D. L. F. Chase.

Boiler Feeder.

No. 88,774. Patented Apr. 13, 1869.

Fig: 1.

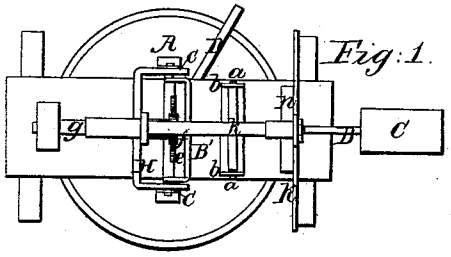


Fig: 3.

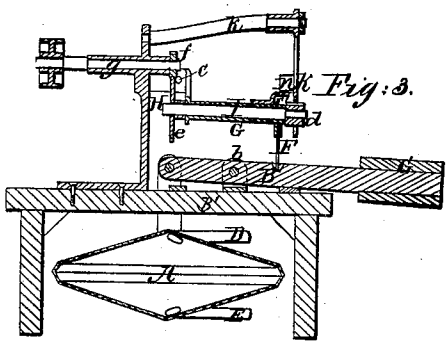


Fig: 2.

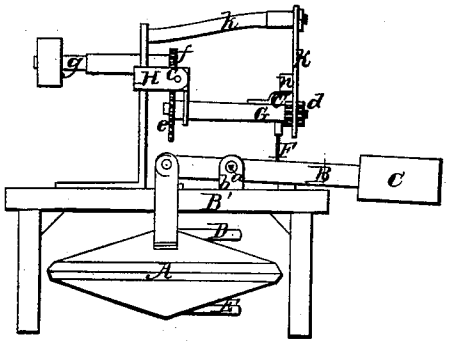


Fig: 4.

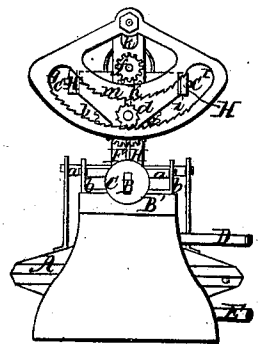
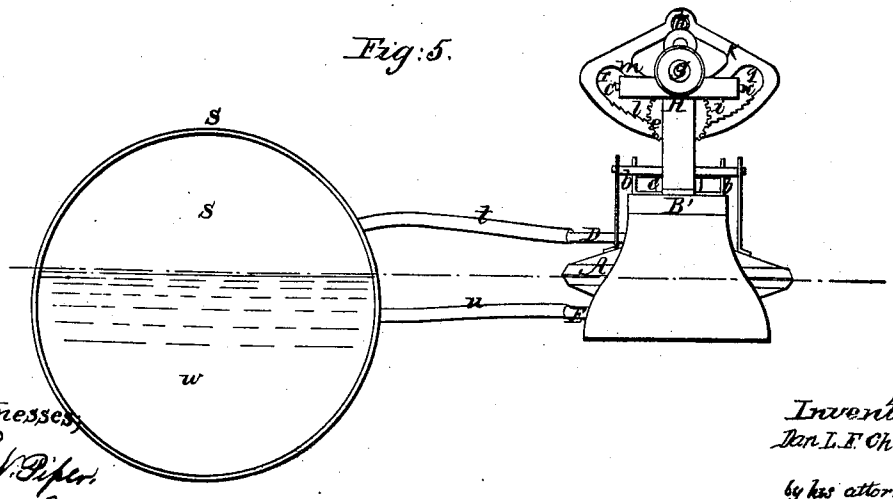


Fig: 5.



Witnesses;
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Dan L. F. Chase.
by his attorney.
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United States Patent Office.

DANIEL L. F. CHASE, OF BOSTON, MASSACHUSETTS.

Letters Patent No. 88,774, *dated April* 13, 1869.

IMPROVEMENT IN AUTOMATIC BOILER-FEEDERS.

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

To all persons to whom these presents may come:

Be it known that I, DANIEL L. F. CHASE, of Boston, of the county of Suffolk, and State of Massachusetts, have invented a new and useful Apparatus for Regulating the Supply of Water to a Steam-Boiler or Generator; and I do hereby declare the same to be fully described in the following specification, and represented in the accompanying drawings, of which—

Figure 1 is a top view;

Figure 2, a front side elevation;

Figure 3 is a longitudinal section; and

Figure 4 is a front end elevation of it.

Figure 5 denotes an end view of the apparatus as applied to a steam-boiler, the plane of the top surface of water in the boiler being level with the plane of the middle of the water-vessel of the apparatus.

In the drawings—

A denotes a metallic steam-tight hollow vessel suspended from one arm of a balance lever, B, having its fulcrum supported by knife-edge bearings *a a* and by standards *b b*, the latter being erected on the frame, or table B′, for sustaining the operative parts of the apparatus.

The said lever has on its other arm a weight, C, to overbalance the weight of the vessel A.

There is a pipe, D, opening out of the top, and another pipe, E, opening out of the bottom of the vessel A. The upper of these pipes is to connect with the steam-space *s*, of a boiler S, (see fig. 5,) by means of a flexible pipe, *t*. The lower of the said pipes is to communicate with the water-space *w* of the boiler, by means of a flexible pipe, *u*, the whole being so as to allow steam and water from the boiler, when generating steam, to flow freely into the vessel A. This vessel is to be arranged at such a height with respect to the proper level of safety, for the water to stand in the boiler, that the plane of the water-line may pass about through the middle of the vessel.

The effect of this arrangement is such that the water-level in the vessel must always be the same as that of the boiler.

Should the water fall in the boiler, it will fall in the vessel, and as a consequence there will be less weight in the vessel, and the weight C will depress the longer arm of the lever.

As the water may rise in the boiler it will flow into and also rise within the vessel, and when the weight of the water therein may be sufficient to overbalance the weight on the longer arm of the lever, that is after the water may have attained its proper height in the boiler, the vessel will descend, and raise the longer arm of the lever.

A pitman, F, extends from the said arm of the lever up to a tubular-sleeve, or lever G, which is pivoted within a standard, H, erected on the table, the pivots being shown at *c c*.

A shaft, I, extending through the sleeve, and supported by it, so as to be capable of being revolved within it, carries a pinion, *d*, at one end and a gear, *e*, at the other.

The said gear engages with another pinion, *f*, fixed on a driving-shaft, *g*, duly supported by the standard H, the whole being arranged in manner as represented.

The pinion *d* extends into the curved slot *i* of a sector K, pivoted to an arm, *k*, projecting from the standard H.

There is a rack, *l*, of teeth at the bottom of the slot *i*, and there is also such another rack, *m*, at the top of the said slot. The upper rack, at one end, projects somewhat beyond the lower one, while the lower one also extends as much beyond the other end of the upper rack, the whole being in manner as represented.

Furthermore, there is a curved flange, *n*, projecting from the inner face of the sector, the centre of the radius of curvature of the flange being coincident with that of the curved racks.

A tongue, *c′*, fixed to the sleeve by resting against the flange while the pinion *d* may be working in either of the racks, serves to keep the pinion in connection with the said rack until the former may pass the end thereof.

The rack-slot extends beyond one end of each rack in the manner as represented at *q* and *r*, in order that the pinion *d*, after having passed out of engagement with either rack, may continue to revolve without imparting any motion to the sector until the pinion may be next moved into engagement with the other rack.

Now, if we suppose the driving-shaft to be put in revolution, and the sector to be so connected with a water-supply apparatus, that when the sector is moved in one direction such apparatus shall be put in action, so as to discharge or feed water into the boiler, and shall be thrown out of action during or after a movement of the sector in the opposite direction, we shall find that we have a means of regulating the supply of water to the boiler in accordance with the demand for it.

As the water may fall within the boiler there will be a consequent fall of water in the vessel A until the weight on the longer arm of the lever, from which the said vessel is suspended, may depress such arm. When this may occur the pinion *d* will be moved into engagement with the lower rack of the sector, and while in engagement therewith, will move the sector in one direction until the pinion may pass out of engagement with the said rack. The pinion will next continue to revolve without producing any further movement of the sector until a quantity of water may have been driven into the boiler sufficient to raise the level of the water in the vessel A to the extent to cause such vessel to overbalance the weight of the lever, and thereby descend and move the lever in a manner to move the pinion into engagement with the upper rack. As soon as this may take place the sector will be put in motion in an

opposite direction until the pinion may pass off the end of the rack, or out of engagement with such rack.

The movement of the sector one way will cause the water-supply apparatus to let water flow or feed into the boiler, the reverse movement of the sector causing such apparatus to arrest the flowage of the water.

I would remark that instead of the sector, with its slot and racks, a slider, supported so as to be capable of sliding rectilinearly, may be employed, it having within it a straight slot provided with racks arranged on opposite sides of the slot.

I would also remark that in the place of the weight on the lever, a spring to act against the lever may be used.

I claim the combination of the vessel A, and its lever B and weight C, with the pitman F, the slotted and double-racked sector K, the vibratory shaft I, and pinion *d*, and the gears for revolving such shaft.

I also claim the combination and arrangement of the flange *n* and tongue *c'* with the duplex rack-sector K, vibratory pinion *d*, its shaft I, shaft-supporter and gears *e* and *f*, substantially as specified.

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Witnesses:

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