G. H. CROSBY.

Safety Valves and Mufflers.

No. 225,801. Patented Mar. 23, 1880.

Fig. 1.

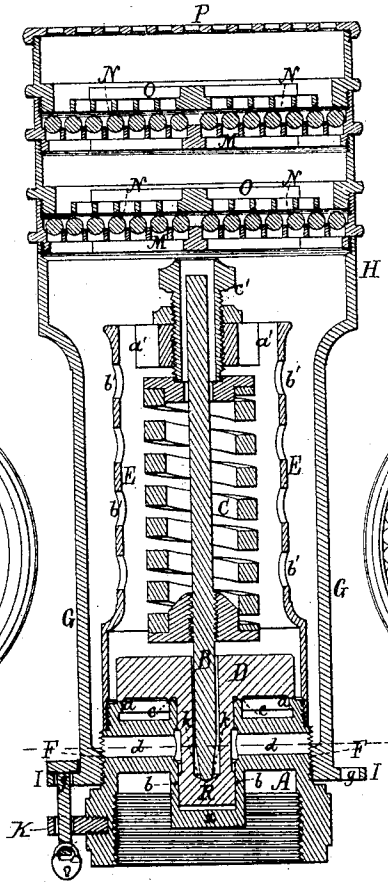


Fig. 2.

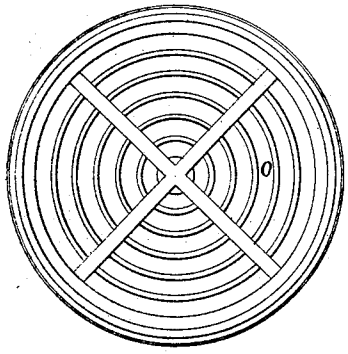


Fig. 3.

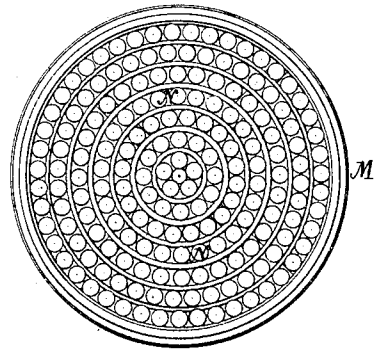
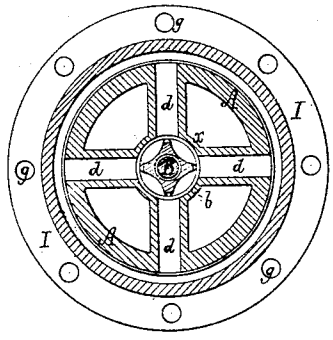


Fig. 4.



Witnesses.
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UNITED STATES PATENT OFFICE.

GEORGE H. CROSBY, OF SOMERVILLE, MASSACHUSETTS.

SAFETY-VALVE AND MUFFLER.

SPECIFICATION forming part of Letters Patent No. 225,801, dated March 23, 1880.

Application filed December 13, 1879.

To all whom it may concern:

Be it known that I, GEORGE H. CROSBY, of Somerville, in the county of Middlesex and State of Massachusetts, have invented a new and useful Improvement in Safety-Valves and Mufflers; and I do hereby declare the same to be described in the following specification and represented in the accompanying drawings, of which—

Figure 1 is a vertical and transverse section of one of my improved safety-valves and its muffler, Fig. 2 being a top view of one of the grids of the muffler, and Fig. 3 being a top view of another of such grids with its series of balls, to be hereinafter described.

The muffler, as shown, has two series of the balls. It may have in practice either a greater or less number of such series, two of them being usually sufficient.

The nature of my invention is fully set forth in the claim or claims hereinafter presented, it relating to the muffler and its adaptation to a safety-valve, substantially as represented and described in the United States Patent No. 160,167 granted to me on February 23, 1875.

In this special safety-valve, A denotes what is termed the "shell," which at top is provided with a valve-seat, *a*, and also with a center bearing, *b*, the latter being for the reception of the valve-guide R. There is formed in said valve-guide a bearing, K, for the foot of the spindle B, such spindle being encompassed by the spring C of the valve D, said spring bearing down the valve, and being provided at top with a tubular compressing-nut, *c'*, into which the valve-stem passes, as shown. The said compression-nut is screwed into the top of the case E, surrounding the spring. The boss *x*, in which the bearing *b* of the valve-spindle is formed, has an upper face, *c*, which, when the valve is down, is covered by and in contact with the said valve. From the chamber of the boss a series of passages, *d*, extend into and through the supporting-arms of the said boss and out through the shell A, two of such passages being shown in Fig. 1. Steam entering these passages from the upper surface of the boss will pass through the passages, the size of the outlets being regulated by an encompassing annulus or sleeve or gate, F, which is screwed upon the exterior of the shell, and projects inward from the case G, supporting the muffler H. This case G is concentric with and surrounds the safety-valve case E, which opens directly into the case G by means of holes or passages *a'*, arranged in the top, and others, *b'*, in the sides of the said case E.

Furthermore, there is to the case G, at its lower end and projecting outwardly therefrom, a flange, I, which is perforated with a series of holes, *g*, at equal distances apart, as shown in Fig. 4, which is a horizontal section of the case G, exhibiting the said flange. The perforated flange thus described extends directly over a perforated ear, K, projecting from the shell A, such ear and perforated flange being to receive a bolt, padlock, or other suitable means of locking the muffler-supporting case to the shell.

The said muffler H, I construct as follows—that is to say, of a supporting grid or grate, or a plate, M, having in it a series of slots to receive and support a series of balls, N, placed in the said slots, each slot having a width less than the diameter of each of the balls contained in it or sustained by it.

In the drawings I have shown a circular grate, M, for supporting the balls, the bars of the grate being rings suitably sustained in position by diametric bars. The balls are arranged in the annular spaces between the rings of the grate and rest on the said rings, and are placed so as to touch, or nearly touch, one another in each circular row of them. Arranged directly over each set of the balls is another grid, O, like that first described, except in having each of its rings arranged immediately over a circular range of balls and at a distance therefrom which will permit each ball of the range to move a little vertically without moving out of the slot or space in which it may be situated. Over the upper grid there is a perforated cover, P, for the steam to escape through. The steam in rushing from the case of the safety-valve into the duct of the muffler, and thence up through the said muffler and against the balls thereof, (which, by preference, I make of lead or some other suitable non-resonant material or composition,) will force the balls up off their seats, and will pass between such balls and be muffled thereby—that is to say, the noise which

would otherwise result froin the escape of the steam will be greatly diminished if not entirely overcome.

When the valve rests upon the boss the steam-passages thereof are closed and the area of the valve upon which the initial pressure of steam exerts itself is reduced proportionately to the surface covered by the boss. When this initial pressure is sufficient to open the valve the area of the valve exposed to the steam action is increased; but at the same time an additional and auxiliary steam-escape is also brought into play, and the difference in size between the outer and inner ends of the steam-passages constituting said escape will determine the degree of differential pressure which will be exerted on the valve in addition to the pressure available to raise the valve in the first instance.

By revolving the muffler and its duct, the sleeve or annular flange projecting inward from the duct will be screwed upon the valve-shell A, and may thus be made to more or less close the discharging ends of the passages *d*.

What, therefore, I claim as my invention is as follows:

1. In combination with a safety-valve, substantially as described, provided with one or more auxiliary steam-escape passages, *d*, arranged as set forth, with the valve seat and shell, and provided with an adjustable annular sleeve or gate, F, screwed upon the shell, the supporting-case G of the muffler, fixed to the said sleeve or gate so as to be supported by it and to serve to revolve it and to sustain the muffler and direct into it the steam on its escape from the case of the safety-valve.

2. The muffler-supporting case provided with the perforated flange and with the annular sleeve or gate, in combination with the safety-valve, as described, having the perforated ear to co-operate with the perforated flange in locking, by means of a padlock or other suitable device, the sleeve F, adapted to be placed in position relatively to the outlet of each of the passages *d*, as occasion may require.

3. The muffler as composed of one or more sets or series of balls, a grid or slotted supporter to each of the said series, and a grid or perforated cap arranged directly over the series and constructed to hold the balls from escaping from their sustaining-slots, and to allow each of said balls to move off its seat, all being substantially as and for the purpose set forth.

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Witnesses:

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