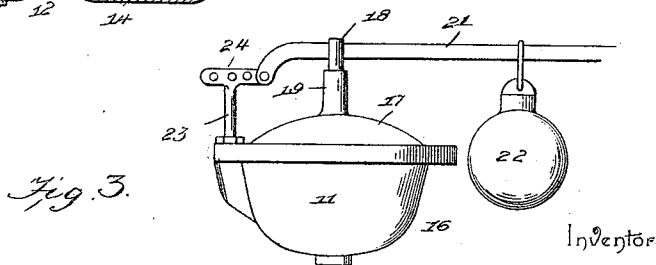
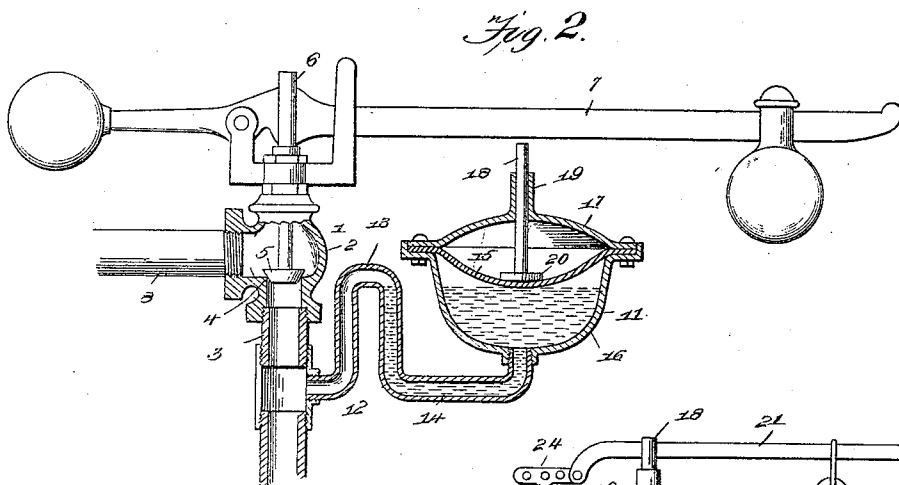
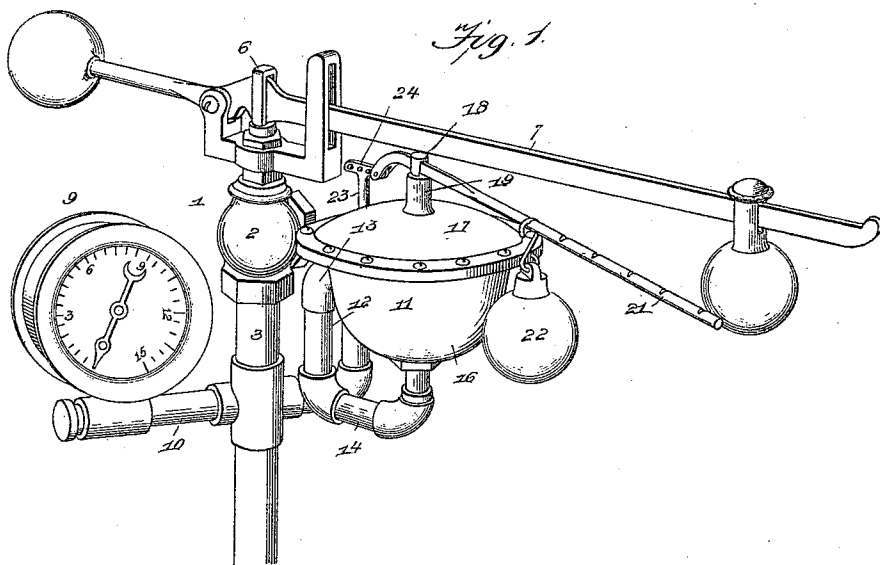


(No Model.)

M. L. BUSH.
SAFETY VALVE ATTACHMENT.

No. 553,897.

Patented Feb. 4, 1896.



Inventor

Witnesses

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MARTIN L. BUSH, OF LAWRENCE, MASSACHUSETTS.

SAFETY-VALVE ATTACHMENT.

SPECIFICATION forming part of Letters Patent No. 553,897, dated February 4, 1896.

Application filed April 24, 1895. Serial No. 547,019. (No model.)

To all whom it may concern:

Be it known that I, MARTIN L. BUSH, a citizen of the United States, residing at Lawrence, in the county of Essex and State of Massachusetts, have invented a new and useful Safety-Valve Attachment, of which the following is a specification.

It is a matter of common knowledge among engineers that safety-valves provided to relieve steam-boilers of excessive pressure frequently fail to operate when the predetermined pressure is reached because of the valve sticking upon its seat, due to various causes, the chief of which is the corrosive action between the valve and its seat. To prevent this sticking, the engineer or fireman operates the valve at stated intervals, thereby destroying the influences at work to cause the valve to remain upon its seat when the required pressure is reached. Even this attendance has not wholly obviated the difficulty, and serious results occur because of the failure of the safety-valve to open at the proper time.

The purpose of the present invention is to improve the class of devices employed to obviate the aforesaid difficulties and provide an attachment which will operate positively and with certainty and cause the unseating of the safety-valve at the proper time.

This attachment in its simplest form comprises a chamber having a liquid-compartment in its lower portion and provided with a diaphragm in its upper portion, upon which rests the inner end of a counterbalanced rod which is disposed to engage with the weighted lever of the safety-valve and cause the latter to respond and relieve the boiler, as will be readily understood.

For a full and complete understanding of the merits and advantages of the invention, reference is to be had to the following description and the drawings hereto attached, in which—

Figure 1 is a perspective view of a safety-valve of ordinary construction, showing the application of the invention thereto. Fig. 2 is a diagrammatical view in section of the parts shown in Fig. 1, the gage, which forms no part of the invention, being detached. Fig. 3 is a detail view showing the adjustable con-

nection between the casing of the attachment and the weighted lever supported thereby.

The numeral 1 represents a safety-valve of ordinary construction for either high or low pressure steam-boilers, and, as shown, comprises the casing 2, ingress-pipe 3, having seat 4, valve 5, valve-stem 6, weighted lever 7, having connection with the valve-stem 6 in the usual manner so as to hold the valve 5 upon its seat, and egress or relief pipe 8. The gage 9, of any desired pattern, is shown attached to the ingress-pipe 3 by means of a branch 10 to indicate the boiler-pressure. The safety-valve is attached to the steam-space of the boiler by means of the ingress-pipe 3 in any approved manner.

The attachment consists of a casing 11 disposed in about the same horizontal plane as the safety-valve and having connection at its lower end with the ingress-pipe 3 by means of a tube or pipe 12, the latter having an upwardly-extending loop 13, whereby a trap 14 is formed in the length of the pipe 12 to provide a liquid seal whereby the diaphragm 15 is prevented from burning by direct contact of the steam therewith. The casing 11 is formed of a lower part 16 and a cap 17, the two having their edge portions flanged and bolted together in the ordinary way. The edge portion of the diaphragm 15 is secured between the flanged edges of the cap 17 and the part 16 and serves to provide a packing joint is attained. The lower portion of the casing 11 contains water or other liquid, and the upper part is an air-chamber to admit of the upward movement of the diaphragm 15 by the pressure of the steam on the water contained in the lower portion of the casing 11. The counterbalanced rod 18 operates loosely through a sleeve 19 projected vertically from the cap 17, and its inner end is expanded or provided with a head 20 to obtain an extended bearing upon the diaphragm 15 to prevent injurious contact with the latter. The under face of the head 20 is convex or flared to correspond to the normal outline of the diaphragm 15 so as not to present any sharp corners or projecting points which would have a tendency to work injury to the said diaphragm. This rod 18 is counterbalanced,

preferably by means of a weighted lever 21, which has pivotal connection at its inner end with the casing 11 and has a bob-weight 22 adjustable thereon to vary the resistance of the diaphragm 15 against the pressure of the steam, as will be readily understood. A post 23, secured at its lower end to the casing 11, terminates at its upper end in a cross-head 24, which has a series of openings in its length to receive the pivot by means of which the lever 21 has adjustable connection with the casing, whereby the attachment can be readily adapted for either high or low pressure boilers and whereby the fulcrum of the said lever 21 can be shifted for any required purpose.

The parts being assembled as herein set forth and illustrated, the operation of the invention is as follows: The steam from the boiler entering the ingress-pipe 3 exerts a pressure against the safety-valve 5 and the diaphragm 15, and when the pressure reaches that for which the safety-valve is set the diaphragm 15 will move upward at its center and actuate the rod 18 and cause the latter to strike the lever 7, thereby starting the valve 5, which will become unseated and relieve the boiler of the excessive pressure in the usual way.

By adjusting the weight 22 upon its lever 21 the attachment can be set to operate at any degree of pressure, and is usually adjusted to operate at a less pressure than, and in advance of, the safety-valve, so as to insure a positive movement of the safety-valve when the predetermined pressure of steam within the boiler is arrived at.

It will be observed that the diaphragm 15, being of larger area than the safety-valve 5, will respond more quickly to the steam-pressure and cannot fail to operate because there

are no parts to become corroded, as is the case with valves closing upon seats.

The invention, as herein stated, is designed for high and low pressure steam-boilers. Therefore it must be understood that in embodying the invention to meet the various demands changes in the form, proportion, and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention.

Having thus described the invention, what is claimed as new is—

The combination with a safety-valve for steam-boilers, of a casing located in about the same horizontal plane as the safety-valve and comprising an upper and a lower part, a diaphragm clamped between the meeting edges of the parts, a pipe connecting the lower portion of the casing with the ingress-pipe of the safety-valve and having a trap in its length, a rod operating through the upper part of the casing and actuated by means of the said diaphragm, a lever having pivotal and adjustable connection with the casing and engaged by the said rod, a weight movable on the said lever to vary the resistance to the pressure exerted for bringing the said rod in forcible contact with the safety-valve lever, and a liquid placed in the lower part of the casing to prevent injurious contact of the steam with the diaphragm, substantially as set forth for the purpose described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

MARTIN L. BUSH.

Witnesses:

J. Q. A. BATCHELDER,
H. L. PETERS.