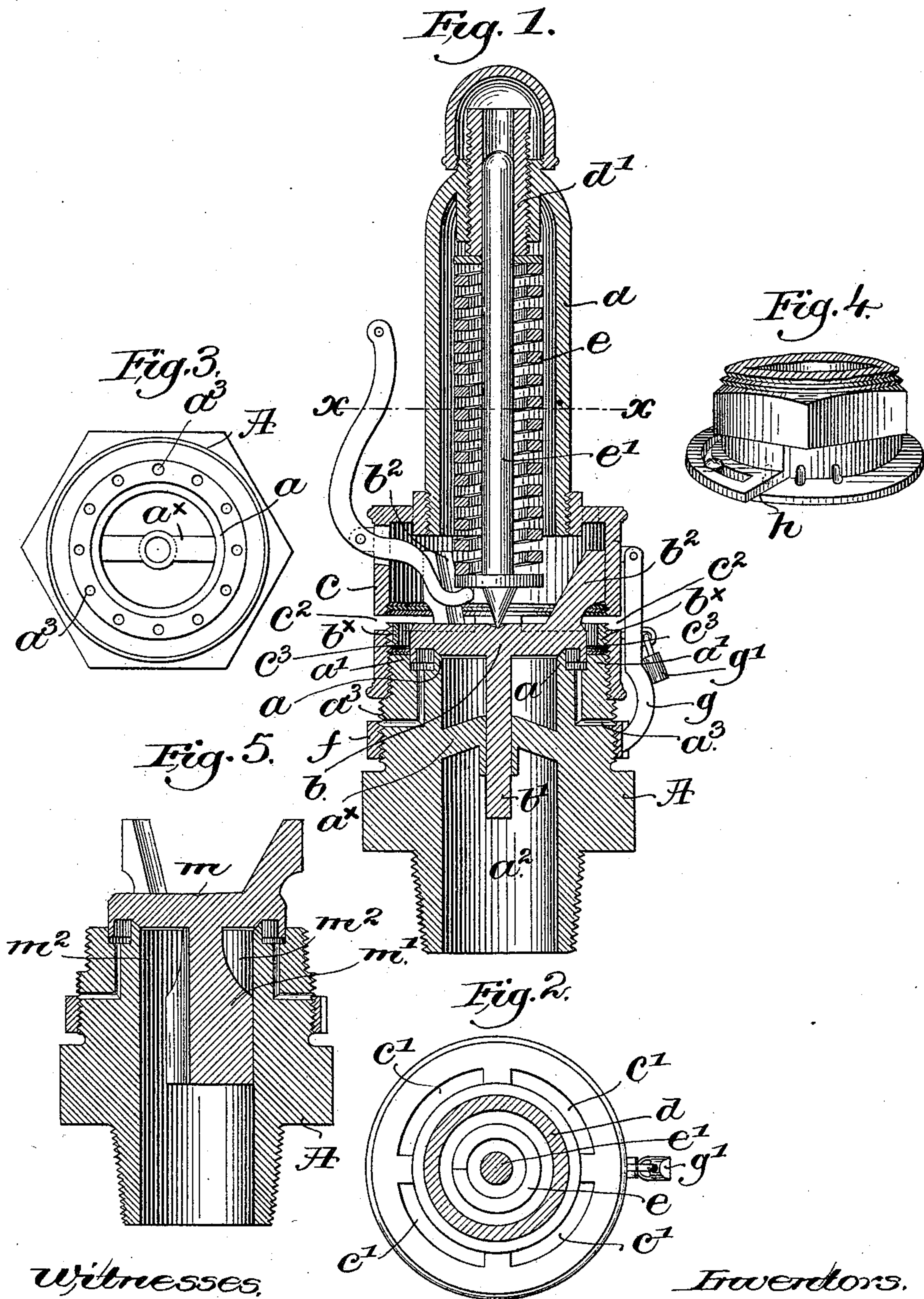


(No Model.)

M. McNEIL & R. KOHLHEPP.
SAFETY VALVE.

No. 525,963.

Patented Sept. 11, 1894.



Witnesses,
Louis N. Goull
Thomas J. Drummond

Inventors,
Murdoch McNeil
Rudolf Kohlhepp,
by Crosby & Gregory Attys

UNITED STATES PATENT OFFICE.

MURDOCK MCNEIL, OF LINDEN, AND RUDOLF KOHLHEPP, OF BOSTON,
ASSIGNORS OF ONE-THIRD TO MARTIN L. CATE, OF BOSTON, MASSA-
CHUSETTS.

SAFETY-VALVE.

SPECIFICATION forming part of Letters Patent No. 525,963, dated September 11, 1894.

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To all whom it may concern:

Be it known that we, MURDOCK MCNEIL, of Linden, county of Middlesex, and RUDOLF KOHLHEPP, of Boston, State of Massachusetts, have invented an Improvement in Safety-Valves, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

10 Prior to this invention in safety valves of the type known as "pop safety valves," it has been customary to provide the valve proper at its under side with three or more lateral guide-wings which extend from the valve downwardly to a considerable distance and act against the interior wall of the steam passage below the seat, to guide the valve in its movements. It has been found in practice that the escaping steam acts to cut the wall of the steam passage and the surrounding valve seat in the corners formed between these guide wings immediately below the valve and the wall of the steam passage, and that consequently the valve seat is in a comparatively short time rendered unfit for use. In valves of this class the means for adjustment are accessible only by removing a part of the outer cap or casing of the valve, which is difficult when the valve is hot as it usually is.

30 This invention has for its principal objects, first, to obviate the cutting of the valve seat by providing a continuous annular escape for the steam; and, second, to facilitate the regulation of the valve by placing the adjusting devices upon or making them accessible from the exterior of the valve casing.

Other features of the invention will be hereinafter described and pointed out in the claims.

40 Figure 1, of the drawings, represents in vertical section one form of safety valve embodying this invention; Fig. 2, a cross section of the same taken on the dotted line $x-x$; Fig. 3, a top or plan view of the base by itself; Fig. 4, a perspective view showing a modified construction to be described; and

Fig. 5, in section shows a modification to be described.

Referring to the drawings, the base A, of suitable shape and construction, is threaded at its lower tapering end to permit it to be screwed into the dome or other part of a boiler or other device, the pressure within which is to be controlled and relieved.

50 In the embodiment of our invention herein shown, the base at its upper end is provided with two concentric lips a, a' , the inner of which surrounds the steam passage a^2 , and is preferably beveled at its inner edge to constitute a valve-seat for the main valve or valve proper b , said valve in Fig. 1, having a depending central spindle b' , which slides vertically in an opening in a yoke a^x extending across the steam passage as shown, and guides the valve in its vertical movements. The valve b at its upper side is herein shown as provided with three or more guide wings b^2 , which move in contact with the inner wall of the steam chamber formed within the ring c screwed to the base, said ring having connected with or forming a part of it, the cap d , threaded interiorly at its upper end to receive the adjustable plug d' between which and the valve b is interposed the usual spring e , the usual central guide spindle e' being also provided as shown. The valve b is provided at its edge with a depending annular lip b^x , which moves within the outer lip a' on the base. See Fig. 1.

80 The base A is provided with a series of apertures or auxiliary passages a^3 which extend from the top of the base between the two lips a, a' , downwardly and out at the side of the base, as shown, the size of the outlet ends of the passages being regulated by a regulating ring f threaded upon the exterior of the base. By rotating the ring in one or the other direction, the outlet ends of the passages are more or less closed or opened.

90 The regulating ring f is provided at its outer side with a series of vertical grooves into one or another of which the free end of the hinged locking lever g is inserted to prevent acci-

dental rotation of the ring, a padlock g' being in the present instance provided to prevent movement of the lever g , and rotation of the ring.

5 The locking lever and padlock constitute one form of locking device for the regulating device of the valve.

The operation of the valve is as follows, viz:—When the steam has reached the predetermined pressure it will lift the valve b , and will escape, a portion down through the auxiliary passages a^3 , and the remaining portion up through the steam chamber and out through main openings or passages c' in the top thereof. The downwardly extended lip b^x on the valve causes the steam to pass downwardly toward the auxiliary passages a^3 before it can turn and pass up outside the valve to the main exhaust openings c' , thereby creating an increased pressure within the lip which varies more or less according to the freedom of the escape through the auxiliary passages a^3 , the pressure being increased and the valve remaining open longer when the auxiliary ports are contracted, than when the said parts are fully opened. By rotating the ring f in one or the other direction, the outlets of the auxiliary passages are varied to more or less restrict the escape of steam there-
30 through, and thereby vary the pressure within the lip b^x and the closing of the valve as desired. This, it will be seen, may be easily accomplished from the exterior of the valve. In the particular construction herein shown, we have also provided the shell ring c with lateral apertures c^2 to furnish additional openings for the escape of the steam, the area of said openings, as shown, being regulated by a ring c^3 threaded on the inside of the shell
40 ring c , rotation of the ring in one or the other direction causing it to more or less open or close the said openings and thereby further regulate the movements of the valve. The ring c^3 is provided with vertical grooves into which the end of a tool may be inserted through the openings c^2 to thereby push the ring around in one or the other direction for adjustment, thereby making the ring adjustable from the outside of the valve.

50 Fig. 5, shows a valve m having a series of depending guide wings m' , said wings, however, being cut away at m^2 to leave a continuous annular discharge for the steam.

Fig. 4, shows another construction in which the escape through the auxiliary passages and the pressure within the lip b^x on the valve, are controlled or regulated by sliding the plate h to close one or more of the passages and thereby more or less restrict the escape of steam from the chamber through said passages. It will be seen that in either of the constructions Figs. 1 and 5, there are no guide wings contacting with the under side of the valve near its seat to form corners in
65 which the steam may act to cut the valve seat,

but that in both constructions a clear uninterrupted annular escape is provided which cannot cut the seat in any way.

This invention is not limited to the particular arrangement or construction of parts herein shown to illustrate this invention, for the same may be varied without departing from the spirit and scope of the invention, the gist of which consists, first, in providing a valve, the under side of which for a short distance from its periphery is perfectly free from guiding ribs or their equivalents, whereby an uninterrupted annular escape is provided, and, secondly, the adjusting devices for the valve accessible from the outside of the casing.

We claim—

1. In a safety valve, the combination of the following instrumentalities, viz;—a base containing a steam passage, a steam chamber at one end of said passage having an outlet at its end and having an outlet at its end opposite the end at which said passage enters a valve seat surrounding the said passage at one end, a co-operating movable valve in said chamber and co-operating with said seat said valve being provided at its upper side with guide wings, between which steam escaping from beneath said valve may rise through and pass out of said chamber a central guide spindle depending from said valve, and a guide-yoke in the steam passage for said spindle, whereby a continuous uninterrupted annular escape for the steam is provided when the valve is raised from its seat, substantially as described.

2. In a safety valve, the combination with a valve casing, a valve seat, a co-operating valve therefor, and main and auxiliary escape passages, of a ring, provided with a series of cross grooves and threaded upon the exterior of said valve casing and adapted according to its position to vary the said auxiliary passages, and a locking device co-operating with said grooves to lock said ring against rotation, substantially as described.

3. In a safety valve, the combination with a casing containing a steam passage, a valve at the upper end of said passage, a steam chamber into which the escaping steam may enter, lateral escape openings in the walls of said chamber, and a ring threaded upon the interior wall of said chamber and provided with openings in its threaded face accessible through the said escape openings, whereby said ring may be rotated to vary the area of said openings, substantially as described.

4. In a safety valve, an inclosing case containing a steam passage, a valve therefor having an annular depending lip, regulating passages extending downwardly and outwardly from said valve, and regulating devices to control the same, combined with a steam chamber into which the escaping steam may enter, lateral openings in the walls of said

chamber, and adjusting devices therefor
whereby movement of the valve may be controlled by the escape of steam through the
auxiliary passages extending downwardly
5 from the valve and also by the escape of steam
through the lateral escape openings, substantially as described.

In testimony whereof we have signed our

names to this specification in the presence of
two subscribing witnesses.

MURDOCK McNEIL.
RUDOLF KOHLHEPP.

Witnesses:

FREDERICK L. EMERY,
JOHN C. EDWARDS.