F. HENNEBÖHLE.

GOVERNOR ACTUATED FLUID CONTROLLER.

APPLICATION FILED AUG. 16, 1915.

1,237,335. Patented Aug. 21, 1917.

Fig. 3.

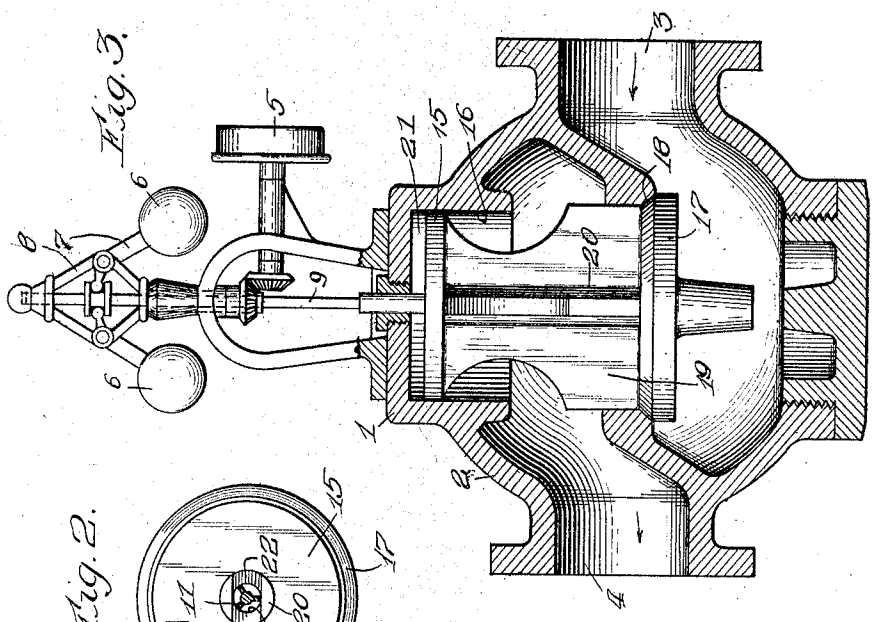
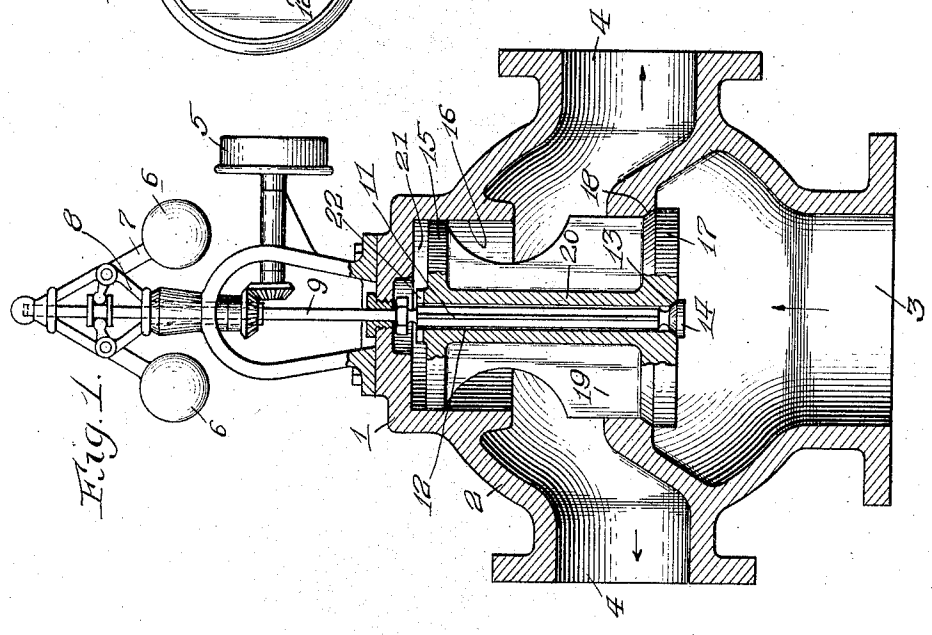


Fig. 2.

Fig. 1.



Witness:
C. L. Farrington

Inventor:
Frank Henneböhle
By Albert Scheible, Atty.

UNITED STATES PATENT OFFICE.

FRANK HENNEBÖHLE, OF CHICAGO, ILLINOIS.

GOVERNOR-ACTUATED FLUID-CONTROLLER.

1,237,335. Specification of Letters Patent. **Patented Aug. 21, 1917.**

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To all whom it may concern:

Be it known that I, FRANK HENNEBÖHLE, citizen of the United States, residing at Chicago, in the county of Cook, State of Illinois, have invented certain new and useful Improvements in Governor-Actuated Fluid-Controllers; 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.

My invention relates to means for controlling the supply of fluid used in connection with a rotating appliance, its general object being to provide means for making the supply of fluid responsive to the speed of rotation, or lack of rotation, of the appliance with which my invention is used. A further object is to provide means for reducing the power required for effecting the desired control of the fluid supply, thereby enabling a quite sensitive governor to control the fluid even when the latter is being supplied under a considerable pressure.

In its general aspects, the controller of my invention may be used for a variety of purposes, of which I shall mention only two as illustrative of its applications. Thus, in the manufacture of confectionery the materials are often heated in revolving drums, the heating being effected by gas jets lighted by suitable pilot means. These drums have to be stopped occasionally for replenishing, or removing, or examining their contents, and at every stop the gas must be turned low (or turned off entirely except for the pilot flames), otherwise the material at one side of the stationary drums may easily be overheated and spoiled. Then when the drums are again set in motion, considerable time is often lost while the gas is again being turned on, which would not be the case if the supply of gas were automatically subject to the speed of rotation of the drums as contemplated by my invention.

So also, in grinding pulp for the manufacture of paper or the like, the pulp is commonly forced against the stone by a piston operated by hydraulic pressure and the effectiveness of the grinding depends considerably upon the maintaining of a proper speed of rotation for the stones. However, this speed is easily checked by an excess of pressure between the piston and the stone, hence the desirability of a controller for the hydraulic pressure which will make the latter subject to the speed of rotation of the stone and which will reduce the pressure whenever the latter is sufficient to retard the rotation beyond a predetermined point. In attempting to control such a supply of fluid, the pressure of the latter (which commonly ranges between 100 and 500 pounds to the square inch) would make it out of the question for a sensitive governor to control the fluid unassisted. My invention therefore aims to utilize some of this pressure for approximately balancing the control valve, thereby permitting the desired sensitiveness of control.

Besides aiming to provide controllers adapted for such widely varied uses, my invention also aims to provide a controller having very few parts, one requiring little or no adjustment, and one capable of withstanding long continued use without appreciable deterioration. Further objects will appear from the following specification and from the accompanying drawings, in which Figure 1 is a view, partly in section, of a controller embodying my invention and suitable for controlling fluid supply at high pressures.

Fig. 2 is a plan view of the movable valve member of the embodiment of Fig. 1.

Fig. 3 is a view, partially in section, of a low pressure fluid controller embodying a simplified form of my invention.

In the embodiment of Fig. 1, my invention includes an approximately balanced valve having a movable valve member slidable within a body 2, which body or pipe fitting has an inlet 3 for the supply of fluid and a plurality of outlets 4, the latter being suitably connected to the pistons associated with the grinding stones. The mechanism rotating the stones is suitably connected with the pulley 5 of a centrifugal governor of any desired type, as for example one having a pair of balls 6 carried by arms 7 connected through links 8 to a non-rotatable, sliding shaft 9. Connected to this shaft is a stem 11 extending vertically through the movable valve member and equipped at its lower end with a frusto-conical head, or auxiliary valve 14, fitting a tapering seat 13 in the lower end of the said valve member. The stem 11 is preferably considerably smaller in section than the vertical bore 12 of the said valve member, thus affording passages through which fluid may pass from the lower to the upper end of the valve mem-

ber when the head 14 is moved off the seat 13. The valve member has at its upper end a cylindrical head 15 slidably fitting a bore 16 in the body member 2, and has at its lower end a head 17 ground to fit a tapering seat 18 at the upper end of the inlet 3, these heads being preferably connected by webs 19 radiating from the central tube 20 which houses the said bore 12.

When the grinding stone or other appliance rotationally connected to the pulley 5 is standing still, the weight of the governor balls 6 acting through the arms 7 and shaft 9 raises the latter and hence presses the head 14 of the stem 11 tightly against the seat 13, thereby preventing fluid from entering the chamber 21 above the upper head 16 of the movable valve member. Consequently, the pressure of fluid entering the inlet 3 is free to force the valve member upward against the seat 18, thus effectively shutting off the supply of pressure-exerting fluid to the pistons. However, as soon as the stone rotates sufficiently rapidly so that the centrifugal force of the balls 6 carried by the shaft 9 overcomes the weight of these balls, this shaft and the auxiliary valve 14 will be lowered, thereby admitting fluid through the passages alongside the stem 11 and through grooves 22 upon the head 15 to the said space 21, where the fluid may act in a downward direction upon the movable valve member. By suitably proportioning the diameter of the seat 18 with respect to that of the head 15, I can readily cause the upward pressure of the fluid under the head 17 to exceed the said downward pressure only by an amount sufficient to sustain the weight of the movable valve member, so that the governor will only be called upon to move the shaft 9 and will not be obliged to lift the valve member 1. By varying the relative sizes of the upper and lower heads, the valve portion of my appliance may be designed to match different fluid pressures and different weights of the movable member, and when so proportioned will need no adjusting whatever for continuous and effective operation.

Where the appliance of my invention is to be used with low pressure fluids, such as the supply of gas for heating a rotating drum, the movable valve member may be built comparatively light and may be connected direct to the sliding shaft of the governor (as in Fig. 3) as no auxiliary pressure will be needed for moving such a relatively light valve against a comparatively nominal fluid pressure. In this case, the inlet 3 will be disconnected from the outlet 4 by the valve when the governor is at rest, thus leaving only the usual pilot flames burning under the rotatable drum. When the latter is rotated, the governor will open the valve, thereby supplying gas for heating the drum, but automatically shutting off this supply when the rotation ceases. Thus the control of the gas will be instantaneously proportioned to the speed of rotation of the drum and there will be no danger of overheating the contents of the drum while the latter is rotating at less than its normal speed or is standing still. This prompt action is particularly desirable in case the machinery is stopped or otherwise hampered by accidents, in which cases my appliance affords a positive safeguard for avoiding an overheating or burning of the heated material or even a possible explosion.

While I have described two applications of my governor-actuated controlling device, it will be obvious that the same might be adapted to a great many other uses. It will also be obvious that the operation is not dependent upon the particular details of construction herein shown (such as the use of a weighted arm type of governor), since the construction might be varied in many ways without departing from the spirit of my invention.

I claim as my invention:

1. The combination with a supply of fluid under pressure, of a machine driven by means other than said fluid, and a speed regulator for said machine comprising a hollow body member having portions of its interior connected respectively to the said machine and said fluid supply, a partition in said member equipped with a perforation separating said portions, said member also having a substantially cylindrical bore in axial alinement with said perforation, a valve member equipped at one end for slidably fitting said bore, said valve member extending through the perforation and equipped at its other end with a head adapted to seat on the partition, one of the aforesaid elements being equipped with a passage connecting the portions of the interior of the body member at opposite ends of the valve member, and means responsive to the speed of the said machine for controlling the said passage.

2. The combination with a pipe fitting for transmitting fluid under pressure, of a machine driven by means other than said fluid, and a speed regulator for said machine comprising a valve member disposed within said fitting and having a head continuously subject to the pressure of the fluid and an oppositely disposed smaller head, the said member having a passage admitting fluid opposed to said smaller head, a pilot valve movably mounted on said member and controlling said passage, and a governor responsive to the speed of said machine and connected to the pilot valve for moving the latter with respect to the valve member to admit fluid under pressure for operation against the said smaller head, the latter

pressure co-operating with the weight of the valve member to balance the pressure of the fluid on the first named head.

3. A controller for a machine braked by fluid under pressure and inversely responsive in speed to the pressure of fluid supplied to the machine, comprising a vertically movable valve member arranged for throttling the supply of fluid and having an upper head and a relatively larger lower head, means for continuously supplying fluid at its maximum pressure to the larger head, a governor responsive to the speed of the machine, and means carried by the valve member and disposed in the main supply path of the said fluid and controlled by the governor for admitting said fluid opposite to the smaller head, the pressure of the fluid on the smaller head coacting with the weight of the valve member to move the latter against the pressure of fluid upon the larger head, thereby varying the extent of the said throttling of the fluid supplied for braking the said machine.

FRANK HENNEBÖHLE.