

Dec. 8, 1931.

W. KIESER

1,835,952

REGULATING VALVE

Filed Aug. 9, 1929

Fig. 1.

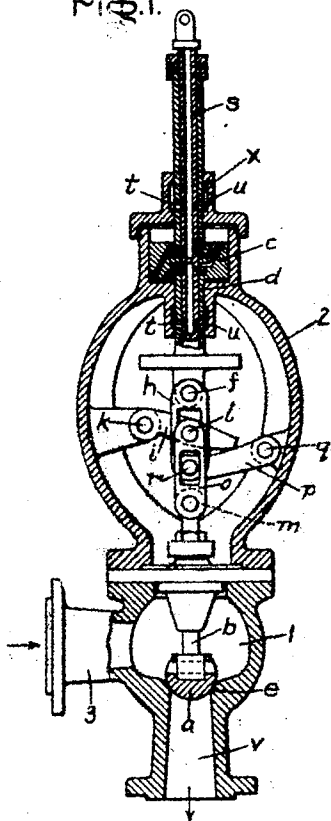


Fig. 2.

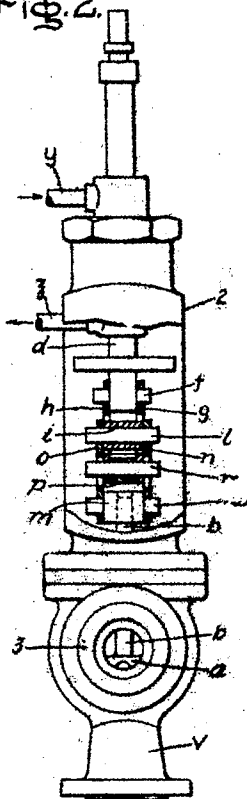
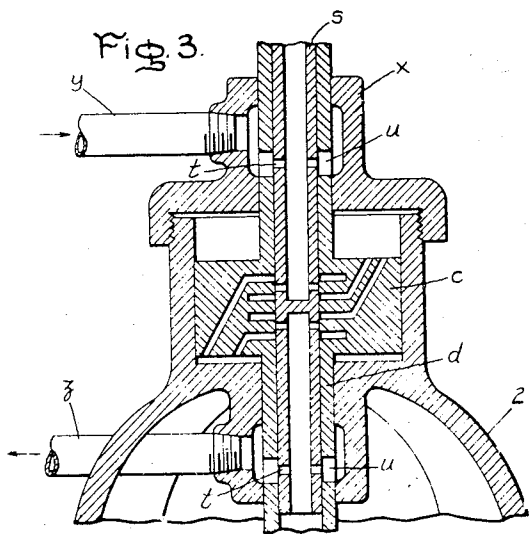


Fig. 3.



Inventor:
Walter Kieser,
by *Charles E. Tulla*
His Attorney.

UNITED STATES PATENT OFFICE

WALTER KIESER, OF BERLIN-CHARLOTTENBURG, GERMANY, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK

REGULATING VALVE

Application filed August 9, 1929, Serial No. 384,707, and in Germany August 21, 1928.

The present invention relates to regulating valves for steam or other elastic fluid and especially to valves which are subjected to high pressures.

5 The object of my invention is the provision in a valve of the character mentioned, of a means to prevent as fully as possible the friction losses of the fluid as it flows through the valve at high velocity, and also
10 of means whereby the lifting force exerted by the operating means is greatest at the start of the opening movement and is thereafter decreased as the valve moves away from its seat, accompanied by a somewhat more
15 rapid movement of the valve.

For a consideration of what I believe to be novel and my invention, attention is directed to the accompanying description and the claims appended thereto.

20 In the drawings which illustrate one of the embodiments of my invention, Fig. 1 is a vertical section of a stop valve, Fig. 2 is a side view thereof with certain of the parts broken away, and Fig. 3 is an enlarged view
25 showing the details of the pilot valve.

30 *a* indicates a spherically shaped valve, *b* the spindle therefor, *c* the power actuated piston of the motor for moving the valve, and *d* the operating piston rod or spindle, said parts being in axial alignment. The casing for the valve as a chamber 1 and also a seat *e* which forms the inlet portion or mouth of an annular nozzle, the walls of said nozzle first converging and then diverging in the direction of flow of the fluid with the point of greatest restriction or throat forming the seat for the valve. From the throat the walls of the nozzle gradually increase toward the point of discharge to form
35 a diffuser *V* and are so proportioned as to convert velocity of the fluid into pressure. If special rings are provided to form the valve seat they must be so arranged as to be without influence on the annular nozzle shaped
40 passage. In other words, they must offer no opposition to the flow of fluid. 3 indicates the conduit admitting fluid to the valve.

Attached to the lower end of the rod *d* of the power piston by a pin *f* are two slotted
45 links *g* and *h*. Extending through these

links is a pin *r*, the later being carried by a lever *p* which is pivoted at *q* to the frame 2 that rises above the valve casing and forms a part thereof. On the upper end of the valve spindle is a cross-head *m* having trunnion pins *w* which fit into holes formed in the outer pair of links *n* and *o*. Extending through the upper ends of these links is a pin *l* which is carried by the lever *i* which is pivoted at *k* to the frame. It will thus be seen that the rod of the power piston is connected to the lower lever *p* and the spindle *b* of the valve to the upper lever *i*. The levers as will be seen are in overlapping arrangement with the pivots therefor displaced laterally from the vertical axis of the motor and the valve.

In order to obtain the maximum power for starting the valve from its seat, that is to say when the difference of pressure on the valve is at its maximum, at least one of these levers *i* or *p* is preferably curved on its sliding or working face to form a cam. In the embodiment shown both of the levers are so curved, the upper one being convex on its lower or working side to form a cam and the lower one concave on its upper or working side to form a cam, said cams moving or rolling one on the other. As the piston *c* moves upwardly to open the valve the lever *p* moves upwardly about its pivot *q* and in so doing engages the outer or free end of the lever *i*, and because the meeting point or region of contact of the two levers is at one side of the vertical axis of the valve spindle the leverage or lifting force is increased. That is to say, the point of contact as regards lever *p* is considerably nearer its pivot than the point of application of the power. On the other hand, the point of application of power to the lever *i* is a considerable distance from the pin *l*, which is the member that applies the lifting force to the valve. As the valve and piston move upwardly the levers roll or move one on the other and the point or region of contact between the two will gradually move toward the axis of the spindle and by so doing decrease the effective lifting force on the valve and at the same time increase the speed of the valve lift. By vary-

ing the lengths of the levers, the point or region of initial contact and their curvature, a greater or lesser initial lifting force and rate of movement may be obtained.

5 The cylinder for the lifting piston is located at the upper end of the frame 2 and is provided with a suitable head, the latter having a chamber x to which oil or other motive fluid under pressure is admitted by the pipe
10 y , the exhaust taking place through pipe z . The piston has a tubular extension having suitable ports u communicating with the chamber x . Inside of the extension and arranged to move longitudinally is a pilot
15 valve s having ports t which control the passage of fluid from the pipe y to the cylinder and to the exhaust pipe z . The pilot valve may be actuated by any suitable means, as for example, by a speed governor which
20 moves in response to changes of load in the machine receiving fluid from the valve.

In a regulating valve intended as in the present case for high pressure, say of the order of 500 pounds per square inch, when
25 the valve is on its seat it is subject to the full difference of pressure. A small opening of the valve suffices to permit a large amount of fluid to flow through the discharge conduit, an amount which might easily be in excess of
30 the requirements. As the valve moves away from its seat the amount of fluid which is permitted to flow does not greatly vary with considerable movements of the valve and the load on the actuating mechanism decreases
35 because the fluid pressure becomes more nearly balanced. It is on account of the foregoing that means must be provided to closely and accurately control the movements of the valve, especially when it is just leaving its
40 seat and when the demand for fluid by the receiving apparatus is small. This accurate control is obtained by the use of the overlapping levers p and i , which on account of their relation provide a very great lifting
45 force just when the pressure difference on the valve is the greatest, and which as the valve moves away from its seat decrease the leverage exerted on the stem and at the same time cause a somewhat more rapid rate
50 of movement of the valve for a given movement of the piston. This latter is due to the fact that the point or region of contact of the two levers moves inward toward the axis of the stem and the lift becomes more and
55 more direct.

What I claim as new and desire to secure by Letters Patent of the United States is:—

1. In a regulating valve, the combination
60 of a valve, a casing therefor which has a fluid containing chamber and a seat for the valve, a fluid actuated motor mounted on top of the casing and in axial alignment with the valve for actuating it, a pair of overlapping levers, each of which is pivotally supported at its
65 outer end on the valve casing at a point out-

side of the fluid containing chamber, means pivotally connecting one of said levers to the motor, means pivotally connecting the other lever to the valve, said levers moving one on the other to change the effective leverage exerted by the motor on the valve as the latter is moved from its seat, and a pilot valve for controlling the motor.

2. In a regulating valve, the combination of a valve, a casing therefor which has a seat for the valve, a fluid actuated motor, a pair of overlapping levers which are pivoted at their outer ends to the valve casing, a link which connects one of the levers to the motor, a second link which connects the other lever to the valve, said levers being in contact with each other at all times and moving one on the other, the region of contact changing with changes in position of the valve to vary the leverage, and a pilot valve for controlling the motor.

3. In a regulating valve, the combination of a valve and its spindle, a casing therefor which has a seat for the valve, a fluid actuated motor having a piston and rod, said motor being in axial alignment with the valve, a pair of overlapping and engaging levers, pivots for the levers which are supported by the casing and are displaced laterally from the axis of the valve, link means connecting one of the levers to the piston rod and the other to the valve spindle, said link means causing the levers to move one on the other to change the effective leverage as the valve is moved with respect to its seat, and a pilot valve which controls the motor.

4. In a regulating valve, the combination of a valve, a casing therefor which has a fluid containing chamber and a seat for the valve, a fluid actuated motor comprising a cylinder, a piston movable therein, a stem for the piston, a pair of engaging levers each of which is supported at one end by the valve casing at a point outside of the fluid containing chamber, one of said levers being pivotally connected to and positively moved by the stem and the other being pivotally connected to the valve and positively moved by the motor, and a means for controlling the supply of fluid to the cylinder.

In witness whereof, I have hereunto set my hand this nineteenth day of July, 1929.

WALTER KIESER.