(No Model.) 3 Sheets—Sheet 1.

W. VANDERMAN.

STEAM TRAP.

No. 300,664. Patented June 17, 1884.

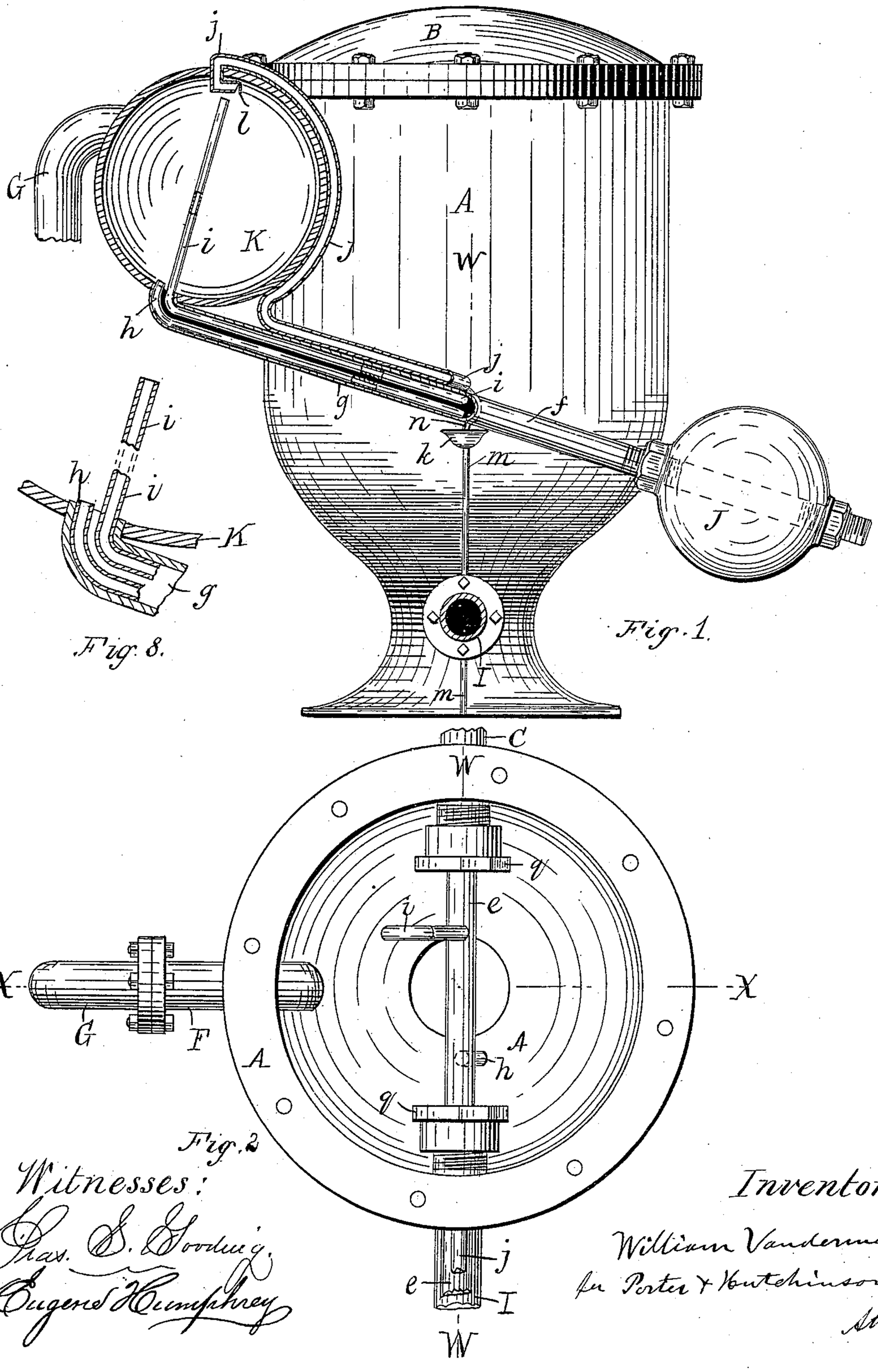

Fig. 1.

Fig. 8.

Fig. 2

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(No Model.) 3 Sheets—Sheet 2.

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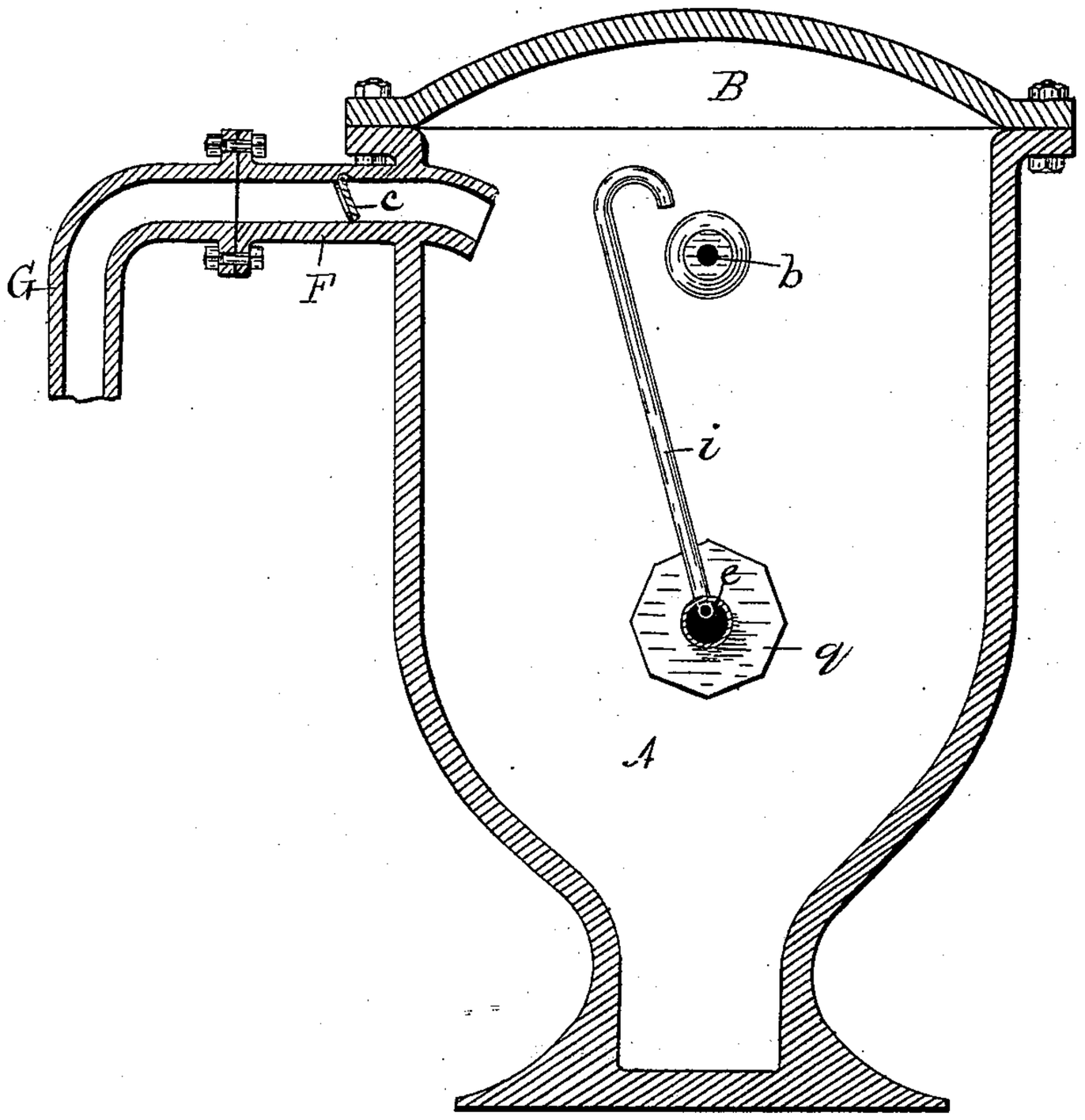

Fig. 3.

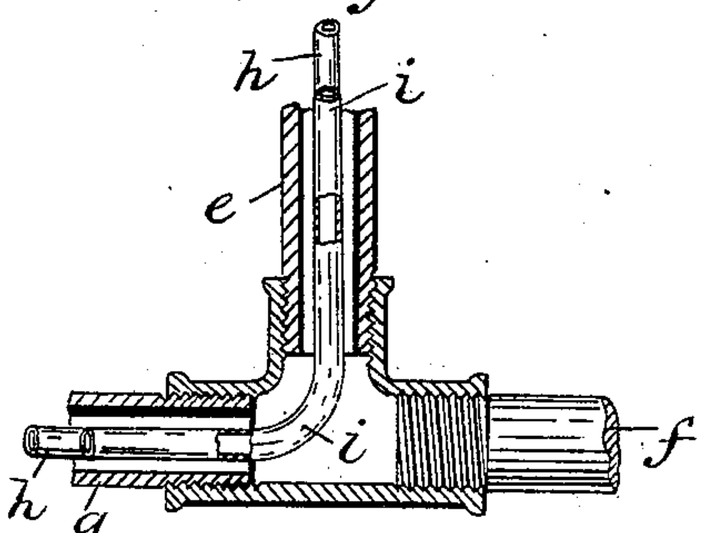

Fig. 5.

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(No Model.) 3 Sheets—Sheet 3.

W. VANDERMAN.

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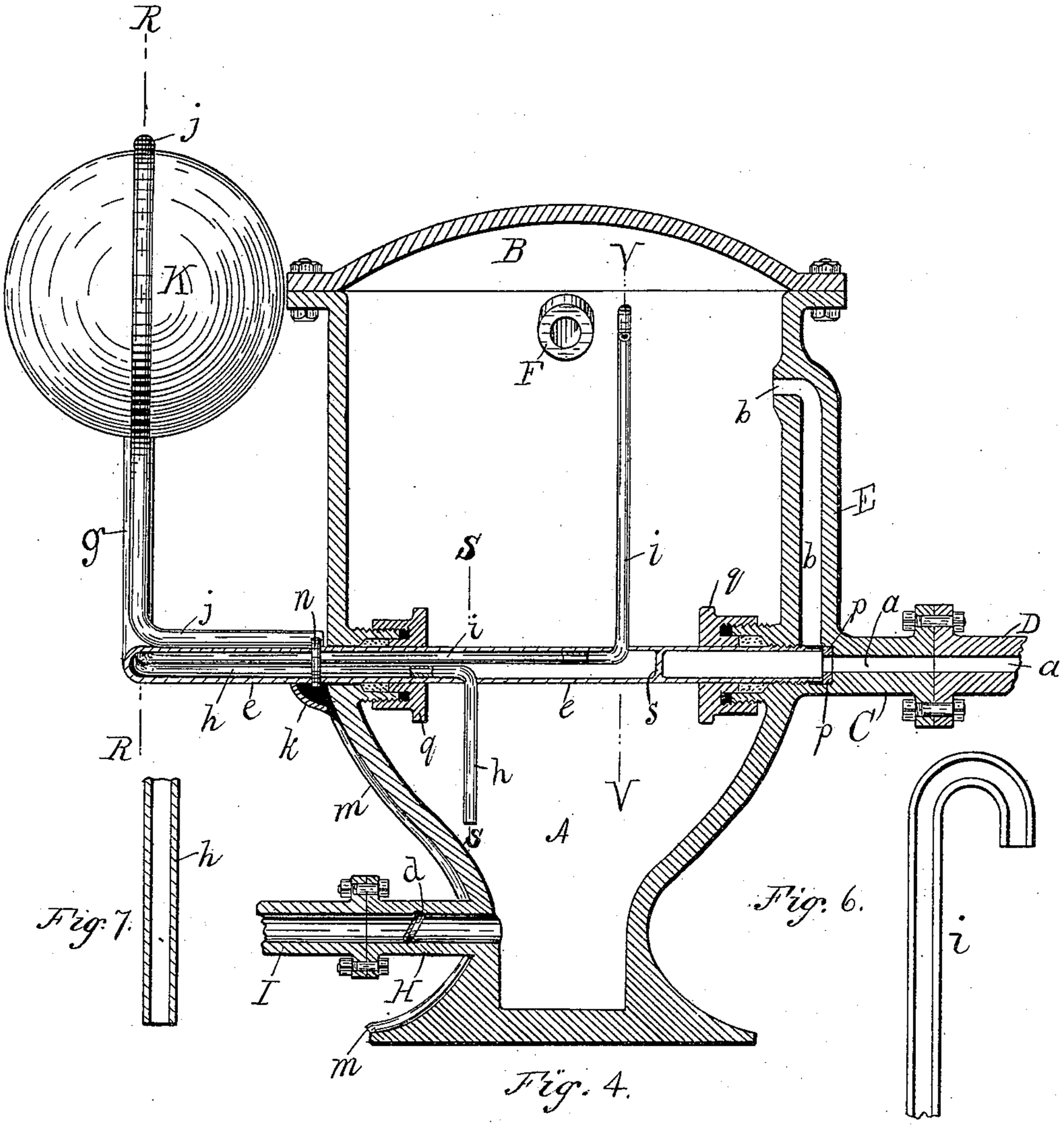

Fig. 4.

Fig. 7.

Fig. 6.

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UNITED STATES PATENT OFFICE.

WILLIAM VANDERMAN, OF WILLIMANTIC, CONNECTICUT.

STEAM-TRAP.

SPECIFICATION forming part of Letters Patent No. 300,664, dated June 17, 1884.

Application filed September 7, 1883. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM VANDERMAN, of Willimantic, in the county of Windham and State of Connecticut, have invented a new and useful Improvement in Steam-Traps and Boiler-Feeders, which will, in connection with the accompanying drawings, be hereinafter fully described, and specifically defined in the appended claims.

This invention relates to that class of steam-traps by which the water of condensation is returned back into the steam boiler or generator; and it consists in the construction and combination of the divers devices embodied therein, as is hereinafter, in connection with the accompanying drawings, more particularly and fully set forth and claimed.

In said drawings, Figure 1 is a side elevation of a steam-trap embodying my invention, the hollow globe and its supporting-arm being shown in vertical section, as on line R R, Fig. 4. Fig. 2 is a top or plan view of the same, except that said globe is omitted, as is also its counter-weight. Fig. 3 is a longitudinal vertical section taken on line Y Y, Fig. 2. Fig. 4 is a similar section taken on line W W, Figs. 1 and 2. Fig. 5 is a detached longitudinal section showing the intersection of the arbor, the arm that supports the solid weight, and the hollow arm that sustains the water-globe or weight, the arrangement of the tubes that communicate with said water-globe being also partly shown. Fig. 6 is a detached section taken on line V V, Fig. 4, through one of the pipes that communicate with the water-globe. Fig. 7 is a similar section taken on line S S, Fig. 4, through the other pipe that communicates with the water-globe. Fig. 8 is a detached sectional view showing the arrangement of the water-pipes in the hollow globe.

In said views, A represents the body or case of my improved trap, which body is preferably formed as an iron casting, and it is provided with a top, B, which is secured in place by bolts inserted in outwardly-projecting flanges formed on A and B, all in the well-known manner, as shown.

At or near the vertical center of body A, I form a short flanged projection or branch, C, having an axial passage, *a*, for induction of steam, which is led directly from the boiler through pipe D, which is connected therewith and with branch C. The axial passage *a* in branch C is continued up and into the case, near its top, in enlargement E, formed thereon, such continuance of the steam-passage being shown at *b*.

At ninety degrees from branch C, and near the top of the case, is formed branch F, which by a pipe, G, is connected with the receptacle of the water of condensation. In said branch F, I arrange, as shown, a hinged valve, *c*, which is automatically opened by the flow of water into A, and is closed by the steam-pressure in A when it is being emptied, as will be explained.

Opposite to branch C, I form a branch, H, which is connected directly with the boiler by a pipe, I, which will lead the water when it is expelled from A back into the boiler. A hinged stop-valve, *d*, is arranged in branch H, as shown, to automatically open when the paramount pressure is from the trap toward the boiler, and to close when the greater pressure is from the boiler toward the trap. A hollow shaft, *e*, is mounted in bearings in the walls of A, so that its axis is coincident with steam-passage *a* in branch C. Upon the outer end of this shaft is secured a rigid arm, *f*, upon which is mounted a weight, J, which, by means of nuts, is secured in place thereon, and may thereby be adjusted relatively to said shaft. A hollow arm, *g*, extends from the opposite side of said shaft and forms a tangential connection with hollow globe K. Two curved tubes, *h* and *i*, are arranged in shaft *e* and arm *g*, said tube *h* extending below the shaft, as shown in Fig. 1, inside of A, and terminating at its upper end at the bottom of the interior of globe K, (see Fig. 1,) while tube *i* extends above shaft *e* to nearly the top of A, where it is bent to a half-circle, Fig. 6, and at its opposite end it terminates near the top of the interior of globe K. (See Fig. 1.) An air-pipe, *j*, is arranged on globe K, which it enters at the top, and extends inside thereof in a horizontal direction a short distance, and is there provided with a hinged gravitation or swinging valve, *l*, which leaves the passage in the tube open when the globe is raised, as shown in Fig. 1, but will close the same when the globe falls, as will be described. Said pipe *j* extends down on *g* and along shaft *e*, close to the exterior of case A, and a small

branch, *n*, extends around the shaft to the drip-cup *k*, from whence a waste-pipe, *m*, conducts the water to any desired point. The inner end of shaft *e* is threaded in the wall of case A, as shown in Fig. 4, in order that when said shaft is rotated by the falling of globe K the shaft, whose end constitutes a valve which bears against packing *p*, will be withdrawn therefrom, and so allow steam to pass from passage *a* into passage *b*, and thence into the trap. A partition, *s*, (shown in shaft *e*,) shuts off the flow of steam through the same; or that part of shaft *e* next to packing *p* may be solid, if preferred. A stuffing-box, *q*, is shown as arranged to pack shaft *e*, where it passes through each wall of the trap; but such packing is not absolutely essential at the end where the steam enters, because a slight leaking of steam into the trap at that point would not seriously interfere with its working.

The practical operation of my invention is described as follows: The trap being arranged and secured in proper relative position, and the connections made, as already described, and globe K being raised, as shown, the trap will be gradually filled with the water of condensation, which will be forced in through pipe G by the steam-pressure in the boiler which supplies the steam thus condensed, such filling of the trap being facilitated by the vacuum which is created in the trap by the condensation of the steam, which is introduced therein to force the water therefrom into the boiler, as will be explained. As the water rises in the trap, it will coincidently fill tube *h* and globe K, the air in the trap escaping by tube *i* into the globe, and the air in the latter escaping through pipe *j*, any water escaping with the air passing off by cup *k* and pipe *m*, as described. When the water has so far risen that globe K preponderates weight J, the globe will fall the distance permitted by the curved arm of tube *i* in the trap, thereby closing valve *l*, and at the same time rotating shaft *e*, and by the action of its described screw-thread moving it away from packing *p* to allow the steam to ascend in passage *b* and enter the trap. When steam-pressure is thus established in the trap, it will act equally in tubes *h* and *i*, thereby producing an equal pressure at the top and bottom of globe K, thus leaving the water therein free to escape by pipe *h* into the trap by force of gravitation, as the steam-pressure in the trap forces the water that is therein back into the boiler through pipe I, such result being effected by the conjoint action of the steam-pressure in the trap and the force of gravitation due to the height at which the trap is arranged above the boiler. When globe K is thus emptied, it will be raised by weight J and the operation repeated.

As shown in Fig. 5, the shaft *e* and its arms *f g* may be respectively secured by means of corresponding screw-threads in a T-shaped coupling as a convenient method of manufacture and as also furnishing facilities for introducing tubes *h i* into the shaft and arm *g*.

I claim as my invention—

1. In a steam-trap, the combination of a shaft journaled therein and arranged to serve as the valve of the steam-induction passage, a hollow globe mounted upon an arm extending from said shaft and properly counterweighted, an air-escape tube connected with the top of said globe and provided with an automatic valve arranged to close when the globe falls, and two tubes inserted in said shaft and communicating with the interior of the trap and terminating at their opposite ends, one at the top and the other at the bottom of said globe, substantially as specified.

2. In a steam-trap, the combination of body A, provided with the water inlet and outlet passages and their automatic stop-valves, a steam-inlet passage, and a rock-shaft arranged to serve as the valve thereof, a hollow globe and its counter-weight arranged upon arms projecting from said shaft, an automatically-closing air-escape pipe communicating with the top of said globe, and two pipes communicating with the interior of the trap and respectively at their opposite ends with the top and bottom of the chamber in said globe, substantially as specified.

3. In a steam-trap, the combination of a rock-shaft, a hollow globe, and counter-weight arranged upon arms projecting from said shaft, two tubes arranged at one end to communicate with the interior of the trap, and at their opposite ends to communicate, respectively, with the bottom and top of the chamber in said globe, an air-tube communicating with the top of said chamber and provided with an automatic valve, and a steam-controlling valve arranged to be actuated by said shaft when the same is rocked, substantially as specified.

4. In a steam-trap, the combination of a rock-shaft journaled therein and arranged to serve as the steam-controlling valve, a hollow globe suitably counterweighted and arranged on an arm projecting from said shaft, and a system of tubes arranged to allow the water to rise in said globe coincidently with that in the trap and to recede in the same manner when both are being emptied, substantially as specified.

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