Maltby & Oborn,

Steam-Boiler Ejecting-Pump,

No. 50,205. Patented Sept. 26, 1865.

Fig. 1.

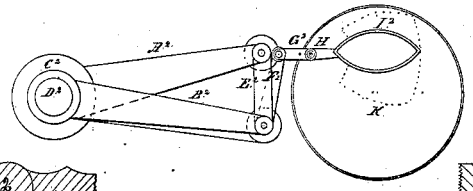
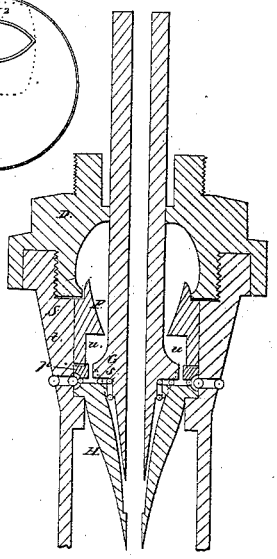


Fig. 5.

Fig. 2.



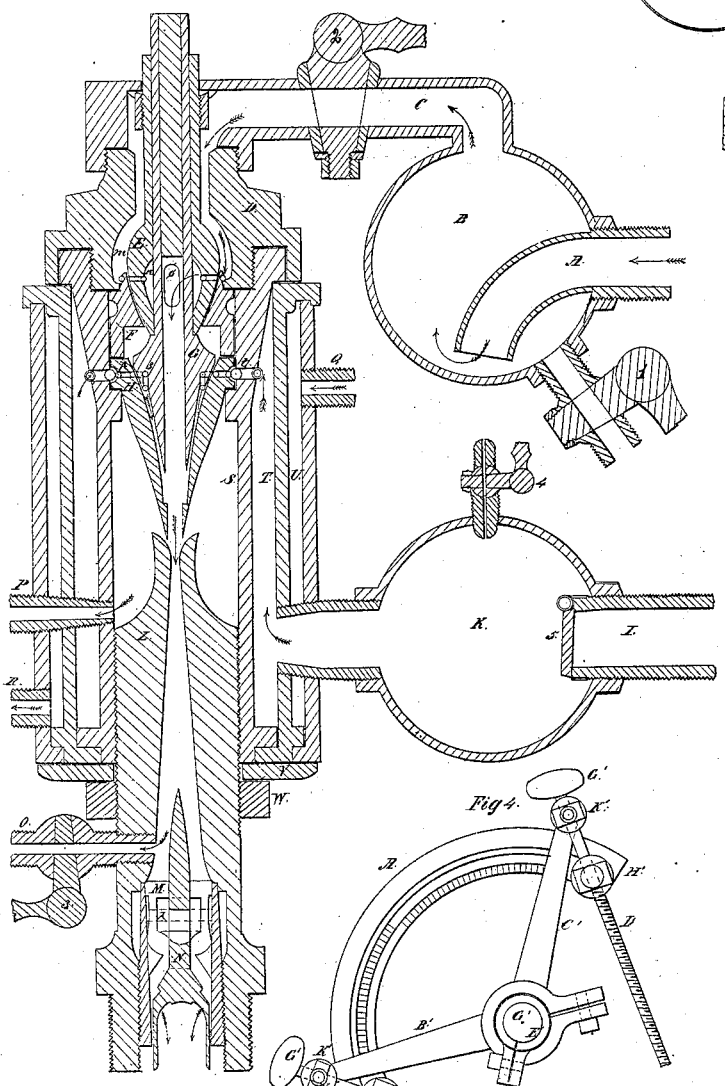


Fig. 3.

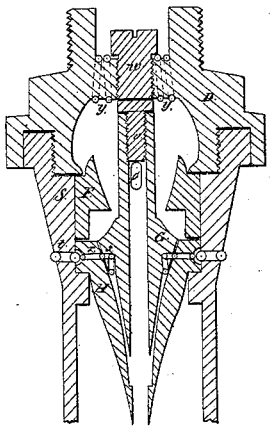
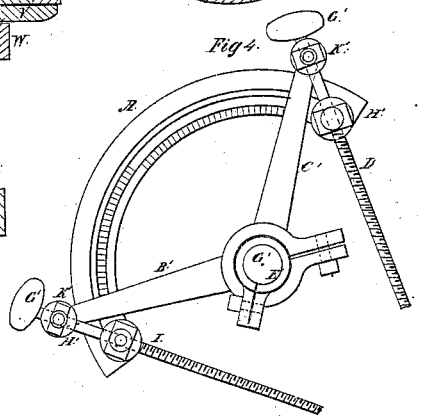


Fig. 4.



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UNITED STATES PATENT OFFICE.

SIDNEY MALTBY AND CHARLES OBORN, OF DAYTON, ASSIGNORS TO THEMSELVES AND WM. H. CLARK, OF CINCINNATI, OHIO.

IMPROVEMENT IN INJECTORS FOR STEAM-BOILERS.

Specification forming part of Letters Patent No. **50,205**, dated September 26, 1865.

To all whom it may concern:

Be it known that we, SIDNEY MALTBY and CHARLES OBORN, of Dayton, in the county of Montgomery and State of Ohio, have invented a new and Improved Injector for Feeding Steam-Boilers; and we do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

Like letters refer to like parts, the numerals used with the letters referring to the letters of the different figures.

The nature of our invention consists in the construction of an improved steam-boiler injector, and the use of a water-jacket applied to any form of injector, to cause a more constant operation with less attention.

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

Figure 1 represents a sectional view of the injector with its several attachments. Fig. 2 represents a sectional view of a modified form of the injector. Fig. 3 represents a sectional view of another modification of the injector. Fig. 4 represents an injector-index. Fig. 5 represents a device to regulate the supply of water.

A is a steam-induction pipe, conveying the steam into the hollow vessel B, this vessel having a stop-cock, 1, which is used to carry off the water until the steam no longer condenses. The stop-cock 2 is closed while the hollow vessel B is being heated sufficiently by the steam.

E is a regulating-valve, to govern the passage of the steam, having openings *n*. These openings have corresponding openings *m* in the packing-ring F, through which the steam passes, and by turning the valve within its ground seat the supply of steam is regulated. The steam passes from the pipe C, in the direction indicated by the arrows, through a series of orifices, *m*, in the packing-ring F, and through corresponding orifices *n* of the valve E; thence through the opening *o* through the orifice of the nozzle G, at the end of which it unites with the water. The nozzle G has a stem by which it is turned in a ground seat of the nozzle H, the two nozzles having a series of corresponding orifices for the passage of water, these orifices being so small that no substance can pass them which would obstruct the nozzles. The turning of one nozzle within the other regulates the flow of water. I, a water-induction pipe, having a check-valve, 5, on the end, within the hollow vessel K. This valve prevents the blowing of the water out of the pipe when the injector fails to operate. This arrangement prevents the heating of the vessel K and the induction-pipe by the steam. In using hot water the stop-cock 4 is used to carry off the steam which accumulates within the hollow vessel K. The water passes from the vessel K to the space within the water-jacket T; thence through the orifices *t t* of the injector S into the groove of the nozzle H, and through a series of openings, *r*, of the nozzle; and thence through the openings *s* of the nozzle G in the direction shown by the arrows, passing outside of the nozzle G, and uniting with the steam at the end of said nozzle. Thus united they pass through the end of the nozzle H, passing the open space into the eduction-nozzle L, and from thence through the feed-pipe to the boiler. The valve-case M is screwed down to a shoulder, and the end is closed with an extra or supplementary valve, *x*, connected to the stem of the valve N. This valve closes the case and receives the force of the water and thereby carries the valve from its seat. The supplementary valve secures the raising of the valve with less force than would be required if its action were directly on the check-valve, in consequence of the water acting on an increased surface.

It is apparent that the usual form of check-valve presents the greater surface on the side next to the boiler; hence a force greater than the resistance is required to force the valve from its seat, while by the arrangement here presented this difficulty is overcome. The stop-cock 3, on commencing the use of the injector, is opened until the steam and water are fully in motion, when by instantly closing the same the full force is communicated at once to impel the water through the feed-pipe.

The cap D has the induction-pipe C connected at its top, and is screwed into the injector S, making the joints on either side of the packing-ring F steam-tight, and thus holding the

packing-ring F and the two nozzles G and H in position. The nozzle L screws into the end of the injector, by which it is adjusted with reference to the nozzle H. A loose flange, V, is slipped over the nozzle L, and with the lock-nut W the two water-jackets T and U are held in position and packed. The external jacket, U, is supplied with the overflow of water through the pipe 2, and the water flows out at the pipe R. The use is to prevent the temperature of the injector rising above 212° in working hot water.

In working cold water it is not necessary to use the external jacket, U. The inner jacket, T, has the induction-water passing or circulating through it to the injector, which water preserves a lower and more uniform temperature, thereby preventing the "unsetting" of the injector from slight changes of temperature. For other forms of injector we construct a case or jacket of suitable form, which in effect is identical with the jacket T. The waste-pipe P is used to carry off any water accumulating about the nozzles.

Fig. 2 represents a modification, dispensing with the valve E and providing orifices *u u* for the passage of the water to the space occupied by the valve and steam space to lessen the heating surface. The steam-pipe is attached to the end of the nozzle G in such manner that the nozzle may be adjusted.

Fig. 3 represents still another modification. The plug *v* closes the stem of nozzle G, and furnishes a surface for the set-screw W, which holds the nozzle to its seat. The steam-pipe is connected to the cap D, and the steam passes through the orifices *y y* to the inner space, thence through the openings *o*, as hereinbefore described.

Fig. 4 represents an injector-index, to enable the engineer to adjust the flow of steam and water with the greatest accuracy. A′ is an index having degrees marked thereon and numbered. B′ is an arm attached to the stem of the valve E. This arm is made to move along the index A′ by the thumb-screw G′, this screw having a movable nut, H′, attached to the end of the index, and a movable joint, K′, by which the requisite movement is given. The arm C′ is connected to the stem of the nozzle G, and is similarly constructed and operated.

Fig. 5 represents a device to regulate the supply of water, used in connection with the injector. K^2 represents the end of a steam-boiler, a section being cut away to show the float within. A shaft, at H^2, passes through the boiler-head, having a stuffing-box, and to the end within the boiler is connected the arm attached to the float I^2, the arm G^2 having a joint by which it is connected to the arm E^2, which connects the levers A^2 and B^2, which are connected to the valve E and nozzle G, hereinbefore described. The movement is produced by the float and is communicated so as to change the relation of the holes *m* and *n* and the holes *r* and *s*, and thereby the flow of water into the boiler is regulated to the amount required.

Having thus fully described our invention, what we desire to secure by Letters Patent is—

1. The valve E, the nozzle G, the packing-ring F, the nozzle H, the cap D, and cylinder S, constructed and arranged substantially as described, and for the purposes set forth.

2. The arrangement of the nozzle L, the waste-cock Z, the flange V, the lock-nut W, and the cylinder S, substantially as described.

3. The supplementary-valve *x*, attached to a check-valve, substantially as described, and for the purposes set forth.

4. The arrangement of the hollow vessel K, the check-valve 5, or its equivalent, and the vent-cock 4, for the purposes specified.

5. The arrangement of the hollow vessel B, the pipe A, and the stop-cocks 1 and 2, for the purposes specified.

6. The adjusting-index, in combination with the steam-injector, for the purposes set forth.

7. The float I^2, in combination with the valves of the injector, for the purposes specified.

8. The arrangement of the water-jackets T and U, substantially as described, and for the purposes set forth.

9. A water-jacket, when applied to a steam-injector, substantially as and for the purpose described.

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Witnesses:
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