# T. Clark,

## Boiler-Furnace Draft-Regulator.

No. 5,254. Patented Aug. 21, 1847.

Fig. 1.

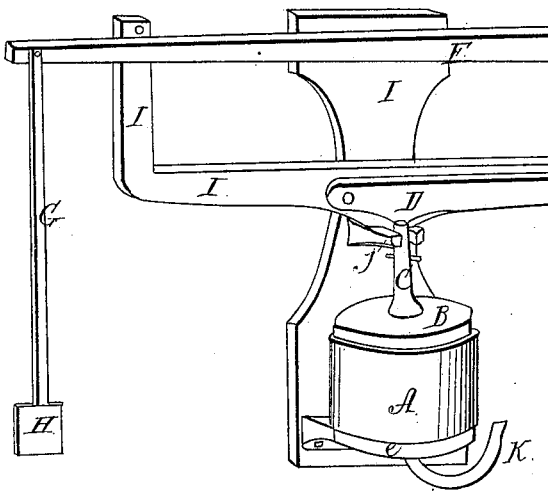



Fig. 2.

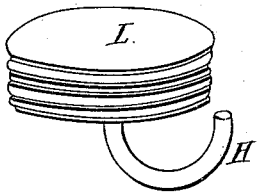
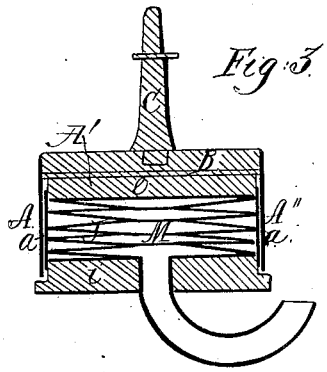



Fig. 3.



# UNITED STATES PATENT OFFICE.

TIMO. CLARK, OF NEW HAVEN, CONNECTICUT.

## SAFETY APPARATUS FOR STEAM-BOILERS.

Specification forming part of Letters Patent No. 5,254, dated August 21, 1847; Reissued August 21, 1847, No. 1,031.

*To all whom it may concern:*

Be it known that I, TIMOTHY CLARK, of the town of New Haven, in the county of New Haven and State of Connecticut, have invented a new and useful Improvement for Regulating the Pressure of Steam in Steam-Boilers, by which I regulate the draft of the furnace, or the force of the blower, as the case may be, by the pressure of the steam in the boiler.

The nature of my improvement consists in connecting an elastic metallic or other suitable elastic vessel with the steam boiler by means of a tube, and loading the lever which presses upon the elastic vessel so as exactly to balance the desired pressure of the steam in the boiler; then if the steam in the boiler increases beyond that pressure, it expands the elastic vessel and raises the lever, which closes the draft, in part, or entirely, according to the amount of the increased pressure, and as the pressure of the steam is decreased, by dampening the fire, (by the want of draft,) the elastic vessel contracts, and the weight depresses the lever, and opens the draft; so that the pressure of the steam in the boiler remains uniformly of the same pressure, for all practical purposes.

To enable others, skilled in the art, to construct and use my improvement, I will proceed to give a full description of its construction and operation, reference being had to the accompanying drawings, which make part of this specification, in which—

Figure 1 is a perspective view of the whole apparatus, combined and ready for attaching to the steam boiler by the tube K. Fig. 2, is a perspective view of the elastic metallic vessel, which, when in use, is inclosed in the movable case A, Fig. 1. Fig. 3, is a direct view of a section of the elastic vessel, tube, case, bearer &c, exhibiting the internal structure of the elastic vessel, and how it is inclosed &c.

The elastic vessel Fig. 2, is made of sheet brass, tinned iron, or any other suitable material, capable of being made air-tight, and of sufficient expansion for the use intended, with a perforation at the bottom, which extends to all of the several apartments of the vessel, as seen at M, Fig. 3, thus allowing the pressure of the steam from the boiler, through the tube, K, to act with equal pressure upon all parts of the internal surface of the vessel and thereby expand the vessel upward to act upon the lever, D, Fig. 1, by means of the upright shaft, or column, C, Figs. 1 and 3. The metallic elastic vessel is made by locking and soldering or otherwise firmly uniting, the outer edges of the first and second plates, L, Fig. 3, and the inner edges of the second and third plates, at their junction with the aperture, M, Fig. 3, and so on, alternately, until the vessel is of the required capacity leaving the upper plate whole, to sustain the pressure, as seen at L, Fig. 2. The elastic vessel is placed in a metallic, or other suitable case, (as seen at *a*, *a*, Fig. 3) open at the top, and with an aperture at the bottom to admit the tube, K. This case is placed on the projecting part, *i*, Figs. 1 and 3, of the frame, I, I, I, I, Fig. 1, or sustained in any other suitable way; a bearer of wood or other suitable material is laid upon the top of the elastic vessel within this case as seen at *b*, Fig. 3, on which the outside case, A, Fig. 1, and A, A′, A″, Fig. 3, rests. This outside case, (A, Fig. 1,) is made open at the bottom and closed at the top, (A, A′, A″, Fig. 3,) and shuts down over the inner case, (*a*, *a*, Fig. 3,) as seen at A, Fig. 1, and secures the elastic vessel from dust, and all other external injuries, or impediments. The circular part of this outside case is extended, as seen at A, A″, Fig. 3, to steady the circular cap-piece, B, Figs. 1 and 3, which is the foot of the upright shaft, or column, C, Figs. 1, and 3, the top of which acts against and raises the lever, D, Fig. 1, when the elastic vessel is expanded by the increased pressure of the steam coming from the boiler, through the tube K. A weight, *d*, Fig. 1, is to be suspended from the lever D, Fig. 1, sufficient to balance the required pressure of the steam, which may be adjusted by sliding or moving it along the lever, or otherwise, as is most convenient; and a spring may be used to assist the weight.

The lever D, Fig. 1, is connected, by the connecting rod E, with the lever F, Fig. 1, so that when the pressure of the steam in the boiler is greater than is required, it expands the elastic vessel upward, which, by means of the upright shaft, or column C, Fig. 1, raises the lever D, Fig. 1, and allows the opposite end of the lever F, Fig.

1, to descend and close, (the damper in the chimney, or,) the gate H, Fig. 1, which regulates the wind from the blower, in part, or entirely, as is necessary, and in proportion to the increase of the pressure in the boiler beyond what is required; and when the pressure of the steam decrease, by the want of draft, the elastic vessel contracts and allows the lever D, to descend, and by means of the connecting rod E, and the lever F, to open the (damper or) gate H, to the necessary extent. The lever F, may be used or dispensed with according to the situation of the damper, or gate, or addition levers may be added, or the levers changed in direction, or arranged or connected in any way which may be found most convenient in each particular case.

The tube K, must be connected with the boiler in some convenient way so as to communicate with the inside of the boiler.

When the whole apparatus is thus connected, the steam, after once attaining the required pressure, and the wieght *d*, being properly adjusted on the lever D, will continue uniformly at that pressure while sufficient fuel is used.

When the blower is worked by a separate engine the lever F, Fig. 1, may be made to operate on the throttle valve of the blower-engine, and thereby lessen the force of the blower; or it may be used in any case, to act on the tightener of the belt of the blower, so that when the pressure of the steam in the boiler is greater than is required, the belt will be slackened, and allowed to slip on the pulley, and thus drive the blower with less velocity, and when the pressure of the steam again decreases the belt of the blower will be tightened, and the blower will be driven with greater velocity; so that the fire which generates the steam is governed by the steam it generates; and thereby a uniform pressure is preserved; the whole apparatus being a complete self regulator.

When the steam is not wanted for constant use, (as when it it not used during the night,) but it is desirable to keep up steam ready for use; the weight *d*, can be so adjusted on the lever D, Fig. 1, as to keep the steam at a less, but yet uniform pressure for any length of time, and be always ready for use when wanted, by re-adjusting the weight.

The advantages of my improvement over all other methods, now used, consists, (in part,) in its capability of keeping the pressure of the steam in the boiler uniform, by regulating the draft, or the force of the blower, (as the case may be,) by the pressure of the steam, or, making it a self regulator. Also in its extreme cheapness, and simplicity of construction and application; and the very small space it occupies, as the outside case of the elastic vessel need not be larger than three inches in diameter, and two inches high.

I am aware that the dampers for steam boilers have been operated by the pressure of the steam by means of pistons in various ways, and therefore I do not claim the opening and closing of the dampers by the pressure of the steam by means of pistons; but

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

The application of an elastic vessel substantially such as is herein described, instead of the piston, whereby the friction of the piston is avoided, and the operation on the damper is rendered much more uniform; the whole constructed and operating substantially as herein described.

TIMOTHY CLARK.

Witnesses:
WILLARD LYON,
R. FITZGERALD.

[FIRST PRINTED 1913.]