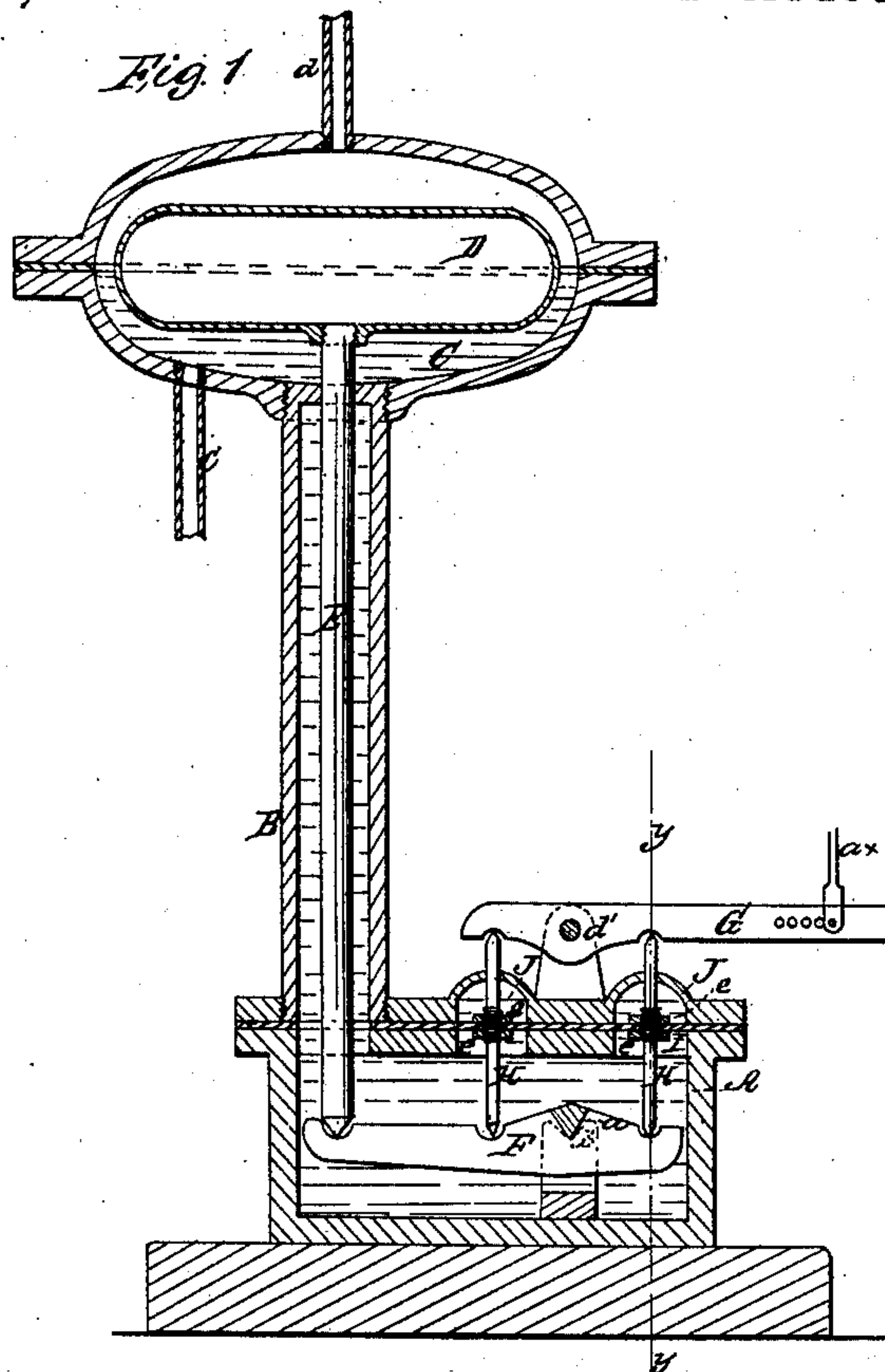


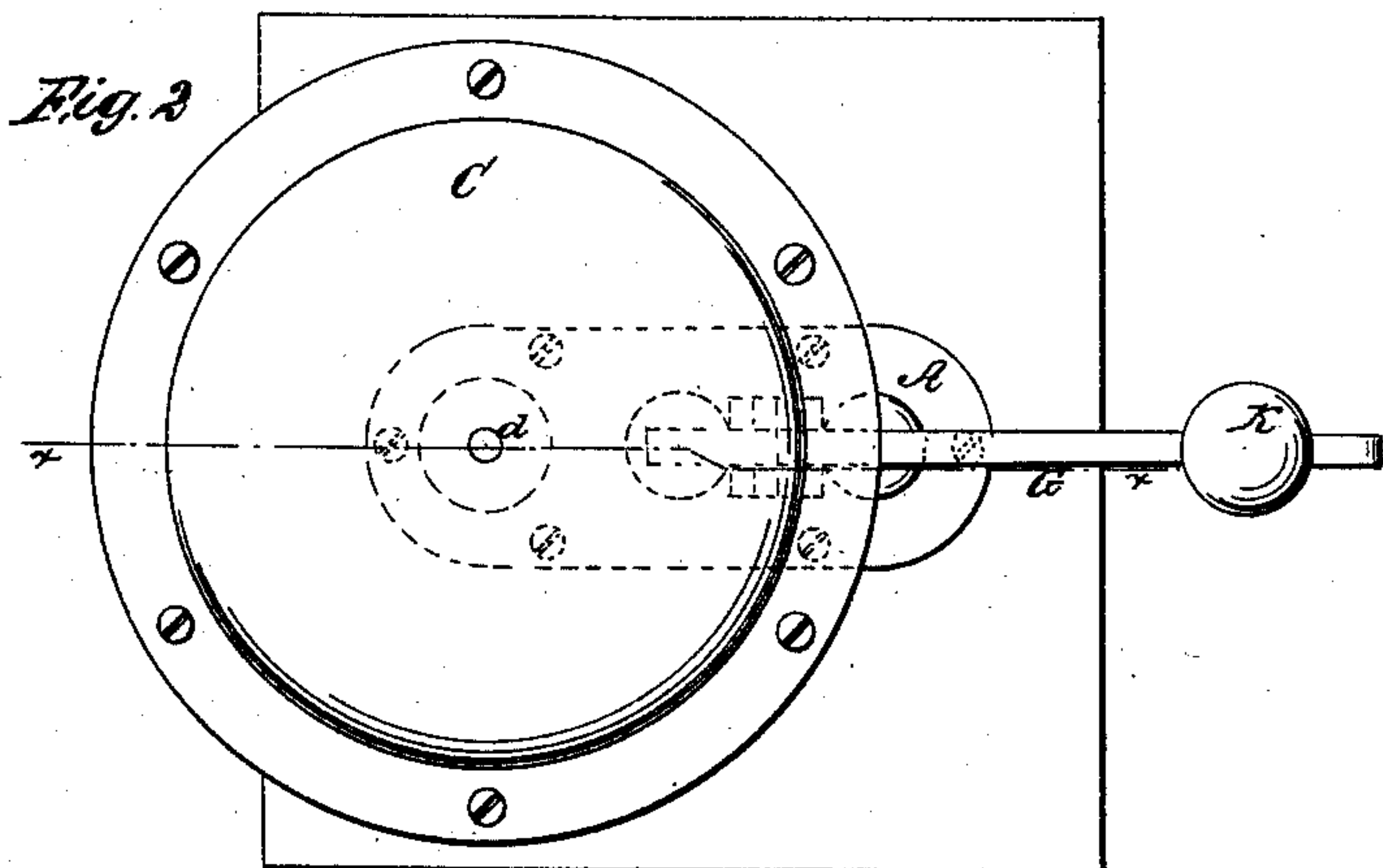
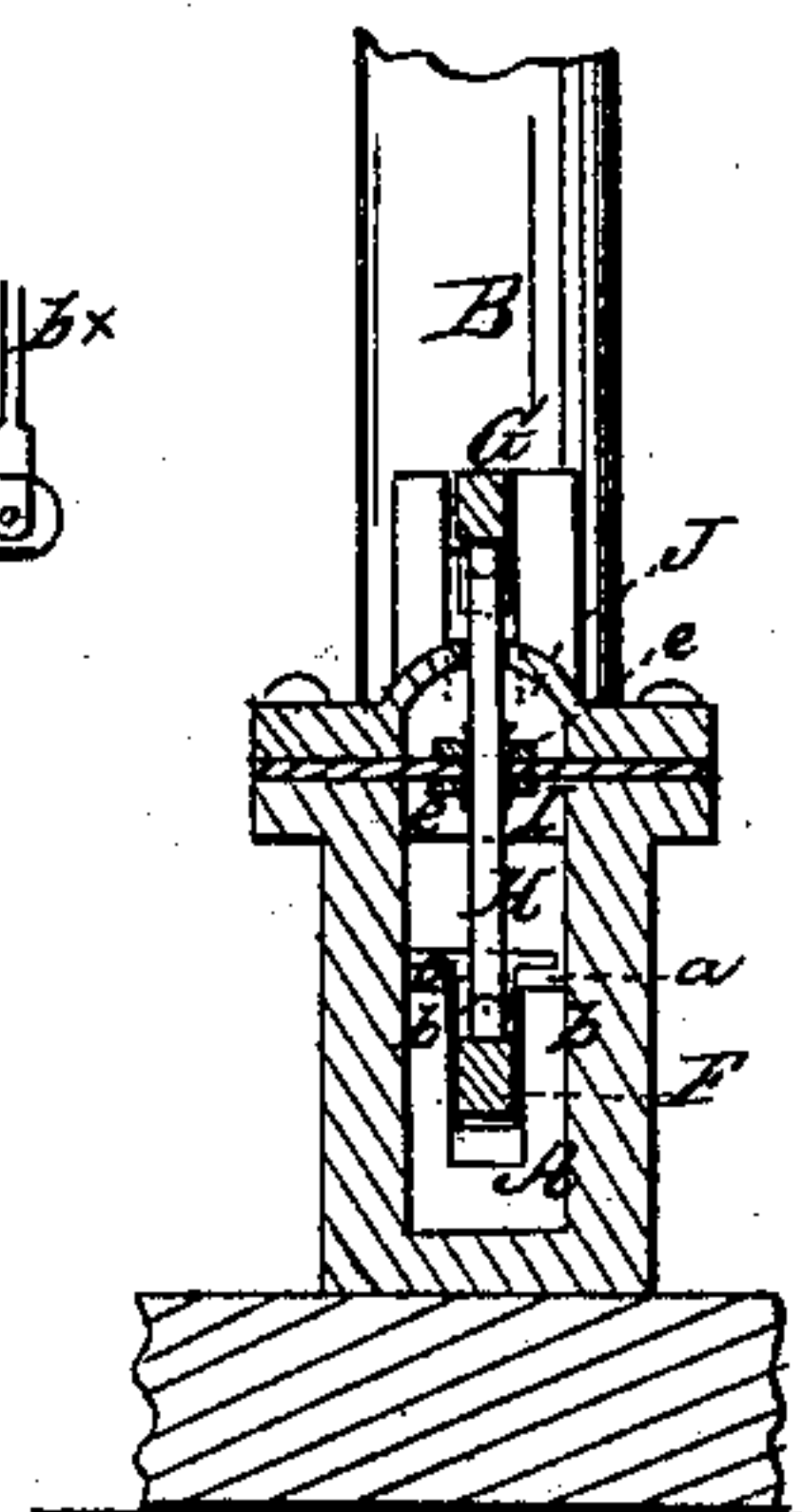
*J. Yates,*  
*Steam-Boiler Indicator.*

*No 46,173.*

*Patented Jan. 31, 1865.*



*Fig 3*



*Witnesses;*  
*Will Livingston*  
*Chas Topliff*

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*Joseph Yates*



# UNITED STATES PATENT OFFICE.

JOSEPH YATES, OF MOTT HAVEN, NEW YORK.

## IMPROVEMENT IN LOW-WATER DETECTORS.

Specification forming part of Letters Patent No. 46,173, dated January 31, 1865.

*To all whom it may concern:*

Be it known that I, JOSEPH YATES, of Mott Haven, in the county of Westchester and State of New York, have invented a new and Improved Water-Level Indicator for Steam-Boilers; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a vertical section of my invention, taken in the line *x x*, Fig. 2; Fig. 2, a plan or top view of the same; Fig. 3, a vertical section of the same, taken in the line *y y*, Fig. 1.

Similar letters of reference indicate like parts.

This invention relates to a new and improved application of a float to steam-boilers for the purpose of indicating the height of the water therein, sounding an alarm when the water is below a certain level, and also, if necessary or desired, be made the means for putting in operation a pump to supply the boiler.

The objection to the use of floats in steam-boilers to indicate the height of the water, has been that they are frequently affected by the foam, so as to be very unreliable; and, further, that the gage-rod attached to the float and passing through a stuffing-box or through guides is so restricted in its free movement by friction as to render the action of the float very uncertain.

My invention is designed to obviate these difficulties; and to this end it consists in isolating the float from the mass or bulk of water in the boiler, and still have the float exposed to the same influences of buoyancy and steam-pressure as when in the boiler, whereby the float is rendered reliable by being placed beyond the action of the foam.

The invention consists, further, in connecting the float-rod with a lever at the exterior of the boiler in such a manner as to avoid all inaccuracies due from friction, and at the same time form a perfect water-tight joint where the rods which form a connection between the float-rod and lever pass through the casing or box in which the float-rod is fitted or works.

A represents a casing or box, which may be of rectangular or other proper form, and hav-

ing an upright tube, B, at one end of it, which is surmounted by an ellipsoidal chest, C, which contains a float, D, to which a pendent rod, E, is attached, the latter extending down within the tube B and resting on one end of a lever, F, within the box A, as shown clearly in Fig. 1. This lever F is provided with knife-edge pivots *a*, which rest on suitable bearings, *b*, in the box A. The float-chest C communicates with the steam-boiler, below the water-level, by means of a pipe, *c*, (shown in red in Fig. 1,) and said chest communicates with the boiler, above the water-level, by means of a pipe, *d*, (also shown in red,) the pipe *d* being at the top and the pipe *c* at the bottom of chest C. By means of these pipes water and steam from the boiler are admitted to the chest C, the water in the latter being at the same height as it is in the boiler, and the float will be subjected to the same buoyancy and steam-pressure in C as it would be if it were in the boiler.

The tube B and box A, it will be seen, are filled with water, as the float chest, tube, and box all communicate with each other.

On the top of the casing or box A there is a lever, G, having its fulcrum at *d'*, and H H are two rods, the lower ends of which rest on the lever F, at opposite sides of its pivots *a*, and at equal distances therefrom. These rods H pass up through a diaphragm, I, of india-rubber or other suitable elastic material, which is attached to the under side of the top of the casing or box A, and forms a partition between the interior of A and chambers J J, through the tops of which the rods H H pass. These rods H have screw-threads cut upon them to receive nuts *e*, two of the latter being on each rod, one above and the other below the diaphragm I. By this means the rods H are allowed to work freely up and down through the top of the box or casing A, and the escape of water from A effectually prevented.

The lever G rests upon the upper ends of the rods H, the latter being at opposite sides of and at equal distances from the fulcrum *d'*. The float D is kept in a state of equipoise by an adjustable weight, K, on the lever G.

From the above description it will be seen that as the float D rises and falls according to the variation of the water-level in the boiler, the lever F will be moved and motion communicated from the lever F to the lever G through the medium of the rods H H, the elas-



tic diaphragm I yielding or giving to admit of the vertical play or movement of the rods, and at the same time serving to prevent any leakage of water around the rods where they pass through the top of the chambers J J. By this simple means the working of the rods H will not be at all interfered with by friction, as the rods may pass loosely through the tops of the chambers J J. The two rods H, at opposite sides of the fulcra of the levers F G, are necessary in order to insure an equilibrium, the pressure exerted against the diaphragm I in or under one chamber J counteracting the pressure exerted against said diaphragm under the other. In Fig. 1 one piece of rubber is made to answer for diaphragms for the two chambers J J; but two separate pieces may be used, if desired.

The lever G has a rod,  $a^x$ , attached to it, communicating with any proper indicator, to show the height of the water level in the boiler, and it also has a rod,  $b^x$ , attached to it, to operate a whistle or any suitable alarm when the water descends to a certain level. A pump-operating mechanism may also be connected with lever G, so that the boiler may be supplied with water when it becomes too low.

By having the float D isolated from the mass or bulk of water in the boiler, as shown, it is free from all vibrations and commotions caused by the ebullition of the boiling water in the boiler, and more especially from an undue rising or elevation frequently caused by filthy foam. By means of the levers, diaphragms, and rods, arranged as shown, the float is allowed to rise and fall freely with the varying height of the water in the boiler without being retarded by friction, which would otherwise attend the movements of the rods H H.

I claim as new and desire to secure by Letters Patent—

1. The combination and arrangement of the float D, the chest C, the rod E, the lever F, and the rods H H, substantially as and for the purpose set forth.

2. The elastic diaphragm or diaphragms I, in connection with the levers F, rods H H, and the lever G, substantially as and for the purpose specified.

JOSEPH YATES.

Witnesses:

M. M. LIVINGSTON,

C. L. TOPLIFF.