H. C. Crowell.

Steam Boiler Ejector.

No. 103,304. Patented May 24, 1870.

Fig 1

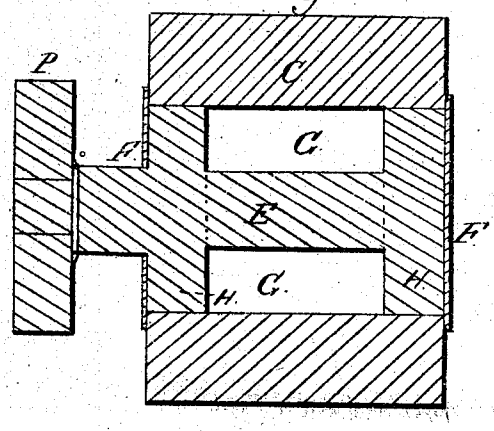
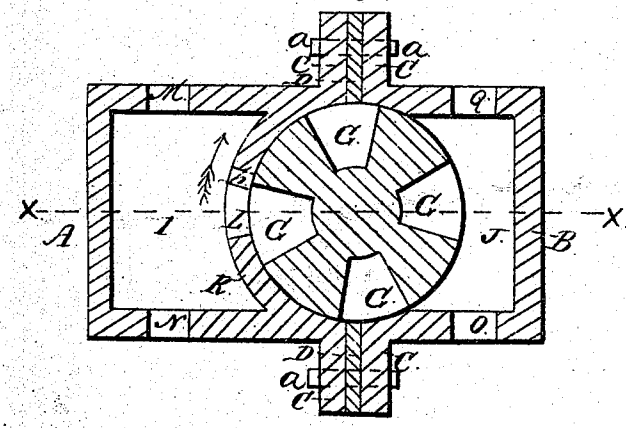
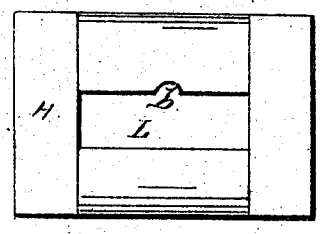


Fig. 2.





Witnesses
J. H. Burridge
E. E. Waite

Inventor
H. C. Crowell

United States Patent Office.

H. C CROWELL, OF MORGAN, OHIO.

Letters Patent No. 103,304, *dated May* 24, 1870; *antedated May* 10, 1870.

ROTARY INJECTOR FOR STEAM-BOILERS.

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, H. C. CROWELL, of Morgan, in the county of Ashtabula and State of Ohio, have invented certain new and useful Improvements in Rotary Injectors for Steam-Boilers; and I do hereby declare that the following is a full and complete description of the same, reference being had to the accompanying drawings making part of this specification, in which—

Figure 1 is a vertical transverse section.

Figure 2, a vertical longitudinal section.

Figure 3, a detached section.

Like letters of reference refer to like parts in the different views presented.

This invention has in view the supplying of steam-boilers with water while under pressure, and at such times only when the water therein shall have fallen below the water-line or line of safety, so that a certain and constant supply is given to the boiler at the proper time, and at no other, the apparatus being self-regulating and uniform so long as the pressure of the steam on the boiler is continued.

Fig. 2 represents a longitudinal section of an oblong square chest or case, made up of two sections, A B, and connected to each other by means of bolts *a*, projected through the flange C, the joint being made tight by a gasket, D.

Transversely in said case is closely fitted a cylinder, E, fig. 1, and retained therein by the plates F, secured to each end of the cylinder, and allowed to project over upon the sides of the case, as represented.

In the sides of said cylinder are sunk buckets or cups G, leaving at each end a section, H, for bearings, and to form the ends of the buckets.

It will be observed, on examination of fig. 2, that the cylinder does not occupy the center of the case longitudinally, but is a little at one side, leaving a much larger space at I than at J. The space or chamber I is divided off from the cylinder by a diaphragm, K, against which the cylinder is closely fitted. In the side of said diaphragm is cut an oblong square opening or port, L, fig. 3, which figure represents a side view of the diaphragm. Said port is equal in length to that of the buckets or cups, but a little less transversely. Midway in the upper edge of the port is bored a small hole, *b*, the purpose of which will presently be shown.

The space or chamber J is not partitioned off by a diaphragm as is chamber I, but is freely open to the side of the cylinder.

Having thus far described the construction and arrangement of the injector, the practical operation of the same is as follows, viz:

The apparatus is attached to the boiler so that the line *x x* shall be even with the water-line, and with which it is put in direct communication by a pipe leading from the hole M to the steam-space of the boiler, and by a pipe leading from the hole N to the water-space, thereby establishing a direct and immediate open relation between them, so that the water and steam will occupy the chamber I, as it does in the boiler by virtue of the law that water seeks its level under pressure as readily as in the open air.

The chamber J is put in open communication with a reservoir of water by a pipe leading from the hole O to the water, which is supposed to be slightly elevated above the line *x x*.

The apparatus on being thus properly adjusted in position, the cylinder is made to revolve by a belt passing over the pulley P, fig. 1. It will be obvious that as the cylinder rotates in direction of the arrows, the buckets G will carry water from the water-chamber J around to the port L, and discharge it into the chamber, should the water in the boiler, and consequently in the chamber I, be below the water-line *x x*, or rather, it will flow out of the buckets into the chamber, by virtue of the law of gravitation, and thus supply the boiler with water until it rises again to the water-line.

The equilibrium being restored between the water in the chamber and bucket, no more will flow in, but will be carried around back into the water-chamber J, from whence it was taken.

By this device it will be evident that the least fall of the water in the boiler below the water-line, will cause the water to flow from the bucket, as it comes in open relation to the port L, and thereby cause it to ascend to the water-line or top of the port, the point of safety.

To facilitate the flow of the water from the bucket when revolving rapidly, the hole *b* allows the steam to enter the bucket in advance of a full discharge of the water, and thereby forces it out into the chamber in less time than it would flow out unaided by the steam. By this means all the water may be forced from the bucket if that in the boiler is running low, and thus a more immediate filling of the boiler is effected.

A certain amount of steam, more or less, according to the amount of water left in the cups after being in open relation to the port, will be carried around to the water-chamber, wherein it is condensed, and allows the buckets to be filled again, which is again returned to the boiler.

To allow the escape of gas and condensed steam from the water-chamber, a vent, Q, is made in the roof of the chamber, through which it may pass off to the outside, and thereby prevent explosion or undue pressure upon the water in the chamber and buckets, without which, the expansion of steam would force the water back into the reservoir.

By the use of this apparatus a certain, constant, and

uniform supply of water is furnished to the boiler, not at intervals, when the water is found to be running low, but at all times, as each cup passes the port, a certain quantity will flow into the chamber, thence to the boiler, regularly and constantly, more or less, as the demand may be, thereby avoiding all danger of explosions in consequence of low water.

It will be obvious, that should the water by any means rise above the water-line or port L, no water from the cups could flow into the chamber, as the equilibrium of the fluid would be at a higher level, and therefore the water in the cups could not flow out before reaching the diaphragm above the port, which would shut off the cup from the port, and the water would be retained in the bucket; hence no accident can result from a too abundant supply of water to the boiler.

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

A rotary injector, when constructed with steam and water-chambers I J, cylinder E, diaphragm K, port L, vent Q, holes M N, and case A, all arranged in the manner substantially as described, and for the purpose specified.

H. C. CROWELL.

Witnesses:
J. H. BURRIDGE,
E. E. WAITE.