No. 703,410. Patented July 1, 1902.

J. HARTNESS.

FLUID REGULATING DEVICE.

(Application filed Jan. 21, 1901.)

(No Model.)

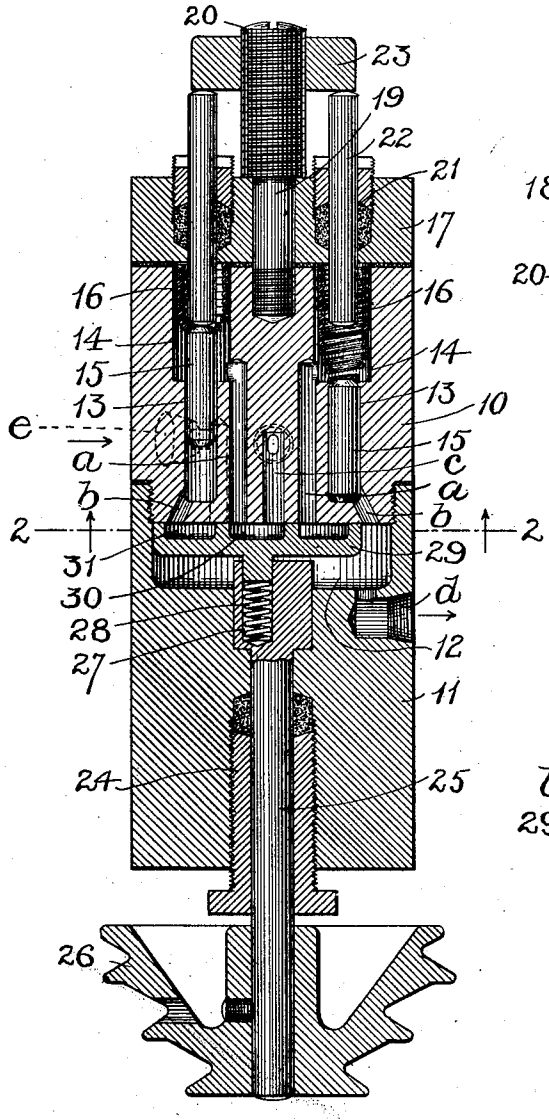

Fig. 1.

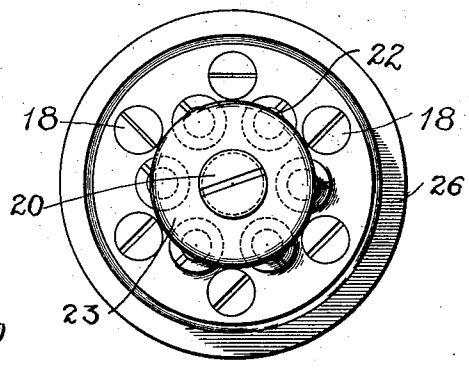

Fig. 3.

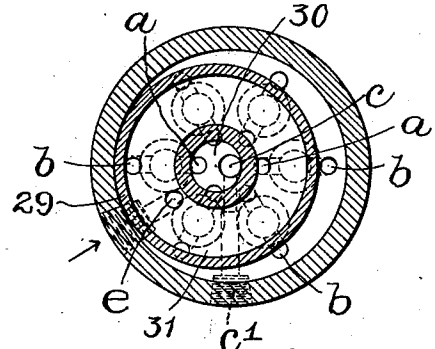

Fig. 2.

WITNESSES.

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JAMES HARTNESS, OF SPRINGFIELD, VERMONT.

FLUID-REGULATING DEVICE.

SPECIFICATION forming part of Letters Patent No. 703,410, dated July 1, 1902.

Application filed January 21, 1901. Serial No. 44,073. (No model.)

To all whom it may concern:

Be it known that I, JAMES HARTNESS, of Springfield, in the county of Windsor and State of Vermont, have invented certain new and useful Improvements in Fluid-Regulating Devices, of which the following is a specification.

This invention has relation to fluid-regulating devices, and has for its object to provide certain improvements therein to adapt them for use in connection with fluid-operated mechanisms, such as turret-lathes and the like.

It is the purpose of the invention to provide a device of the character referred to, in which the passage of fluid therethrough may be accurately governed, so as to insure an even movement of the driven part in the said fluid-operated mechanism.

According to the present invention in its simplest form it comprises an expanding chamber adapted to receive fluid and a spring bearing against the wall of said chamber to force the fluid out of the latter. I have shown an expanding chamber as comprising a cylinder and piston with the spring bearing against the piston; but it is obvious that the pressure of the spring may be augmented in other ways, as by conducting fluid under pressure against the outer end of the piston, as illustrated.

Referring to the drawings, Figure 1 represents a longitudinal section through a regulator embodying the invention. Fig. 2 represents a section on the line 2 2 of Fig. 1. Fig. 3 represents an end view of the same.

The casing consists of two parts 10 and 11, having screw connection, with an exhaust-chamber 12 between them. The section 10 of the casing is provided with a plurality (six, as shown) of expanding cylinders or chambers, each reduced at one end, as at 13, and expanded at the other end, as at 14. Leading from the two ends of each chamber are two ducts *a* and *b*, respectively, the mouths of the ducts *a* and *b* being arranged in two concentric circles, as shown in Fig. 2. In each compartment there is placed a movable member or loose piston 15, against which bears a compression-spring 16 in the end 14 of the chamber. The outer ends of the compartments are closed by a head 17, secured in place by screws 18 and by a central screw 19, which is threaded at 20. Through stuffing-boxes 21 are passed adjustable pins 22, which limit the outward movement of pistons 15, there being as many pins as there are pistons. The said pins are adjusted by a nut 23, screwed adjustably upon the screw 20 and pressing against the ends of said pins 22. In the center of the section 10 there is a duct *c*, which communicates with a waste-aperture *c'*.

d indicates the exhaust-aperture, communicating with the exhaust-chamber 12, over which the liquid is forced, and *e* indicates the inlet-duct, arranged, as shown in Fig. 2, with its mouth at a little distance from the center of section 10. Through section 11 of the casing and through suitable stuffing-box 24 is a shaft 25, having its axis concentric with the circle in which the mouths of ducts *a* and *b* are arranged. On the end of this shaft there is a cone-pulley 26, by which it is rotated, the head 27 being formed on the inner end of said shaft and provided with a socket to receive a spring 28 and the stem of the circular valve 29. This valve bears against the inner end of section 10 of the casing, and it is provided with two concentric chambers 30 31, respectively. Said valve travels in a curved path when the shaft 25 rotates, its chambers being so arranged that fluid is permitted to flow through ducts *b* into the smaller ends 13 of the cylinders and at the same time to permit the liquid which is in the larger end of said cylinder to flow out through the waste-pipe *c'* and then to permit the liquid to flow into the larger end 14 of each cylinder to force the piston downward or inward, with the result that the liquid in the smaller end of said piston is forced out through the exhaust-pipe 12 into the exhaust-chamber *b*.

It will be observed that when the parts are in the position shown in Fig. 1, taken in connection with Fig. 2, liquid is always admitted to the outer chamber 31 of the valve and that when said chamber registers with any one of the ducts *b* liquid may flow through said duct into the smaller end of the piston. The chamber 30 in said valve always registers with the waste-duct *c* and registers successively with ducts *a* to permit the waste fluid to pass out through the waste-pipe.

The valve in its revolution alternately opens

communication between each duct *b* and the inlet-chamber and the exhaust-chamber 12, respectively, the parts being so arranged with relation to each other that when the duct *b* communicates with the chamber 12 the corresponding duct *a* communicates with the inlet-aperture and also that when the duct *b* is permitted to communicate with the inlet-aperture the duct *a* communicates with the waste-pipe *c*. Thus the valve acts very much as the ordinary reciprocating valve in a pump to permit fluid to pass into the lower end of the cylinder from an inlet and to pass out therefrom into the exhaust pipe.

The size and stroke of the piston and the frequency of movement of the valve control the amount of fluid which is passing through the regulator, so that I can accurately determine and regulate the flow of the fluid.

By employing the springs to coöperate with the incoming fluid in forcing out the fluid from the piston m^{13} I am enabled to augment the pressure of the fluid in the exhaust-chamber 12, as will be readily understood, this being an important feature of the invention.

Another advantage which I secure in the employment of the spring is that I prevent the hammering of the liquid in propelling a turret or other part of a fluid-operated lathe, so that the pressure is yielding and continuous, as well as automatic.

It is not to be taken from this detailed description that I limit myself to the particular details described and illustrated, as I may employ all known mechanical equivalents therefor.

Having thus explained the nature of the invention and described a way of constructing and using the same, although without attempting to set forth all of the forms in which it may be made or all of the modes of its use, I declare that what I claim is—

1. A fluid regulating or measuring device comprising an expanding chamber having a loose movable element, valve mechanism exterior to said chamber and independent of said movable element, for permitting the ingress and egress of liquid under pressure into and from the chamber, on both sides of the movable element, and a spring bearing against said movable element to eject the liquid under pressure.

2. A fluid regulating or measuring device comprising a chamber, a loose liquid-measuring member moved in one direction by fluid, a spring for moving said member in the other direction, and valve mechanism independent of said member, said parts being combined whereby fluid is measured and discharged under a continuous yielding pressure.

3. A fluid regulating or measuring device comprising a cylinder having a loose piston, valve mechanism operable independently of said piston for conveying fluid alternately to and from said cylinder on both sides of said piston, a spring bearing against said piston for ejecting the fluid from said cylinder and a separate exhaust for the fluid on the spring side of the cylinder.

4. A fluid regulating or measuring device comprising an expanding chamber having a movable element, valve mechanism independent of said element for admitting fluid alternately to the opposite sides of said element, mechanical means for augmenting the pressure against one side of said element to increase the pressure of the fluid discharged from the other side of said element, and separate exhaust-ducts for the fluid from the opposite sides of said element.

5. A fluid regulating or measuring device comprising a cylinder having a loose piston, valve mechanism operable independently of said piston for conveying fluid alternately to and from said cylinder on both sides of said loose piston, a spring bearing against said piston for ejecting the fluid from said cylinder, and adjustable non-yielding means for checking the movement of said piston at any point in its travel.

6. A fluid regulating or measuring device comprising a casing having a plurality of cylinders with loose independent pistons therein, ducts leading to the opposite ends of said cylinders, a common fluid-inlet, fluid-outlets, and a single valve mechanism operable independently of said pistons for supplying fluid to and exhausting it from said ducts in succession.

7. A fluid regulating or measuring device comprising a casing having a plurality of cylinders with loose independent pistons therein, ducts leading to the opposite ends of said cylinders, a common fluid-inlet, outlets, and a valve mechanism operable independently of said pistons for alternately supplying fluid to and exhausting it from said ducts in succession.

8. A fluid regulating or measuring device comprising a casing having a plurality of cylinders with loose pistons therein, ducts leading to the opposite ends of said cylinders, a common fluid-outlet, a common waste-outlet, and a valve mechanism governing the passage of fluid through said outlets.

9. A fluid regulating or measuring device comprising a casing having a plurality of cylinders with loose independent pistons therein, a single valve operable independently of said pistons for permitting the ingress and egress of fluid to and from the cylinders on both sides of the loose pistons, pins projecting through the ends of said cylinders to limit the play of the pistons, and an adjustable member having a threaded connection with the casing for adjusting said pins simultaneously.

10. A fluid regulating or measuring device comprising a casing having a plurality of cylinders with loose independent pistons therein, a single valve operable independently of said pistons for permitting the ingress and egress

of fluid to and from the cylinders on both sides of the loose pistons, pins projecting through the ends of said cylinders to limit the play of the pistons, a threaded stud on the casing and a nut on said stud and adjustable relatively thereto, for adjusting said pins simultaneously.

In testimony whereof I have affixed my signature in presence of two witnesses.

JAMES HARTNESS.

Witnesses:
W. LE ROY BRYANT,
HORACE BROWN.