S. J. MAUREL & C. L. TRUEL.

SAFETY-VALVE.

No. 190,884. Patented May 15, 1877.

Fig. 3

Fig 2

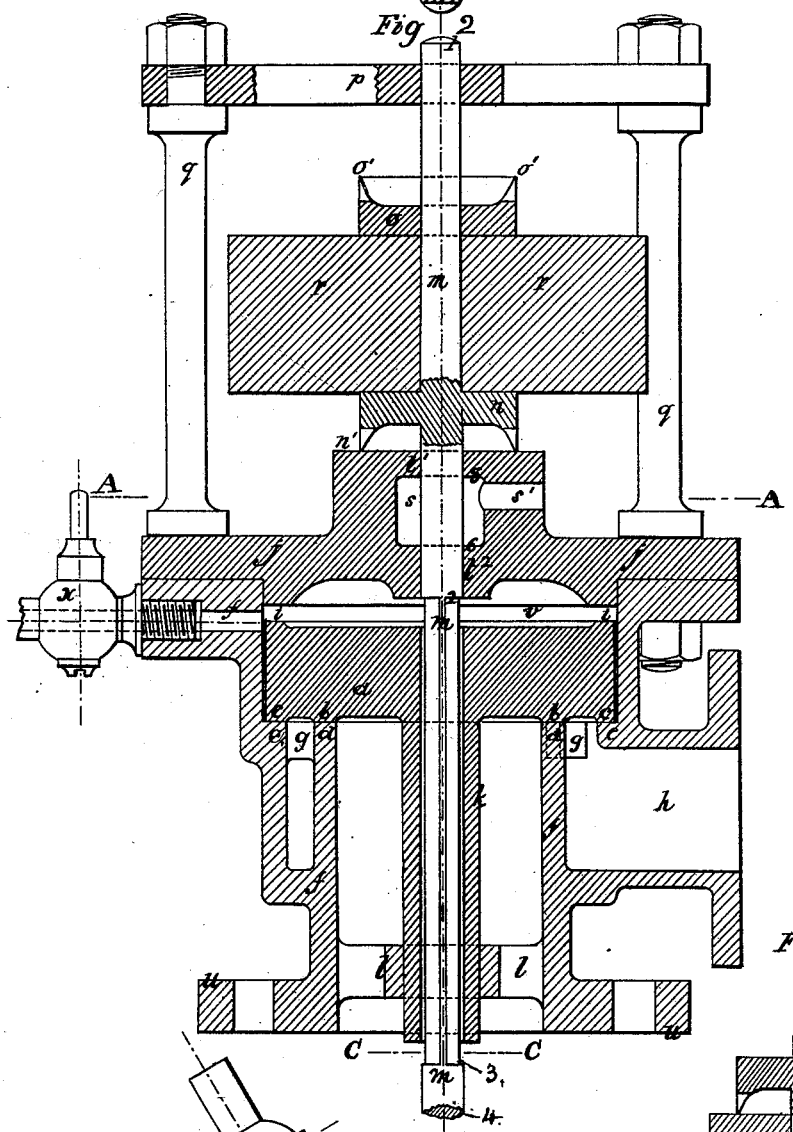


Fig 1.

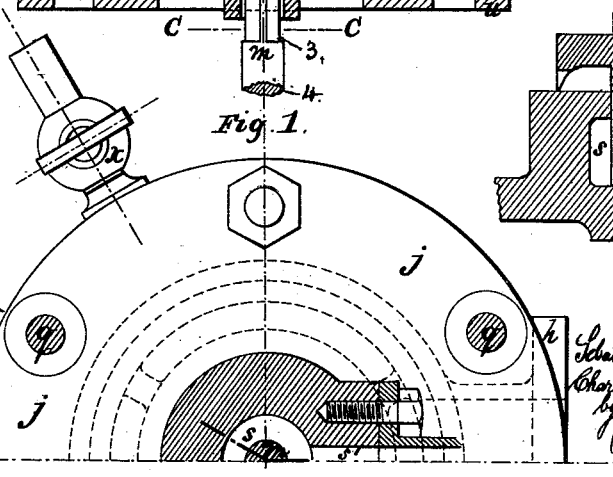
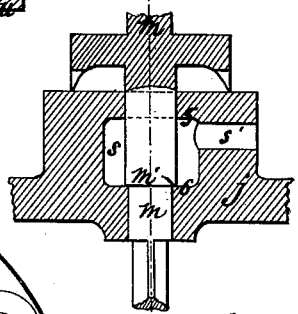


Fig 4



Witnesses
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UNITED STATES PATENT OFFICE.

SEBASTIEN J. MAUREL AND CHARLES L. TRUEL, OF MARSEILLES, FRANCE.

IMPROVEMENT IN SAFETY-VALVES.

Specification forming part of Letters Patent No. **190,884**, dated May 15, 1877; application filed February 19, 1877.

To all whom it may concern:

Be it known that we, SEBASTIEN JOSEPH MAUREL and CHARLES LOUIS TRUEL, both of Marseilles, in the Republic of France, have invented certain new and useful Improvements in Safety-Valves; and we do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawing, and the letters marked thereon.

This improvement has reference to an apparatus which is placed directly or indirectly on steam-boilers, and not only prevents the pressure of the steam exceeding a certain limit, but also acts as a preventive to explosions by reason of the instantaneous and copious escape of steam which it affords.

In order that our improvement may be clearly understood, we will describe it in detail, conjointly with the four figures of the accompanying drawing, of which—

Figure 1 is a half-plan of our safety-valve, in section, through A A, Fig. 2; Fig. 2, an elevation, in section, through B B, Fig. 1; Fig. 3, a section through the rod at C C, Fig. 2; and Fig. 4, a modification in the shape of the stem.

This apparatus consists in a valve, *a*, which acts also like a piston, the under part of which has two concentric annular ground faces, *b* and *c*, which rest on similar faces *d* and *e*, formed on the seat of the box *f*. The space *g*, between these two latter, forms an annular passage, to which is connected a discharge-nozzle, *h*, opening in the atmosphere. The upper face of this valve-piston has also an annular facing, *i*, which comes in contact with the under face of the cover *j* when raised by the steam, and thus limits the rise of the valve, the cylindrical periphery of which (which may be provided with one or more metallic rings like the piston of a steam-engine) slides gently in the cylindrical box *f*. The stem, or rather the socket *k*, of the valve is also free to rise and fall in the guide or cross bar *l*, fixed to or forming part of the box *f*. *u* is the flange for bolting the box to its boiler. *x* is a cock for blowing off the condensed water from the upper face of the valve *a*.

The valve is bored centrally for the reception of a rod, *m*, which passes out and rests on the cover *j* by means of a circular knife-edged disk, *n*. The upper part of this rod, from 1 to 2, is cylindrical. The middle part, from 2 to 3, is triangular, or of any other polygonal form, and the lower part, from 3 to 4, is cylindrical, and of the same diameter as the upper part, from 1 to 2. On the part, from 1 to 2, is situated the disk *n*, hollowed out below with a peripheral knife-edge, *n'*, opened in one or more places to the atmosphere. *p* is a cross, fixed to the top of the uprights *g*, and which acts as a guide for the rod *m*. On the disk *n* we place the balance-weight *r*, and on this latter a loose knife-edged disk, *o*, for arresting the rise or elevation of the rod *m* by the contact of the former against the cross-bar *p*, above mentioned. The cover *j* of the box is provided with a small chamber, *s*, opening out into the atmosphere at *s'*, and is bored at t^1 and t^2 to fit the rod, but still to allow it to rise and fall. The space between *p* and *o'* limits the stroke of the central rod, and is equal to the distance between 5 and 6 in the chamber *s*, including a certain quantity requisite to establish a sufficient communication between the chamber *v*, situated over the valve *a* and the atmosphere. This quantity is calculated so that when the central rod *m* is raised to its highest point all the steam which rises through the space existing between the triangular section of the rod and the circular section of the hole in the valve-stem *k* finds an issue to the atmosphere by passing through the chamber *s* and the outlet *s'*.

It will be observed that when the central rod *m* rests on its lower knife-edged disk *n* the steam rises freely between the triangular part of the central rod *m* and the stem of the valve *a* to the upper face of the valve, while, when the rod is driven up with its knife-edged disk *o* in contact with the cross *p*, this passage of the steam to the upper face of the valve is arrested.

Supposing our valve adapted to a boiler where the pressure of steam is not to exceed five atmospheres, and that the section of the central rod *m* is equal to one square inch, then the weight *r*, together with that of the rod itself, and its two disks *n* and *o*, must be equal to seventy-five pounds, and under these conditions these parts will just be balanced

by contact of the knife-edged disk *n'*, resting on the cover *j*, and the steam from the boiler, in the manner above stated, has access to the chamber *v* and on the upper face of the valve, maintaining it on its seat by reason of the upper face of this valve having a larger surface than that of its under surface acted on by the steam from below. Directly the pressure of the steam exceeds seventy-five pounds, it raises the central rod *m* until its further progress is arrested by the knife-edged disk *o'* coming in contact with the cross-bar *p*. At the same time the cylindrical part 3 to 4, closing the aperture in the stem of the valve, intercepts any further passage of the steam to the chamber *v* on the upper face of the valve, while the triangular part 2 to 3 forms a direct communication between the chambers *v* and *s*, whereby the steam in the former is discharged freely in the atmosphere. Under these circumstances, the upper face of the valve *a* being relieved from pressure, the steam from the boiler, acting on the under face of the valve, raises it, and thereby escapes, through the annular passage *g* and the nozzle *h*, into the atmosphere, and continues thus to flow until its pressure is reduced to seventy-five pounds; then the rod and the valve descend to their normal position, as shown in Fig. 2.

The modification shown at Fig. 4 has reference to the central rod *m*, and is for the purpose of preventing escape of steam from the chamber *s* when the rod is down, and the pressure does not exceed seventy-five pounds. With this view we form a shoulder, *m'*, on the rod, which closes on a seat, the two parts in contact being ground together.

From the foregoing it will be observed that the central rod fulfills three important functions, viz: first, it admits steam to the upper face of the valves; secondly, it intercepts this admission; and, thirdly, it creates a passage to the open air for the steam admitted above the valve.

It will also be observed that the valve itself has a double action, since by its under face it acts as an obturator when in contact with its seat, and gives passage to the steam when raised from its seat, while, by its periphery, it prevents steam from above passing down to the annular chamber *g*.

Having thus explained the nature of our improvement, we claim as our invention—

1. The valve *a*, provided with the tubular stem *k*, the two concentric annular projections *b* and *c* on its under side, and the annular projection *i* on its upper side or face, as shown and described.

2. The box *f*, provided with double seatings *d* and *e*, adapted to the annular projections *b* and *c* of the valve, and with an annular chamber, *g*, communicating with and having its outlet in the discharge-nozzle *h*, as shown and described.

3. In combination with the rod *m*, constructed with the cylindrical and triangular portions, as described, the cover *j*, with its chamber *s*, having the lateral discharge *s'*.

4. The central rod *m*, subdivided in cylindrical and triangular-shaped sections 1 to 2, 2 to 3, and 3 to 4, with its lower and upper knife-edged disks *n* and *o* and weight *r*, for the purposes stated.

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