J. ERWOOD.

RELIEF VALVE.

APPLICATION FILED OCT. 7, 1907.

901,084. Patented Oct. 13, 1908.

Fig. 1.

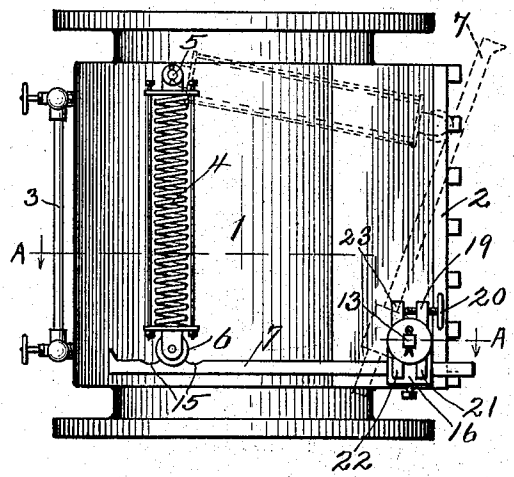


Fig. 2.

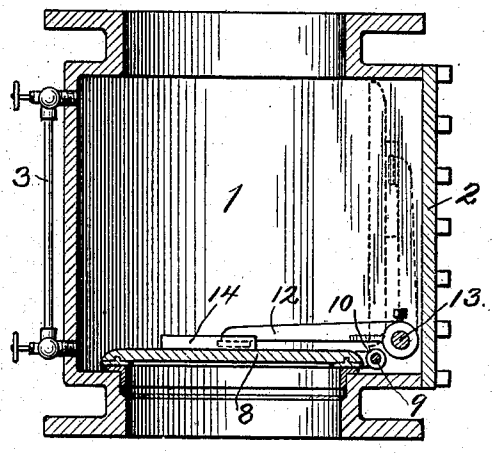


Fig. 3.

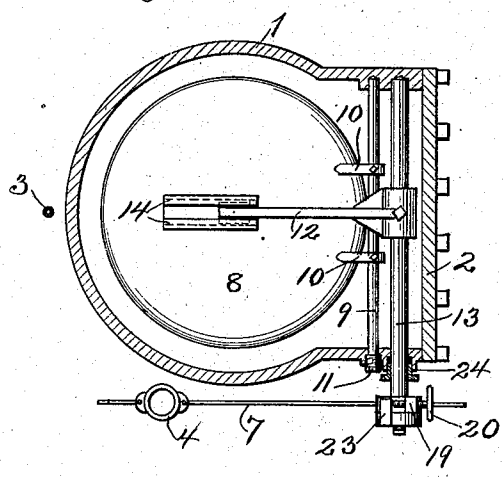


Fig. 4.

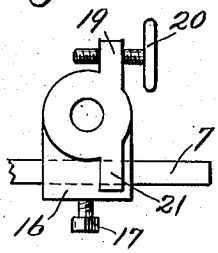


Fig. 5

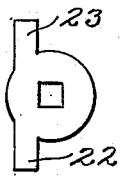
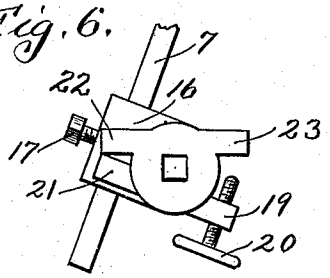


Fig. 6.



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RELIEF-VALVE.

No. 901,084. Specification of Letters Patent. Patented Oct. 13, 1908.

Application filed October 7, 1907. Serial No. 396,235.

To all whom it may concern:

Be it known that I, JOHN ERWOOD, of Chicago, in the State of Illinois, have invented certain new and useful Improvements in Relief-Valves, of which the following is a specification.

This invention relates to that class of valves known as relief valves, wherein the valve is kept closed by means of a weighted lever, permitting the surplus of a desired fixed pressure to escape by means of overcoming the gravity of the weight and raising the valve off of its seat. The resistance of the weight, however, is unmoved, and offers a fixed resistance to the current of steam, regardless of volume or lift of the valve.

The object of my invention is to enable those skilled in the art to build a valve in such a way that, after it has been adjusted to open a desired distance against a fixed resistance, the valve will automatically disengage itself from the fixed resistance, and will freely swing back out of the passage way of the onrushing volume, and present an unrestricted passage of the full area of the pipe on which it is fitted. I have accomplished this result by means outlined in the accompanying drawings, in which

Figure 1 is a side elevation showing the valve body and bonnet. Fig. 2 is a sectional elevation through the center of the body, and Fig. 3 is a sectional plan of Fig. 1 through line A—A, Figs. 4, 5 and 6 are enlarged details of the adjustable collars used for controlling the range of compression of spring 4 Figs. 1 and 3, similar figures representing similar objects.

In the drawings, 1 is a valve body, recessed on one side to permit of the valve being swung back and the placing of the operating shafts therein, and fitted with a bonnet (2).

3 is a gage glass for observing the volume of water in the body when flooded, approximately to the height of the dotted line through Figs. 1 and 2.

(4) is a spiral compression spring fitted in a swinging cage and suspended on a fixed stud (5), screwed into the body.

6 is a grooved wheel secured to the bottom spring piece and tracking on spring lever (7). The valve disk (8) is hinged to a trunnion shaft (9), by means of two lugs (10), cast thereon and pinned loosely to shaft (9), the body of the valve being bored to receive it, and the shaft held in position by means of plug (11). Pressure is applied to the back of the valve disk by means of pressure lever (12), which is fixed on pressure shaft (13), which is set in a bored boss on the inside of the body at one side and passes out through the stuffing box on the opposite side, on which is fixed the adjusting mechanism shown in the larger detail of Fig. 6, to be described further on.

In order that the pressure lever (12) will pick up the valve disk when the spring lever is raised by hand, I have cast thereon a square bearing foot to travel between two overhanging guide strips (14) cast on the back of the valve disk, the operation of which is shown in the dotted outline of Fig. 2, wherein the point at which the pressure lever bears on the back of the disk changes with its lift, as the pressure opens the valve and increases the resistance on the back of the disk by throwing the force of the spring out of the center to one side, and so bringing a pressure on shaft (9) to counteract the change in the leverage of the spring, as for example, if ten pounds be exerted on the center of the back of the disk by lever (12), shaft (9) is neutral and acts simply as a hinge, and a pressure of ten pounds will open the valve. If the ten pounds is applied to the edge of the disk, its effect will be to double its resistance against opening and shaft (9) is called upon to resist a lift of that side of the disk equal to the weight on the opposite side. I require this condition to overcome or counterpoise the weakening of the spring effect in forming a toggle, as the spring lever rises and tends to increase the angle between the spring lever and spring, and the spring becomes less effective. This example is purposely overdrawn to make clear my design of a traveling center on the disk and one of the needs of two shafts.

I have shown on spring lever (7) several small recesses (15) one of which grooved wheel (6) is supposed to be engaging and the object of these recesses or indents becomes evident when I describe the action of the valve as follows: The pressure of steam or air on the underside of the disk tends to raise it and permit of escape through the body. This is governed by the pressure of the spring, which, upon yielding to the tendency of the valve disk to rise, permits of the

lever (7) changing from a horizontal plane to the perpendicular line of the spring, to an incline, and, in consequence, the grooved wheel (6) tends to run down and off. Were it not for the recesses this tendency would be immediate (plus the static friction in the several parts) upon the increase in angle. The drawings show the angle between the perpendicular line of the spring to the plane of the lever to be 90 deg., and by placing the grooved wheel in either of the recesses (15) this angularity is either augmented or diminished, and the point at which the grooved wheel (6) will slip or roll off, and thus relieve the lever of resistance, is changed accordingly. After the spring and frame is released by this process, the end of the spring lever will clear stud (5) and will allow the valve disk and interior mechanism to pass back into the recess of the body and present an unobstructed passage through the valve body, the spring and frame in the meantime, having been pushed, or raised, out of the way by the action of the spring lever. At such times as the valve is to be thrown out of service it can be locked back by setting the grooved wheel of the spring frame against the back edge of the spring lever as shown by the dotted lines of Fig. 1. This enables the valve to be placed in any position, when it is not necessary to flood the body with water, as referred to previously, and lock it, open or closed.

I have previously referred to the adjusting mechanism on the outer end of the shaft (13), and I now proceed to detail its functions, of which there are two. The first is that of enabling the spring lever to travel through a greater period of a circle than the interior mechanism; the second is that of enabling the spring end of the spring lever to be elevated or depressed at will, in order to increase or decrease the pressure of the spring upon it, both of these functions are adjustable. To accomplish this, I employ two collars, as shown by large detail Figs. 4, 5 and 6. Fig. 4, is rotary on the shaft (13) and Fig. 5, is fast thereon. It will be noticed that Fig. 4, has three lugs cast thereon, lug (16) being corded out to receive the spring lever, which is made adjustable in length and secured by set screw (17), while lugs (19 and 21) are cast on the collar at a tangent to the shaft on which it oscillates, and serves as stops in governing its movement on the shaft (13). The plan of this collar is shown in Fig. 3, and constitutes the inner one on the end of shaft (13). Fig. 5, is the companion collar and is fixed firmly to shaft (13). It also has two lugs (22 and 23) cast tangential thereon, except that they are offset over the side of the collar, and intended to intercept the path of rotation of lugs (19 and 21) on Fig. 4, and engage them. The plan of this collar is also shown in Fig. 3, and constitutes the outer collar on the end of shaft (13), the degree of movement of the loose collar being governed by the hand wheel and screw (20), as also the angle of the spring lever to the center line of the spring. The effect of these tight and loose collars is further detailed in Fig. (6), wherein the spring lever is shown carrying over the loose collar on the shaft, relieving the downward points of contact of adjusting screw (20) on lug (23), passing around and bringing lugs (21 and 22) in contact and turning shaft (13), thus operating the interior mechanism through the stuffing box (24). It will also be observed that, while the effect of the adjusting screw (20) relatively changes the position of the spring lever (7) when the valve is closed, the position of the lever when the valve is open remains the same by means of the two fixed points of contact of lugs (21 and 22).

Having thus described my invention, what I claim as new therein, and desire Letters Patent thereon, is—

1. In a valve, the combination of a suitable valve body provided with a straight passageway therethrough, a disk to close said passageway hinged to swing to one side of said passageway, and a shaft located nonconcentric to the hinge of said disk, connected to said disk to operate the same.

2. In a valve, a suitable valve body provided with a passage therethrough, a hinged disk fitted to close said passage, guides on the back of said disk, a pressure shaft mounted in said valve body, and an arm rigidly secured to said shaft having its free end arranged to slide in said guides.

3. In a valve, the combination of a suitable valve body, a hinged valve disk, a pressure shaft extending through said body with one end extending outside of the valve body, means for exerting a constant rotating pressure to the exposed end of said shaft, an arm secured to said shaft having its free end in constant engagement with said disk.

4. In a relief valve, a suitable valve body, a hinged valve disk, a shaft having one end exposed to the exterior of said valve body operatively connected to said disk, means on the exterior of said valve body comprising an adjustable spring and lever for exerting a rotating pressure to said shaft.

5. In a relief valve, a suitable valve body, a hinged disk, a shaft in said valve body having one end extending to the exterior of same operatively connected to said disk, a lever mounted on the exposed end of said shaft arranged with lost motion relative to the shaft, and a spring to exert a constant pressure on said lever whereby the said disk is held to its seat.

6. In a relief valve, a suitable valve body, a valve disk, a pressure shaft operatively connected to said disk, a lever mounted on

said pressure shaft, having lost motion relative thereto, a plurality of notches in said lever, and a roller, spring pressed into one of said notches whereby said disk is held to its seat and a partial rise of said disk will cause said roller to leave its notch.

7. In a relief valve, a suitable valve body, a hinged valve disk, a shaft in said valve body having one end extending to the exterior of same operatively connected to said disk, a lever mounted on the exposed end of said shaft having lost motion relative thereto, means for varying the extent of lost motion between said lever and said shaft, a spring to exert a constant pressure on said lever and a transparent gage communicating with the interior of the valve body.

8. In a valve, a suitable valve body provided with a straight passage therethrough, a disk fitted to close said passage hinged to swing to one side of said passage leaving a clear passage, a pressure shaft mounted in said valve body and an arm rigidly secured to said shaft having its free end slidably connected to said disk.

9. In a valve, a suitable valve body provided with a passage therethrough, a disk fitted to close said passage hinged to swing to one side of said passage leaving a clear passage, a pressure shaft extending through said valve body with one end extending outside of the same, means for exerting a constant rotating pressure to the exposed end of said shaft and an arm secured to said shaft having its free end in constant engagement with said disk.

10. In a valve, a suitable valve body provided with a straight passageway therethrough, a disk fitted to close said passageway hinged to swing to one side of said passageway leaving a clear passage, a shaft having one end exposed to the exterior of said valve body operatively connected to said disk, and means comprising an adjustable spring and lever for exerting a rotating pressure to said shaft.

11. In a valve, a suitable valve body provided with a straight passage therethrough a disk fitted to close said passage hinged to swing to one side of said passage to leave a clear passage, a shaft in said valve body having one end extending to the exterior of same operatively connected to said disk, a lever mounted on the exposed end of said shaft arranged with lost motion relative to the shaft, and a spring to exert a constant pressure on said lever whereby the said disk is held to its seat.

12. In a valve, a suitable valve body provided with a straight passage therethrough, a disk fitted to close said passage hinged to swing to one side of said passage, a pressure shaft operatively connected to said disk, a lever mounted on said pressure shaft having lost motion relative thereto, a plurality of notches in said lever, and a roller spring pressed into one of said notches whereby said disk is held in position closing said passage and a partial rise of said disk will cause said roller to leave its coöperating notch.

13. In a valve, a suitable valve body provided with a straight passage therethrough, a disk fitted to close said passage hinged to swing to one side of the passage, a shaft in said valve body having one end extending to the exterior of same operatively connected to said disk, a lever mounted on the exposed end of said shaft having lost motion relative thereto, means for varying the extent of lost motion between said lever and said shaft, a spring to exert a constant pressure on said lever and a transparent gage communicating with the interior of the valve body.

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Witnesses:
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