A. W. CRAM.

Combined Safety Apparatus and Damper Regulator.

No. 197,831. Patented Dec. 4, 1877.

Fig. 1.

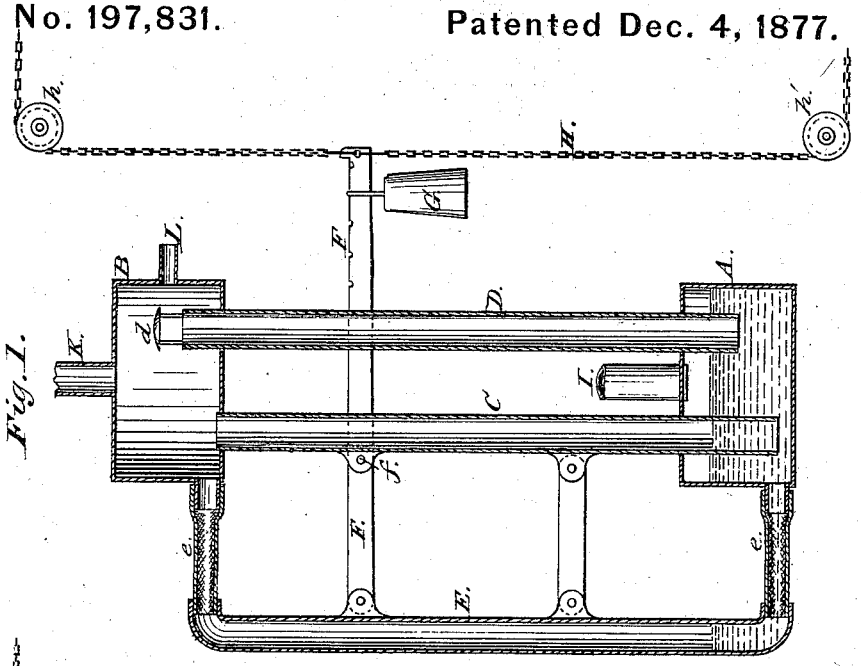
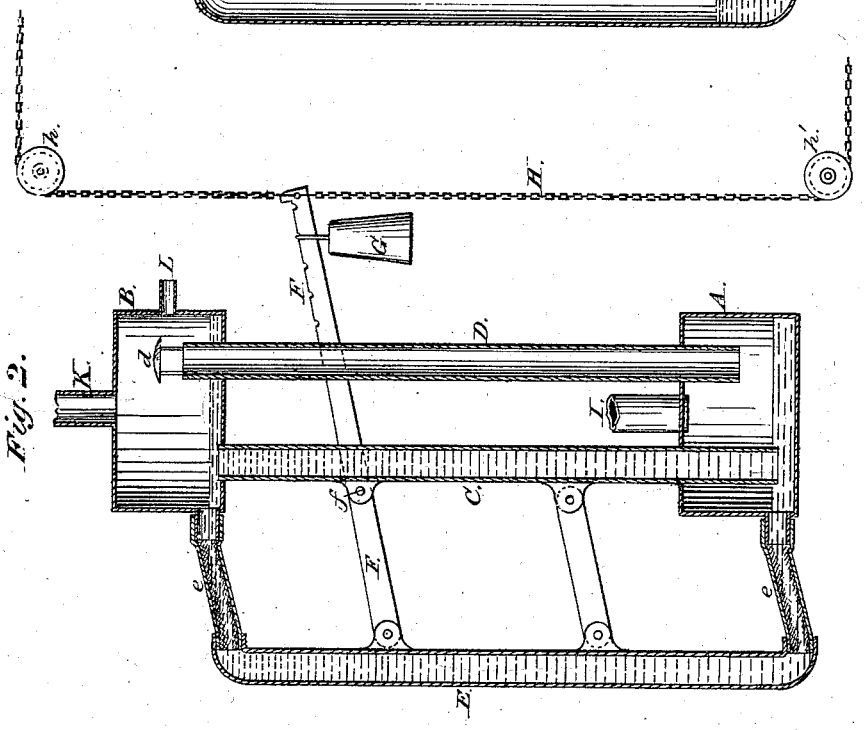


Fig. 2.



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ALONZO W. CRAM, OF HAVERHILL, MASSACHUSETTS.

IMPROVEMENT IN COMBINED SAFETY APPARATUS AND DAMPER-REGULATOR.

Specification forming part of Letters Patent No. **197,831**, dated December 4, 1877; application filed October 15, 1877.

To all whom it may concern:

Be it known that I, ALONZO W. CRAM, of Haverhill, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Combined Safety Apparatus and Damper-Regulator; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

My invention relates to safety apparatus and damper-regulator; and the object is to produce an apparatus that is more reliable, sensitive, and certain than those now in general use.

The invention consists of an upper and lower vessel or chamber, connected by two fixed pipes, and a third pipe provided with flexible or jointed tubes, to which third pipe a lever is pivoted and weighted to any desired pressure, and to the end of said lever a chain is attached, passing over suitable pulleys above and below, and connected to the damper by which the draft is regulated, thus forming an automatic device by which the steam is always maintained at a uniform pressure. Any liquid may be employed in the vessels, mercury being preferred, which is placed in the lower vessel to a certain height, and when the pressure increases, said liquid is forced up into the upper vessel through the pipes, and the weight of the liquid in the flexible pipe, to which a lever is attached, moves said flexible pipe downward and closes the damper by a chain connected thereto, and thus diminishes the draft until the proper pressure is again obtained, when the liquid will run back into the lower vessel, and assume its normal state. The steam at the same time passes through the other fixed pipe and out of the top of the upper vessel, all of which will be more fully described in the following specification, reference being had to the accompanying drawing, in which—

Figure 1 represents a vertical section of the apparatus in its normal position. Fig. 2 is a vertical section of the apparatus when the steam is escaping and the damper is closed.

In the drawing, A represents the lower, and B the upper, vessel, of any suitable size and form, and they are connected by the fixed pipes C D. The pipe C descends to near the bottom of the lower vessel, and just enters the bottom of the upper vessel, while the pipe D descends a short distance into the lower vessel, and passes through the bottom of the vessel, and ascends about one-third way above. It is also provided with an elevated cap, *d*, to turn down any liquid that might rise through it. Near the bottoms of the vessels, on one side, the pipe E is connected by any flexible jointed or hinged tube, as shown at *e e*, so that the lower end will be below the surface of the liquid, and the upper end may be used to carry the liquid back from the vessel B to the vessel A after the boiler has been blown off to the proper pressure. To the pipe E a pivoted lever, F, is attached, and is fulcrumed at *f* on the pipe C. The outer end of this lever is notched for different pressures, and is provided with a weight, G, to adjust it. To the extreme outer end of the lever F a chain, H, is attached, which passes over the pulleys *h h'*, secured to any suitable brackets or place on the boiler, and is connected to the damper in the chimney-flue. As the steam-pressure increases the damper is closed by the descending of the pipe E and rising of the lever, caused by the steam pressing upon the mercury or other liquid in the lower vessel, and forcing said liquid into the pipes C and E and vessel B until the lower end of the pipe D is opened, and the steam entering through the pipe I, which is connected with the steam-space of the boiler, passes through the pipe D, and escapes through the pipe K in the upper vessel B. The weight of the liquid in the flexible pipe E, which is connected to the lever F, and, by means of the chain H, to the damper, at the same time closes said damper, and thus reduces the draft. When the steam has been sufficiently blown off, and the proper pressure been obtained, the liquid falls again and resumes its normal position, and the damper is again opened. An overflow-pipe, L, in the side of the vessel B is arranged at a proper distance from the bottom, so as to allow any surplus liquid that may come in from any cause whatever to escape.

The operation of the apparatus will be readily understood from the above description by those skilled in the art, and will need no further explanation here.

The advantages of my apparatus are, that it is very simple in construction; it is not liable to get out of order; it is positive and reliable in its operation; it is especially applicable to boilers for heating dwellings and those using very low pressures; it is very sensitive; it can be made of any size and of any suitable material.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A safety apparatus and damper-regulator consisting of an upper and lower vessel suitably connected, and a flexibly-jointed pipe connected to a lever and chain for operating the damper, substantially as and for the purpose specified.

2. In a safety apparatus and damper-regulator, the flexibly-jointed pipe E, attached to vessels A B, the connecting-pipe C, and lever F, with chain H, connected to the damper of a boiler, substantially as shown and described.

3. The combination of the vessels A B, pipes C D, and flexibly-jointed pipe E with the lever F and chain H, connected to the damper of a boiler, substantially as shown and described.

4. The vessel A, having inlet-pipe I, vessel B, with outlet-pipe K and overflow L, the pipe C, and the pipe D, provided with cap *d*, in combination with the flexibly-jointed pipe E and lever F, connected to chain H and the damper of a boiler, substantially as and for the purpose described.

5. A safety apparatus and damper-regulator consisting of the upper and lower vessels A B, pipes C D, and flexible pipe E, provided with joints *e e*, pivoted lever F, and chain H, connected to the damper of a boiler, all constructed and arranged as shown, and for the purpose specified.

In testimony that I claim the foregoing as my own I hereby affix my signature in presence of two witnesses.

ALONZO W. CRAM.

Witnesses:
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A. S. PULSIFER.