G. STEELE.

PRESSURE SAFETY ATTACHMENT FOR HOUSE BOILERS.

No. 193,049. Patented July 10, 1877.

Fig. 1

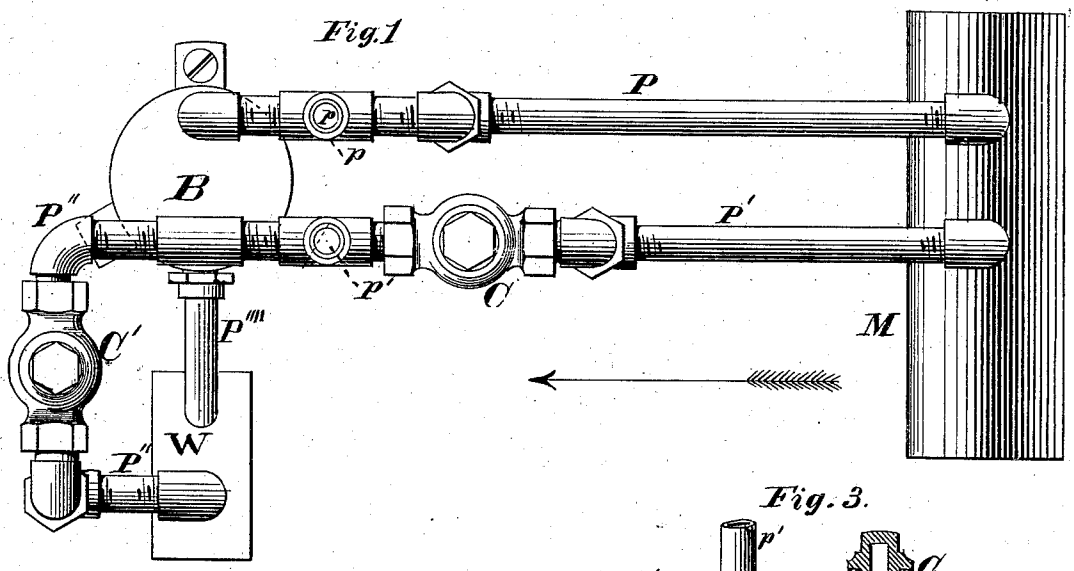


Fig. 3.

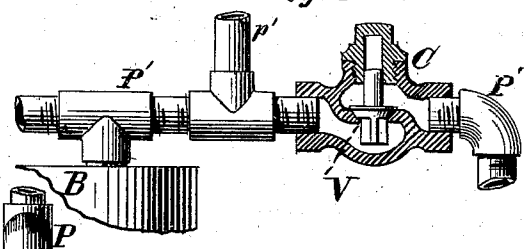
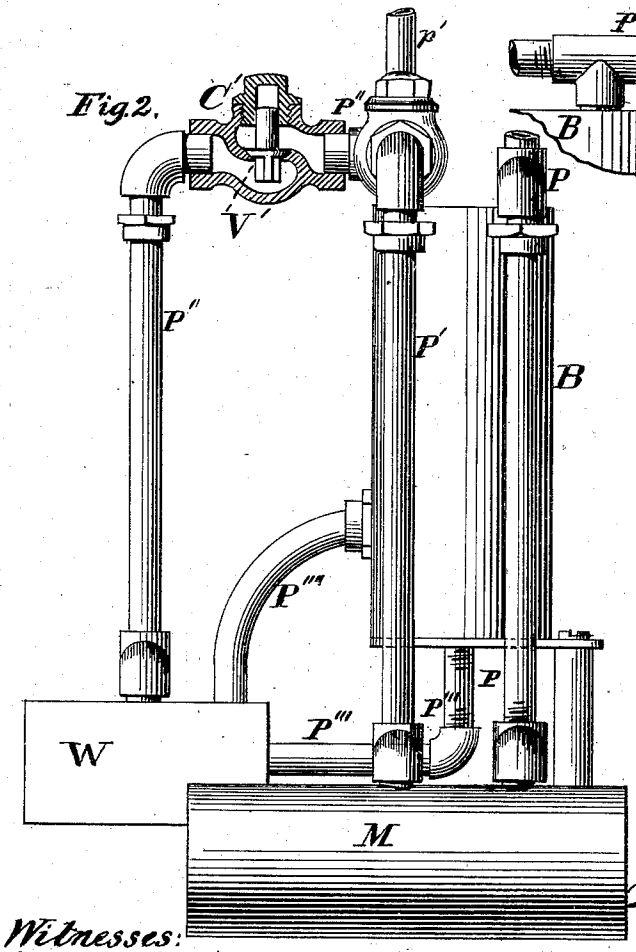


Fig. 2.



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GEORGE STEELE, OF NEW YORK, N. Y.

IMPROVEMENT IN PRESSURE SAFETY ATTACHMENTS FOR HOUSE BOILERS.

Specification forming part of Letters Patent No. **193,049**, dated July 10, 1877; application filed December 27, 1876.

To all whom it may concern:

Be it known that I, GEORGE STEELE, of the city, county, and State of New York, have invented an Improved Pressure Safety Attachment for House-Boilers; and I hereby declare that the following is a full, clear, and exact description of the same.

My invention is specially applicable to boilers used for domestic purposes, usually placed in kitchens and connected with kitchen-ranges, and which supply hot water to baths, laundries, and lavatories. In boilers of this class, as ordinarily arranged and constructed, when the water is not drawn off for some time, or is drawn off only in small quantities, while the fires in the ranges with which such boilers are connected are vigorously maintained, steam accumulates in the boilers in such quantities as to force the water out of the boilers against the pressure of the water from the water-mains which supply them. When this occurs, and a faucet is opened in a pipe to obtain hot water from any such boiler, the steam rushes out with great force and rapidity, while the water rushes in much more slowly. The violence of the efflux of steam frightens the servant, who, without reflection, suddenly closes the faucet. A frequent result is that the inflowing cold water condenses the steam remaining in the boiler so suddenly that the water cannot at once fill the vacuum so produced, and the external pressure of the air collapses the boiler.

To prevent this accident, and also to prevent damage to the water-back in the range with which such boiler is connected, resulting from obstruction of the pipe through which water circulates from the boiler to the said water-back, and to supply a means whereby the undue accumulation of steam in either the boiler or the water-back may be constantly and automatically prevented, are the objects of my invention.

The invention consists in independent and separate pipes, separately and independently connected both with the water-back in the range by which the water is heated and the boiler, and with the boiler and the water-main from which the boiler is supplied, said pipes being also connected with each other, and extending from said water-back and boiler to said main, and having a common communication with said main by a connection separate and independent from that of the pipe through which water from said water-main is supplied to the said boiler, said pipes having check-valves, which prevent the passage of water through them into said boiler and water-back from the said water-main, but which allow the passage of steam through one or both of said pipes to said water-main whenever the pressure in the said pipes is enough greater on the under sides of said check-valves, respectively, facing toward the said boiler and water-back, than on the upper sides facing toward the said water-main, to overcome the weight of, and to raise, said check-valves from their seats.

Figure 1 in the accompanying drawing is a plan view of a water-back, boiler, supply-pipe leading from a water-main to the boiler, and my pressure safety attachment thereto attached, with the parts arranged in proper relation for use. Fig. 2 is an elevation of the same, with sectional view of one of the check-valve boxes, showing the check-valve within; and Fig. 3, a detail of a portion of the apparatus.

B represents the boiler, and M the water-main. P is the pipe which supplies water from the said main to the said boiler in the usual manner, entering the boiler at the top and descending nearly to, and delivering the water nearly at, the bottom of the boiler. To this pipe is united the cold-water service-pipe *p*, which supplies cold water to various parts of the building in which the apparatus is placed.

The water passes from the boiler B to the water-back W, through the pipe P‴, Fig. 2, and when the said water-back W is heated water circulates upward through the pipe P⁗ to the said boiler, and downward through the pipe P‴.

Connected with both the top of the water-back W and the top of the boiler B is the pipe P″, which leads back to and is connected with the pipe P′, which leads back to and opens into the water-main M, and which is also connected with the top of the boiler B.

In the pipe P′ is placed the check-valve box C, and in the pipe P″ is placed the check-valve box C′. The check-valve box C contains the valve V, Fig. 3, and the check-valve

box C′ contains the valve V′, the valve V being located in the pipe P′, between the boiler B and the water-main M, and the valve V′ being placed in the pipe P″, between the boiler B and the water-back W.

The said check-valves are arranged to close when the pressure is equal on both sides of the same, but when the pressure is greater on the side of the valve V, which faces away from the water-main, than on the side of the same which faces toward said main, the said valve will open and establish a free passage from the boiler to the main M, through the pipe P′. This difference of pressure occurs whenever there is sufficient accumulation of steam to force down the level of the water in the boiler to a moderate distance below the top of said boiler, because the water-column in that part of the pipe P′ which lies between the main M and the check-valve V acts against the pressure of the water in the main M, while the pressure of the water-column in that part of the supply-pipe P which descends nearly to the bottom of the boiler inside of the same, and which pressure, when the boiler is full of water, is counterbalanced by the pressure of the water in the boiler, has a siphon action when the water in the boiler is so depressed which counterbalances in great measure the backward pressure of the water in that part of the said pipe P lying between the water-main and the boiler, and thereby assists the pressure in the said main, and this combined pressure is transmitted to the interior of said boiler. The accumulated steam, then raising the valve V, escapes, and passing into that part of the pipe P′ lying between the said valve V and the main M, is condensed, and the pressure in the boiler B is thereby relieved till the said check-valve again closes upon the equalization of the pressure in the said boiler and pipe P′, by the entrance of water into said boiler.

It occasionally happens that the pipe P‴ becomes wholly or partially stopped by sediment or other obstruction. When this occurs in ordinary apparatus for heating water, the circulation of the water up through the pipe P⁗ from the water-back W to the boiler, and from the boiler down through the pipe P‴ to the said water-back, is either stopped or impeded.

The generation of steam in said water-back is then very rapid, said steam passing up through the pipe P⁗ into and accumulating at the top of the boiler, and, when the circulation between the boiler and water-back is wholly impeded by the obstruction of the pipe P‴, the water remaining in the water-back may ultimately all be converted into steam, which steam will depress the water in the boiler below the upper open end of the pipe P⁗. The steam in the water-back under such conditions will be superheated. The water-back will then be damaged by overheating. Moreover, if under such conditions the obstruction in the pipe P‴ suddenly yields, and allows even a small quantity of water to pass from the boiler to the water-back, the total destruction by explosion or fracture of the said water-back may and sometimes does occur.

To prevent these consequences I connect the top of the water-back W with the top of the boiler B by the pipe P″, which is also connected with the pipe P′, placing the check-valve V′ between the said boiler and the said water-back, which prevents any passage of steam or water from the boiler through the pipe P″ to the said water-back, but which, when on account of the obstruction of the pipe P‴, steam is generated in the said water-back under sufficient pressure to raise the check-valve V′, allows the said steam to pass to the boiler, and from thence out through the check-valve V and the pipe P′ to the main M.

The accumulation of steam to such an extent as to endanger either the water-back or the boiler is thus entirely prevented.

The pipe P′, with the check-valve V, may, however, be used without the pipe P″, it having a separate and independent action, as hereinbefore described. In such case the pipe P′ will terminate at its connection with the boiler.

I claim—

1. The pipe P′, provided with the check-valve V, placed between the boiler B and the water-main M, and separately and independently connected with said boiler and water-main, substantially as and for the purpose herein specified.

2. The pipe P″, connecting the water-back W with the boiler B and with the pipe P′, and provided with the check-valve V′ between the said water-back and boiler, substantially as and for the purpose specified.

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