C. Evans,

Steam Safety Valve,

No. 3,921, Patented Feb. 24, 1845.

Fig: 1.

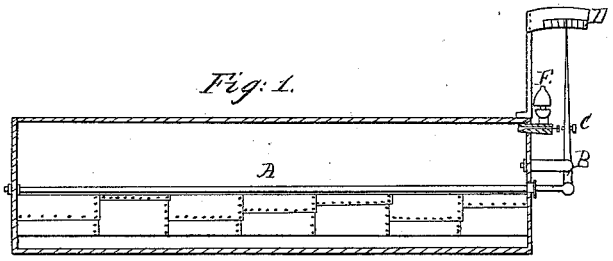


Fig: 2.

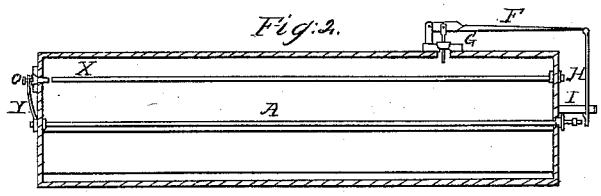


Fig: 3.

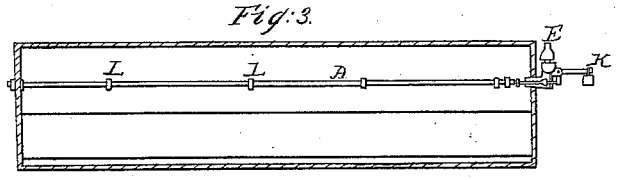


Fig: 4

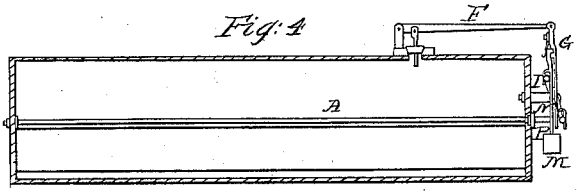


Fig: 5.

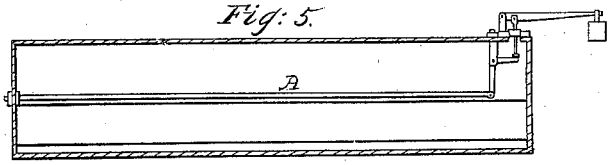


Fig: 6.

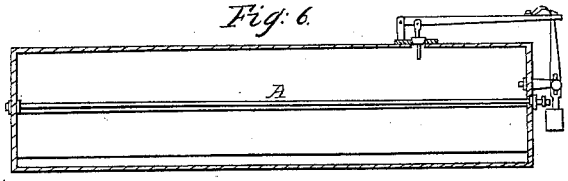
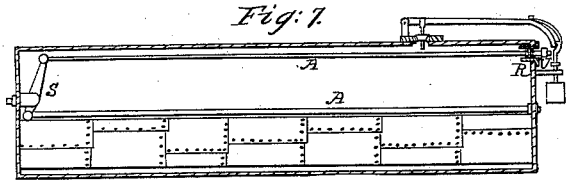


Fig: 7.



UNITED STATES PATENT OFFICE.

CADWALLADER EVANS, OF PITTSBURGH, PENNSYLVANIA.

METHOD OF PREVENTING THE EXPLOSION OF STEAM-BOILERS.

Specification of Letters Patent No. 3,921, dated February 24, 1845.

To all whom it may concern:

Be it known that I, CADWALLADER EVANS, of the city of Pittsburgh, county of Allegheny, and State of Pennsylvania, have invented a new and Improved Mode of Preventing Steam-Boilers from Bursting; and I do hereby declare that the following is a full and exact description.

The nature of my invention consists in the application of the difference in the expansion of two metals or the expansion of a metal so applied as to cause a safety valve to open, to regulate the supply of water in the boilers, to give notice of the fall or scarcity of water, to regulate a damper, to extinguish the fire by letting water spout on it and to show the relative temperature of the steam or boiler, all of which can be performed by the same machine, respectively and at the time required or each can be applied separately.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

The boiler is constructed in the usual form and may have all of the usual appendages but in order to obviate the defects of the common safety valve &c., I make a brass rod A a little longer than the boiler and about $\frac{3}{4}$ of an inch diameter. One end of this rod is fastened to one end of the boiler, the other end passes through a stuffing box, the rod laying on the top and in contact with the flue, as will be seen in Figure 1. The end of the rod coming through the stuffing box, is connected to the lever B by a joint.

C is a tempering screw to regulate the temperature at which the apparatus is to open the whistle valve E.

D is a graduated scale to show the relative temperature of the steam or boiler.

The operation is as follows: As the heat increases in the boiler, whether the temperature arises from too high steam or a scarcity of water the brass rod A expands about twice as fast as the iron of the boiler and puts in motion the index lever B and at a certain temperature, the end of the tempering screw C will press against the stem of the whistle valve E and open the valve giving the alarm. As the temperature decreases the brass rod shrinks or shortens again and the whistle stops. When a copper boiler is used the rod should be made of iron for in that case the rod draws in and must be connected with the lever B above the fulcrum.

Fig. 2 represents a mode of applying the apparatus to open a safety valve. F the lever of the safety valve G is made of steel and in the form of a spring, to the end of which is attached the iron rod H which has a catch hooking under the bar I. It will be seen that the safety valve will open at all times by the pressure of steam in the same manner as a locomotive safety valve but when the temperature is such as to expand the brass rod A so as to force the iron rod H from its holt on the bar I the safety valve will fly open wide and let the steam escape. Brass rod X in Fig. 2 shows the apparatus when applied to open but a simple valve such as at V, the valve being kept to its place by the spring Y.

Fig. 3 represents the apparatus when applied to open the whistle valve E the valve being kept in its place by means of the lever and weights K, this valve will open and sound the whistle by the pressure of the steam, as well as by the heat expanding the rod. L L are guides for the rod. If this valve be placed at the same height of the lower gage cock the difference in the sound of the whistle, when either water or steam alone is blown through it, it will always denote from which cause the valve is opened.

Fig. 4 represents another mode of causing the safety valve to open, but in this case the weight M is not only cast off from pressing down the safety valve but is applied to force the valve up. N is a bar of iron on the end of which is suspended, in a joint the small lever I, at each end of this small lever is a wrist or pin. G is a rod fastened to end of lever F. The lower end of this rod is forked and straddles the lower pin of small lever I. P is a rod to which the weight M is fastened the upper end of this rod is made to catch or lock into the rod as at G. Near the upper end of this rod it is also made to straddle the upper pin of small lever. Now when the expanding rod forces the lower end of the small lever I out, it separates the connecting catch at G, the weight then settles on the upper pin of the small lever, pulling it down and forcing up the other end of lever which presses the safety lever up. Figs. 5 and 6 are also two different modes of applying the apparatus to open a valve but need no description as they can

be readily understood by inspection of the drawings.

Fig. 7 represents the mode of applying the expanding rods when it is desirable to obtain considerable motion. Any number of rods can be used in this manner. It would be advisable, where there is more than one rod, that one of them at least be placed on top of the flue, the others suspended in the steam. The mode of disconnecting the weight from the lever of the valve needs no description, as it can be understood by inspection of the drawing. R is a small brass cylinder of about 3 inches in area. On the upper brass rod is secured a piston fitting the cylinder or that which would be more preferable would be to enlarge the rod where it passes through the boiler to about 3 inches area and let it work through a stuffing box. The object of this part of the arrangement, is that the pressure of the steam will always keep a strain or stretch upon the expanding rods, so as to prevent any loss of motion on account of the bending or springing of the rods or any derangement that might arise from the wearing of the joints of the lever S &c. Should there be any wear so as to allow the rods to shoot too far forward it can be readily regulated at any time by means of the regulating nut U at the end of the brass rods.

What I claim as my invention and desire to secure by Letters Patent, is—

The application of the difference in the expansion of two metals or the expansion of a metal, as a means of preventing explosions of steam boilers in the manner described or any analogous means producing the same result or effect.

C. EVANS.

Witnesses:
D. M. GEESE,
GEO. M. EVANS.