

J. Montgomery,
Steam-Boiler Indicator.

N^o 28,003.

Patented Apr. 24, 1860.

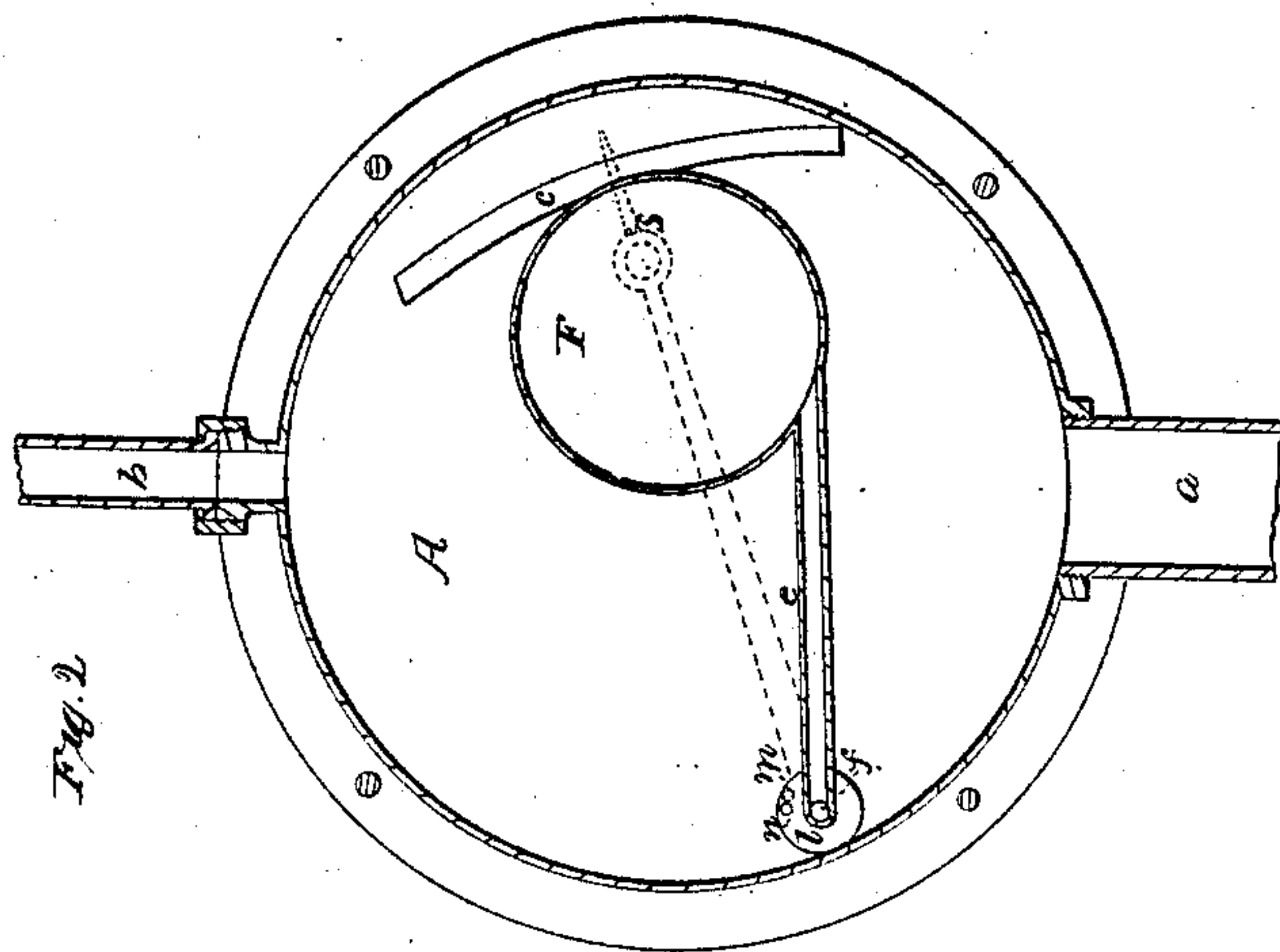


Fig. 2.

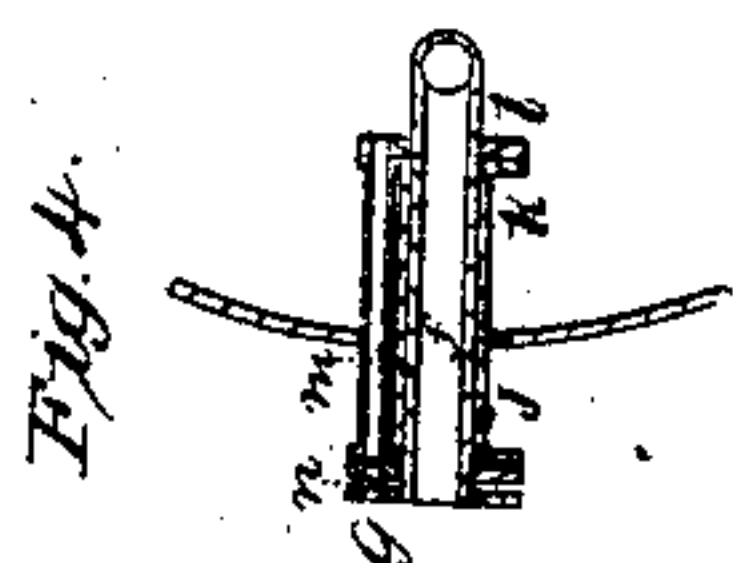


Fig. 4.

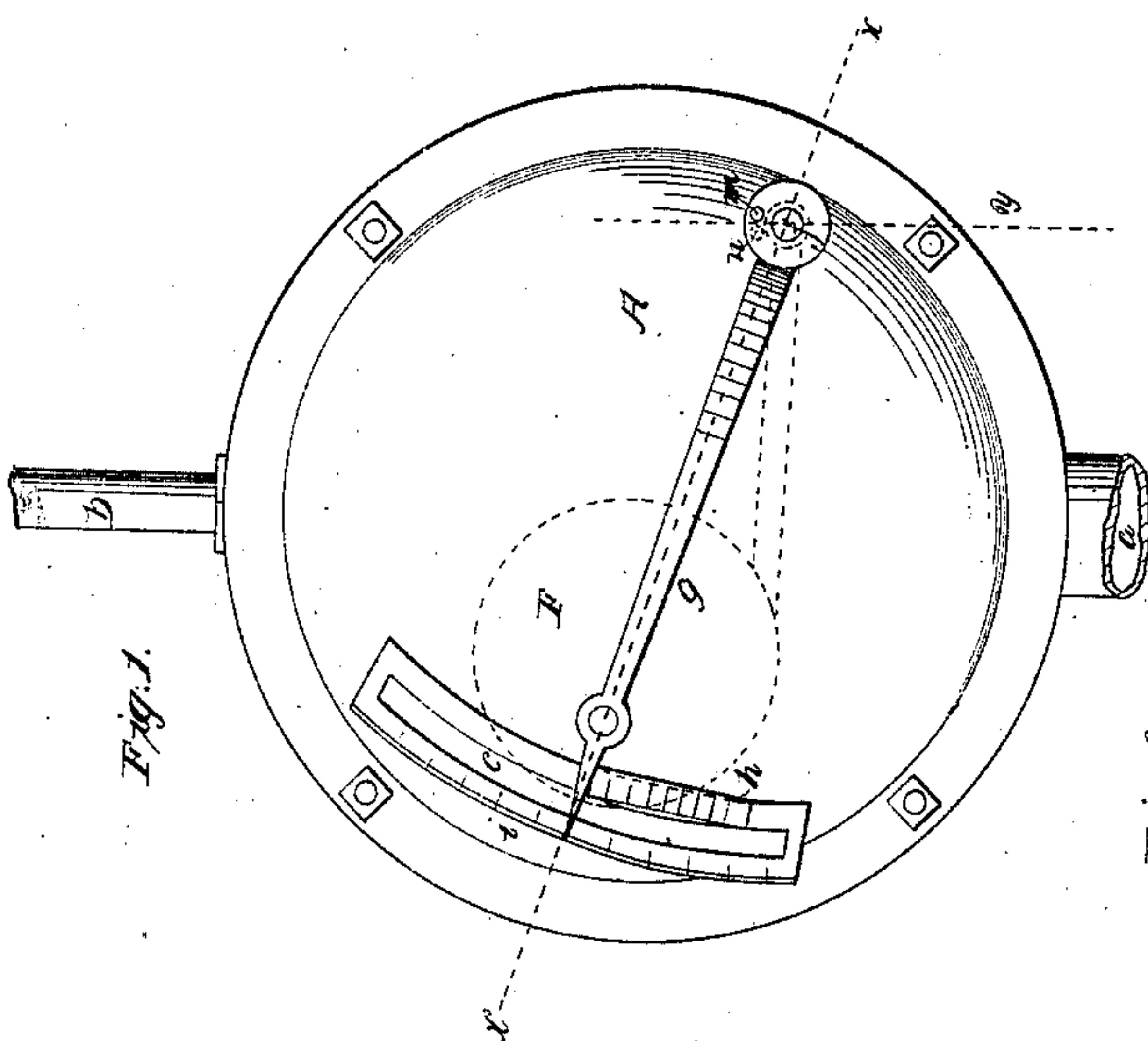


Fig. 1.

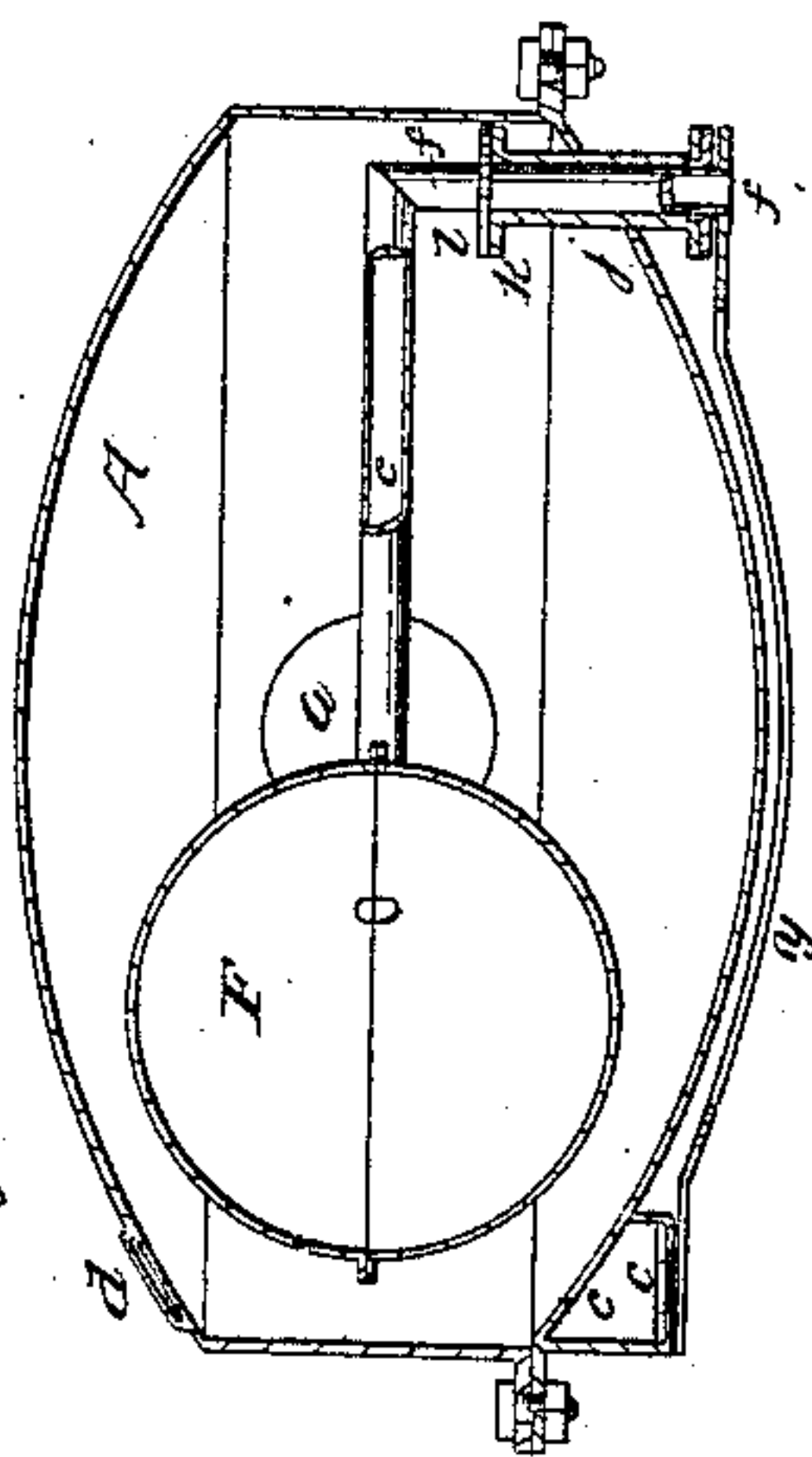


Fig. 3.

UNITED STATES PATENT OFFICE.

JAMES MONTGOMERY, OF BALTIMORE, MARYLAND.

COMBINED SALINOMETER AND WATER-GAGE FOR STEAM-BOILERS.

Specification of Letters Patent No. 28,003, dated April 24, 1860.

To all whom it may concern:

Be it known that I, JAMES MONTGOMERY, of the city and county of Baltimore and State of Maryland, have invented a new and useful Combined Salinometer and Water-Gage for Steam-Boilers; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a front view of my improved gage; or, as I prefer to term it, "compound alarm meter." Fig. 2 is a vertical section of the same in a plane parallel with the front. Fig. 3 is a section of the same in the plane indicated by the line x, x , in Fig. 1. Fig. 4 is a section of a portion of the instrument in the line, y , of Fig. 1.

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

My invention consists in a combined salinometer and water gage in which the principles of the float gage, and of the transparent gage, are combined in such a manner as to indicate, not only the level of the water in the boiler, but also the degree of saturation of the said water with salt or other mineral matter; thereby informing the engineer when it is desirable to "blow out" or feed and also indicate when the water is foaming or expanding.

In carrying out my invention it becomes necessary to provide some means of making a float perfectly reliable, which is something that, as far as is known to me, has never been heretofore accomplished, for even hollow metal floats employed in boilers have been penetrated by the water and steam; and, no means of escape having been provided for the water of condensation, their buoyancy has been thereby materially changed.

With a view to the above result, a part of my invention consists in providing a passage of communication between the interior of a hollow float and the atmosphere; said passage being so contrived that either steam or water may escape freely from the float as the same is so placed as to form an inclined plane and thus allow the water to discharge of its own gravity.

Another part of my invention consists in a certain arrangement of passages, in combination with a float, in such a manner that, when the water sinks to or below a certain level, an escape of steam is permitted through the said passages to give an alarm.

The same results take place when undue or excessive effervescence or foaming ensues.

To enable others to make and use my invention I will proceed to describe its construction and operation.

A is a box of cast iron or other metal intended to be secured to a suitable casting that is to be bolted to the boiler at such a height that the middle of the box will be nearly on a level with the proper water line and provided with two communications with the boiler, viz, one by a pipe, a , at the bottom communicating with the water space, and another by a pipe, b , at the top, communicating with the steam space, by which the box will be caused to be kept filled with water up to the same level as the boiler. The pipes, a and b , should be fitted with stop-cocks to shut off communication between the box and the boiler, when desirable. This box A is provided with a glass window, c , in the front, and with one or more windows, d , at the back, opposite to c , the latter windows being to transmit light to aid in seeing the water through the window, c , to show the level of the water in the box: and at one or more sides of the said window, c , there is a fixed scale, i , of inches or other parts to denote the exact level of the water. The box also contains a float F, consisting of a hollow ball of copper, or other suitable metal, which is attached to a hollow arm, e , which vibrates upon a pivot, f , to which it is securely attached, the said pivot working in a bearing provided for it in the box. The arm, e , and pivot, f , are both made hollow throughout to provide a passage of communication from the interior of the float to the atmosphere, and the pivot, arm and float are so arranged, that, at any ordinary level of the water, the arm will have an inclination downward from the float to the pivot, by which arrangement any water that may enter, and condense within the float, may run down from it by gravitation through the arm and through the pivot; which, also, constitute a means of escape for water that may penetrate the float. The pivot f , carries outside the box A, an indicator arm g , whose point, situated opposite the window c , rises, as the float rises, and the said index is so set that, if the water in the boiler is pure or of the greatest purity that can be obtained, its point will be opposite the level or water line that is visible through the window, c . As the water becomes satu-

rated with salt, or other mineral matter, by which its specific gravity is increased and the point of the index rises above the visible water line and thereby serves to indicate
 5 the state of saturation. By this arrangement a graduated hydrometric scale, *h*, attached to the index finger serves by comparison with the visible surface of the water in the boiler at any time, to indicate the exact
 10 degree of saturation, and inform the engineer when it is desirable to "blow out." The ascertaining of this degree may be facilitated by marking the scale, *h*, at the point which will come even with the visible level
 15 at the highest degree of saturation that is permitted, with the letter B, or any other character signifying "blow out." The comparison between the index, *g*, and the visible water line or level, serves also to indicate when the water is foaming, as, in that
 20 state of the water, the float, having a less buoyant medium to sustain it, will descend relatively to the surface of the water and the point of the index will descend relatively to the visible water-line.
 25

The hollow pivot, *f*, on which the float arm vibrates, is fitted to a truly bored fixed socket bearing, *j*, in the front of the box A, which socket is provided inside the box with
 30 a flanch, *k*, see Figs. 3 and 4, which serves as a bearing for a flanch, *l*, formed upon the pivot, *f*. The opposite faces of the flanches *k* and *l*, are ground together to a steam tight joint, and, when the pivot is in its place, the
 35 pressure inside the box A serves to hold the flanch, *l*, tight up against the flanch, *k*, and thus prevent steam or water escaping round the pivot, *f*, without the use of a stuffing box, which would be productive of a greater
 40 amount of friction, and which, as the pivot is made very thin to get as large a passage as possible through it, would be very liable to injure the pivot.

m, see Figs. 1, 2 and 4 is a passage along
 45 the outside of the socket, *j*, extending from the inner face of the flanch, *k*, to the exterior of the box. *n*, is an aperture in the flanch, *l*, of the hollow pivot, *f*, said aperture being at the same distance from the center of the
 50 pivot as the inner mouth of the passage, and so arranged that, so long as the water is at a safe level in the boiler and the box A, it will never be opposite the passage, *m*, but leave the said passage closed by the flanch, *l*, but

that when the water falls below a safe level 55 the said aperture, *n*, will come opposite the passage, *m*, and open the said passage to permit the escape of water or steam through the said passage to the atmosphere, and thus, by the noise of the escape, giving notice of 60 the want of water. The escape being at first only in a small quantity, and gradually increasing, makes at first only a slight noise (as it were a whisper) to call the attention of the attendant whose duty it is to preserve 65 a proper level, and gradually louder till it creates a general alarm. A whistle may be applied to the passage, *m*, to produce an alarm that will be audible at a distance. In the same manner an alarm will be given 70 when the boiler is foaming, but the alarm sounded by foaming will have a different tone, as a mixture of water and steam will be given off causing a sputtering sound.

What I claim as my invention and desire 75 to secure by Letters Patent, is—

1. A hollow float F, having a hollow arm *e*, which communicates with the atmosphere when said float and arm are so arranged that any water which may leak or insinuate 80 itself into the float will automatically, or by its own gravity flow out or discharge therefrom, substantially as set forth.

2. The combination of window *c*, and indicating arm *g*, when so arranged that the 85 visible level of the water will act to show the height of same, substantially as and for the purposes set forth.

3. The hydrometer scale *h*, attached to the end of the indicating arm *g*, and arranged at the side of the window *c*, so that 90 the amount of saturation of the water with salt or other mineral may be easily read without the aid of a thermometer, substantially as set forth. 95

4. Making the axial box or bearing of the float arm with an alarm passage *m*, in combination with the providing of a similar passage in the flanch *l*, of the hollow arm when the joint between the hollow arm and 100 its axial box is made tight by the internal pressure of the steam of the boiler, substantially as set forth.

JAMES MONTGOMERY.

Witnesses:

D. HOBART,
 RICH'D. H. OGDEN.