

(No Model.)

W. VANDERMAN.

3 Sheets—Sheet 1.

STEAM TRAP.

No. 310,967.

Patented Jan. 20, 1885.

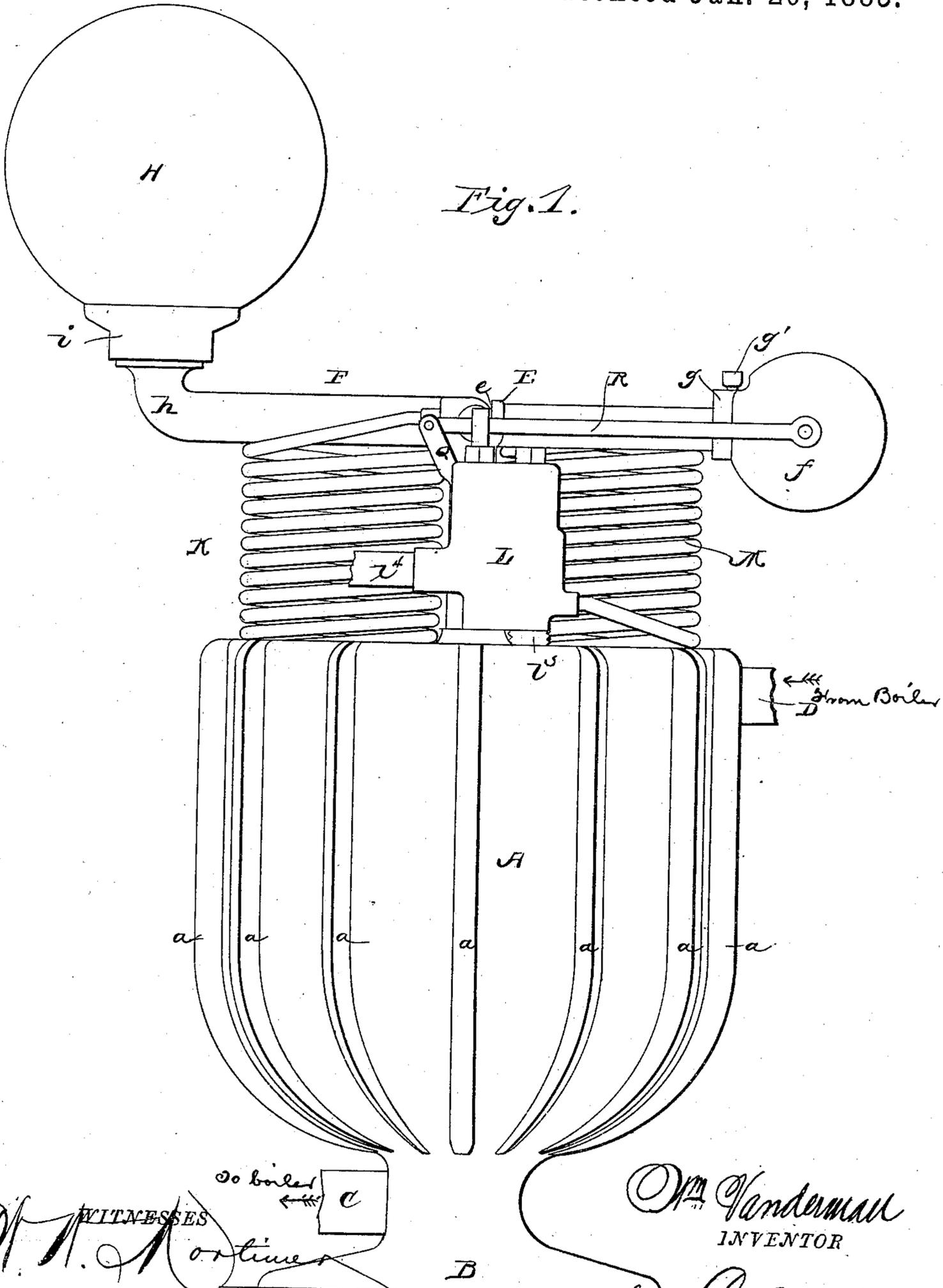


Fig. 1.

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Fig. 2.

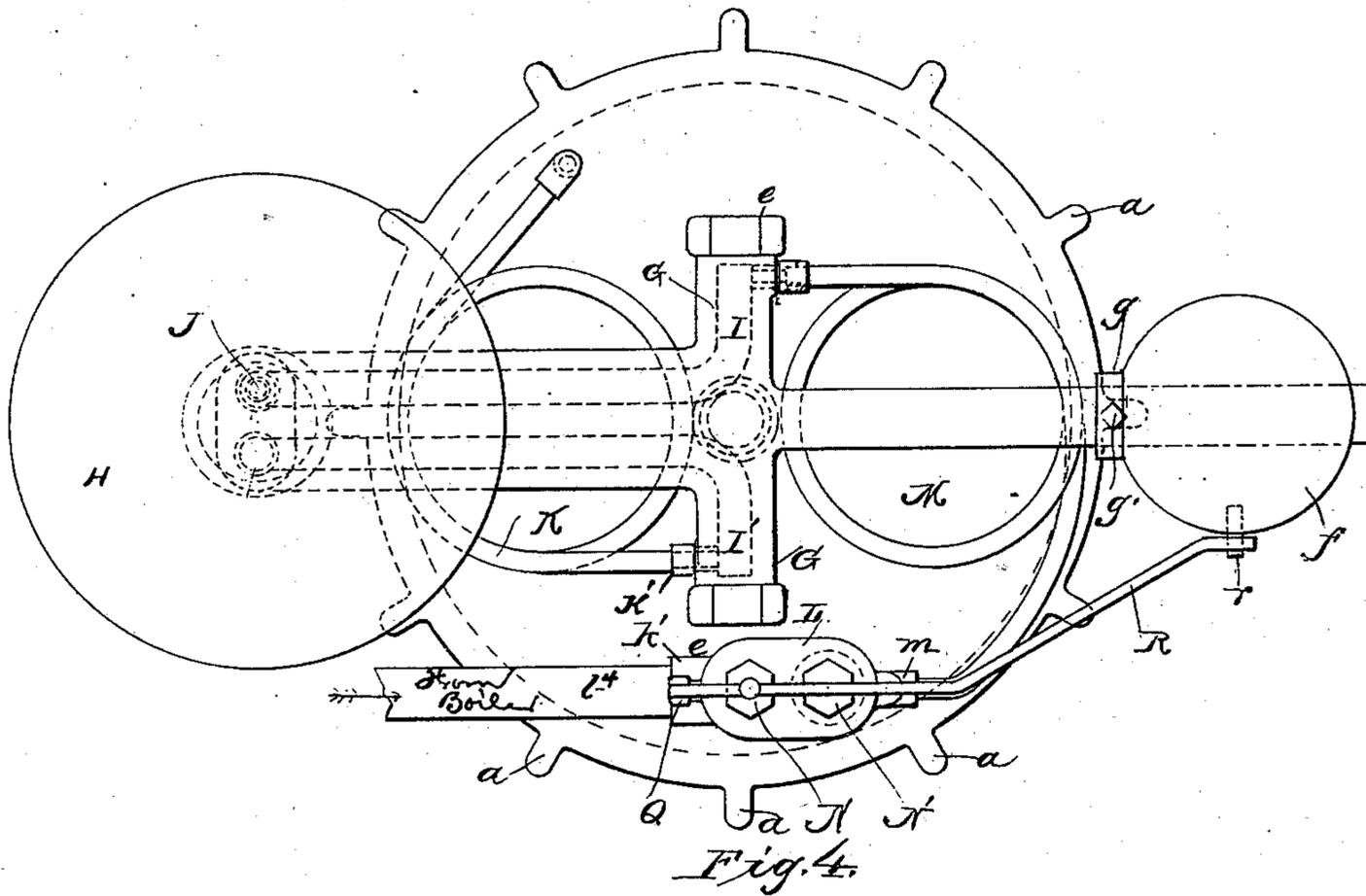
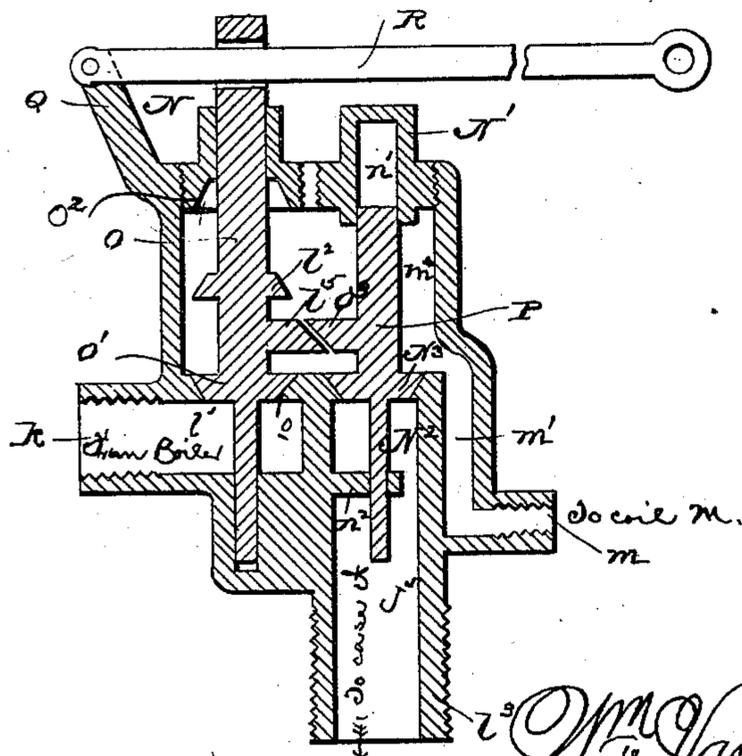


Fig. 4.



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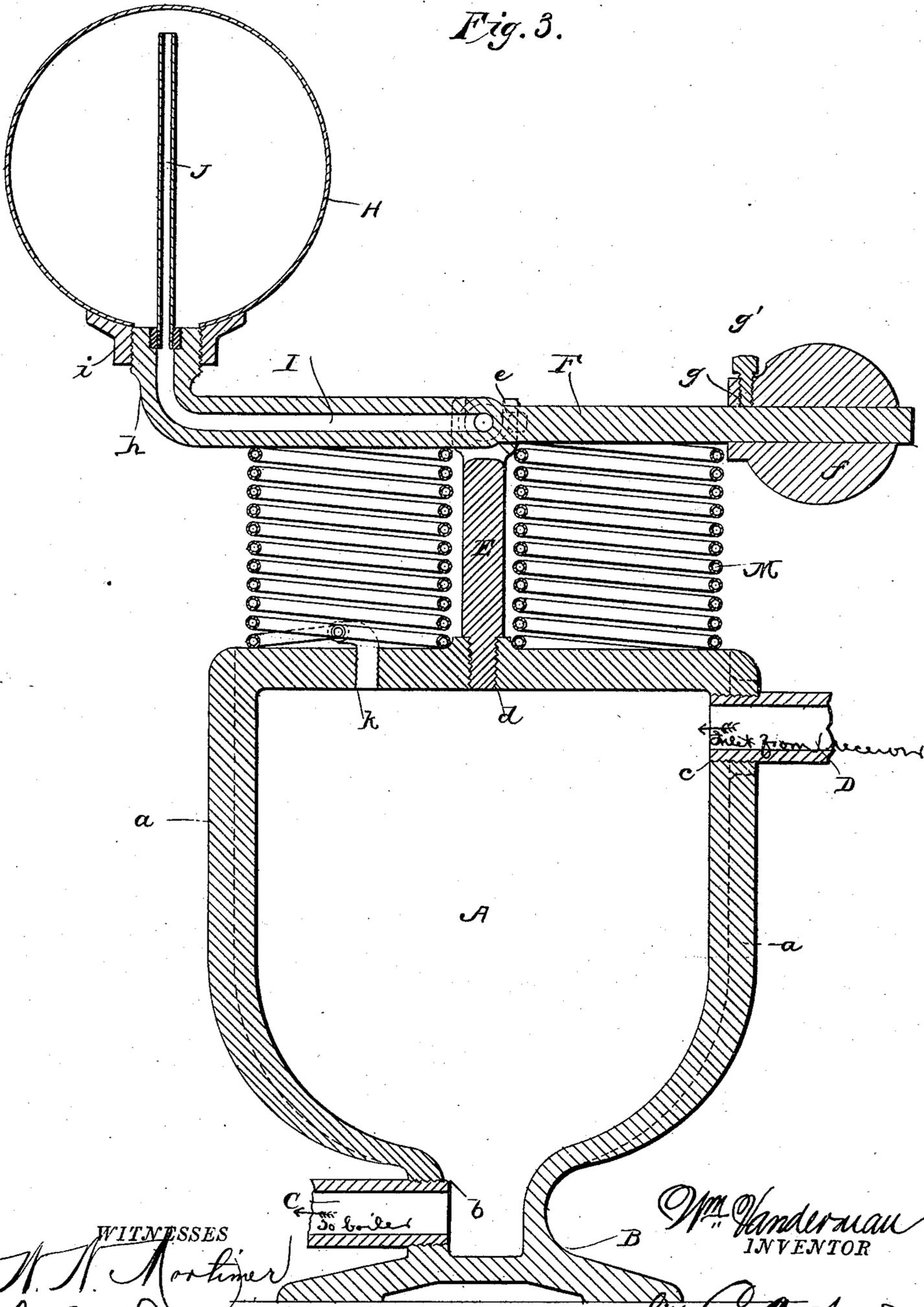
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Fig. 3.



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UNITED STATES PATENT OFFICE.

WILLIAM VANDERMAN, OF WILLIMANTIC, CONNECTICUT.

STEAM-TRAP.

SPECIFICATION forming part of Letters Patent No. 310,967, dated January 20, 1885.

Application filed October 13, 1884. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM VANDERMAN, a citizen of the United States, residing at Willimantic, in the county of Windham and State of Connecticut, have invented a new and useful Improvement in Steam-Traps, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to steam-traps by which the water of condensation is returned back into the steam-boiler or generator; and it has for its object to provide a device of this character which shall be simple in its construction, effective and efficient in its operation, and strong and durable.

With these ends in view the invention consists in the improved construction and combinations of parts hereinafter fully described, and pointed out in the claims.

In the drawings, Figure 1 is an elevation of a steam-trap embodying my invention. Fig. 2 is a plan view. Fig. 3 is a central longitudinal vertical section of Fig. 2, and Fig. 4 is a sectional view of a valve used in connection with my improved trap.

In the accompanying drawings, in which like letters of reference indicate corresponding parts in all the figures, A represents the body or case of my improved trap, which is preferably cast, and is provided at its lower end with a support or seat, B. Said trap is also provided on its body or case with a series of ribs, *a*, extending its entire vertical length and strengthening said body or case.

At the lower end of the body or case A, upon its side, is provided screw-threaded opening *b*, which is adapted to receive an outlet-pipe, C, which leads to the boiler, (not shown,) said pipe being exteriorly screw-threaded to engage with the female of the said opening *b*.

Upon the body or case A, near its upper end, and on the opposite side from the opening *b*, is provided a similar screw-threaded opening, *c*, for the reception of the exteriorly-screw-threaded end of an inlet-pipe, D, leading from what I term the "receiver" (not shown) to the trap.

Upon the top of the body or case A is provided a screw-threaded opening, *d*, to receive the exteriorly-screw-threaded end of a forked support or standard, E, the ends of the forks

of which are recessed or cut away, as shown at *e*, to form bearings for a purpose which will be hereinafter fully explained.

F represents a lever, at one end of which is mounted a weighted ball, *f*, having a central passage to receive the end of said lever. Said ball is also provided with a flange or collar, *g*, adjacent to the inner end of the passage or opening, which collar or flange is provided with a screw-threaded opening to receive a set-screw, *g'*, whereby said ball may be adjusted and rigidly secured at different points upon the end of said lever. At or about midway the length of this lever are provided two outwardly-extending arms, G, which bear in the recesses formed upon the ends of the forked support or standard E. The end of the lever F opposite the weighted ball *f* is turned upwardly, as shown at *h*, and is exteriorly screw-threaded.

H represents a ball, which may be made of any desired sheet metal; but it is preferably constructed of copper. There is an opening, *i*, formed at the lower end of said ball, and surrounding said opening and secured to the ball H is an annular flange or collar, *i'*, which is preferably cast. Said flange is interiorly screw-threaded, and receives the exteriorly-screw-threaded end of the lever F.

I I' represent passages formed in the lever F, the passage I extending from one of the arms G, near the outer end thereof, through the lever F, directly to the ball H, and the passage I' from the other or opposite arm, G, running in a parallel line with the passage I, but having no communication therewith. It will be seen that the end of the coil M communicates with the passage I at one side of the arm, while the end of the coil K communicates with the passage I' at the opposite end of the arm and upon the opposite side thereof. The end of the passage I, at the point where it communicates with the ball H, is screw-threaded. Fitting the screw-threaded ends of the passage I is a pipe, J, which extends nearly to the top of the ball H, inside the same, and having communication with the ball H at such point. In the top of the case, near the edge thereof, is provided a screw-threaded opening, *k*, communicating with the interior of the case or body A.

K represents a coiled pipe, which is con-

connected with the opening *k* in the case A at one end, and with the passage I', by means of a tubular screw-threaded connecting-flange, K'. It will thus be seen that a direct communication is established between the case A and the hollow ball H.

L represents a valve-casing, which is located on top of the body or case A, at one side thereof, and having a downwardly-extending tubular and exteriorly-screw-threaded stem, *l'*, to engage a screw-threaded opening in the top of the case, thus establishing a communication between the said valve-casing L and the body or case A. The valve-casing L is provided on one of its sides, about midway its length, with a screw-threaded opening, *k'*, which is adapted to be engaged by a pipe, *l'*, communicating with the boiler, (not shown,) said pipe being exteriorly screw-threaded at its point of connection with the opening in the valve L. Upon the opposite side of the valve-casing L is provided a screw-threaded hole or opening, *m*, which connects with a passage, *m'*, leading to the upper chamber, *m²*, of the valve.

M represents a coiled pipe, similar in construction to the one already mentioned. This coiled pipe M rests upon the top of the body or case, and is connected with the opening *m* of the valve-casing L at its lower end, its upper end being connected with the passage I, already described, thus establishing a communication between the valve and hollow ball H. The valve-casing L has openings in its top to receive bushings N N'. The bushing N has a seat or recess upon its under side of the shape of a truncated cone, while the bushing N' has a vertical recess or passage, *n'*, as shown.

O represents the valve-stem, which has a disk, *l²*, which is of the form of a truncated cone, and which, when the stem is raised, is adapted to fit the seat on the lower end of the bushing N.

O' represents another disk, formed on the stem O. This disk is the form of an inverted truncated cone, and is adapted to fit a seat, *o*, of the same form, which is located adjacent to the upper end of the passage *l'*.

Upon the stem O, about midway between the two disks, is provided an inwardly-extending tappet, *l³*, the purpose of which will be more fully described.

P represents another valve-stem, the upper end of which is located in the opening in the bushing N'. The upper end of the sides of the passage N² are cut off inwardly to form a seat for a disk, N³, of the form of a truncated cone, and extending inwardly from one side of said passage is an arm, *n²*, for supporting and holding the lower end of the stem P in place.

Upon the stem P, on a line with the tappet of the stem O, is arranged a tappet, *o³*, which extends inwardly. It will be seen that when the stem O is raised the stem P will be raised a corresponding distance by means of their tappet-connections.

Upon the outer upper side of the valve-casing is arranged an upwardly-extending arm, Q, to which is pivoted a rod or lever, R, said rod or lever passing through an opening, *q*, in the upper end of the stem O outside of the valve. It will thus be seen that when said rod or lever is raised it will raise the stem O, which, as before mentioned, will raise the stem P in the manner described. The other end of the rod or lever is bent around, and is pivoted to a pin, *r*, extending outwardly from the weighted ball *f*.

The operation is as follows: The trap is placed a proper distance above the boiler, with the discharge-pipe connecting the trap with the boiler, (not shown,) the receiving-pipe connecting with the receiver, (not shown,) which is placed at the lowest point to receive water from the heating-coils, &c. The steam-valve casing or chamber L is connected with the steam-pipe from the boiler by the connecting-pipe *l'*. The steam being turned onto the coils, the air in them is forced into the trap or case A, and from thence through the passage *k* and coil K to the ball H, through the passage I'. This passage I' terminates in the ball H at *i*, and differs from the passage I in that it has no pipe J extending up into the ball H. The air which has been forced into the ball H through the coil K then passes down through passage I, through coil M, into the valve casing or chamber L at *m*; from thence it passes upward through the valve and escapes into the outer atmosphere by the spindle O and bushing N. In this way all the air is discharged from the heating pipes or coils, and also the steam is allowed to escape in the same manner as the air described above from the case A and the ball H after each operation of the trap, so as to readily admit of its being refilled with water for another discharge. As the pipe J, extending up near the top of the ball H, is so elevated that the water which is forced into the ball H overcomes by its weight the weighted ball *f*, the ball H then makes a downward movement, and at this point the water ceases to flow into the ball H. As the air is being discharged from the case A and the ball H, as above described, the water is forced from the receiver into pipe D, into case A, and fills case A; from thence into the passage *k*, through the coil K, through the passage I', and continues filling the ball H until said ball is filled enough to overcome the weighted ball *f* by its weight. The ball H then being the heaviest makes a downward movement, the coil K allowing it do so by being compressed. The coil M assists the ball H to make this downward movement, as it was compressed by the weighted ball *f* before the movement. The ball *f* in making the upward movement raises the lever R, which lever, being attached to the spindle O, raises the same from the valve-seat O', also at the same time the valve-spindle P is raised from the valve-seat N³. The valve is open until the projection *l²* strikes the ground-joint in bushing N,

and in this way prevents any water or steam escaping from the valve around the spindle O and bushing N when the valve is open. The ball H, making a downward movement, opens the valve L, as above described. The steam is then by this operation admitted into valve-casing I through pipe *l*⁴. The steam is admitted through the valve-seat N³ into case A through passage *j*⁵, and at the same time through the passage *m*¹ and *m*, and through the coil M; from thence through the passage I, through the pipe J, into the ball H. As the direct steam-pressure from the boiler has been admitted onto the water in case A, and also onto the water that has been admitted into ball H by the operation above described, and as the trap is elevated above the water-line of the boiler, the pressure on the trap and boiler is equalized by the above operation, and the water flows out of case A, through pipe C, to the boiler by its own gravitation. As the water is discharged from the case A it is also discharging from the ball H back through passage I, coil K, and into the case A through passage *k*. As the water that fills and empties from the ball H fills and empties through the coil K, the coil M, by means of the pipe J and the passage I¹ and its connection to the valve L, conducts the air out of the case A and ball H when the trap is filling, or the steam that may have been in the case A or ball H when the trap was discharging. The same coil, M, conducts the steam from the valve-casing L, through the coil M, and through the passage I¹ and pipe J, into the ball H when the ball has made a downward movement, or when the trap is discharging. After the water has been discharged from the ball H enough to lighten it so that the weighted ball *f* is the heaviest, the ball *f* makes a downward movement and carries the lever R with it until the spindle O strikes the valve-seat O², and also the spindle P has descended by its own weight, and closes the valve-seat at N³. This valve N³, when closed, allows of no escape of water or steam from case A. This valve-seat N³ is held to its seat by the back-pressure from ball H, through coil M and the passages *m* and *m*¹, as the escape of steam or air at bushing N is not so great but what there is a back-pressure on valve-seat N³ when the valve is closed. After the weighted ball *f* has made the downward movement and the valves are closed at O¹ and N³, whatever steam that may have remained in case A and ball H while discharging the water passes back through the passage I¹ and coil M and the passages *m* and *m*¹ and escapes by the spindle Q¹ and bushing N to the outer air. While this steam is escaping from the trap the water is filling case A through pipe D for another discharge. The coils K and M act as conducting-coils and also as springs.

The principle of the construction of the coil K is such that it permits of the water passing slowly from the ball H, and gives the case A

sufficient time to empty before the weighted ball *f* descends.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a steam-trap, the combination, with a body or case, of coiled pipes arranged upon the upper side thereof, and a lever carrying a weighted ball and a hollow ball, substantially as set forth.

2. In a steam-trap, the combination, with a body or case, of coiled pipes arranged upon the upper side thereof, a valve, and a pivoted lever having a hollow ball at one end and weighted at its other end, one of said pipes connecting the hollow ball and valve, while the other connects the hollow ball and case, substantially as set forth.

3. In a steam-trap, the combination, with a body or case, of coiled pipes arranged upon the upper side thereof, a valve, and a pivoted lever having a hollow ball at one end, its other end being weighted, and an arm or rod connecting the valve-stem with said weighted end of the lever, substantially as set forth.

4. In a steam-trap, the combination, with a body or case, of a forked standard having recessed ends, and removably secured to said body, a lever having outwardly-extending arms bearing in said recessed ends of the forked standard, a hollow ball arranged upon one end of said lever, a valve, and coiled pipes connecting the ball and valve and the ball and body or case, substantially as set forth.

5. The combination, with a body or case having inlet and outlet tubes, as described, of a valve arranged upon the upper side thereof and communicating therewith, a lever pivoted upon the upper side of said body, a hollow ball secured upon one end of said lever, a valve, and coiled pipes connecting the ball and valve and the ball and body or case, substantially as set forth.

6. The combination, with a body or case having inlet and outlet openings, as described, of a valve arranged upon the upper side thereof and communicating therewith, a lever pivoted upon the upper side of said case, said lever having a hollow ball at one end and a weighted ball at its other end, a rod connecting the valve-stem and weighted ball, and coiled pipes connecting the hollow ball and valve and the ball and case, substantially as set forth.

7. The combination, with a body or case having inlet and outlet openings, as described, of a valve arranged upon the upper side thereof and communicating therewith, and also communicating with the boiler, a lever pivoted upon the upper side of said case, said lever having a hollow ball at one end and a weighted ball at its other end, a rod connecting the weighted ball and valve-stem, and coiled pipes connecting the valve and hollow ball and the case and hollow ball, substantially as set forth.

8. The combination, with a body or case having inlet and outlet openings, as described, of a valve communicating therewith, and also communicating with the boiler, a lever pivoted upon the upper end of said case, said lever having a hollow ball at one end and a weighted ball at its other end, passages formed in said lever and communicating with the hollow ball, and coiled pipes connecting one of said passages and the valve, while the other connects the other passage and the case, substantially as set forth.

9. The combination, with a body or case having inlet and outlet openings, as described, of a valve communicating therewith, and also communicating with the boiler, a lever pivoted upon the upper end of said case, said lever having a hollow ball at one end and an adjustable weighted ball at its other end, a rod connecting the valve-stem and weighted ball, passages formed in said lever and communicating with the hollow ball, and coiled pipes connecting one of said passages and the valve, while the other connects the other passage and body or case, substantially as set forth.

10. The combination, with a body or case having inlet and outlet openings, as described, of a valve communicating therewith, and also communicating with the boiler, a forked standard secured upon the upper side of said case, a lever pivoted upon said standard, said lever having a hollow ball at one end and an adjustable weighted ball at its other end, a pivoted rod connecting the valve-stem and weighted ball, passages formed in said lever, pipes arranged at the ends of said passages and leading into the hollow ball, and coiled pipes connecting one of said passages and the valve, while the other connects the other passage and case, as set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses.

WILLIAM VANDERMAN.

Witnesses:

GEO. W. MELONY,
JAMES J. KEOW.