A. ORME.

Safety-Valve.

No. 160,790. Patented March 16, 1875.

FIG. 1.

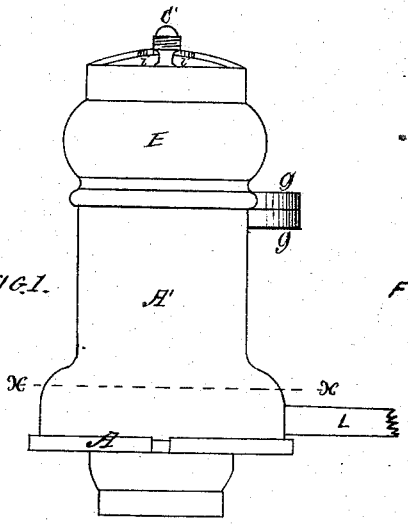


FIG. 2.

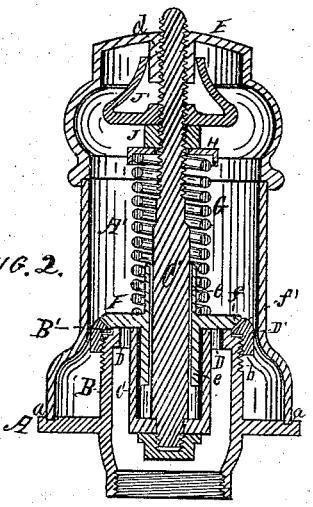


FIG. 3.

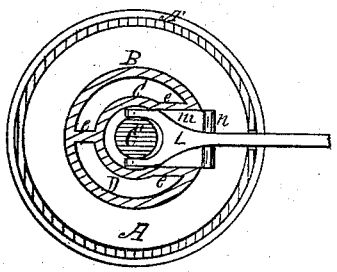
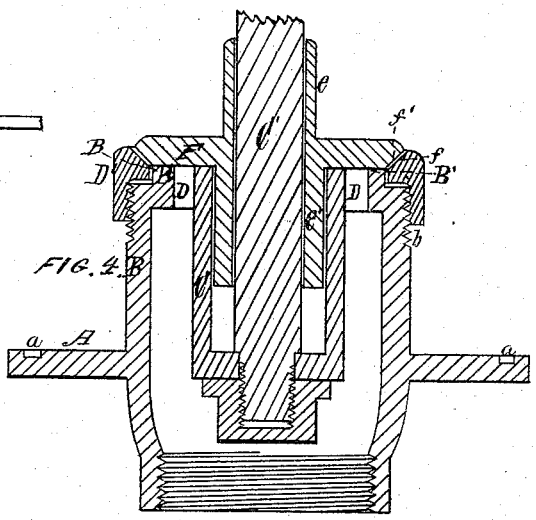


FIG. 4.



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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN SAFETY-VALVES.

Specification forming part of Letters Patent No. **160,790**, dated March 16, 1875; application filed May 19, 1873.

To all whom it may concern:

Be it known that I, ALEXANDER ORME, of Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Safety-Valves; and I do hereby declare the following to be a full, clear, and exact description thereof, which will enable others skilled in the art to which my invention appertains to make and use the same, reference being had to the accompanying drawings forming part of this specification, in which—

Figure 1 is a front elevation of a safety-valve embodying my said improvement. Fig. 2 is a vertical central section of the same, showing the internal or working parts. Fig. 3 is a plan of the same, taken on the line *x x* drawn across Fig. 1; and Fig. 4 is an enlarged vertical central section of the lower portion of the same with outer case removed.

Similar letters of reference indicate like parts in the several figures of the drawings.

My invention relates to that class of safety-valves used to graduate the pressure of steam in the boiler; and the improvement consists in providing the outer surface of the valve-seat with an adjustable angular face corresponding with a like angular face on the valve, whereby the escape-passage for the steam from under the valve may be increased or decreased, and thus, when the valve is slightly raised, present an enlarged surface to the action of the steam greater than the area of the opening in the valve-seat; and in the several combinations of the parts, as will be more fully understood by the following description and claims.

In the drawing, A represents the base of the valve-case, the lower portion of which is screw-threaded internally to receive the nipple by which it is connected to the boiler, or the lower surface of the base may be ground to a steam-joint and secured to the dome-plate in the usual manner. A′ is the valve-case, the lower end of which is tightly fitted into an annular groove, *a*, formed in the upper surface of the base, as shown in Fig. 2. Firmly secured to the base A, or made as a part of the same, is an annular rim, B, which extends upward above the base, as shown in Figs. 2 and 4. C is a cylindrical case, which is permanently attached to the base A by radial arms *c c*, shown in Fig. 3. This case extends upward, so that its upper end is on the same horizontal plane with the upper end of rim B, and is less in diameter than the inner surface of the rim, forming an annular space or port, D, between the walls of the rim and case, into which the steam from the boiler passes. The arrangement of rim B and case C is such that the annular port between them is immediately in the center of the horizontal area of the valve-face, forming a seat proper on each side of the port, the objects of which are several: first, it insures a uniform pressure of steam against the valve-face, which overcomes the tendency to rock the valve when being lifted off its seat; secondly, it reduces the area of surface to the pressure of steam when the valve is seated, and instantly increases the area of surface to the pressure of steam when the valve is lifted off its seat, instantly lifting the valve to its full opening. The central portion of the base of case C is provided with an aperture, within which is permanently secured a spindle, C′. This spindle extends upward through the center of the main valve-case A′, and slightly above the case, and is screw-threaded at its upper end, as shown in Fig. 2. E is a cylindrical cap, which is tightly fitted upon the upper end of the case A′, and extends upward to a point near the upper end of the spindle. This cap is provided at its center with a depending flange, *d*, through which the spindle passes, by which means the cap is firmly held upon the case. F is the valve, which is provided upon its upper and lower side with cylindrical flanges *e e′*, through which the spindle loosely passes, as shown in Figs. 2 and 4. The arrangement of this valve is such as to admit of a free and easy ascending and descending movement, and the object of the flanges is to increase the bearing-surfaces of the valve on the spindle, which will prevent the valve from rocking when lifted by the excess pressure of steam. The diameter of the lower face of the valve is equal to the gross diameter of the upper end of rim B, forming the seat B′, and it is so arranged that when seated the lower surface of the valve rests upon the upper ends of the rim and case C, over the annular space or port D, tightly closing the

same. G is a spiral spring, which is loosely fitted upon and around spindle C′ and flange *e*, and is so arranged as to bear upon the upper surface of the valve. Loosely fitted upon the spindle is a collar, H, adapted to bear upon the upper end of spring G. Mounted on the spindle above the collar is a nut, J, which is adapted to bear against the upper surface of the collar. The arrangement of this nut and collar is such as to admit of being adjusted so as to increase or decrease the pressure of the spring against the valve, the object of which is to determine the pressure of the spring so as to hold the valve in its seat against the pressure of the steam in the boiler until the same exceeds the limit allowed. The upper end of rim B is screw-threaded externally, as shown at *b*, Figs. 2 and 4. Mounted on the threaded portion of this rim is a ring, D′, which extends upward slightly above the upper edge of the rim, and is so arranged as to admit of being turned around on the rim, the object of which is to allow the same to be raised or lowered as may be required. The upper edge of the ring is chamfered on its inner side, forming an angular face, *f*, of the seat. The inner edge of this angular face terminates at the outer corner of the rim, and the plane of its face is parallel with the plane of a like angular face, *f′*, formed around the outer edge of the valve. J′ is a lock-nut, which is also mounted on the said spindle, and arranged to bear against the upper surface of nut J, the object of which is to prevent the latter from turning. The object of this adjustable angular face is to determine the area of the escape-opening so as to partially retain the steam under the valve when the latter is slightly raised by the excess pressure in the boiler, and thus increase the area of surface so that the valve is instantly raised to a full opening, when the pressure of steam in the boiler exceeds the limit allowed, so as to overbalance the pressure of the spring, and thereby insure a free escape of the steam. The further object in making the ring adjustable is to allow the same to be removed, ground, and readjusted, should the same become worn. L is a horizontal lever, which is fulcrumed upon the upper surface of the base, as shown at *n*. This lever is fork-shaped at its inner end, and passes, through a recess, *m*, formed in the walls of rim B and case C, to and around the spindle, as shown in Fig. 3, and is so arranged as to admit of a slight tilting movement. The inner end of this lever passes under and against the lower end of flange *e′* of the valve, the object of which is to raise the valve independent of the pressure of steam when desired. The upper end of case A′ and lower end of cap E are provided with lugs *g g*, through which is formed an aperture adapted to receive a lock-bolt, the object of which is to prevent the cap from being displaced. The upper surface of cap E is provided with a series of openings, *i*, through which the steam passes from the case when the valve is open.

The operation of my invention is as follows: The base of the valve-case is secured to the boiler, as previously described, allowing the annular space or port D to communicate with the opening in the boiler. Nut J is then adjusted so as to compress the spring sufficient to produce a pressure on the valve equal to the desired pressure of steam in the annular port, the force being equal to the pressure in the boiler. Ring D′ is so adjusted as to form a slight space between the angular faces *f f′* of the ring and valve, and as the pressure of steam in the boiler exceeds the limit allowed the spring yields and the valve is slightly raised, allowing the steam to come in contact with the enlarged area of the valve, which instantly lifts it to a full opening, and the surplus steam passes into the main case and exhausts, through the opening *i* in the cap, until the pressure in the boiler is reduced sufficient to bring the pressure against the enlarged area of the valve below the pressure of the spring, when the valve instantly reseats and prevents further waste of steam, the excess pressure of steam against the enlarged area of the valve being determined by the area of the space between the angular faces.

Having thus described my invention, I claim—

1. In combination with the valve-seat B′, and valve F provided with the angular face *f′*, the adjustable ring D′, having the angular face *f*, as specified.

2. The valve F, provided with the flanges *e e′*, in combination with seat B′, spindle C′, spring G, and nut J, all operating as specified.

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