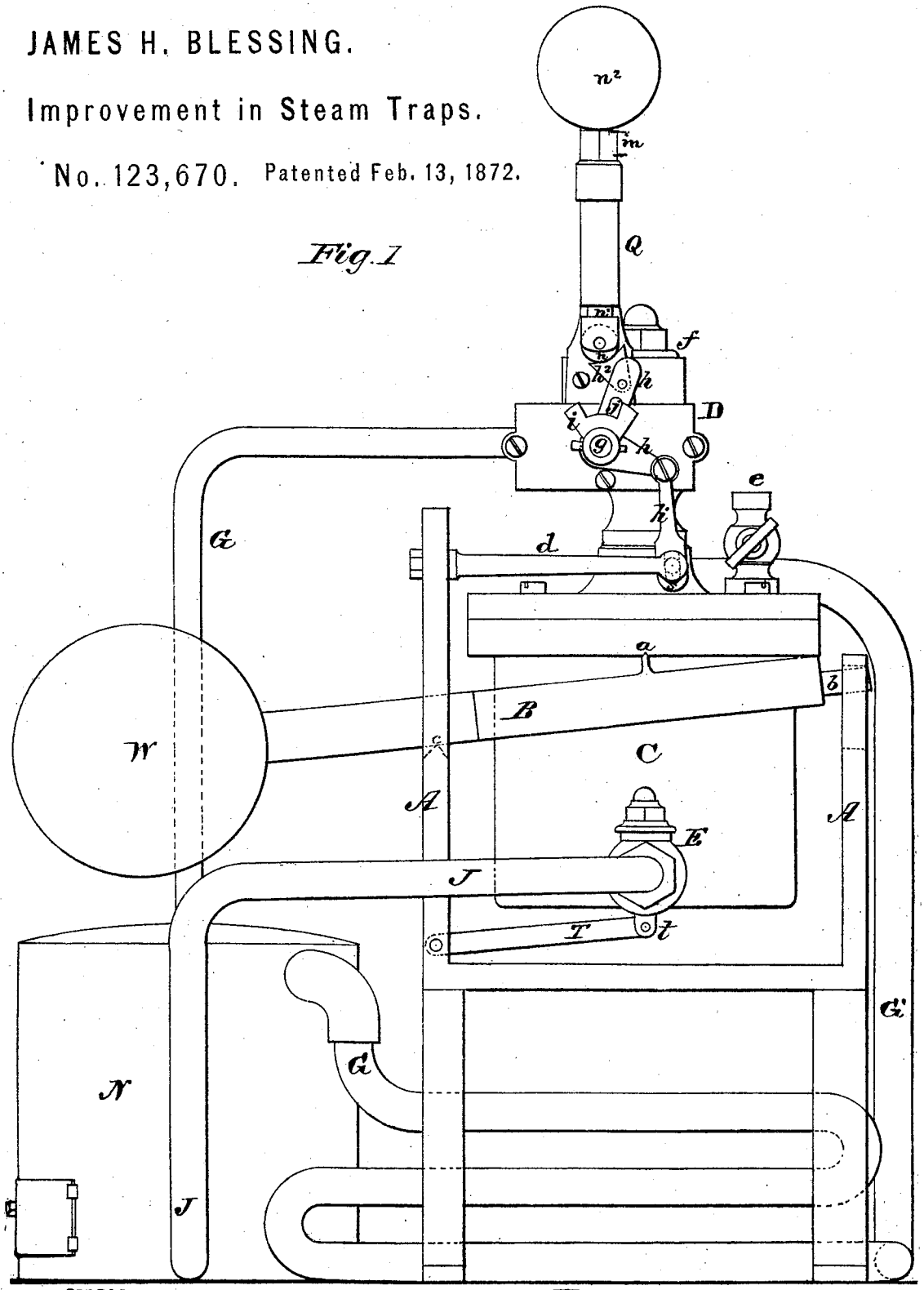
3 Sheets--Sheet 1.

JAMES H. BLESSING.

Improvement in Steam Traps.

No. 123,670. Patented Feb. 13, 1872.

Fig. 1



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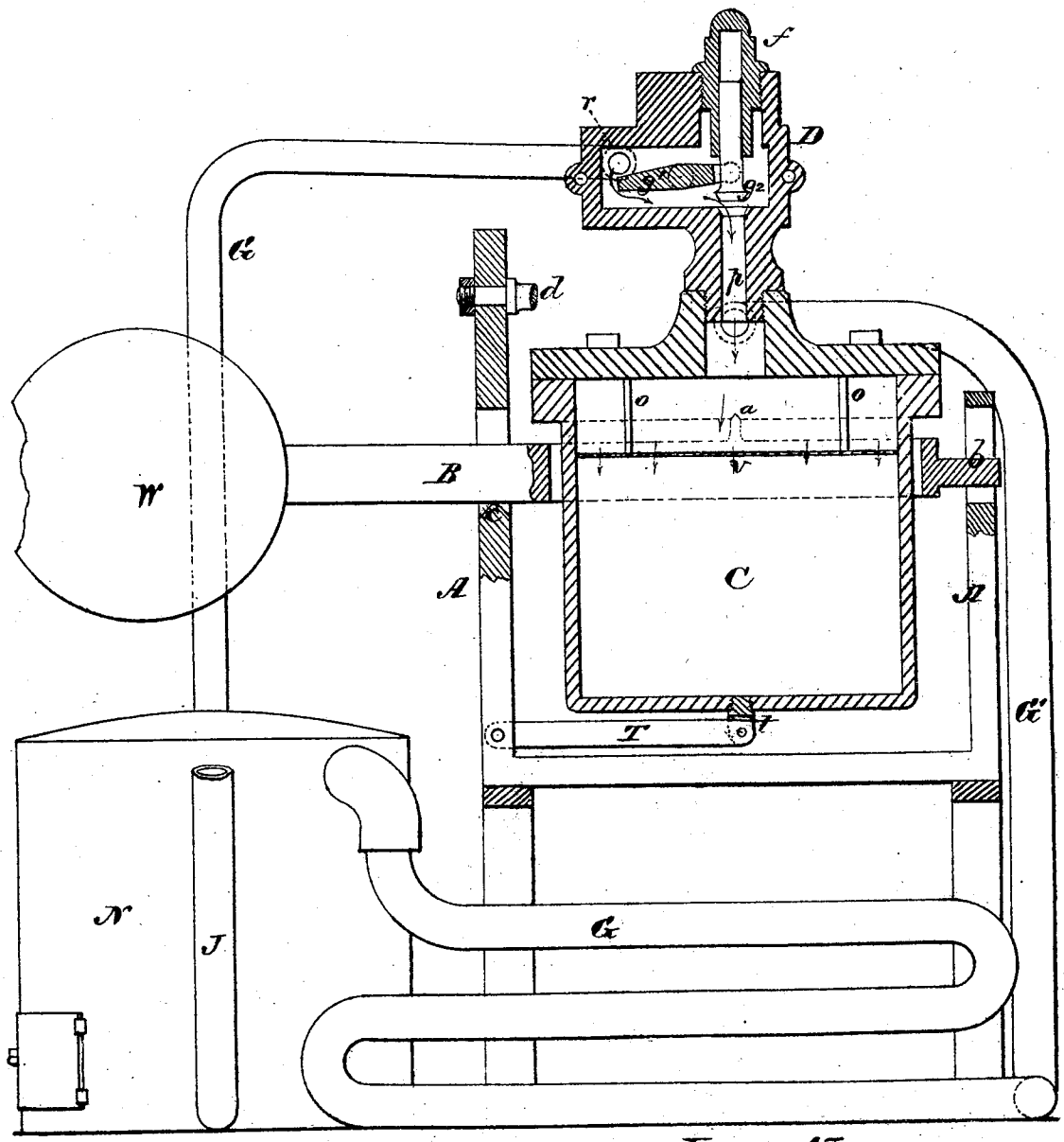
3 Sheets--Sheet 2.

JAMES H. BLESSING.

Improvement in Steam Traps.

No. 123,670. Patented Feb. 13, 1872.

Fig. 2



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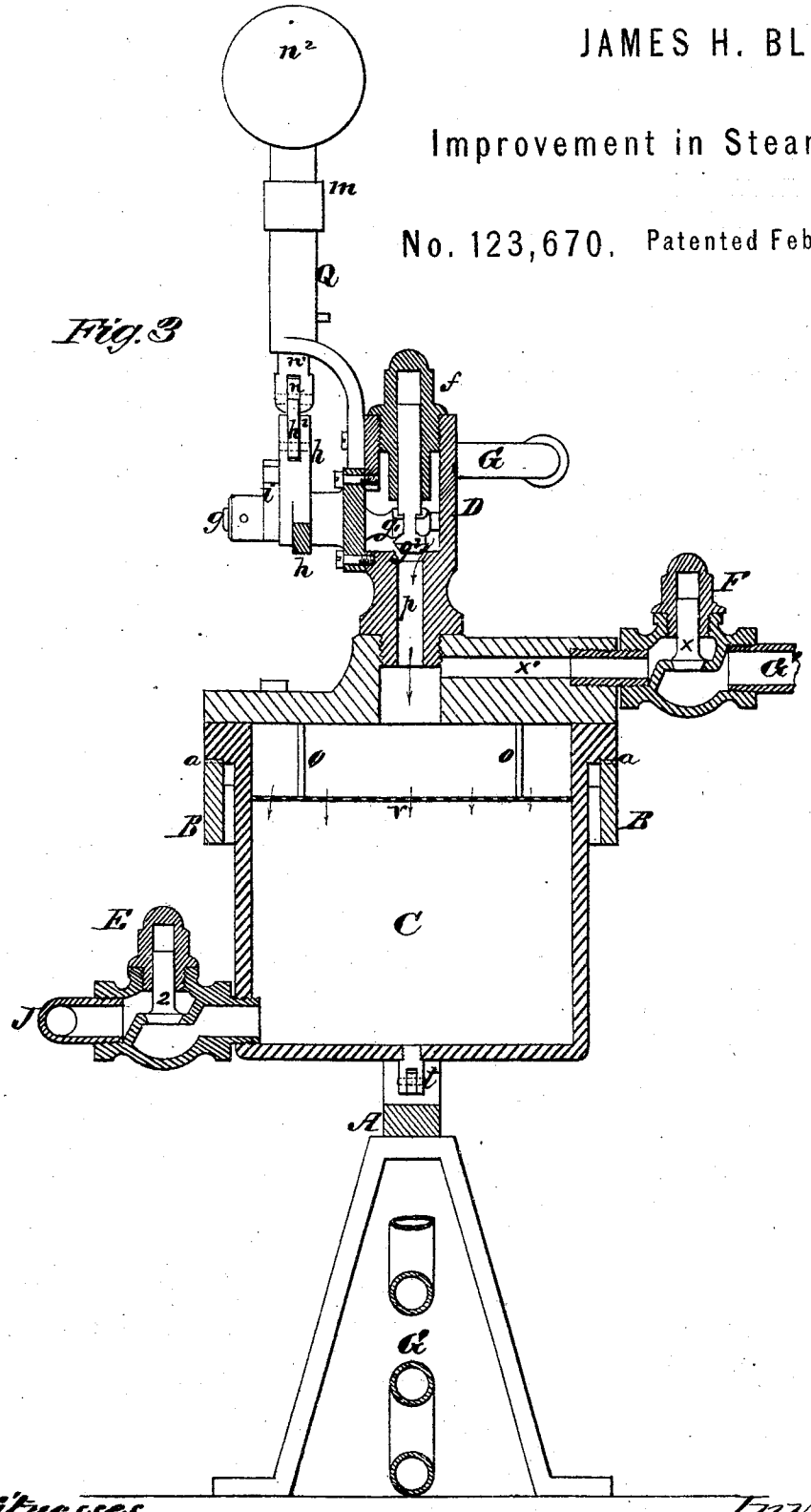
3 Sheets--Sheet 3.

JAMES H. BLESSING.

Improvement in Steam Traps.

No. 123,670. Patented Feb. 13, 1872.

Fig. 3



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UNITED STATES PATENT OFFICE.

JAMES H. BLESSING, OF ALBANY, NEW YORK, ASSIGNOR TO HIMSELF AND FREDERICK TOWNSEND, OF SAME PLACE.

IMPROVEMENT IN STEAM-TRAPS.

Specification forming part of Letters Patent No. 123,670, dated February 13, 1872.

To all whom it may concern:

Be it known that I, JAMES H. BLESSING, of Albany, in the county of Albany and State of New York, have invented an Improved Automatic Steam-Trap; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawing making part of this specification, in which—

Figure 1, Plate 1, is an elevation of the improved trap and its connections with a steam-boiler. Fig. 2, Plate 2, is a vertical section taken centrally through the trap and its valve-box. Fig. 3, Plate 3, is a section taken vertically and centrally through the trap in a plane at right angles to the sectional plane of Fig. 2.

Similar letters of reference indicate corresponding parts in the several figures.

This invention relates to traps which are used in connection with apparatus for warming buildings with steam, and which will automatically return back into the boiler the water of condensation, thereby keeping the boiler supplied with warm or hot water.

In my trap, which was secured to me by my first Letters Patent, numbered 114,257 and dated on the 2d day of May, 1871, water of a head greater than the pressure of the steam in the boiler was used to force the water of condensation back into this boiler. In my second Letters Patent, dated on the 27th day of June, 1871, and numbered 116,403, a piston, of greater area than the one for forcing the water back into the boiler, was actuated by steam, which was lost by exhausting it into the atmosphere. In my third Letters Patent, dated on the 12th day of December, 1871, steam was used as the actuating agent, which, after performing its service, was exhausted and lost in the atmosphere.

In the trap which forms the subject of this application there will be, practically, little or no loss of the water of condensation, as the steam which is used in obtaining an equilibrium of the pressures, is taken directly from the boiler which supplies the heating-coils, and is returned in the form of hot water, with the water of condensation from the said coils, back again into the boiler, as will be hereinafter explained.

The following description of my invention will enable others skilled in the art to understand it.

In the accompanying drawing, Figs. 1 and 2, I have represented a steam-boiler, N, in connection with my improved trap, for the purpose of showing the tubular connections between the trap and boiler without regard to the relative proportions of said parts, or the arrangement thereof. C represents a cylinder, which is adapted for receiving the water of condensation from the heating-pipes and discharging this water back again into the steam-boiler. This cylinder and its attachments are mounted on knife-edge bearings *a a*, which rise from the yoked portion of a lever, B, that has its fulcrum at *c*, on one upright arm of a frame, A. The long arm of lever B is provided with an adjustable counterbalancing weight, W, which keeps the cylinder C in the elevated position shown in Fig. 1, except when a sufficient quantity of the water of condensation accumulates in it to overcome said weight; then it will assume the position indicated in Fig. 2 until the water escapes from it into the boiler. An extension, *b*, of the lever B works in a vertical slot in the frame A and limits the extent of vibration of this lever; and a rod, T, which is pivoted to the frame A at one end and to a lug, *b*, in the center of the bottom of the cylinder C at the other end, serves to steady this cylinder in its up-and-down movements. Through the head of cylinder C is a passage, *p*, which communicates with the interior of a valve-box, D, secured rigidly to this head. The valve-box D is quadrangular in form and is provided interiorly with a valve, g^2, which has its seat at the upper terminus of the passage *p*, and which is formed on the lower end of a vertical stem that plays in and is guided by a screw-cap, *f*. The valve-stem is notched, and at this point it is embraced by the bifurcated end of a trip, g^1, which is formed on a horizontal oscillating shaft, *g*. This shaft *g* extends through one side of the valve-box D and receives upon it,

outside of the box, an angular lever, h, and a forked segment, i. The angular lever is connected by its lower arm to a fixed arm, d, by means of a rod, h^1, the lower end of which is slotted. The upper arm of this lever h is provided with a tumbler, h^2, on the concave surface of which a loaded rod, n^1, is supported by means of an anti-friction roller, n. The rod n^1 is guided in its vertical movements by means of the tubular portion of a bracket, Q, which is fixed to the valve-box D, and the weight n^2 on the upper end of this rod n^1 is adjustable and can be fixed at the desired point by means of the shouldered nut m, shown in Figs. 1 and 3. In front of the angular lever h is the forked segment i, between the ends of which plays a lug, j, on the upper arm of the lever h.

When the parts just described are properly adjusted with relation to the length of strokes of the cylinder C, and this cylinder is caused to descend by an accumulation of water in it sufficient to overcome the weight of the ball W, the upper arm of the lever h will be forced over to the left-hand side of a vertical plane intersecting the axis of the shaft, g, and will, by means of the lug j and segment i, lift the valve g^2. When the weight W again preponderates, by the escape of water from the cylinder C, the latter will rise, and, by the mechanism above described, the value g^2 will be shut. The strokes of the cylinder C will only move the upper arm of lever h past the center of shaft g slowly; but, by having a slot in rod h^1 and using the loaded rod n^1, lug j, and segment i, the weight n^2 is caused to act quickly upon the valve g^2 at the termini of the strokes of the cylinder C. The pipe G^1, which communicates with the steam-space of the steam-boiler, and which is continuous with the steam-coils or heaters, enters the upper end of the trap through a valve-box, F, and passages x^1 and p. In the box F is a valve which rises to admit the steam to the trap, but which prevents its return. The pipe J leads from the water-space in the steam-boiler into the bottom of the trap-cylinder C, through a valve-box, E, the valve 2 in which opens to allow the escape of water from the trap, but closes to prevent its return therein. The pipe G leads from the steam-space in the boiler into the valve-box D at r, or this latter pipe may communicate with the steam-pipe G', if desirable.

Operation.

The water of condensation which is formed in the heating-coils is forced therefrom, under boiler pressure, through the receiving valve-box F and passages $x' p$, into the cylinder C at its upper end, and falls upon a finely-perforated distributing-plate, v, which facilitates the condensation of steam which enters the cylinder with the water. The perforated plate v is suspended from the head of cylinder C by rods O O. When the cylinder has received a sufficient weight of water to overcome the friction of the parts and the weight n^2 which is attached to the valve-tripping device, this cylinder with its attachments descends, as indicated in Fig. 2, and opens the valve g^2 in valve-box D, thus establishing a communication between the steam-space in the boiler N and the interior of the cylinder C, through the pipe G and passage p. This allows the water which had accumulated in the cylinder to descend into the boiler through the drip-pipe J and its discharge-valve 2. The trap is now filled with steam corresponding in pressure with that in the boiler, and, as this steam is lighter than the water which was in the trap, the latter will ascend by the preponderance of the weight W and shut the valve g^2, thereby cutting off the boiler-pressure in the trap. In a few seconds condensation reduces the steam in the trap to water and allows the water of condensation from the heating-coils to be again forced into the trap through valve-box F. In first starting the heating-coils the water from condensation in them is cold as it enters the trap, and in condensing quickly the steam left in the trap from a previous movement thereof produces instantaneously so much of a vacuum that it causes the water of condensation to flow into the trap with great rapidity and the trap itself to move with greater speed than is subsequently the case. After the trap has worked for a time the coil becomes highly heated, and, the water of condensation being of much higher temperature and steam being mixed with it as it flows through valve-box F, the trap does not move so rapidly, since condensation is somewhat retarded. After working a still longer time, the water being entirely drawn from the heating-coils, steam alone enters the trap, when an equilibrium of pressure is produced and the trap ceases to move, until, through condensation in the trap and heating-coils, this equilibrium is destroyed, when the water of condensation again flows into the trap, and the latter continues to repeat its movements automatically in accordance with the rapidity of condensation. The cock e is intended for allowing the escape of air from the trap.

The receiver C may be of a spherical form and applied in this form without any material change in the construction of the supports; but when made in that form the pivoted rod T may be dispensed with.

Having described my invention, what I claim as new is—

1. A steam-trap which is sustained upon one arm of a lever, B, and counterbalanced by a weight, W, on the opposite arm of such lever, in combination with pipes G, G', and J, and an automatic tripping device for the valve h^2, substantially as described.

2. The trap-cylinder C, suspended upon knife-edges *a a* on lever B and guided below by a pivoted rod T, substantially as described.

3. The gravitating trap-cylinder C, valve-box D, and a valve-tripping device which is connected by a rod, h^1, to a fixed arm, *d*, whereby the rising and descending movements of the trap will actuate the said valve, substantially as described.

4. In combination with the trap herein described, the distributing-plate *v* inside of the cylinder C, constructed substantially as described.

5. A gravitating receiver, C, of a steam-trap, to return the water to the boiler, substantially as described.

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Witnesses:

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EDM. F. BROWN.