H. H. KELLEY.

FLUID PRESSURE REGULATOR.

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1,024,992. Patented Apr. 30, 1912.

Fig. 1.

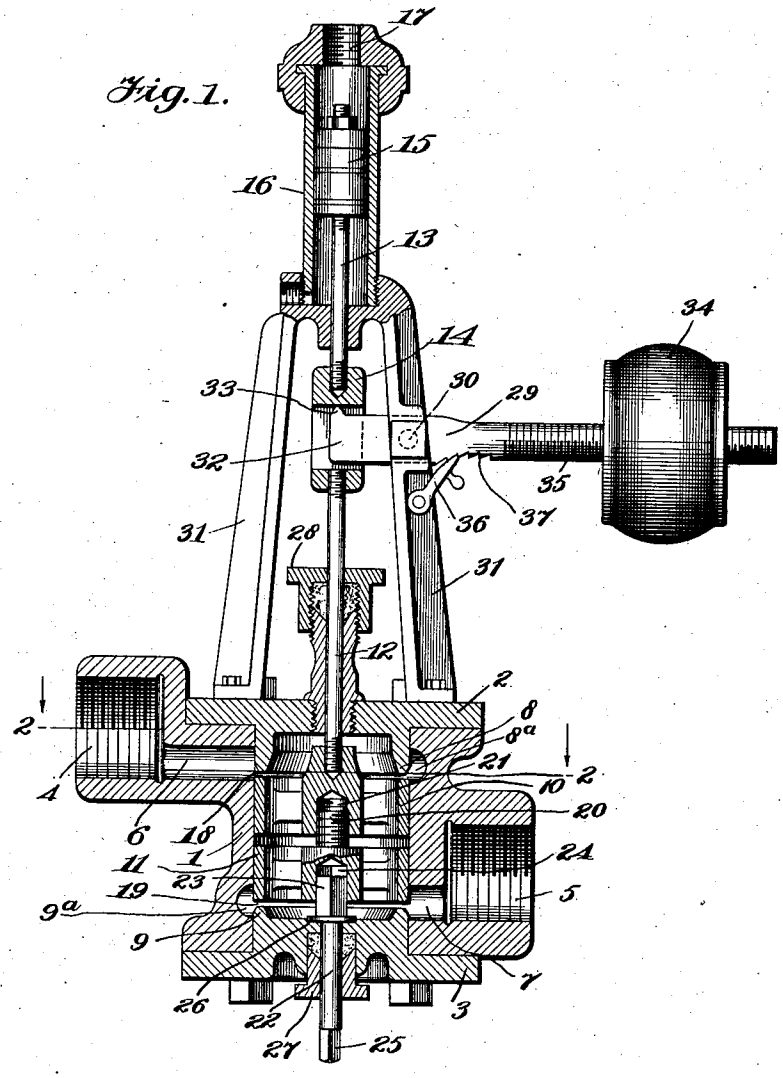
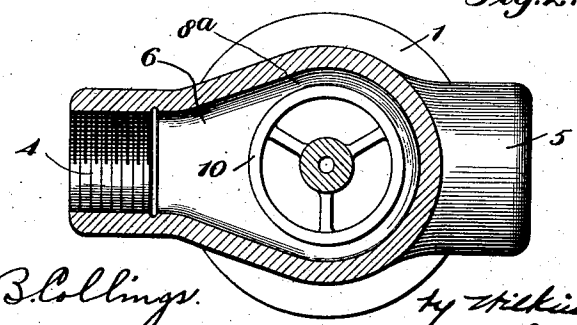


Fig. 2.



Witnesses

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HARRY H. KELLEY, OF ATLANTA, GEORGIA.

FLUID-PRESSURE REGULATOR.

1,024,992. Specification of Letters Patent. Patented Apr. 30, 1912.

Application filed August 31, 1911. Serial No. 647,102.

To all whom it may concern:

Be it known that I, HARRY H. KELLEY, a citizen of the United States, residing at Atlanta, in the county of Fulton and State of Georgia, have invented certain new and useful Improvements in Fluid-Pressure Regulators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to fluid pressure regulators and proposes an arrangement especially adapted to pumping systems, whereby the pumping engine is automatically controlled directly through the fluid which is pumped, to the end of regulating the speed of the engine commensurable with the degree of pressure obtained in the flow at the point of discharge; and which is capable of manual adjustment to variable working conditions for determining the amount of the flow.

The invention has for its further purpose to provide a device of the character in question which is simple in design; inexpensive to manufacture, ready of installation, and wherein its working is positive and regular.

With these and other objects in view the invention consists in the novel details of construction and combinations of parts more fully hereinafter disclosed and particularly pointed out in the claims.

Referring to the accompanying drawings forming a part of this specification in which like numerals designate like parts in all the views:—Figure 1 is a vertical sectional view, partly in elevation, of the device in operative position, and Fig. 2 is a top plan sectional view thereof taken on the line 2—2.

Referring to the construction 1 designates the valve body or casing which has a central and vertically disposed bore closed at either end by heads 2 and 3; and also having inlet and outlet ports 4 and 5, which communicate with the central bore, or cylindrical chamber, through constricted passageways 6 and 7 respectively. The heads 2 and 3 are constructed with portions 8 and 9 providing opposed seats for the valve working within the cylinder, and which controls the passage of steam to the engine in a manner to be presently described. The valve casing immediately surrounding said valve seats is cut away to provide annular chambers 8^a and 9^a which communicate with the passageways 6 and 7, the purpose whereof being to obtain a balancing of pressure for the controlling valve, and also to permit the pressure fluid to enter and leave the valve chamber simultaneously at all points in its circumference, as will be understood.

The regulating valve consists of two cylindrical parts or sections 10 and 11, and said section 10 is connected with a rod 12 which, through a rod 13 and a yoke 14, is connected with a piston 15 that works in a cylinder 16. Said cylinder has a port 17 which is adapted to be brought into communication with the flow of liquid which is pumped, at the point of discharge, and through which said piston 15 is actuated to control the pressure regulating valve (10 and 11), as will be presently explained.

The valve sections 10 and 11 are designed to be adjusted with respect to each other for the purpose of varying the extent of the opening of the fluid passageways 18 and 19. The means for effecting this adjustment consists in a stud 20 on the valve section 11, which has screw-threaded engagement with an aperture 21 of the valve section 10. A shaft 22, mounted to turn in the head 3, has a squared head 23 that loosely fits within a similarly designed recess 24 in the valve section 11. The shaft 22 has its outer end 25 squared to receive a wrench or similar tool for turning said shaft, whereby the valve sections 10 and 11 may be adjusted toward or from each other, for the purpose above mentioned. A collar 26 on the shaft 22 seats within a recess in the face of the head 3, and with a stuffing box 27 provides a substantially liquid tight joint for said shaft. A similar stuffing box 28 is provided for the valve actuating rod 12 for a like purpose.

The means for manually setting the pressure regulating valve to variable working positions consists in a lever 29 fulcrumed at the point 30 to one arm of a frame 31 mounted on the casing head 2, and the arm 32 of said lever fits within the yoke 14 where it has a toe 33 in engagement therewith. A weight 34 is designed to be adjustably mounted on the screw threads 35 of said lever, and a pawl 36 pivoted to the arm 31 is adapted to engage the teeth of a rack 37 on said lever 29, for holding the same in the different adjusted positions.

When the device is used as a steam pump governor, the valve casing is connected in

the steam supply pipe of the pump (or in a by-pass of said pipe) and the cylinder opening 17 connected to communicate with the water discharge pipe of the pump, whereupon the operation is substantially as follows: Assuming that no water pressure exists at the discharge end of the pump the weight lever 29 is first raised sufficiently to bring the valve (10 and 11) to approximately an intermediate position in its working chamber, when the pawl 36 is placed in engagement with the teeth of the rack 37 to hold the lever in this position. The shaft 22 is then turned to bring the valve sections 10 and 11 closer together and thus shorten said valve, but enlarging the extent of the fluid passageways 18 and 19. The throttle valve of the pump is opened and the pump allowed to create the desired maximum water pressure against the piston 15 when the weight 34 is adjusted on the lever toward its fulcrum point until the valve closes against the lower valve seat 9. The pressure of water is ascertained by means of a suitable pressure gage connected at any point in the discharge pipe of the pump. When the valve is seated as just indicated, and which, of course, causes the pump to stop, the outer end of the lever 29 will have been slightly raised, and such movement permits the pawl 36 to be automatically released from its engaging teeth and drop clear of the lever, and thus permit the lever to descend when pressure is removed from the piston 15. The pressure in the water discharge pipe of the pump is now lowered gradually (by opening a valve) which permits the piston to rise under the influence of the weight 34 and thus admit steam to the pump. The speed of the pump is then permitted to rise to the maximum safe limit, at which time the shaft 22 is turned to further separate the valve sections and to partly close their respective inlet and outlet openings to throttle the steam. This throttling is continued until the pump throttle valve has been opened wide, it being understood, of course, that the speed of the pump is dependent upon the extent of the opening 19, the opening at 18 being the same as the opening 19. This speed, whatever it may prove to be, becomes the maximum under the given reduction of water pressure, for should the pressure be further lowered the opening 18 will be correspondingly closed, thus automatically reducing the supply of steam as the water pressure decreases and preventing the pump speed from increasing. When the water pressure rises again, the opening 18 will be increased, thus increasing the steam pressure to the pump in direct proportion to the increased water pressure; this increase of pressure causing the pump to attain the maximum speed again. Should the water continue to rise, the piston 15 will be forced downwardly, causing the valve to close the opening 19 thus again throttling the supply of steam to the pump. When the maximum water pressure is reached the valve will be forced against its seat 9 completely shutting off the steam supply and stopping the pump.

From the foregoing it will thus be seen that a slight lowering of the water pressure increases the speed of the pump, and a further lowering of such pressure causes the valve to open wide, and the pump to attain a predetermined maximum speed, the openings 18 and 19 then being equal. A further reduction of water pressure causes the valve to rise partly closing the opening 18 and throttling the steam supply to the pump. In event that the water pressure should fall still lower, the valve will seat against the seat 8 and shut off all steam from the pump and cause it to stop again.

It will be obvious that those skilled in the art may vary the details of construction and arrangement of parts without departing from the spirit of my invention, and therefore I do not wish to be limited to such features except as may be required by the claims.

What I claim is:—

1. In a fluid pressure regulator, the combination of a valve casing adapted to be connected with a pump; a valve comprising sections mounted to operate in the casing; an adjustable connection between said sections whereby to position the valve within said casing; and a fluid pressure, and manually actuated means for positioning the valve, substantially as described.

2. In a fluid pressure regulator, the combination of a valve casing adapted to be connected with a pump; a valve in said casing; means for manually setting the valve in different working positions; means for holding the valve in such positions; and a fluid pressure actuated means adapted to automatically effect the release of said holding means and thereafter regulate the working position of the valve, substantially as described.

3. In a fluid pressure regulator, the combination of a valve casing adapted to be connected with a pump; a valve in said casing; a stem on said valve; a fulcrumed lever connected with the valve stem; a weight adjustably mounted on the lever; a pawl adapted to hold the weighted lever in different adjusted positions to set the valve; and a fluid pressure piston connected with the valve stem and adapted to automatically effect the release of the weighted lever and thereafter regulate the position of the valve, substantially as described.

4. The combination with a sectional valve and a casing providing a working chamber therefor; of an adjustable connection be-

tween the valve sections whereby to position the valve in the casing; and means for actuating the valve, substantially as described.

5. The combination with a sectional valve and a casing providing a working chamber therefor; of an adjustable connection between the valve sections comprising, a screw-threaded stud on one of the sections and a screw-threaded aperture in the other section receiving said stud; and a shaft engaging with one of the sections for turning the same to position the valve in the casing; and means for actuating the valve, substantially as described.

6. The combination with a sectional valve and a casing providing a working chamber therefor; of an adjustable connection between the valve sections comprising, a screw-threaded stud on one of the sections and a screw-threaded aperture in the other section receiving said stud; a shaft rotatably mounted in the valve casing and having connection with one of said valve sections, said shaft adapted to be turned to move the valve sections toward and from each other to position said valve in the casing; and means for actuating the valve, substantially as described.

7. In a fluid pressure regulator, the combination of a valve casing adapted to be connected with a pump; a valve in said casing; said valve comprising two cylindrical sections in superposed relation; one of said sections having a screw-threaded stud and the other of said sections having a screw-threaded aperture receiving said stud; a shaft journaled in the casing and having a slidable and non-rotatable connection with one of the valve sections whereby to move the sections toward and from each other to position the valve; a frame mounted on the valve casing; a cylinder supported by the frame and adapted to have communication with the pump discharge; a fluid pressure actuated piston in said cylinder; a piston rod connected to said piston; a stem on the valve; a yoke connecting the valve stem and the piston rod; a lever fulcrumed on the frame and having one end engaging with said yoke; a weight adjustable on said lever adapted for setting the valve to different working position; and a pawl adapted to engage with the lever and support the same in adjusted position; and said fluid pressure piston adapted to effect the release of the pawl and thereafter regulate the position of the valve, substantially as described.

8. In a fluid pressure regulator, the combination of a valve casing provided with valve seats, and having an inlet and an outlet port; a hollow valve located within said casing coöperable with either of said seats to close the valve, and to open the valve when in an intermediate position thereof, and means for actuating the valve, substantially as described.

9. In a fluid pressure regulator, the combination of a valve casing provided with valve seats and having an inlet and an outlet port; a hollow valve comprising adjustable sections located in said casing; said valve coöperable with either of said valve seats to close the valve, and to open the valve when in an intermediate position thereof; means for adjusting the valve sections to vary the extent of the valve opening; and means for actuating the valve, substantially as described.

10. In a fluid pressure regulator, the combination of a valve casing provided with valve seats and having an inlet and an outlet port; a valve located in said casing comprising two hollow cylindrical sections, a screw threaded connection between said sections providing adjustment therebetween; said sections coöperable each with its respective valve seat to close the valve, and to open the valve when in a position intermediate of the seats; and means for actuating the valve, substantially as described.

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

HARRY H. KELLEY.

Witnesses:
J. C. MARTIN,
FRANK K. HOUSTON.