J. H. CHAMP.

CUT-OFF FOR FLUID PRESSURE MOTORS.

APPLICATION FILED JULY 19, 1909.

956,287.

Patented Apr. 26, 1910.

2 SHEETS—SHEET 1.

Fig. 1

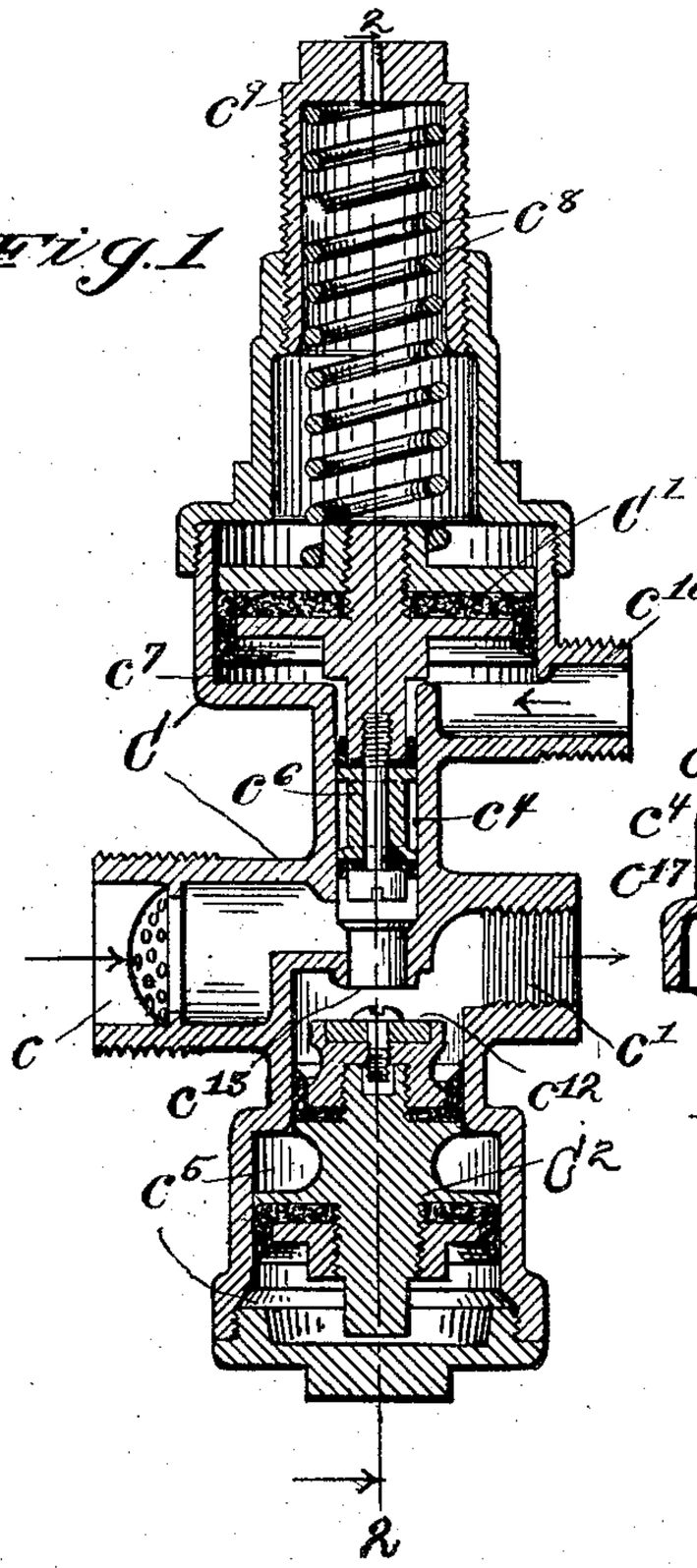


Fig. 2

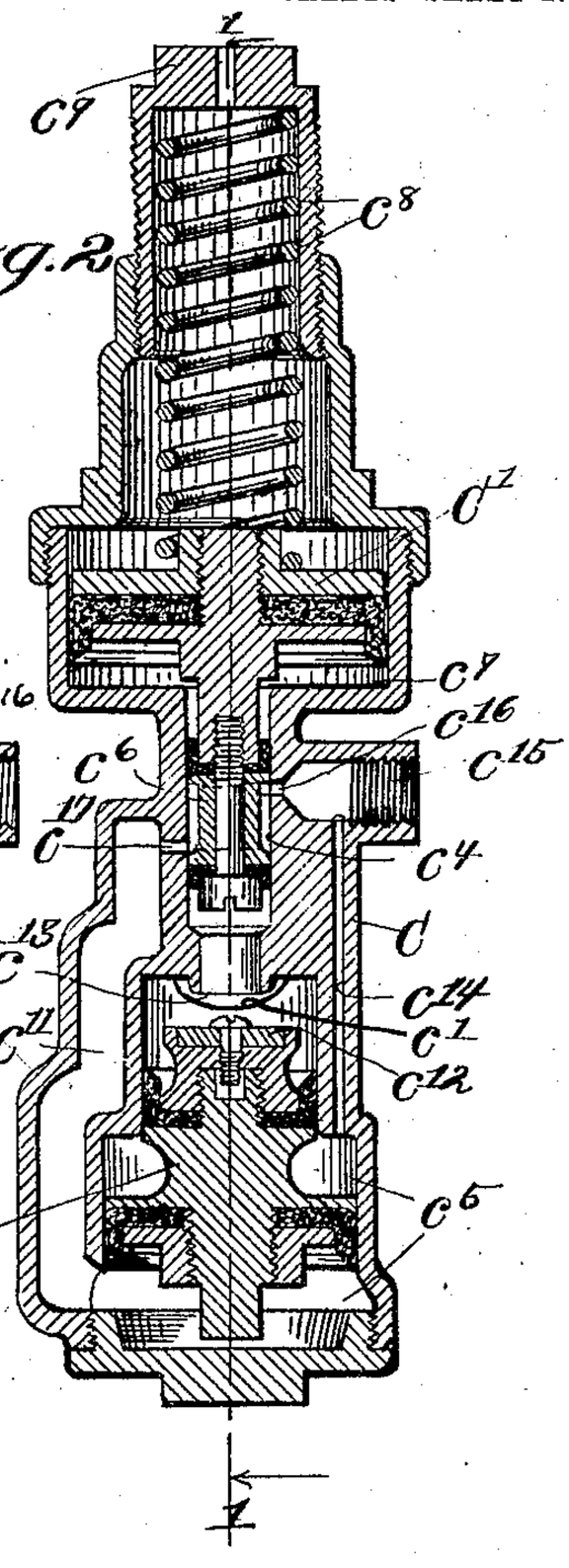


Fig. 3

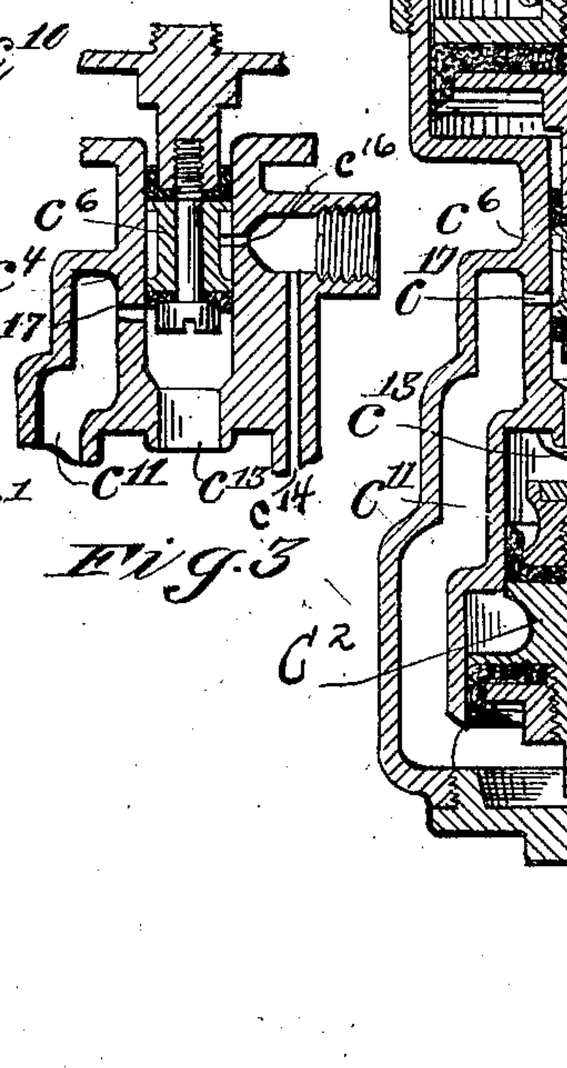
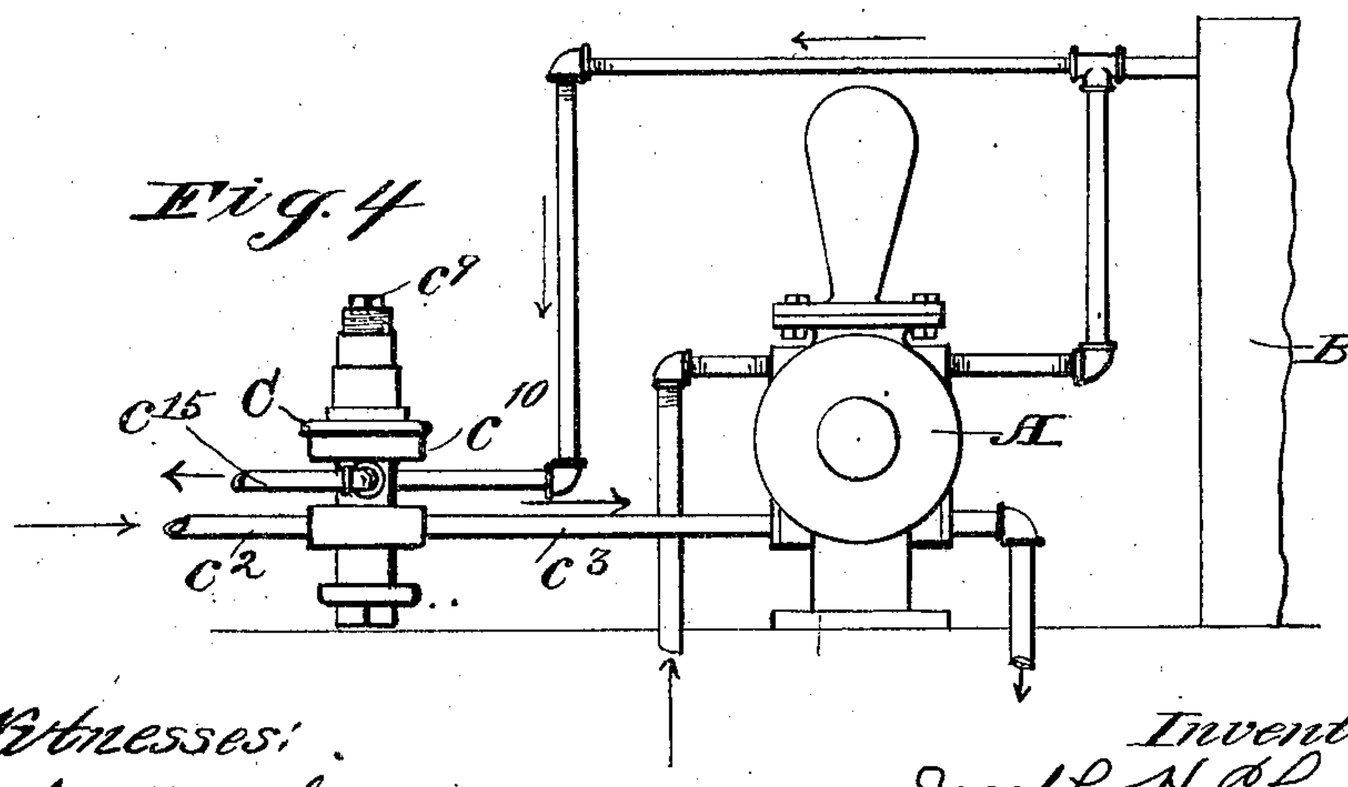


Fig. 4



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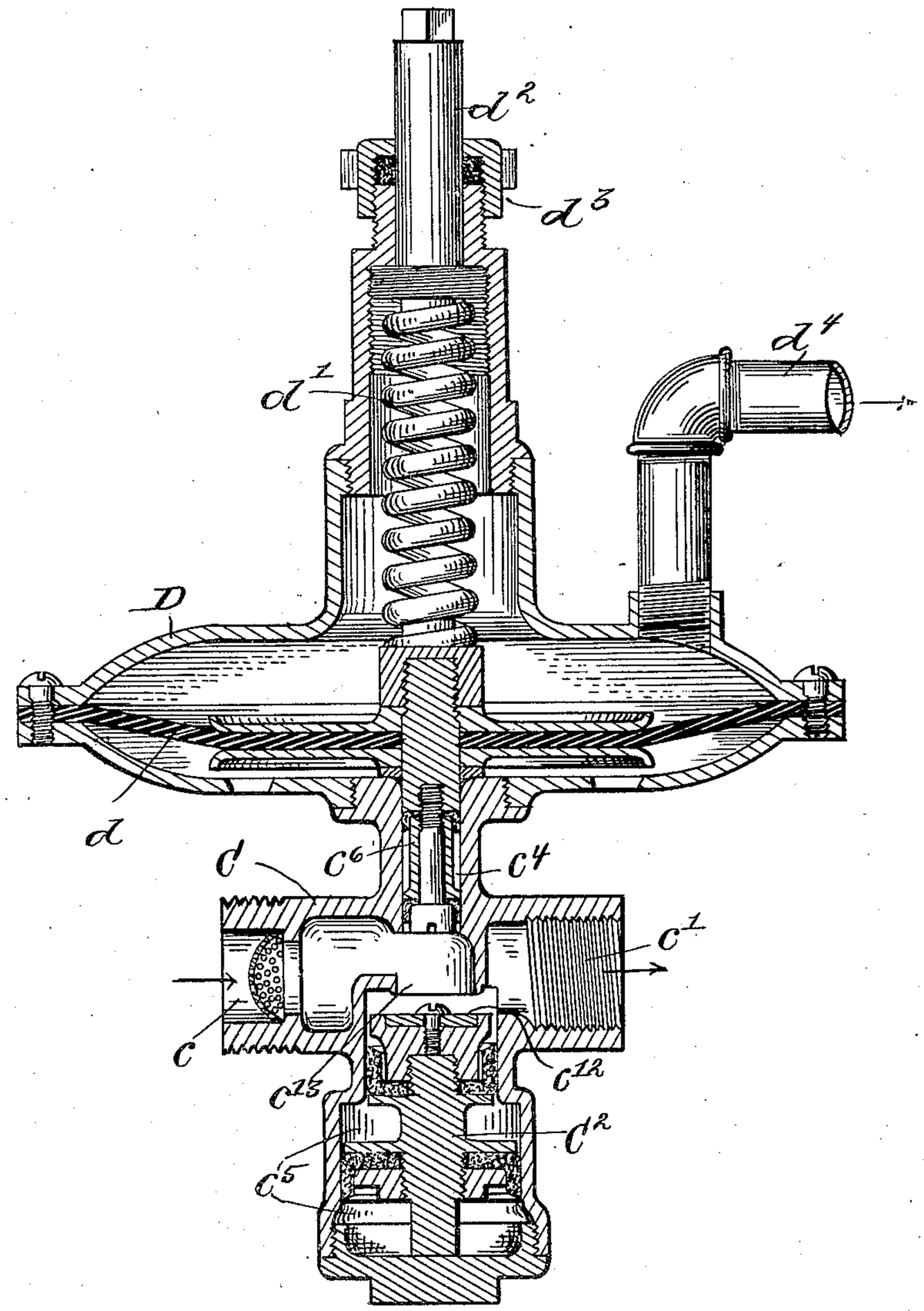
2 SHEETS—SHEET 2.

Fig. 5



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UNITED STATES PATENT OFFICE.

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CUT-OFF FOR FLUID-PRESSURE MOTORS.

956,287.

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Application filed July 19, 1909. Serial No. 508,288.

To all whom it may concern:

Be it known that I, JOSEPH H. CHAMP, a citizen of the United States, and a resident of Cleveland, county of Cuyahoga, and State of Ohio, have invented a new and useful Improvement in Cut-Offs for Fluid-Pressure Motors, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle so as to distinguish it from other inventions.

The present invention relates in general to regulating valves for automatically controlling the flow of the energizing fluid to a pump, or other engine, a specific application, for example, being the control of the flow of water to a water motor operating a water lift.

The object of the invention is the provision of a simple and compact device for this purpose, and one that will not easily get out of order.

To the accomplishment of these and related objects, said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims.

The annexed drawing and the following description set forth in detail certain mechanism embodying the invention, such disclosed means constituting, however, but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawing:—Figure 1 is a vertical central section of a cut off, or regulating valve, embodying my several improvements; Fig. 2 is a similar sectional view taken at right angles to that of Fig. 1; Fig. 3 shows a valve detail as in Fig. 2, but in a different operative position; Fig. 4 is a view, more or less diagrammatic in character, representing the valve as it appears when installed in connection with the pump and reservoir; while Fig. 5 shows a modified construction of valve adapting it for use in a vacuum system.

As has been indicated, one field of use for my improved cut off or valve, is the controlling of the supply of water, as from a city main, to a water motor A, and in the illustrative installation of Fig. 4, such motor is shown as pumping another liquid, as for example, water from a cistern into a reservoir B. The latter may either be elevated above the pumping station, or else it may be a closed reservoir, and the water introduced therein against the increasing pressure of the confined volume of air. In either event an increasing hydrostatic head or equivalent pressure is produced which is utilized in effecting operation of the controlling valve, or cut-off. The latter responsively admits more or less water to the motor, and if necessary cuts off the supply thereto entirely, thus stopping the same.

Referring then to the detailed construction of such control valve when thus employed in pressure service, it will be seen to comprise a casing C provided with alined inlet and outlet openings c c' to which are joined the appropriate connections c^2 c^3 (Fig. 4) leading from the water main (not shown) and to the pump A respectively. Transversely disposed with respect to the line of said openings, and lying above and below the same respectively, is a valve chamber c^4, and a piston chamber c^5, the former being adapted to accommodate a double piston valve c^6 and terminating above in an enlarged chamber c^7 for the accommodation of a secondary piston C′, or equivalent fluid pressure actuated device, that is connected with said valve, so as to raise and lower the same in its chamber. Normally a spring c^8, held under a variable tension by a nut c^9 inclosing its outer end, serves to retain said piston and valve in their lowermost position despite any pressure exerted thereagainst by the water entering through the inlet opening c of the casing. A connection c^{10}, however, leading from the reservoir to the under side of said piston permits the latter to be raised by the pressure, whether fluid or liquid, transmitted through such connection whenever a predetermined height is reached in the reservoir, as will be readily understood. A passage c^{11} having connection with said auxiliary valve chamber c^4 through a port c^{17} leads therefrom to the outer end of the main piston chamber c^5. Such latter chamber is formed of two different diameters to accommodate the respective portions of a differential piston C^2 reciprocably held therein with its smaller face directed inwardly, while its larger face is directed outwardly. Such smaller face bears a valve c^{12} that is adapted to seat against a port c^{13} formed in the casing between the inlet and outlet openings, and thereby to control connection between such openings. A by-pass c^{14} is provided, moreover, in the casing, such by-pass leading from the portion of the main piston chamber intermediate between the two parts

of said differential piston to a waste connection c^{15} provided in the casing laterally of the auxiliary valve chamber c^4. Such auxiliary valve chamber is likewise connected with such waste connection through an orifice c^{16}, which orifice, together with the port c^{17} connecting the valve chamber with a passage c^{11}, are so disposed that in the lower position of said auxiliary valve the passage in question is put into communication with the waste connection; while in the upper position of said valve, such communication is broken off, the port c^{17} being now located below the valve, and the passage c^{11} thus put into communication with the inlet side of the casing proper.

In view of the foregoing description of the structure of my improved cut-off or regulating valve, its mode of operation should be readily apparent. In the normal or open position of the valve illustrated in Figs. 1 and 2, the pressure against the secondary piston C′ that actuates the auxiliary valve c^6, is insufficient to raise the latter against the spring. The passage c^{11} leading from the under side of the differential piston C^2, accordingly, is in communication with the waste c^{15} and the pressure of the water supplied to the casing through the inlet opening, is accordingly effective to depress said differential piston and the valve carried by the upper face thereof, so as to leave a free and unobstructed passage for the water through the cut-off to the motor or pump A. When now the water in the reservoir B supplied by said pump reaches a predetermined height, piston C′ and thereby the auxiliary valve, will be raised, the new position of the latter being that indicated in Fig. 3, in which position the communication between ports c^{16} and c^{17} is closed so that the liquid supplied to the casing through the inlet opening is now admitted to the under side of the differential piston C^2, while at the same time communication between such side and the waste is cut off. Such under face being of greater area than the upper face, the effect of such admission of the water to the differential piston casing, will be to raise the piston and thereby the valve, so as to cut off the flow of the water through the valve to the pump, the piston and valve being maintained in such position so long as the pressure against the under face of the auxiliary-valve-actuating piston C′ is not reduced.

The simplicity of construction and fewness of operative parts, thus seen to characterize my improved cut-off, render the same unlikely to get out of order, no attention whatever being ordinarily required while in use. It need scarcely be added that while I have thus illustrated my improved cut-off valve as employed in controlling the supply of water to a water motor, it is equally adapted for use in similarly controlling steam, compressed air or other energizing fluid, as well as water. It is similarly immaterial whether, as indicated, the hydrostatic pressure of water in a reservoir, or else the pressure exerted by an inclosed body of air, be utilized in actuating the piston that operates the auxiliary valve.

In the modified construction of Fig. 5, the sectional plane of which corresponds with that of Fig. 1, a diaphragm valve d in a chamber D is substituted for the secondary piston C′ in chamber c^7, as actuating means for auxiliary valve c^6. As before a spring d' serves to normally retain said diaphragm and valve in their respective inner positions, but instead of a single adjusting nut c^9, a plug d^2 adjustably held in a stuffing box d^3 is utilized. Finally in lieu of a pressure line connected with chamber D on the under side of the diaphragm, a suction line is connected with the outer side of said chamber, so that a predetermined suction will serve to actuate the diaphragm and draw the valve c^6 in its outer position. The manner in which such modified construction of the cut-off is installed should be evident and hence is not illustrated, it being understood, of course, that the water supplied through the cut-off operates a vacuum pump instead of a force pump. It need merely be stated in conclusion that the term, fluid-pressure-actuated, as herein employed, refers to either positive or negative pressures, compared with normal, *i. e.* atmospheric pressure.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:—

1. In a device of the character described, the combination of a casing having inlet and outlet openings; transversely disposed piston and valve chambers in said casing and communicating with the outlet and inlet sides of said casing, respectively; a passage with a port opening into said valve chamber and leading thence to the outer end of said piston chamber; a differential piston in such piston chamber, the smaller face of such piston being directed inwardly; a valve borne by such face and adapted to control connection between the inlet and outlet openings; an auxiliary valve in said valve chamber, adapted in one position to open the port of such passage to the casing interior and in another position to open such port to waste; and fluid-pressure-actuated means for operating said auxiliary valve.

2. In a device of the character described, the combination of a casing having substantially alined inlet and outlet openings;

transversely disposed piston and valve chambers in said casing, one on each side of the line of said openings and communicating with the outlet and inlet sides of said casing, respectively; a passage with a port opening into said valve chamber and leading thence to the outer end of said piston chamber; a differential piston in said piston chamber, the smaller face of said piston being directed inwardly; a valve borne by such face and adapted to control connection between such inlet and outlet openings; an auxiliary valve in said valve chamber, adapted in one position to open the port of said passage to the casing interior and in another position to open said port to waste; and fluid-pressure-actuated means for operating said auxiliary valve.

3. In a device of the character described, the combination of a casing having substantially alined inlet and outlet openings; transversely disposed piston and valve chambers in said casing, one on each side of the line of said openings and communicating with the outlet and inlet sides of said casing, respectively, said casing being formed with a port alined with said chambers; a passage, with a port opening into said valve chamber, and leading thence to the outer end of said piston chamber; a differential piston in said piston chamber, the smaller face of said piston being directed inwardly; a valve borne by such face and adapted to be pressed against the port in said casing and thereby control connection between such inlet and outlet openings; an auxiliary valve in said valve chamber adapted in one position to open the port of said passage to the casing interior and in another position to open said port to waste; fluid-pressure-actuated means for operating said auxiliary valve; and a passage leading to waste from between the two faces of said piston.

Signed by me this 16th day of July, 1909.

JOSEPH H. CHAMP.

Attested by—

F. L. HINDS,

E. H. VOGELPOHL.