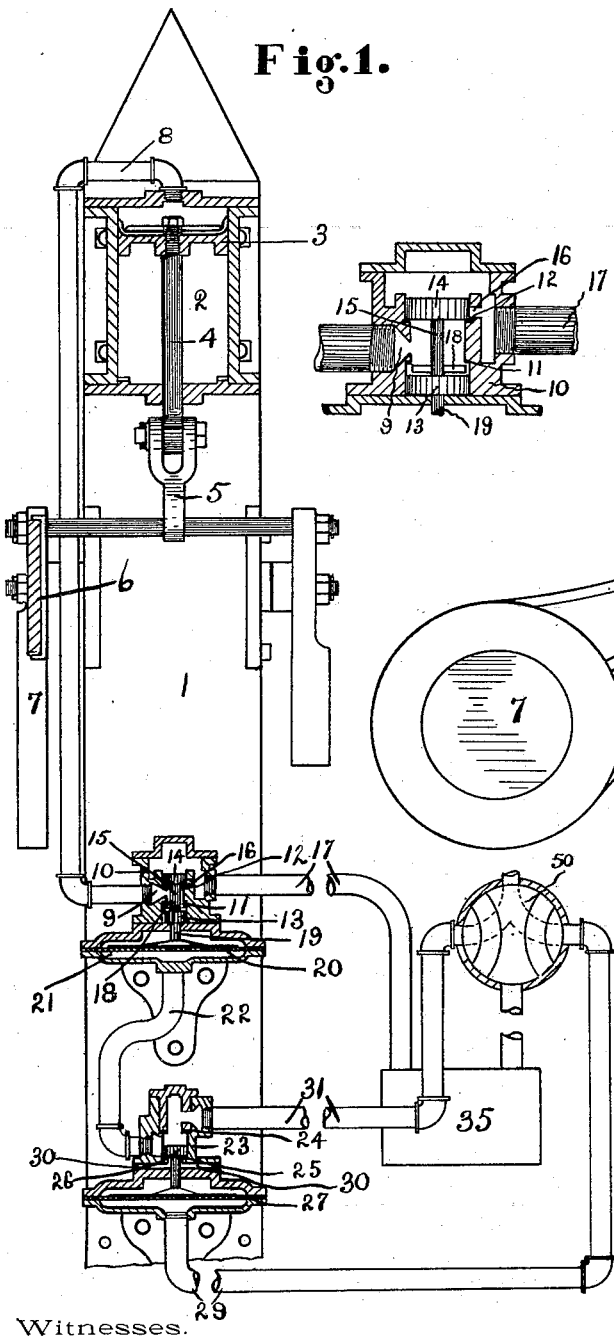
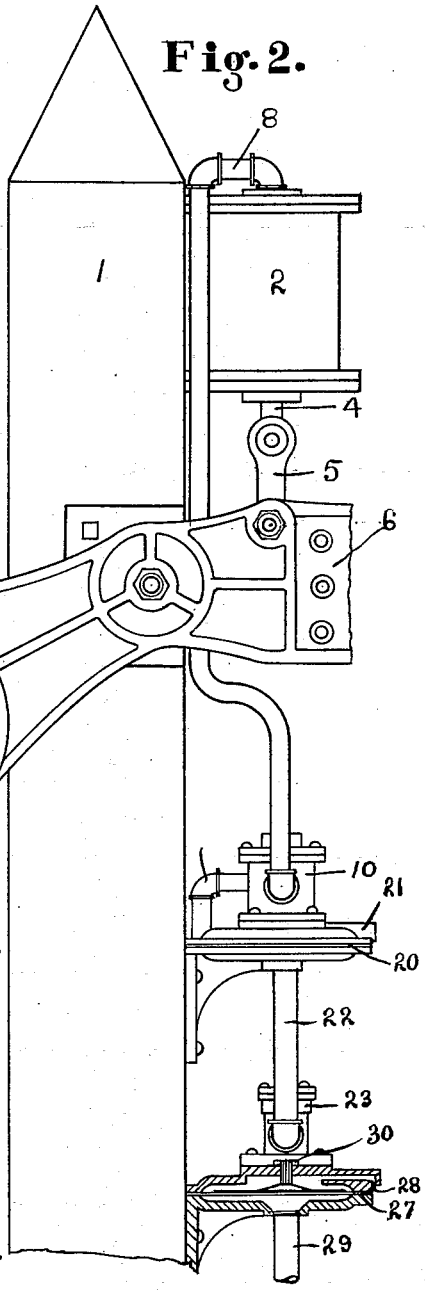


Fig. 2.



Witnesses.

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SIGNAL.

SPECIFICATION forming part of Letters Patent No. 647,719, dated April 17, 1900.

Application filed October 29, 1897. Renewed March 22, 1900. Serial No. 9,788. (No model.)

To all whom it may concern:

Be it known that I, FRANK L. DODGSON, of Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Signals; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the reference-numerals marked thereon.

My invention relates to that class of pneumatic devices, such as signals, adapted to be operated at a distance from the controlling point by means of compressed air or other fluid under pressure, and has for its object to provide for the rapid operation of such signals by a very slight alteration in the pressure. Heretofore in devices of this nature it has been customary to operate signals, more particularly the "distant" signals or semaphores, in one direction by the admission of fluid under pressure to the main pipe or conduit leading to the signal and to operate said signal in the opposite direction by reducing the pressure in said pipe, but the length of time required to vary the pressure at the signal by a variation at the controlling-point is often too great to cause the prompt action of the signal which is desired.

With the object in view, therefore, of causing the prompt action of the signal the present invention consists in certain improvements whereby the signal is operated directly by fluid under high pressure available at the signal or other operated device, the valve devices for regulating the admission of said fluid being controlled by a differential valve, which latter is in turn actuated by fluid under pressure in two separate mains or conduits under the control of the operator at the controlling-station. By this means the auxiliary differential valve controlling the main signal-controlling valve may be operated positively and quickly by slight variations in the pressure in the two pipes under the direct control of the operator.

The invention further consists in certain improvements in construction and combinations of parts, all as will be hereinafter fully described, and the novel features pointed out in the claims at the end of this specification.

In the drawings, Figure 1 is a vertical sectional view of a signal-operating device embodying my improvements and showing also diagrammatically the controlling-valve and the connections between it and the signal; Fig. 2, a side elevation of the signal with a portion of the valves at the signal shown in section.

Similar reference-numerals in both figures indicate similar parts.

While I prefer that my present improvements be used for operating such a device as a signal or semaphore and have shown it in connection with such a signal, it is only essential that the operated device, whether signal, switch, or other mechanism, shall embody a cylinder with a piston operating therein or its mechanical equivalent, said piston being automatically movable in one direction when the pressure in the cylinder is reduced.

1 indicates a signal-post; 2, a cylinder secured thereto; 3, a piston operating in the cylinder and connected by a rod 4 and link 5 with an operated part 6 as a semaphore or signal-arm, having a weight 7, connected thereto, operating to throw the arm up to the position shown in full lines in Fig. 2, indicating danger or normal position.

8 indicates a pipe communicating with the cylinder 2 and also with the chamber 9 in the valve-casing 10, secured to the post. Arranged in the valve-casing 10 are seats 11 and 12, preferably packed, as shown, with which cooperate the heads 13 and 14, connected to a valve-stem 15.

16 indicates a port controlled by the head 14, said port opening into a chamber in the upper part of the valve-casing, with which communicates a pipe 17, leading to a suitable reservoir 35 for fluid under pressure, either located at the signal-post, at the central controlling-station, or elsewhere, the pressure being practically constant. The valve-casing 10 is provided with an exhaust-port 18 beneath the seat 11, and the valve 13 14 is adapted to be engaged by a pin or projection 19, secured to or resting upon a diaphragm 20, arranged below it. The casing above the diaphragm 20 is provided with an exhaust-port 21 or is otherwise open to the air, and the chamber below the diaphragm is connected by a pipe

22 with a valve-casing 23, provided with valve-seats 24 and 25, with which seats coöperate a valve 26, having its stem connected with or operated upon by a diaphragm 27. The chamber above the diaphragm 27 is provided with an exhaust-port 28 or is otherwise open to the air, and the chamber beneath the diaphragm is in communication with the supply main or pipe 29, leading from the signal to the controlling-valve 50, adapted to be actuated by the operator or otherwise. Beneath the valve-seat 25 is an open exhaust port or passage 30, and above the seat 24 is a chamber, with which communicates a supply main or pipe 31, leading to the valve under the control of the operator.

The controlling-valve 50 may be of any suitable construction by which fluid under pressure from a reservoir 35 may be admitted to the supply main or pipe 29 and the supply main or pipe 31 opened to the air, or when desired to operate the signal in the opposite direction pressure may be admitted to the main 31 from the reservoir or other suitable source and the main 29 opened to the air. In the present embodiment I have shown diagrammatically such a controlling-valve as is contained in my prior patent, No. 513,231, dated January 23, 1894, as I find this is convenient for the purpose; but any other form of valve or valve devices could be employed, if desired, which will accomplish the same result. It is preferred that a single valve be employed; but this is not absolutely essential.

As shown, the signal or operated device is in the normal or danger position with the piston 3 at the end of the cylinder, the valve 14 is upon the seat 12 and is held by pressure of the fluid in the chamber in the upper part of the valve-casing, the cylinder being open to the air through the exhaust-port 18, and both the mains 29 and 31 are open to the air. In order to operate the signal to the safety position it is only necessary to open the main 29 to the air and admit fluid under pressure to the main 31, and said fluid will pass thence through the pipe 22 to the chamber beneath the diaphragm 20. Then by reason of the difference between the areas of the diaphragm and the upper end of the valve 14 the fluid-pressure against the bottom of the diaphragm will raise the valve-heads 13 and 14, closing the exhaust-port 18 and opening the port 16, admitting fluid from the supply-pipe 17 to the signal-cylinder and causing the operation of the piston, and the piston and signal will be maintained in this position as long as the pressure is continued in the main 31. When it is desired to return the signal to danger position, the main 31 is opened to the air and the main 29 connected with the reservoir. This operation will cause the diaphragm 27 to be raised and by reason of its being of larger area than the valve 26 said valve 26 will be closed against the seat 24, notwithstanding that air has not been completely exhausted from the pipe 31. This raising of the valve 26 from the seat 25 will permit the escape of the air from the pipe 22 through the exhaust 30, allowing the diaphragm 20 to be moved down quickly by the pressure upon the valve-head 14, connecting the pipe 8 with the exhaust-port 18 and permitting the quick exhaust of the fluid from the pipe 8, when the weight or counterpoise connected mediately with the piston will return the latter to normal position at the top of the cylinder. By this means a very quick action of the signal is obtained, as I find in practice that the employment of the two differential valves, one controlling the supply of fluid directly to the cylinder and the other controlling the supply of fluid to the larger area of the first-mentioned differential valve, insures the positive operation of the distant signal in a small fraction of the time required to exhaust the air from a long continuous pipe or to reduce the pressure at the far end thereof to a sufficient degree to cause the actuation of an ordinary valve.

The arrangement whereby the fluid is admitted to the larger area of the lower controlling differential valve to cause the opening of the cylinder to the air is advantageous, as the operation of the signal to the danger position is insured, even if the same amount of pressure were contained in the supply-mains 29 and 31 or the main 31 should for any reason become stopped up.

While I prefer to employ differential valves embodying diaphragms constituting the larger area, it will be understood that pistons operating in cylinders could be readily employed.

I claim as my invention—

1. The combination with the cylinder and the piston operating therein, a reservoir for fluid under pressure adapted for connection with the cylinder, and two main pipes to which fluid under pressure is admitted alternately, of a differential valve actuated in one direction by the fluid from the reservoir and controlling the supply and exhaust to the cylinder, and a differential valve between the two main pipes controlling the passage of fluid to and from one side of the first-mentioned differential valve, substantially as described.

2. The combination, with the signal-arm, the piston connected thereto, the cylinder, the supply and exhaust ports therefor, two valves, the first controlling the supply and exhaust to the cylinder, and the second controlling the operation of the first valve, two mains for fluid under pressure, one passing the first valve and to the cylinder, and the other passing the second valve and to the first valve for operating the latter, a third main leading to the second valve for operating the same, and means for supplying and exhausting the second and third mains alternately.

3. The combination with the weighted signal-arm, the piston connected thereto, the

cylinder, the supply and exhaust ports for the cylinder, a reservoir for fluid under pressure, a valve operated by fluid from the reservoir in a direction to admit fluid to the cylinder, and a diaphragm for operating said valve to open the cylinder-exhaust and close the supply-valve, of two main fluid-supply pipes, valve devices for admitting fluid under pressure to said pipes alternately, and a differental valve actuated by a difference in pressure in the supply-pipes, the valve being actuated by pressure on the larger surface in a direction to cause the opening of the exhaust-port of the cylinder, substantially as described.

4. The combination with the signal-arm and a weight for turning it to normal position, the piston connected thereto, the cylinder having the supply and exhaust ports, a reservoir for fluid under pressure, and a differential valve for controlling the supply and exhaust ports and moved in one direction by pressure from the reservoir, of two supply-mains, valve devices for admitting fluid-pressure to the mains, a differential valve actuated by difference in pressure in the mains and controlling the operation of the first-mentioned differential valve, and connections between the valves and mains whereby pressure in the main connected to the greater area of the second differential valve will cause the opening of the exhaust-port in the cylinder and permit the signal to return to normal position, substantially as described.

5. The combination with the cylinder and the piston operating therein, a reservoir for fluid under pressure adapted to be connected to the cylinder, of two supply-mains for fluid under pressure and two differential valves actuated by variations in pressure in the supply-mains, one of said valves controlling the admission of pressure from the reservoir to the cylinder when pressure is applied to its greater area, and the other always causing the exhaust from the cylinder when pressure is applied to the greater area, the greater areas of both valves being actuated by an increase in pressure in the supply-mains, substantially as described.

6. The combination, with the signal-arm, the piston connected thereto, the cylinder, the supply and exhaust ports therefor, a pneumatically-operated valve controlling the supply and exhaust to the cylinder and normally set for exhaust and normally tending to return to the exhaust position, a second pneumatically-operated valve for moving the first valve to the supply position and having fluid-pressure on both sides thereof to move it in both directions, and means for alternately supplying and exhausting the pressure on both sides of said second valve.

7. The combination, with the cylinder and piston operating therein, a reservoir for fluid under pressure adapted to be connected to the cylinder, the two supply-mains for fluids under pressure, and two valves actuated by variation in pressure in the supply-mains, one of said valves controlling the admission of fluid under pressure from the reservoir to the cylinder when operative pressure is applied to the valve from one supply-main, and the other valve causing the exhaust from the cylinder, when operative pressure is applied to said valve from the other supply-main, each valve being actuated by a change in pressure in the supply-mains substantially as described.

8. The combination, in a pneumatic semaphore, of a pivoted semaphore-arm having a counterweight tending to raise said arm to indicate "danger," a cylinder placed above said arm, a piston in said cylinder provided with connections to said arm, and a main connected with the cylinder for operating the piston by fluid-pressure to depress said arm to indicate "safety" and upon reduction of pressure therein to permit the arm to return to indicate "danger."

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Witnesses:
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