M. T. DAVIDSON.

Traps for Steam-Pipes.

No. 145,157. Patented Dec. 2, 1873.

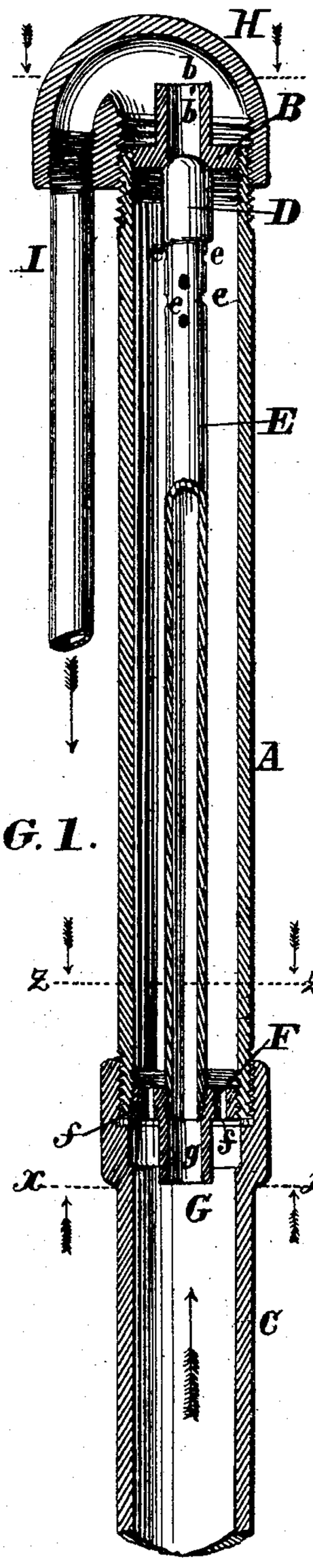

FIG. 1.

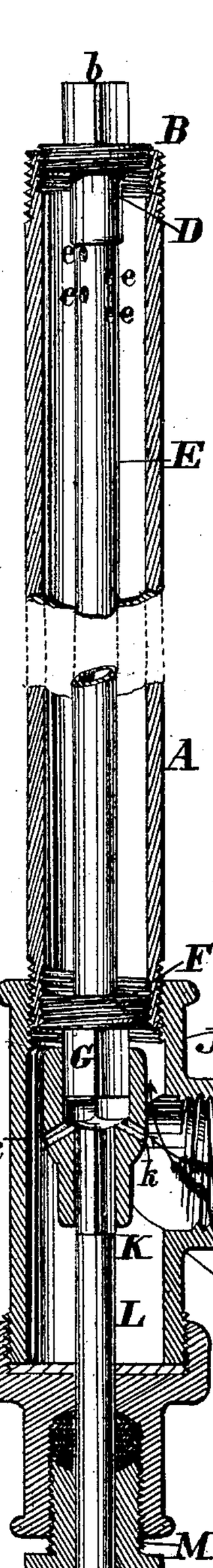

FIG. 5.

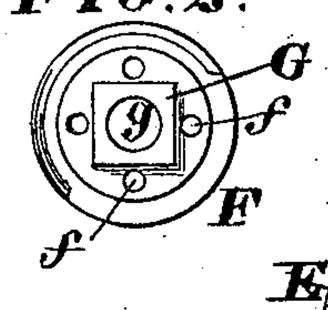

FIG. 2.

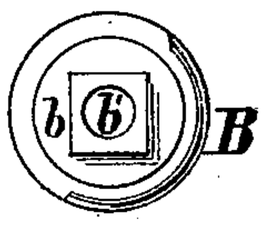

FIG. 3.

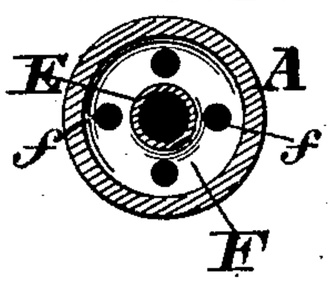

FIG. 4.

WITNESSES.
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UNITED STATES PATENT OFFICE.

MARSHALL T. DAVIDSON, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN TRAPS FOR STEAM-PIPES.

Specification forming part of Letters Patent No. **145,157**, dated December 2, 1873; application filed October 14, 1873.

To all whom it may concern:

Be it known that I, MARSHALL T. DAVIDSON, of Brooklyn, in the county of Kings and State of New York, have invented an Automatic Trap to Discharge Air from Steam-Pipes, of which the following is a specification:

My automatic trap consists, essentially, of a valve attached to the extremity of a pipe of copper or other highly-expansive metal, through and around which the steam is allowed to pass, and an outer pipe of iron, within which the copper pipe is set adjustably, so that the proximity of the valve to its seat may be regulated, as required. The outer pipe may be applied to or form part of a steam-heating coil. The greater expansibility and contractibility of the copper pipe, and the greater heat imparted thereto by the circulation of the steam on both the inside and outside of it, cause the valve to be tightly closed when the pipes are full of steam, and to be opened when air accumulates in the pipes, allowing the parts to cool by radiation.

In the accompanying drawing, Figure 1 is a vertical section of the upper end of a steam-heating coil with my automatic regulator attached. Fig. 2 is a view of the lower end of the regulator at *x x*, Fig. 1, the connecting-pipe being omitted. Fig. 3 is a view of the upper end thereof at *y y*, Fig. 1, the cap-pipe being omitted. Fig. 4 is a horizontal section at *z z*, Fig. 1. Fig. 5 is a vertical section illustrating attachments by which the apparatus is tested and adjusted, as hereinafter described, prior to its application to the steam-coil, of which it is to form a part.

A represents a pipe, to be applied to the upper end of a pipe, C, forming part of the coil of a steam heating apparatus. B is an adjustable head, occupying the threaded upper end of the said pipe. This head is formed with a square, *b*, for the reception of a suitable key to adjust it, and with a central aperture, *b'*, countersunk at its base, to serve as a seat for the valve D, which is attached to the end of a copper pipe, E, fixed in a head, F, which latter is threaded on its periphery, and fits within a corresponding screw-thread in the lower end of the pipe A, so that, by turning the connected head F and pipe E, the valve D may be adjusted relatively to its seat, as may be necessary. For this purpose the head is formed with a square, G, for the reception of a key. An aperture *g*, extends through the square G, to admit steam to the interior of the pipe E; and apertures *f*, surrounding the said square, admit steam to the space around the pipe E. In the upper part of the said pipe are apertures *e*. These provisions permit the steam to circulate freely within and on the outside of the copper pipe. The pipe A is, preferably, surmounted by a cap-pipe, H, provided with a conductor, I, to carry off any water of condensation which may be carried over with the air or steam.

For the purpose of adjusting the valve before applying the apparatus to the heating-coil, I have devised the apparatus represented in Fig. 5. This consists, essentially, of a T-coupling, J, provided with an internal key, K, attached to a rod, L, which is adapted to slide through a stuffing-box, M, in the base of the T-coupling, and is slid or turned, as required, by a handle, N. Apertures *k*, through the walls of the key K, admit steam to the interior of the copper pipe, when the key is applied thereto. The T-coupling J is screwed upon the end of a steam-pipe, O, provided with a cock, P, of any suitable form.

To obtain a proper adjustment of the valve D, the apparatus is applied to the T-coupling J, as illustrated in Fig. 5. The key K is advanced until it engages with the square G. The cock P is then opened, when the steam, by passing both inside and outside of the copper pipe E, quickly expands the said pipe. The key K is then turned to the right, so as to force the valve D tightly to its seat. The cap H is then screwed tightly down, and the apparatus, being removed from the adjusting-coupling, is ready to be placed in its permanent position on the steam-coil.

It will now be apparent that, when the pipes A and E contain no steam, the excessive contraction of the copper pipe E, as compared with the iron pipe A, will withdraw the valve D from its seat.

When steam fills the coil and displaces the air contained therein, the pipe E, by reason of its having steam both inside and out, and by reason, also, of the greater expansibility un-

der heat of the material of which it is made, expands more rapidly, and to a greater extent, than the pipe A, and thereby tightly closes the valve.

My apparatus thus provides an automatic and effective mode of relieving steam-coils of the air which invariably collects therein, more or less air being carried in with the steam and separated therefrom as the steam condenses.

An accumulation of dead air necessarily results in the cooling of the pipe E, the effect of which is to open the valve, as before stated, and permit the escape of such air under the pressure within the pipes, and, as soon as the air has escaped, the occupation of its place by steam closes the valve.

The apparatus is thus automatic in its operation, and requires no attention. It is supplied to the mechanic in readiness for application as simply as an ordinary pipe.

The following is claimed as new:

1. The combination of the external iron pipe A, the internal copper pipe E, the valve D, seat B, and openings *e*, *f*, and *g*, to permit the free circulation of steam both inside and outside the pipe E, as explained.

2. The combination of the pipe A, port *b'*, valve D, expansible hollow valve-rod or pipe E, and the head F, adjustable, for the purpose of setting the valve in proper normal position, substantially as explained.

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Witnesses:
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