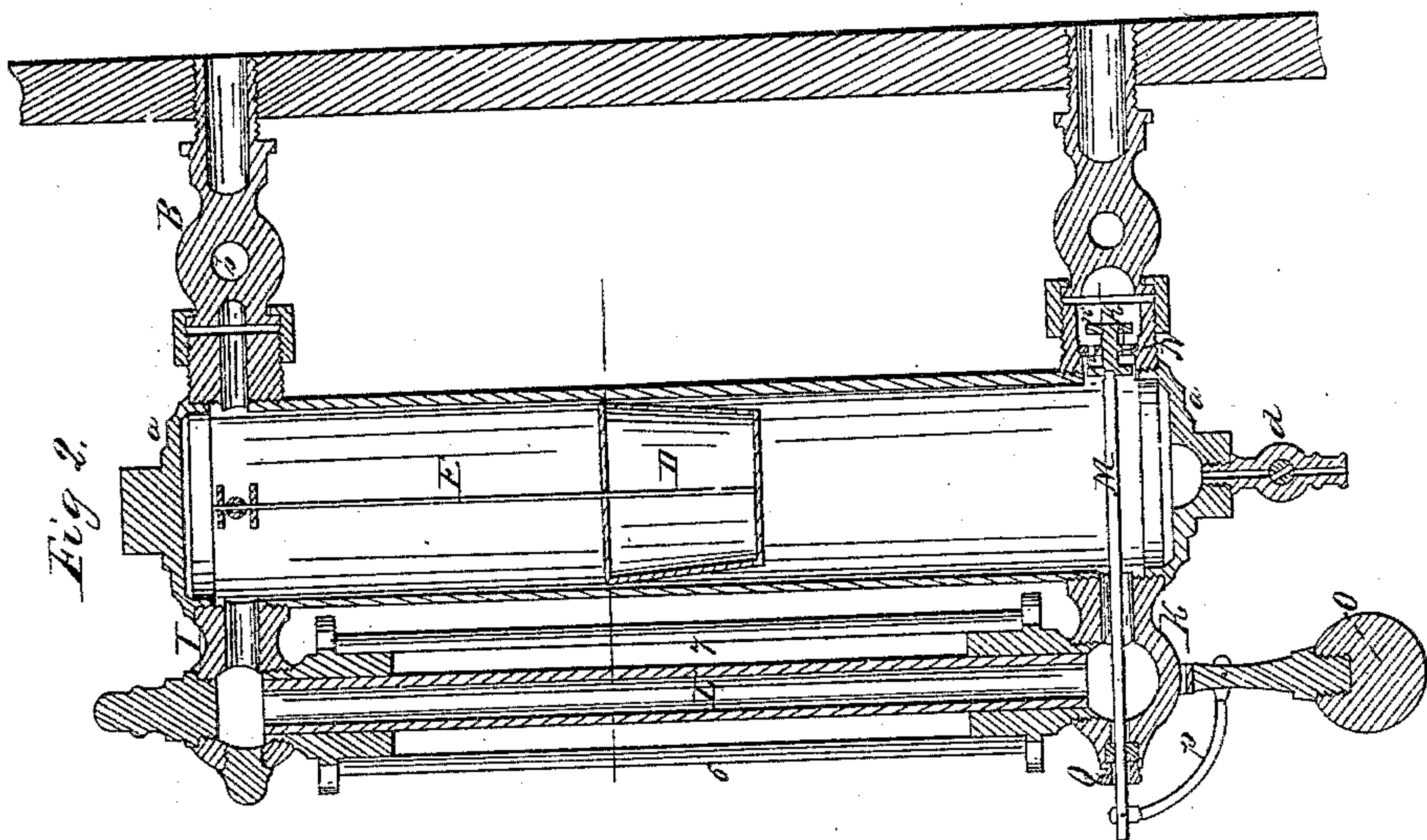


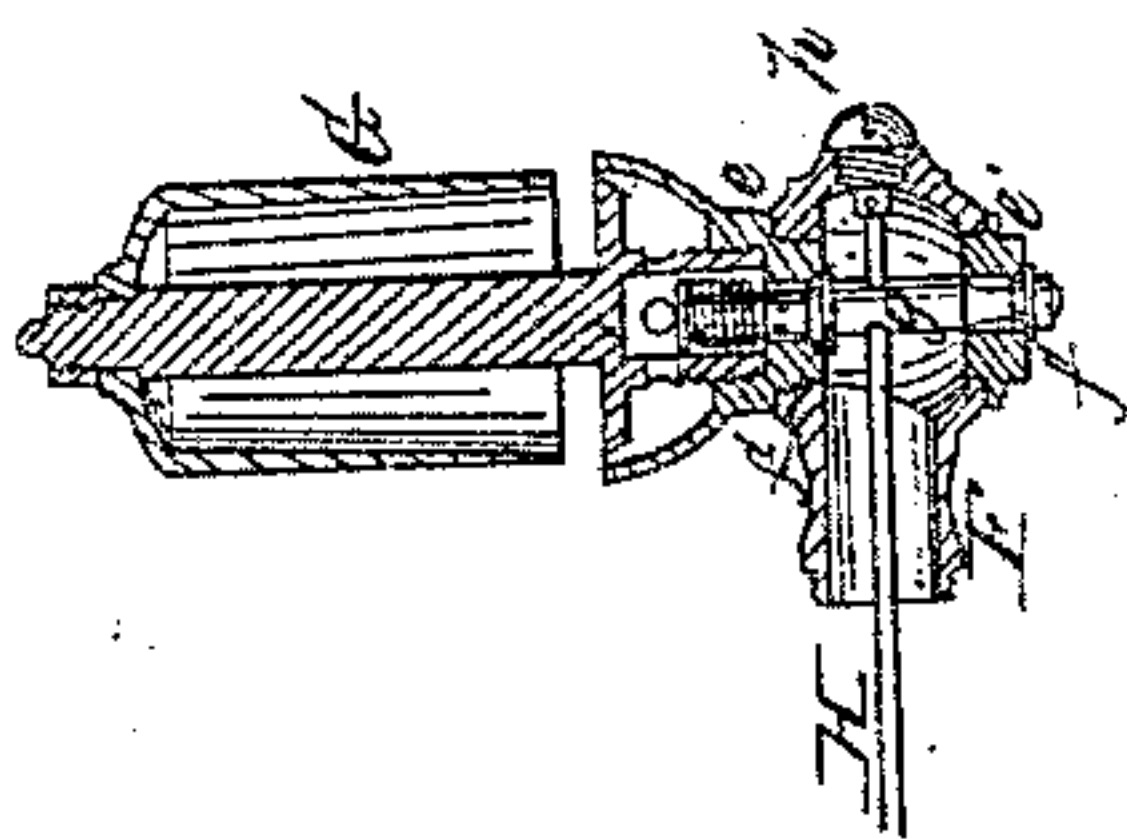
*Springer & Bartram,  
Steam-Boiler Indicator.*

*N<sup>o</sup> 62,230.*

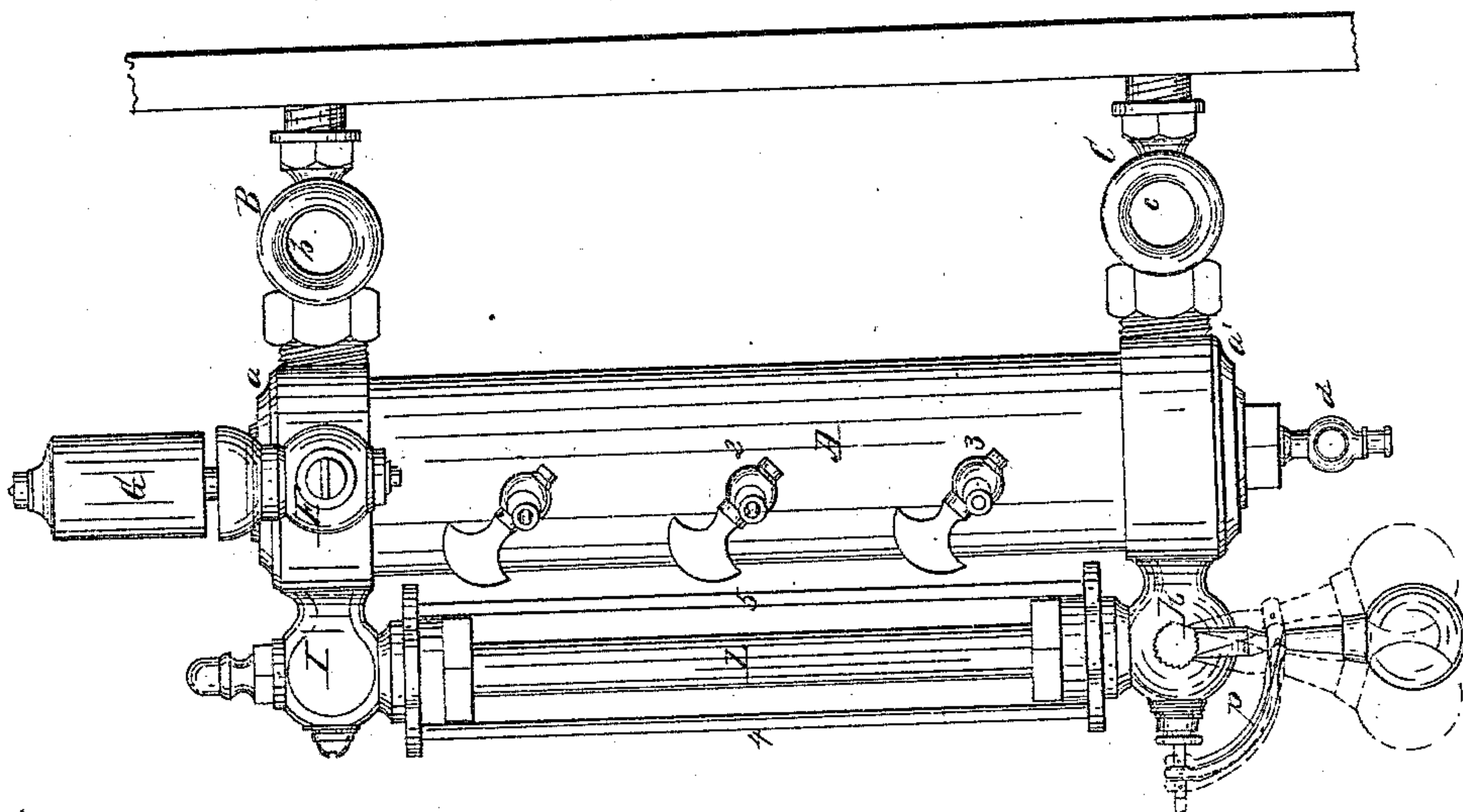
*Patented Feb. 19, 1867.*



*Fig. 2.*



*Fig. 3.*



*Fig. 1.*

*Witnesses,*

*J. I. Peyton  
Theodore Lang*

*Inventors,*

*Joseph H. Springer  
Wm. M. Bartram  
by Baldwin & Co. Attys.*



# United States Patent Office.

JOSEPH H. SPRINGER AND WILLIAM M. BARTRAM, OF PHILADELPHIA,  
PENNSYLVANIA, ASSIGNORS TO HENRY STELLWAGEN, TRUSTEE.

*Letters Patent No. 62,230, dated February 19, 1867.*

## IMPROVEMENT IN LOW-WATER ALARMS FOR STEAM GENERATORS.

The Schedule referred to in these Letters Patent and making part of the same.

### TO ALL WHOM IT MAY CONCERN:

Be it known that we, JOSEPH H. SPRINGER and WILLIAM M. BARTRAM, of the city and county of Philadelphia, in the State of Pennsylvania, have invented a new and useful Improved Steam Monitor or Low-Water Alarm for Steam Boilers; and we do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1 represents a view in elevation of our steam monitor.

Figure 2 represents a vertical central section through the same; and

Figure 3 is a section through the centre of the steam pipe and valve-rod that operates the whistle.

Letters Patent of the United States, dated June 19, 1866, and numbered 55,732, were granted to us for certain improvements in indicators for steam generators, on which our present inventions are improvements.

While our original invention above mentioned is very effective in operation, we have found it desirable to provide some further adaptations for applying it to marine steam generators working in a rolling sea, because; in such navigation, as the water level changes in the boiler with the pitching of the vessel, it necessarily produces a corresponding change in the level of the water in the indicator, irrespective of the actual quantity of water in the boiler; as, for example, on descending a wave the water level would rise in the indicator, and on ascending a wave the water would fall in the indicator independent of any save a very marked change in the quantity of water in the boiler. Again, we have found some inconvenience arising from placing the valve which regulates the alarm over the centre of and in connection with the glass tube, as in our Patent No. 55,732, by reason of the steam which condenses about the valve passing into the glass tube. Again, we find it desirable to be able to test the operative condition of the alarm by some device independent of the water in the boiler.

Now, it is the object of our improvement to adapt our original indicator to these requirements in marine boilers; to which end our invention consists, first, in so arranging the balance-valve that the pressure of the steam shall be equal on the top and bottom of the valve when it is placed at one side of the monitor; second, in so connecting the monitor with the steam generator that the monitor can be removed at any moment at the pleasure of the engineer; third, in the attachment of a pendulum to the water-valve (whether double or single) in such manner that the fore and aft pitching of the vessel shall alternately open and close the valve and thus regulate the level of the water in the monitor, while the communication between the boiler and monitor shall remain open when the vessel rights again upon an even keel; fourth, in combining a test cock with the monitor to determine the action of the steam valve independently of the water in the boiler.

A metal tube or cylinder, A, closed by caps, *a a'*, on its top and bottom, is provided with gauge-cocks 1, 2, 3, and at its upper end communicates with the steam chamber of the boiler by a pipe, B, and at its lower end communicates with the water chamber of the boiler through a pipe, C. The pipes B C are coupled to the cylinder A by screw-joints. The pipe B is provided with a stop-cock, *b*, and the pipe C with a stop-cock, *c*, so that by closing the stop-cocks *b* and *c* the working connection between the boiler and the monitor may be shut off, and by uncoupling the pipes B and C the monitor can be removed at pleasure, and of course attached again, and the stop-cocks opened so as to renew the working connection, these removals and replacements being made without interrupting the working of the boiler. Within the cylinder A we suspend, as shown in fig. 2 of the drawings, a light metallic cup or bucket, D, the circumference of which is nearly equal to the internal circumference of the cylinder, thus leaving the bucket free to rise and fall within the cylinder. The bucket is so suspended (by a rod, E,) that its top is nearly on a plane with the water line of the boiler, which should be about the centre of the cylinder A, as shown by a red line in fig. 2 of the drawings. The bucket may have a perforated top, if preferred, instead of being left entirely open. The lower cap *a'* of the cylinder is provided with a cock, *d*, for a purpose to be hereinafter described. From the side of the upper end of the cylinder A, a pipe, F, projects far enough to receive a valve and its seat, above which this pipe is provided with a steam whistle, G. Within the pipe F a seat, *e*, is arranged for the valve *f*, on the valve-rod *g*, which is also provided with a second valve, *f'*, resting against a seat, *e'*, beneath the pipe F, as shown in fig. 3. The valve-rod or stem *g* has coiled round it a spiral spring, the tendency of which is to hold the valves *f f'* upon their seats



*g g'* The valve-stem *g* is punched or drilled near its centre with a hole large enough to receive a valve-rod, *H*, which is pivoted to a screw, *h*, in the outer end of the pipe *F*, and the rod *H*, after passing through the valve-stem, extends forward in the pipe *F* beyond the centre of the cylinder *A*, its front end being punched or drilled with a hole that will receive the upper end of the rod *E*, which supports the bucket, the rod *E* being properly adjustable by screw-nuts above and below the rod *H*. By this arrangement, when the whistle blows the surplus escape of steam and the water condensed about the valve-stem pass out through the bottom of the pipe *F*, instead of into the glass tube. From the upper and lower ends of the cylinder and opposite the pipes *B C*, we provide two hollow projections or pipes, *I K*, between which we secure a glass tube, *L*, in any proper manner to render it steam-tight, and this we protect with guard rods 4, 5, 6, 7, to prevent its being broken. The upper pipe *I* communicates with the steam chamber of the boiler through the cylinder *A*, and the lower pipe *K* communicates with the water space of the boiler, also through the cylinder. A valve-stem, *M*, passes through the cylinder and through the pipe *K* from the pipe *C*, within which we provide a perforated disk, *N*, that has a valve face on each side, against which the valves *n n'* press alternately as the stem *M* is moved back and forth. Under the pipe *K* we suspend a pendulum, *O*, by set-screws passing through the arms of its Y-shaped stem and bearing upon the sides of the pipe, so that the pendulum is free to swing back and forth to conform to the pitching motion of vessels at sea. A curved arm, *P*, passes from the stem of the pendulum to the outer end of the valve-stem *M*, which passes through a stuffing-box, the curved arm being so pivoted at both ends as to communicate the vibrations of the pendulum to the stem *M* and valves *n n'*.

The operation of our improved monitor is as follows: It is attached to the boiler and the stop-cocks *b c* are opened. The water from the boiler will then enter the cylinder *A* and rise to the level of the red line in fig. 2, filling the cup or bucket *D* and maintaining that level so long as the proper supply of water is maintained, but when the water in the boiler becomes too far reduced for the safe and proper working of the boiler it will also be reduced in the cylinder and sink until the weight of the cup filled with water which it retains overcomes the resistance of the spring on the valve-stem, when the valve *f* will open and the escape of steam through it to the whistle will admonish the engineer. At the same time the valve *f'* will open and permit any condensed steam to pass out without obstructing the action of the whistle. When the vessel pitches the pendulum will vibrate with the vessel, and, by alternately opening and closing the valves *n n'*, prevent the undue flow of water from the boiler to the cylinder, or from the cylinder into the boiler, and thus sustain the cup *D* in its proper position and insure a regular action of the whistle with relation to the true quantity of water in the boiler. At times it may be found desirable to test the action of the whistle independently of the water in the boiler, and this we do either by shutting off the water from the boiler by turning the cock *C* or by moving the stem *M* to close the valve-seat, then open the cock *d* in the bottom cap of the cylinder, when, if the whistle and its connections are in proper condition, the discharge of water from the cylinder and the consequent sinking of the cup *D* will cause the whistle to blow, as already described.

Of course we do not mean to limit ourselves to any precise dimension for a monitor or for its parts, but design to adapt them in various sizes to the varying conditions in which the whole may be used; and it is obvious that, instead of two valves acting on one seat alternately to check the flow of water from the boiler to the cylinder, a single valve may be placed on the rod to work alternately against two valve-seats. Other equally obvious modifications may be employed without departing from the substance of our invention. It is also obvious that by drilling a hole on one side and near the top of the cylinder a steam-pressure gauge may be as well attached to the monitor as to the boiler.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. The arrangement of the balance-valve *f*, with reference to the monitor and whistle, substantially as and for the purpose set forth.
2. The combination and arrangement of the pendulum attachment with the stem of the water-valve, substantially as and for the purpose set forth.
3. The arrangement of the test-cock *d*, the cylinder, the cup *D*, and the valve-stem *M*, substantially as and for the purpose specified.

In testimony whereof we have hereunto subscribed our names.

JOSEPH H. SPRINGER,  
WILLIAM M. BARTRAM.

Witnesses:

BARTHOLOMEW CLARKE,  
W. OGLE.