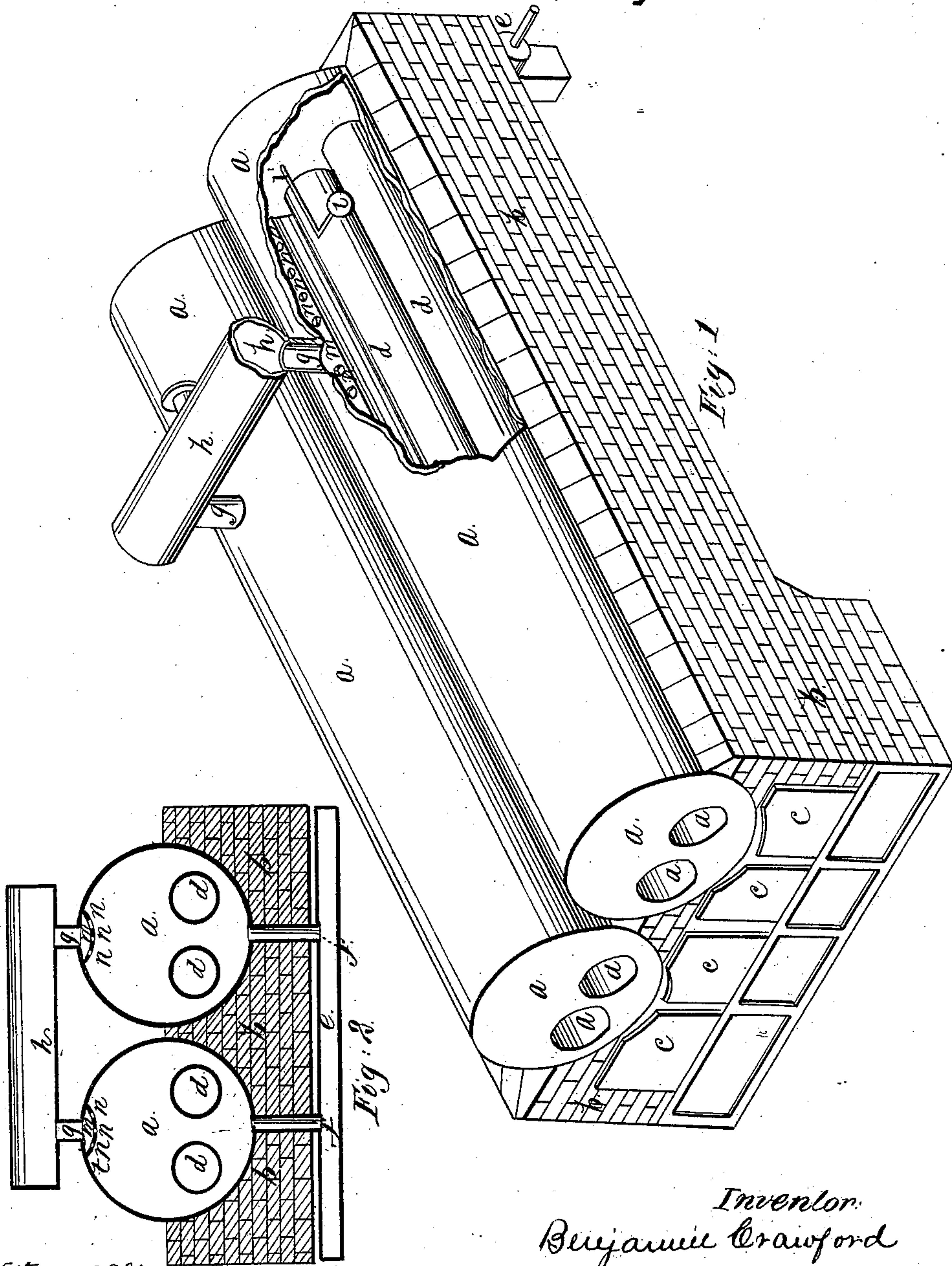


B. Crawford,
Steam-Boiler Cleaner.
No 76,607. Patented Apr. 14, 1868.



Witnesses:
Thos B Kerr
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United States Patent Office.

BENJAMIN CRAWFORD, OF PITTSBURG, PENNSYLVANIA.

Letters Patent No. 76,607, dated April 14, 1868.

IMPROVEMENT IN STEAM-GENERATOR.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, BENJAMIN CRAWFORD, of the city of Pittsburg, in the county of Allegheny, and State of Pennsylvania, have invented a new and useful Improvement in Steam-Boilers; and I do hereby declare the following to be a full, clear, and exact description thereof.

In the boilers of steamboats plying our western waters, floats are placed to float on the surface of the water, and thus indicate to the engineer, by a gauge or index on the outside of the boiler, the height of the water within. This is necessary as a precaution against the water in the boiler becoming too low, with a consequent danger of explosion. Two or more boilers are likewise commonly placed on each boat, and connected together by pipes leading from each to a common mud-drum. It has been found that under the almost constant motion to which the floats are liable from the ebullition of the water, its rising and falling, with an increase or decrease in the supply of feed-water, and its flow and reflow with the varying motions of the boat, the floats are liable to and sometimes do become loosened from the stems which carry them, and as they are made of light material, and commonly of small size, the force of the steam rushing out through the steam-pipe or throttle not unfrequently carries the loosened float into or against the mouth of the steam-pipe, and of course prevents the escape of steam therefrom. The inevitable result is, that as the formation of steam in the boiler thus closed is not prevented, the pressure of the steam so formed and confined in the top of the boiler forces the water contained in the closed boiler out into the other boilers through the mud-drum and the pipes leading thereto. The surface of the water in the closed boiler is thus brought below the fire-line, with the usual results of an undue heating of the boiler, a serious lessening of the tenacity of the metal composing it, explosion, destruction of property, and almost invariably a loss of life. Usually, in such cases, the causes of the explosion are unknown. The gauge of the exploded boiler having been inoperative, the engineer has not been previously warned. With the explosion the float usually disappears, and nothing remains to show the cause of the disaster.

The object of my invention is to prevent explosions so caused by rendering it impossible for the float, when loosened, to close the steam-pipe, and the nature of it consists in protecting the mouth of the steam-pipe by one or more bars, a grating, or a perforated plate, covering it, or by a number of projections arranged around and near to it, or by so branching or dividing it that the steam may enter it at two or more points. The float will then be prevented from entering it, or closing it, or obstructing all the passages leading thereto.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and mode of operation, referring for that purpose to the accompanying drawing making a part of this specification, in which—

Figure 1 is a perspective view of a pair of flued boilers, so much of one of the boilers being cut away as is necessary to show my improvement placed therein; and

Figure 2 is a sectional view, formed by planes passing vertically through the steam-drum, steam-pipes, boilers, and mud-drum, and horizontally just beneath the boilers.

Like letters of reference indicate similar parts in each.

a a are two cylindrical-flued boilers, resting on and bedded in the furnace-walls, *b*. *c c* are the furnace-doors, *d d* the flues, *e* the mud-drum, *f f* the pipes connecting the mud-drum *e* and boilers *a*; *g g* the steam-pipes leading to the steam-drum *h*, and *i* the float, attached to a stem, *i'*, which, by a gauge or index of the usual construction, on the outside of the boiler *a*, indicates the height of the water within. As the float *i* plays up and down on the surface of the moving and boiling water, it sometimes becomes loosened, and, being of light material, is carried by the force of the rushing steam into the mouth of the pipe *g*, closing it partially or wholly, with the disastrous results above set forth. To prevent this, I protect the mouth of the pipe *g* in any of the ways above mentioned, but, as shown in the drawing, I cover it with a plate, *m*, of any desirable length, and having perforations, *n*, in any desirable number. If, then, the float *i* be carried up against the plate *m*, so as to close a part of the perforations *n*, a sufficient number will still be open to allow the free escape of steam. Hence the gauges, if there be any in the other boilers, will indicate correctly the height of the water in all, and if

there be none the possibility of explosion from a lack of water will be deferred till the engineer will observe, if he be at all attentive, the non-working of the gauge. Thus it is useful in a single boiler, as well as in a gang of boilers.

My invention possesses another advantage, of a somewhat different character. In the steam-boiler, as ordinarily constructed, the formation of steam is most rapid immediately under the mouth of the pipe *g*, and from that point the steam rushes into the pipe *g* with great rapidity, and passes off in a highly-saturated condition, carrying with it a considerable quantity of hot water. The heat contained in the water thus carried off is of course lost, with the force which it represents. By placing over the mouth of the pipe *g* a long perforated plate, *m*, this evil is effectually obviated. The steam which then escapes into the pipe *g* is gathered from the whole or the greater part of the surface of the water in the boiler, and necessarily passes off in a drier state, whereby its expansive force is considerably increased. The same end may be secured by substituting a fine grating for the plate *m*.

For the purpose of preventing the stoppage of the pipe *g* by the float *i*, when the latter becomes loosened from its stem *z'*, I sometimes substitute for the plate *m* one or more bars, or a grating, or arrange a number of projections around the mouth of the pipe *g*, pointing downwards, or divide the boiler end of the pipe *g* into branches, two or more, so that the steam will enter it at different points.

In this manner I entirely obviate all danger of the explosion of boilers from the loosening of the float. The consequent benefit of saving of property and life is obvious.

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

The arrangement of a perforated plate *m* over the mouth of the steam-pipe *g*, inside of the boiler, in combination with the pipe *g*, for the purposes hereinbefore described.

In testimony whereof, I, the said BENJAMIN CRAWFORD, have hereunto set my hand.

BENJ. CRAWFORD.

Witnesses:

GEO. H. CHRISTY,
A. S. NICHOLSON.