R. F. HALLIWELL.

VALVE OPERATING MECHANISM.

APPLICATION FILED MAY 17, 1919.

1,410,294. Patented Mar. 21, 1922.

Fig. 1.

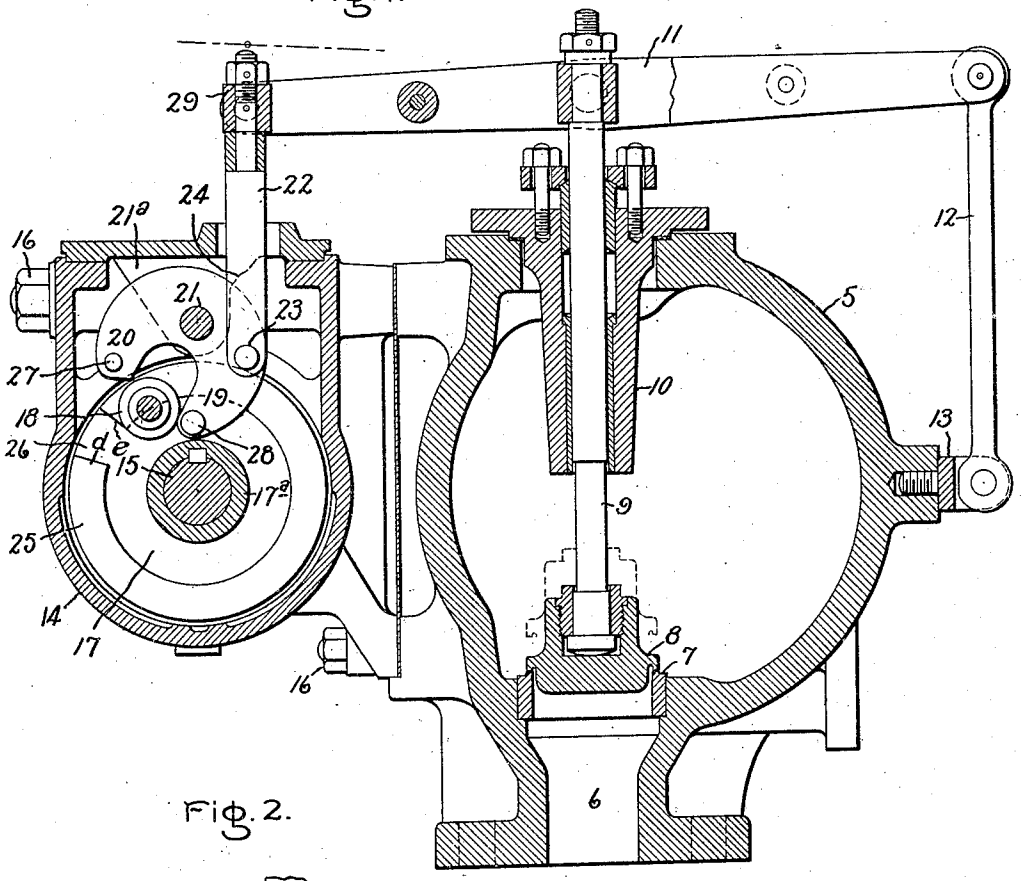


Fig. 2.

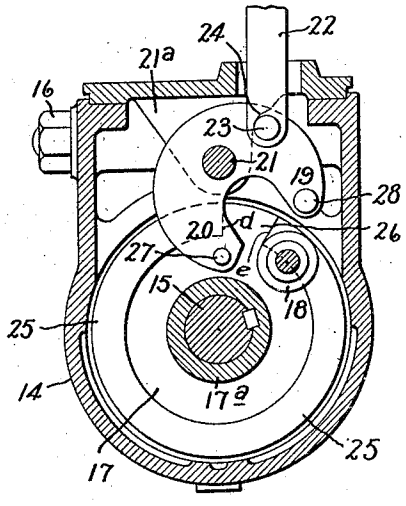
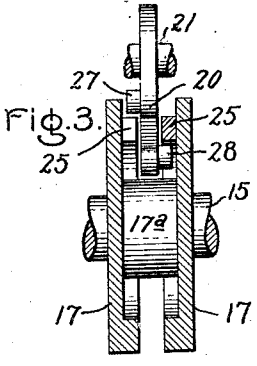


Fig. 3.



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UNITED STATES PATENT OFFICE.

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VALVE-OPERATING MECHANISM.

1,410,294. Specification of Letters Patent. Patented Mar. 21, 1922.

Application filed May 17, 1919. Serial No. 297,769.

To all whom it may concern:

Be it known that I, REGINALD FRANCIS HALLIWELL, a subject of the King of Great Britain, residing at Rugby, county of Warwickshire, England, have invented certain new and useful Improvements in Valve-Operating Mechanism, of which the following is a specification.

The present invention relates to valve operating mechanisms such as are used, for example, to control the flow of elastic fluid to turbines, and has for its object to provide an improved construction and arrangement in a mechanism of this character.

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.

In the drawing, Fig. 1 is a transverse sectional view of an embodiment of my invention, Fig. 2 is a sectional view showing certain parts in a position different from that shown in Fig. 1, and Fig. 3 is a detail, sectional view of certain parts.

The invention is particularly applicable to a valve mechanism wherein the flow of elastic fluid to a turbine is controlled by a series of valves which are opened one after another to admit elastic fluid, and are closed one after another to cut off the supply of elastic fluid, such valve mechanisms being well known.

Referring to the drawing, 5 indicates an elastic fluid valve chest to which elastic fluid is admitted from a suitable source of supply. Chest 5 may be comparatively long and the fluid may be admitted at one end. Leading from chest 5 are one or more passages 6, each having a valve seat 7 upon which seats a valve 8. Each passage 6 communicates with nozzles of the turbine when the valve mechanism is used in connection with a turbine.

The stem 9 of valve 8 extends through a stuffing box 10, and at its upper end is connected to the central portion of a lever 11. One end of lever 11 is fulcrumed on the upper end of a link 12, the lower end of link 12 being pivoted to a member 13 carried on the side of valve chest 5. Connected to valve chest 5 and extending along the side of the same is a casing 14 in which is pivoted a shaft 15. Casing 14 may be connected to the valve chest 5 by suitable bolts 16. On shaft 15 is a double flanged disc 17 comprising two flanges spaced by a hub 17^a which is keyed to the shaft. Between the two flanges of disc 17 is a roller 18 which when the disc is turned engages the arms 19 and 20 of a horseshoe or U shaped rocker which is pivoted at 21 to a bracket 21^a carried by a cover of casing 14 above each disc. The rocker comprising arms 19 and 20 is pivoted to bracket 21^a at about its central position and to one side of the pivot point 21 is fastened the lower end of the forked link 22 the upper end of which is suitably attached to lever 11. Link 22 is connected to the rocker by means of a pin 23 which projects beyond the sides of link 22 to form a stop which engages surface 24 of bracket 21^a to prevent the valve being lifted too far. On the inside faces of the flanges of disc 17 are projecting ridges 25 shown in Fig. 3 each ridge being a complete circle with the exception of a gap 26, this gap being placed on one side of the roller 18 on one flange and on the other side of the roller on the other flange, the gaps being arranged to permit of the passage of projecting stop pins 27 and 28 on opposite sides of the rocker arms 20 and 19. The ends of gap 26 of the left hand flange shown in Fig. 3 are indicated in Figs. 1 and 2 by the letters *d* and *e*. The stop pins 27 and 28 are of such a length that they will bear on such portion of the outer circumference of disc 17 as is occupied by ridge 25 and render it impossible for the rocker to be turned from the shut or open position of the valve except by engagement of the roller 18 between the rocker arms 19 and 20 at which time the gaps 26 are in such a position as will allow the stop pins 27 and 28 to pass. This arrangement prevents the gear being wrongly assembled and also prevents any jamming of the gear due to attempting to move the rocker while its position is not controlled by engagement of the roller 18 between the rocker arms.

When the valve is open the elastic fluid pressure will act on the area of the valve stem 9 and if great enough will tend to lift the valve still further. Displacement of the gear from this cause is prevented by stop pin 23 bearing against surface 24 after the rocker has been turned by the roller 18 as far as possible in a direction to open the valve. Should the fluid pressure be insufficient to force the stop pin 23 against the surface 24, the valve is held open by stop pin

28 bearing on outer circumference of disc 17. As it would be extremely difficult to set the gear so that the valve would be positively seated exactly at the instant of disengagement of the roller 18 from between the rocker arms, the rocker arm 20 is cut away slightly in order to permit of the roller being disengaged when the valve is a short distance off its seat. Under these circumstances, however, the difference in elastic fluid pressure above and below the valve due to throttling of the fluid is sufficient to tend to close the valve on to its seat and force the rocker arm 19 against the roller 18 whereby the valve can only seat itself when the roller is moved out of engagement with arm 19.

Link 22 is provided with a distance piece 29 at the point of attachment to lever 11 and this distance piece is made of such a length that when the valve is properly seated the rocker will be in a suitable position for the engagement of roller 18 on rotation of the disc. To render this adjustment easier, stop pin 23 is arranged to nearly touch the outer circumference of the disc when the rocker is in its correct position and when fitting the distance piece it is only necessary to make it of such a length as will result in the stop pin 23 being lifted from contact with disc 17 by a small amount to avoid rubbing and to ensure that valve is hard on its seat.

In the drawing valve 8 is shown as being closed and the operating mechanism for it is in a position to begin to open it when shaft 15 and disc 17 are turned in a clockwise direction. On the other hand, if shaft 15 and disc 17 are turned in an anti-clockwise direction, roller 18 will move away from arm 19 and valve 8 will remain closed. Assuming now that it is desired to open valve 8, shaft 15 is turned in a clockwise direction whereupon roller 18 presses against arm 19 swinging the same about pivot 21, as is obvious. This will raise link 22 and lever 11 causing the valve 8 to open. When the valve is fully opened the arrangement is such that roller 18 will pass under the end of arm 19 so that shaft 15 may continue to rotate in a clockwise direction. At this time stop pin 23 will almost have reached stop 24. As arm 19 is moved around pivot point 21 by roller 18, it will be seen that at the same time arm 20 will be moved down behind roller 18, and when the valve is fully opened it will occupy a position, as shown in Fig. 2. In this figure stop pin 23 is shown in contact with stop 24 due to difference in the pressures on the opposite ends of stem 9 holding the valve open.

Now if shaft 15 and disc 17 are moved in a counter clockwise direction from the Fig. 2 position, roller 18 will move under the end of arm 19 and engage arm 20, and as the movements continue it will turn the rocker in a direction to pull down on link 22 and force valve 8 to closed position. It will thus be seen that with the arrangement shown the valve is positively actuated in both directions.

In the case of an elastic fluid turbine where there is a number of valves 8, it will be understood that there will be a valve operating mechanism, as shown, for each valve, i. e., there will be a disc 17, roller 18 and horseshoe shaped member comprising arms 19 and 20. The rollers 18, however, for the respective valves will be offset angularly with respect to each other around shaft 15 so that they will come into play one after another to open and close their respective valves 8. It will be understood that in each instance, after the valve is either fully opened or fully closed the arms 19 and 20 do not interfere with the continued movement of shaft 15 since roller 18 can move under such arms.

Shaft 15 may be moved by hand or it may be moved in the well understood manner by means of a servo-motor the pilot valve of which is controlled by a speed governor, or otherwise.

In accordance with the provisions of the patent statutes, I have described the principle of my invention, together with the apparatus which I now consider to represent the best embodiment thereof, but I desire to have it understood that the apparatus shown is only illustrative and that the invention can be carried out by other means.

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

1. In a valve mechanism, the combination of a valve, and operating means therefor comprising a horseshoe shaped member pivoted between its two ends, an actuator arranged to engage one arm of said member to open the valve and the other arm to close it, and means associated with the actuator for preventing movement of the valve except by the actuator.

2. In a valve mechanism, the combination of a valve, and an operating means therefor comprising a horseshoe shaped member pivoted between its two ends, a shaft, an actuator carried by the shaft and arranged to engage between the arms of said member, and means associated with the actuator for preventing movement of the valve except by the actuator.

3. In a valve mechanism, the combination of a chest, a valve therein, a lever to which the valve is connected, and means for moving the lever comprising a horseshoe shaped member pivoted between its two arms, a link connected at one end to said lever and at its other end to said member at one side of its pivot point, a shaft, and an actuator carried by the shaft and adapted to engage between the arms of said horseshoe shaped

member when the shaft is turned to open and close the valve.

4. In a valve mechanism, the combination of a valve, and an operating means therefor comprising a horseshoe shaped member pivoted between its two ends, a shaft, an actuator carried by the shaft and arranged to engage between the arms of said member to open and close the valve, the arrangement being such that when the valve is fully open or fully closed said actuator may move past the ends of said arms, and means for locking the valve in open and closed positions when the actuator moves past the ends of said arms.

5. In a valve mechanism, the combination of a chest, a valve therein, a lever to which the valve is connected, and means for moving the lever comprising a horseshoe shaped member pivoted between its two arms, a link connected at one end to said lever and at its other end to said member at one side of its pivot point, a shaft, and an actuator carried by the shaft and adapted to engage between the arms of said horseshoe shaped member when the shaft is turned to open and close the valve, the arrangement being such that when the valve is fully open or fully closed said actuator may move past the ends of said arms.

6. In a valve mechanism, the combination of a valve, and an operating means therefor comprising a horseshoe shaped member pivoted between its two ends, a shaft, an actuator carried by the shaft and arranged to engage between the arms of said member to open and close the valve, the arrangement being such that when the valve is fully open or fully closed said actuator may move past the ends of said arms, stops for limiting the movements of said operating means, and means for locking the valve in open and closed positions when the actuator moves past the ends of said arms.

7. In a valve mechanism, the combination of a chest, a valve therein, a lever to which the valve is connected, and means for moving the lever comprising a horseshoe shaped member pivoted between its two arms, a link connected at one end of said lever and at its other end to said member at one side of its pivot point, a shaft, a disc on the shaft, a projection on the disc which engages between the arms of said horseshoe shaped member to open and close the valve, and a stop pin on said horseshoe shaped member which rides along the periphery of said disc.

8. In a valve mechanism, the combination of a chest, a valve therein, a lever to which the valve is connected and means for moving the lever comprising a horseshoe shaped member pivoted between its two arms, a link connected at one end to said lever and at its other end to said member at one side of its pivot point, a shaft, a disc on the shaft, a projection on the disc which engages between the arms of said horseshoe shaped member to open and close the valve, a stop pin on said horseshoe shaped member which rides along the periphery of said disc when the valve is closed, and a fixed stop which the stop pin engages when the valve is fully open.

9. In a valve mechanism, the combination of a valve, a horseshoe shaped member pivoted between its two ends and connected to the valve to open and close it when the said member is turned on its pivot, a shaft, a double flanged disc carried by the shaft, a roller pivoted between the flanges of the disc and arranged to engage between the arms of said member to open and close the valve, and pins carried by said arms which ride along the periphery of said flanged disc to hold the valve in open or closed position when the roller moves beyond the ends of said member.

In witness whereof, I have hereunto set my hand this twelfth day of March, 1919.

REGINALD FRANCIS HALLIWELL.

Witnesses:
JOHN HALFRED,
DOROTHY WHITE.