H. G. ASHTON.
Safety-Valve.

No. 200,119. Patented Feb. 12, 1878.

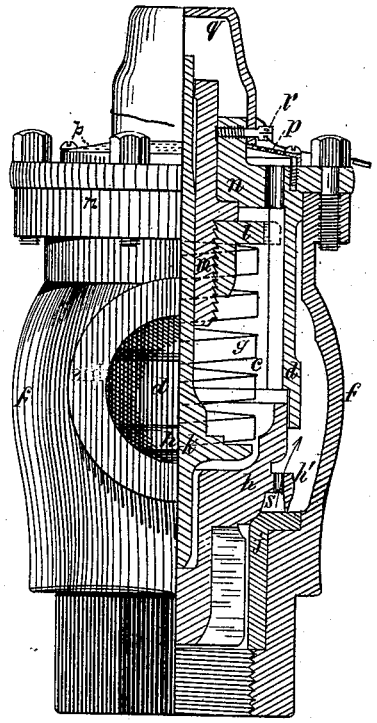

Fig. 1.

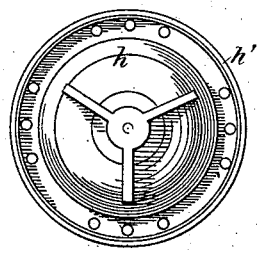

Fig. 2.

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HENRY G. ASHTON, OF SOMERVILLE, MASSACHUSETTS, ASSIGNOR TO ASHTON VALVE COMPANY, OF HARTFORD, CONNECTICUT.

IMPROVEMENT IN SAFETY-VALVES.

Specification forming part of Letters Patent No. **200,119**, dated February 12, 1878; application filed December 4, 1877.

To all whom it may concern:

Be it known that I, HENRY G. ASHTON, of Somerville, in the county of Middlesex and State of Massachusetts, have invented certain Improvements in Safety-Valves, of which the following is a full, clear, concise, and exact description, taken in connection with the accompanying drawings, making a part hereof.

The drawings show a valve embodying my invention in the best form known to me.

The bushing *j* is provided with a cover or casing, which, for convenience, is made in two parts, *f* and *n*, and within this casing is a cylinder, *d*. The valve is marked *h*, and its bushing or seat *j*. Its spindle *k* supports one end of the spring *g*, the other end of which is pressed upon by the nut *l*, which is controlled by the screw *m*, a shoulder on which bears against the under side of the cover *n*. The load of the valve is increased by turning the screw *m*, and thereby forcing the nut *l* nearer to the valve and tensioning the spring *g*. The stress of this spring is exerted upon the valve through the spindle *k*.

The cover *n* is firmly secured to the casing *f*, and it is preferred to form the cylinder *d* in one piece with the cover *n*, so that when the cover is put in place the cylinder *d* will be in the right relation to the valve. Besides the central hole in the cover *n*, (through which the upper part of the screw *m* passes,) I provide other holes, in order to give a free outlet to the air in the chamber *c*, and to such steam as passes into that chamber while the valve is rising. In order to prevent cinders and dirt from getting through these holes, I use the perforated cover *p*. I prefer to make the lower end of cylinder *d* a little larger in diameter than the rest of it, as shown, in order to form a shoulder or cap.

In order to prevent tampering with the valve, a hood, *q*, is placed over the upper part of the screw *m*, and held in place by a screw, *r*, which has holes through its head to receive a wire, the wire passing around the hood *q*, and having its ends sealed, so that the screw *r* cannot be removed without breaking the seal or cutting the wire.

The valve *h* is provided with an annular projection, *h'*, of the form shown, the thin edge of which comes close down to the bushing or seat *j* when the valve is closed, thereby forming a chamber, *s*. A series of holes lead from the chamber, for the purpose now to be explained.

When the steam in the boiler begins to exceed the desired pressure and forces the valve a little off its seat, the steam which escapes enters the chamber *s*; but as it cannot escape from that chamber except through the holes, (and a small portion of it under the thin edge *h'*,) it will there produce a pressure, aiding in lifting the valve, making what is well known as a "pop-valve"—that is, a valve which rises suddenly and gives a large area for the escape of the steam, relieving the boiler speedily and effectually.

It will be observed that as the valve rises, and as the steam consequently escapes more freely, the outlet from the chamber *s* under *h'* also enlarges, and as the valve descends this outlet decreases. Without these holes the valve shown would not close until the pressure in the boiler had fallen much below the pressure when the valve rose; but if these holes be of the proper area the valve will close when the pressure in the boiler is decreased less than two pounds to the square inch—that is, this valve will prevent the pressure exceeding the point at which the valve is set to rise more than one or two pounds, and will close when the pressure in the boiler has fallen less than two pounds below that at which the valve is set to rise. The total area of these holes must be adapted to the size of the valve, the pressure of the steam in the boiler, and the stiffness of the spring.

In the working-valve, from which the drawings were made, and which is a two and one-eighth inch valve, designed for use on a locomotive-engine carrying one hundred and thirty pounds of steam, there are twelve holes, each five thirty-seconds of an inch in diameter.

My custom is to test each valve before it is put into use; and it is necessary, in order to get the best result, to carefully adjust the total area of these holes to the spring used, no two springs being exactly alike.

The main feature of my invention consists in the combination of a pop-valve, so called—

that is, a valve so arranged with a small chamber, *s*, into which the steam enters as soon as the valve begins to rise, that the valve is lifted largely and suddenly by the pressure of the steam in that chamber, aiding the pressure in the boiler to overcome the force of the spring—with a hood or casing, to receive the escaping steam, and cylinder, into which the valve rises, making what I term an "under-discharge pop-valve"—that is, a pop-valve in which the escaping steam is prevented access to the outer surface of the valve by means of a cylinder or inner casing, into which the valve rises, and in which it fits closely enough to prevent the entrance of any considerable portion of the escaping steam.

So far as I know or believe, I am the first to construct such a valve, for although pop-valves are well known, (two examples being Patents No. 58,294, dated September 25, 1866, and No. 156,312, dated October 27, 1874,) and although under-discharge valves are also well known, (as, for instance, Patent No. 120,519, dated October 31, 1871,) yet I am the first to combine the two features in one valve; and I have discovered that this combination is very important in all cases where the escaping steam (or other gas or fluid) is prevented in any way from escaping freely from the hood or casing, as is often the case, and as will be well understood without further explanation.

Another important feature of my invention relates to the peculiar construction of the valve and its seat or bushing; and this part of my invention consists in the combination, with the valve and its seat or bushing, of the perforated annular projection *h'*, shaped as shown, and so as to form, with the seat, the chamber *s*.

This method of construction furnishes a pop-valve not liable to get out of order, and which, when properly made, will give full relief, and yet close as soon as the boiler-pressure is reduced to the desired point.

What I claim as my invention is—

1. In a safety-valve, the valve *h*, having the chamber *s*, in combination with the seat *j*, cylinder *d*, and casing *f n*, arranged to operate substantially as described.

2. In a safety-valve, the valve *h*, having the perforated annular projection *h'* and chamber *s*, in combination with the seat *j*, substantially as described.

H. G. ASHTON.

Witnesses:

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J. E. MAYNADIER.