F. W. RICHARDSON.

Mufflers for Steam-Boilers.

No. 213,348 Patented Mar. 18, 1879.

Fig. 1.

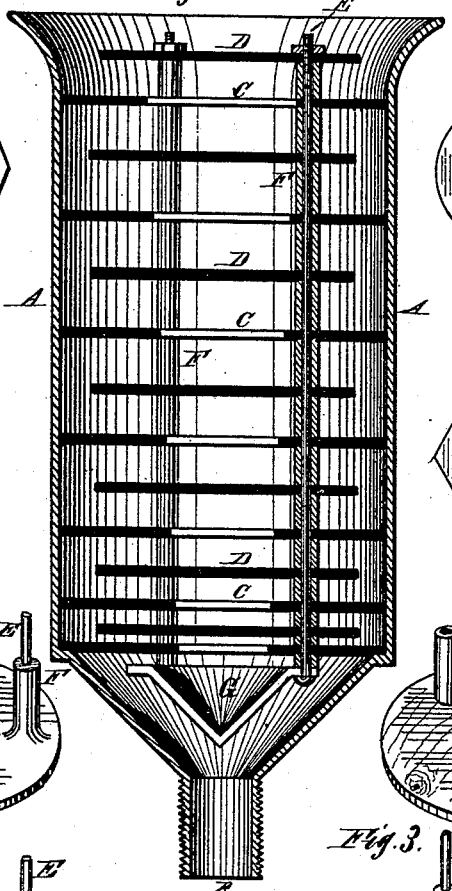


Fig. 4.

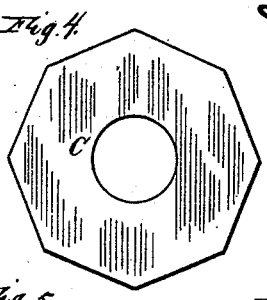


Fig. 6.

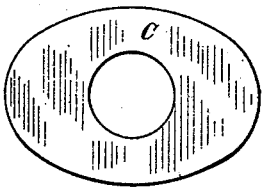


Fig. 5.

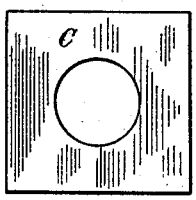
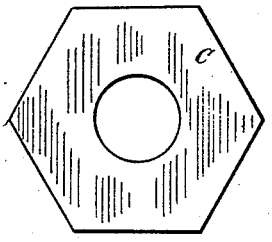
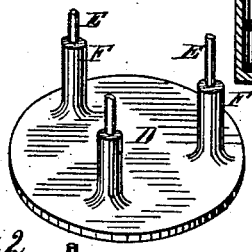


Fig. 7.





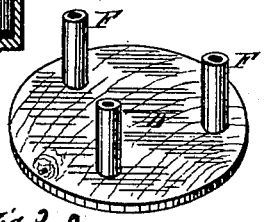


Fig. 2.

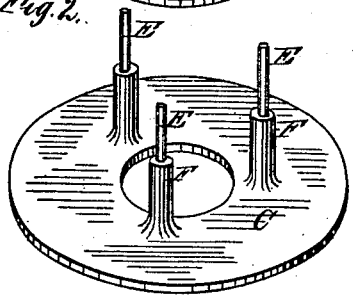


Fig. 3.

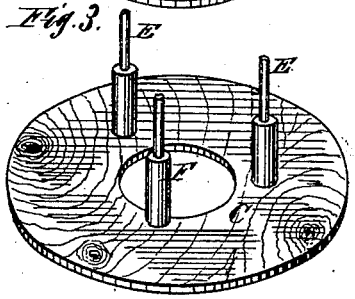
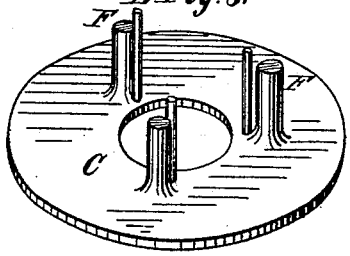


Fig. 8.



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Attorney.

UNITED STATES PATENT OFFICE.

FRED W. RICHARDSON, OF TROY, ASSIGNOR OF ONE-THIRD HIS RIGHT TO JOSEPH H. PARSONS, OF NEW YORK, N. Y.

IMPROVEMENT IN MUFFLERS FOR STEAM-BOILERS.

Specification forming part of Letters Patent No. **213,348**, dated March 18, 1879; application filed October 2, 1878.

To all whom it may concern:

Be it known that I, FRED W. RICHARDSON, of Troy, county of Rensselaer and State of New York, have invented certain new and useful Improvements in Mufflers, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

Figure 1 is an axial section and elevation of my improved muffler, the several parts being shown as assembled for use in accordance with my most approved plans. Fig. 2 is a perspective view of a pair of the plates or diaphragms employed, the pair being detached from the casing, and the two plates being separated from each other. Fig. 3 is a similar view, illustrating the detached and separated plates as made of wood or other material than metal. Figs. 4, 5, 6, and 7 are plan views, showing different forms or sizes of plates which may be employed, and serving to indicate that the mere outline or contour of the plates and casing may be changed at pleasure. Fig. 8 is a perspective view, showing a plate with lugs cast or otherwise formed thereon, which lugs serve to insure the proper relative location of the system of diaphragms within the exterior casing.

Like letters in all the figures indicate corresponding parts.

My invention has relation to that class of devices intended for subduing or entirely obviating the noise of escaping steam as it issues from a safety-valve or other connection of a boiler, said class of devices now being commonly known as "mufflers;" and it (the invention) has for its object the simplification of this class of devices, especially with respect to their general construction and operation, and also the increase of their effectiveness in fulfilling the desired ends.

To accomplish all of this my invention consists in certain novel and useful arrangements or combinations of parts, which will be hereinafter first fully described, and then pointed out in the claims.

A is the exterior casing or box, having one or more inlets, as B, at or near one extremity, for the admission of steam, gas, or compressed air as it issues from the boiler through some of the ordinary connections. Within this casing are located a series of diaphragms or plates, C D C D, &c., the office of which is to change the direction of the numerous currents passing through the muffler.

The plates C are each made to fit against the inner surface of casing A, and are perforated at their center, as plainly shown. Plates D are made smaller than C, and are suspended over them.

Under this arrangement it is apparent that the incoming steam, or gas or air, will be deflected in its course, passing up around D, between it and the casing, thence through the central opening in C; again back to the wall or casing, and so on until it escapes at the mouth of the muffler, the change in direction each time being very nearly directly opposed to the former course.

As shown in Fig. 1, the central perforations in plates C gradually increase in size from the first to the last in the series, and all the plates are separated by gradually-increasing distances from top to bottom. This arrangement has its advantages in affording a gradually-increased area for the escape, whereby the escape is greatly facilitated and unnecessary retardation or back-pressure obviated; but so far as the principles of the invention are concerned this arrangement may be modified, and the disposition, size, and relative location of the several elements of the series may be varied at pleasure.

The several plates or diaphragms are united by two, three, or more bolts, E, which pass through them, and they are most conveniently maintained in proper relative location by thimbles F, of proper length, slipped over the bolts, as plainly shown. As in Fig. 2, the thimbles or lugs may be cast or otherwise formed directly upon the plates, and afterward perforated; or, as in Fig. 3, they may remain solid, and the bolts passed through other perforations, reaching only through the plates.

The whole system of interior plates may be removed at once from the casing. The lowermost plate or diaphragm, G, I prefer to make

cone-shaped, as shown, so as not to present too abrupt an obstruction to the incoming gas, air, or steam.

Instead of providing the alternate plates with one large central perforation, the same objects may be accomplished by perforating it in a number of places, as will be readily understood.

The casing may be in horizontal section, of any desired contour, as may also the plates, which should correspond therewith. I have illustrated in Figs. 4, 5, 6, and 7, respectively, an eight-sided plate, a square, oval, and six-sided plate, and these will be sufficient to indicate that their form may be changed in any number of ways.

The material of which the casing and plates are to be constructed is in no way essential to the principles of their operation. Iron is, of course, preferred; but wood, brass, or any other material may be employed.

The casing may have one inlet, or as many more as may be desired.

The device may occupy any desired position, and receive the steam, &c., from suitable pipes.

The most common use of the improvement is in connection with a locomotive, whereon it is employed to subdue the noise of the steam escaping from the safety-valve, from the pump, brake-connections, or any other connections; but it may be used in a multitude of situations, and in connection with any form of boiler or other device from which the escaping fluid, of whatever nature it may be, produces an objectionable noise.

The number of deflecting-plates employed within the casing will depend upon circumstances of use, and may be increased or decreased at pleasure.

When constructed and arranged in accordance with the foregoing description, the improved device is found to operate successfully for the purposes intended, and to admirably answer the several purposes and objects of the invention as previously stated.

The theory of its operation is substantially as follows: The current of incoming steam is broken up by impinging against the first obstruction. The broken currents reunite in an enlarged space. The reunited currents are again broken by the next obstruction, and so on until the whole issues from the mouth of the muffler in a steady and easy current without much force and without noise. When the muffler becomes filled with steam the breaking and reuniting of the currents are facilitated by opposite currents within the casing—that is to say, the sudden noisy rush of one current on its way to the outlet is, in a measure, retarded by the volume of steam already occupying the passage, the inertia of which must first be overcome before any escape can take place. This inertia operates with a force directly opposed to the outgoing currents, and, without being sufficient to oppose any considerable back-pressure, serves to overcome the objectionable rush easily and perfectly.

To accomplish similar ends it has heretofore been proposed to employ a mass of comminuted material, such as gravel, stone, iron filings, and the like. This material affords a multitude of small passages for the steam, so small, in fact, that back-pressure must result from its use. In my improved device the volume of steam itself is made to perform offices which result in a similar breaking up and distribution of currents, while its elastic nature and general tendency to escape from the casing or box are characteristics which stamp it as much more suitable and beneficial for use than any solid substance.

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

1. In a muffler, the combination, with the centrally-perforated plates or diaphragms, of a second series of plates made smaller than the first, and affording annular passages between them and the casing, the several plates being arranged with gradually-varying distances between them, for the purposes set forth.

2. In a muffler, the combination, with the centrally-perforated plates or diaphragms, of a second series of plates made smaller than the first, and affording annular passages between them and the casing, and the initial conical deflector suspended below the double series and over the inlet, the several parts being held in place by the bolts and thimble, and the whole arranged, either by varying the distances between the plates, or by varying the size of the central perforations, so that a gradually-enlarged steam-passage is afforded through the muffler, for the purposes and objects set forth.

3. In a muffler provided with a series of deflecting-plates, the described arrangement of plates, with gradually-increasing distances between them, for the purposes set forth.

4. In a muffler provided with a series of perforated deflecting-plates, the described arrangement of plates whereby the perforations gradually increase in area from the inlet to the outlet, substantially as explained.

5. In a muffler, the combination of a series of perforated and imperforate plates, the plates being arranged at varying distances from each other, and the perforations gradually increasing in area from the inlet to the outlet, substantially as shown and described.

In testimony that I claim the foregoing I have hereunto set my hand in the presence of two witnesses.

F. W. RICHARDSON.

Witnesses:

Z. B. DAVIS,

M. C. BALDWIN.