J. T. HANCOCK

INSPIRATOR.

No. 185,861. Patented Jan. 2, 1877.

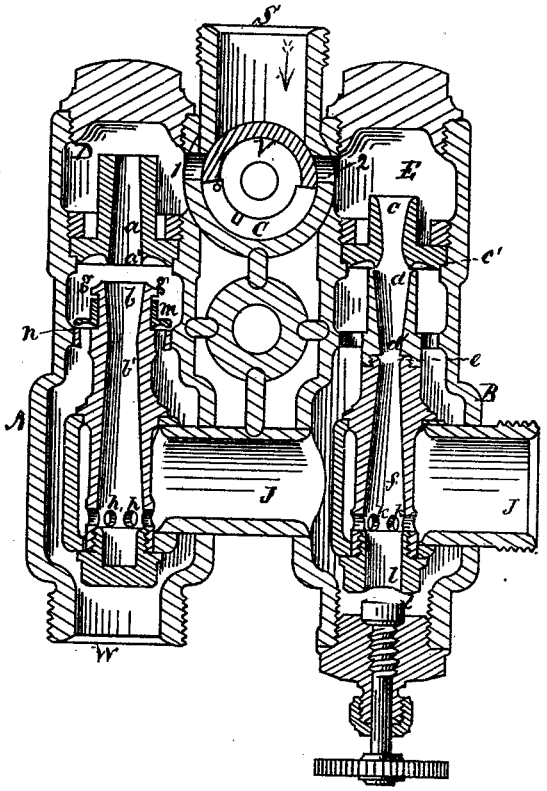

Fig. 1.

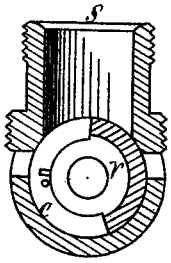

Fig. 2.

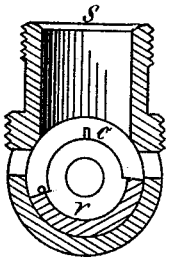

Fig. 3.

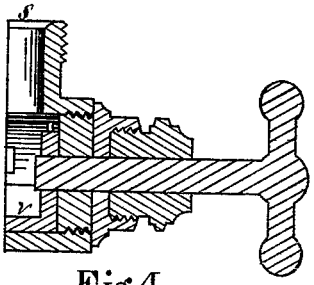

Fig. 4.

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UNITED STATES PATENT OFFICE.

JOHN T. HANCOCK, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN INSPIRATORS.

Specification forming part of Letters Patent No. **185,861**, dated January 2, 1877; application filed August 25, 1876.

To all whom it may concern:

Be it known that I, JOHN T. HANCOCK, of Boston, in the county of Suffolk and State of Massachusetts, have invented an Improved Hydraulic Apparatus entitled an "Inspirator," of which the following is a specification:

My invention relates to that class of apparatus known as "injectors;" but as this title is not a correct indication of the mode and cause of action of my invention, I have given it the name of "inspirator," which I consider as more applicable to and expressive of the nature of my invention.

The object of my invention is, first, to supply water to a boiler by a less expenditure of power than that required for a pump, and, consequently, with a relative saving of fuel; secondly, to draw the required quantity of water, by means of the attractive power of steam acting in one part of my apparatus, from the greatest depth which a pump is capable of doing, and to deliver the same to another part of my apparatus in quantity equal to what the said part requires at all varying pressures of steam, from zero upward, and with reasonable variations in the temperature of the water; thirdly, to regulate the supply of water to the requirements of a boiler, even when the apparatus is exposed to sudden jars or shocks, thus insuring a constant and reliable feed. These three important features—viz., economy, capacity, and reliability—I claim to have accomplished in my apparatus, when the ordinary injector has failed.

My invention consists in the employment and combination of two sets of apparatus, contained each in a separate chamber, the one being employed for lifting water from a well or other source of supply, and conveying the same to the other chamber, from whence it is conducted to the boiler.

In the accompanying drawing, Figure 1 represents a vertical section of an apparatus embodying my invention. Figs. 2, 3, and 4 represent the main valve in different positions, connecting with the steam-pipe from the boiler.

A and B are two cylindrical casings. The casing A contains the injector apparatus for lifting the water, and B the injector apparatus for transmitting the water to the boiler. The two casings A and B are connected, near their upper ends, with a pipe, S, leading from the boiler. At the lower end of the pipe S, and between the steam-chambers in the upper portions of the casings A B, is a circular valve-chamber, C, containing a valve, V, which is capable of being partially rotated, so as to cover or uncover one or both of the ports 1 and 2 in the steam-chambers D and E, so as to admit of the passage of steam to the same, as required. In chamber D is a conical pipe or passage, *a*, the larger diameter being at the lower end, so that the steam, in passing through the same, expands. Below the pipe *a* is a conical tube, *b*, a space, *g*, being left being left between the two, the area of the upper part of tube *b* being somewhat larger than that of the lower end of tube *a*. The tube *b* is contracted for a short distance, and then expands again, as shown, the lower end of the same being closed, and provided near the end with orifices *h h*, connecting with the conduit J, which communicates with chamber B, and extends to the boiler. Near the upper portion of the pipe *b*, and surrounding the same, is a valve, *m*, seated on a projection, *n*, and which is allowed a slight vertical motion. It is designed to prevent the water from falling in the event of its upward flow being partially and temporarily checked by the presence of air at the space *g*, or by the passage of water through the jet-tube *a*.

In the steam-chamber E is fitted a conical tube, *c*, having an enlarged lower end opening into an annular space, *c'*. Below the tube *c* is another conical tube, *d*, which I term a "combining-tube," a space being left at the top so as to admit of the passage of water or steam from the main chamber of casing B into the said tube. The upper end of tube *d* is considerably larger than the lower end of tube *c*, and at the diminished portion *d'* is a groove, *e*, for the purpose of equalizing the velocity of the water across the horizontal section of the moving column at that point. Below the point *d'* the portion *f* of the tube expands, and is provided at its lower end with a valve, *l*, for closing the same when necessary.

Near the lower end of the tube *f* are openings *k k*, to allow of the passage of the water into the conduit J when the valve *l* is closed.

The operation of my inspirator is as fol-

lows: The apparatus being connected with the boiler by the pipe S, and the casing A being connected at W with a well or other water-supply, the valve V is set in the position shown in Fig. 2, to allow the steam to pass from the pipe S into the steam-chamber D, the valve *l* being open. The steam then passes through the tube *a a'*, across the opening *g* into tube *b*, and thence out through the openings *h h* into the conduit J; thence to the chamber in casing B, and upward over the top of and into the tube *d;* then descending through the pipe *f*, and passing through the openings *k k* into conduit J, makes its exit (unless condensed during its passage) by means of an ordinary valve placed in the extension of conduit J before reaching the check-valve of the boiler. A portion of the steam will pass downward from conduit J and enter the tube *f* at the valve-opening *l*, and thence pass upward through the openings *k k*. The flow of steam across the interval *g*, between the tubes *a* and *b* in chamber A, soon exhausts the air in said chamber and the pipes connecting with the water-supply, which allows the water to ascend to condense the steam and fill all the passages to the bottom of tube *f*. The valve *l* is then closed, and the water passes upward to the top of the chamber in casing B, and flows downward through pipe *d*, leaping across the groove *d'* into the tube *f*, and passes out through the orifices *k k* into conduit J, and thence toward the valve, between the check-valve of the boiler and the apparatus.

As soon as the valve *l* is closed the valve V is turned, so as also to open communication from the pipe S to the chamber E, as shown in Fig. 3, which allows the steam to flow through the tube *c* into the water which is now passing through the combining-tube *d*, where the steam is condensed. The flow of water, being now accelerated by this second jet of steam, moves rapidly through the conduit J to the temporary outlet in the same, and upon closing the valve the water can only escape through the check-valve into the boiler. By diminishing the flow of the steam from the boiler a corresponding diminution of the quantity of water is supplied to the boiler.

I claim as my invention—

1. The combination of the steam-chamber D, the jet-tube *a*, the interval *g*, the combining-tube *b b'*, and valve *m*, the whole composing a lifting apparatus, substantially as set forth.

2. The combination of the steam-chamber E, the jet-tube *c*, the annular space *c'*, and the combining-tube *d d'*, the whole composing a transmitting apparatus, substantially as described.

3. The combination of an injector for forcing water into a boiler, and a second injector communicating with the well, and communicating with and supplying water to the first, substantially as described.

4. The combination of two communicating injectors, one communicating with the well and the other with the boiler, and a valve, whereby steam may be directed to either or both, as specified.

5. The groove *e*, in combination with the tube *d* and delivery-tube *f*, substantially as and for the purpose set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN T. HANCOCK

Witnesses:

JOS. H. ADAMS,

C. W. TUTTLE.