

J. L. HASTINGS.
Low-Water Gage and Alarm.

No. 226,171

Patented April 6, 1880.

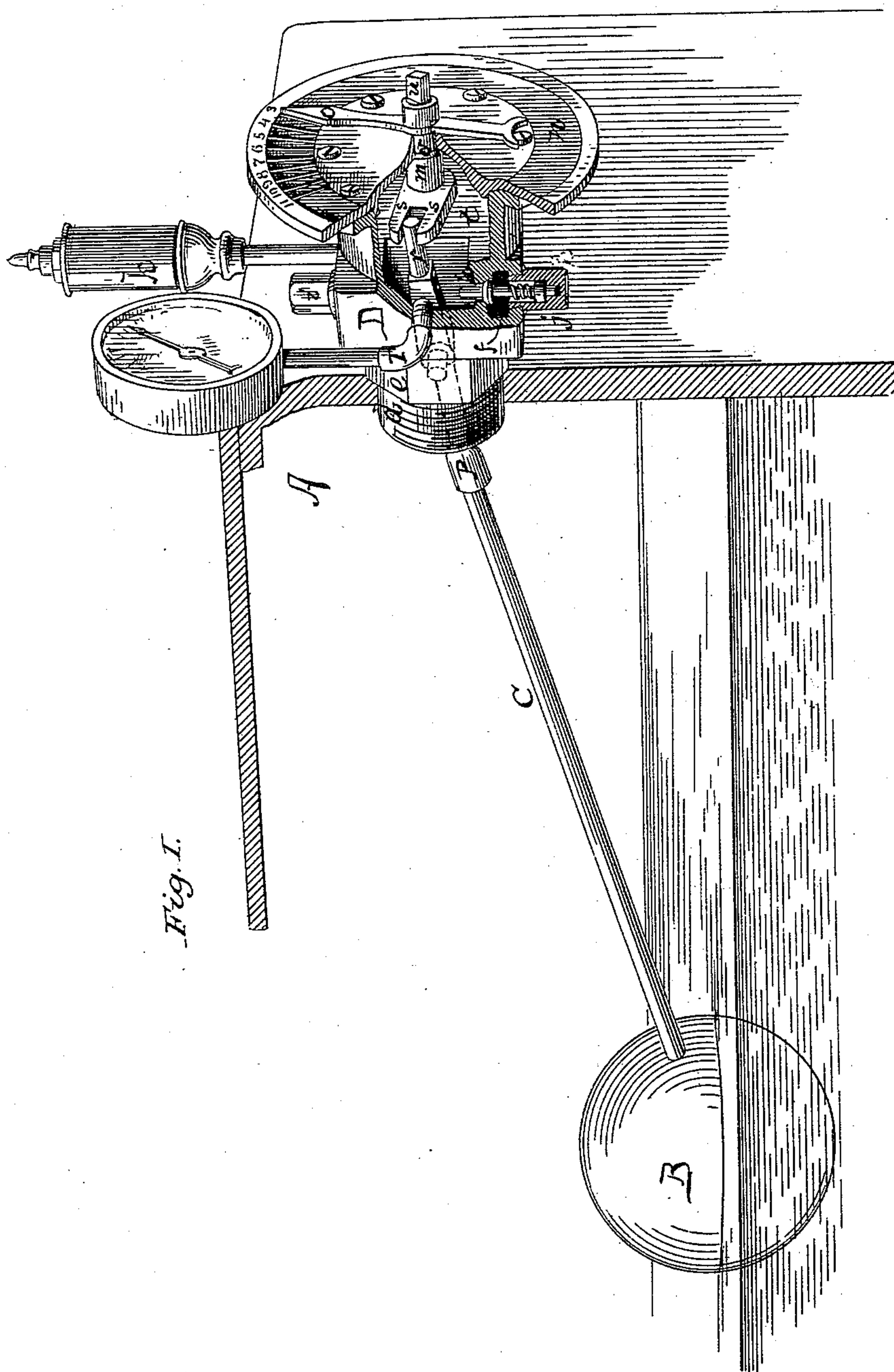


Fig. 1.

Witnesses:

D. P. Cowl
L. H. Marshall

Inventor:

James L. Hastings
By his atty
W. O. Smith

J. L. HASTINGS.
Low-Water Gage and Alarm.

No. 226,171

Patented April 6, 1880.

Fig. 2.

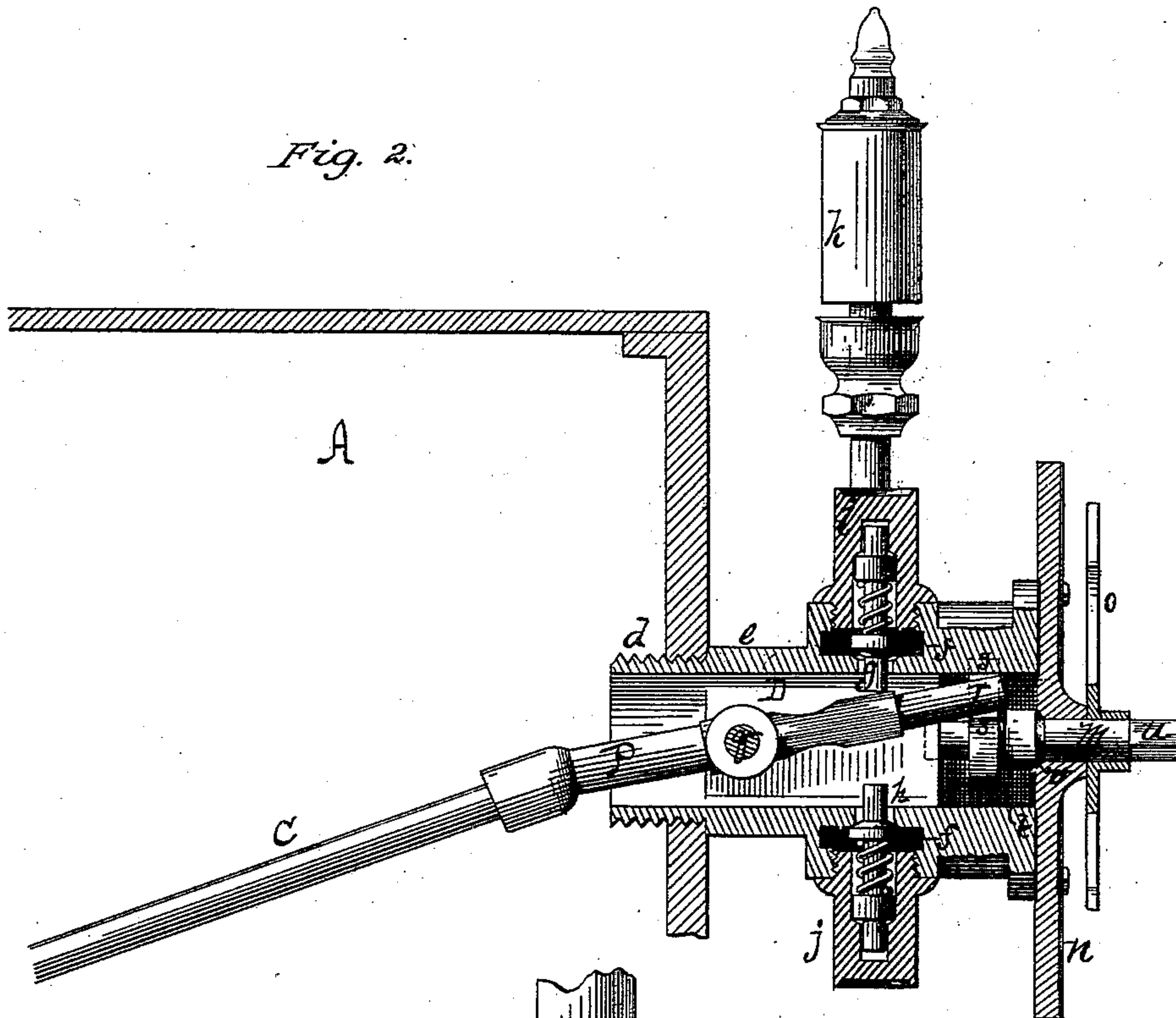
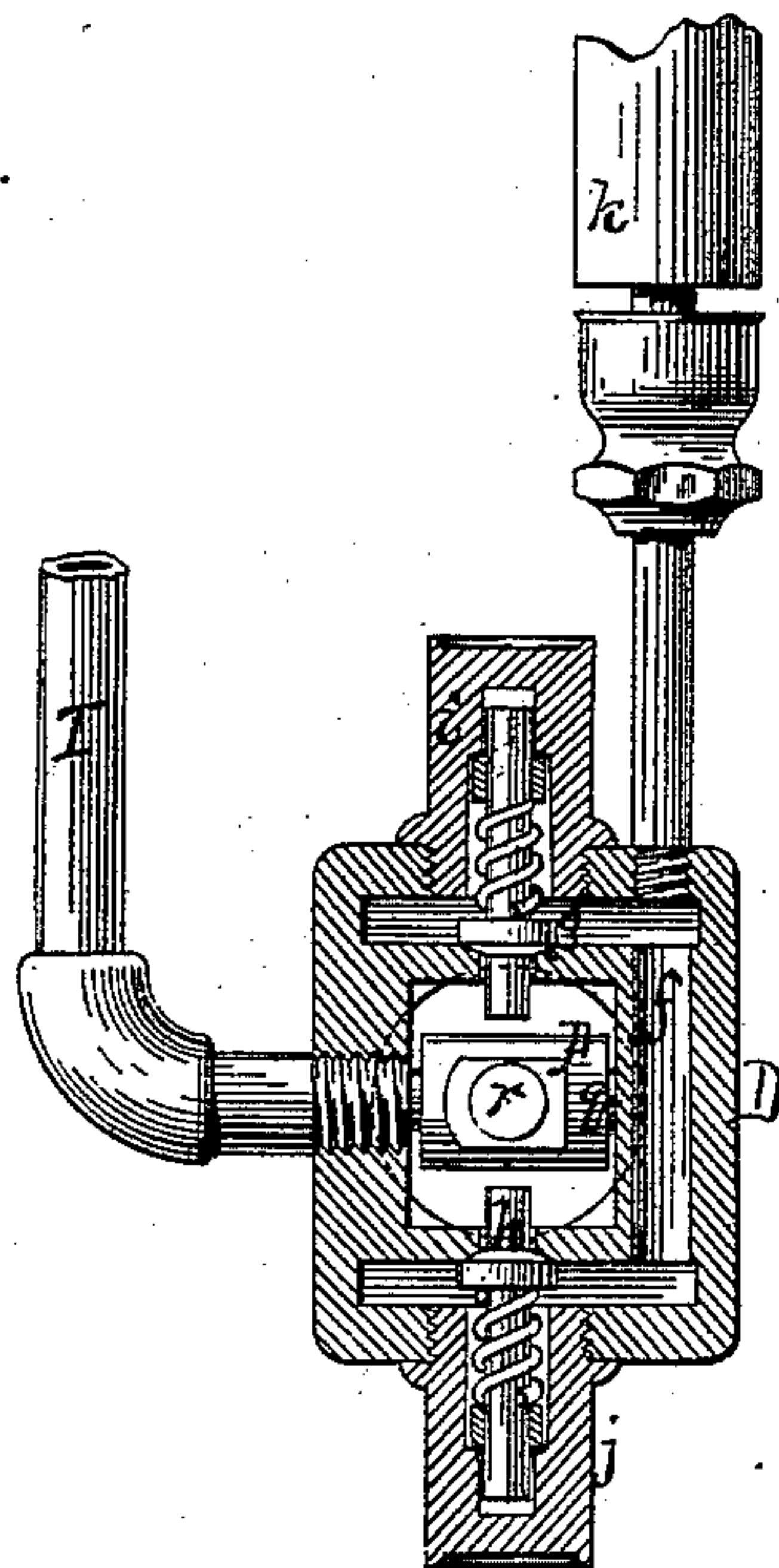


Fig. 3



Witnesses:

Clarence Poole,
L. W. Marshall.

Inventor:

James L. Hastings,
By his Attys.
R. D. Smith.

UNITED STATES PATENT OFFICE.

JAMES L. HASTINGS, OF BELLEFONTE, PENNSYLVANIA.

LOW-WATER GAGE AND ALARM.

SPECIFICATION forming part of Letters Patent No. 226,171, dated April 6, 1880.

Application filed January 15, 1880.

To all whom it may concern:

Be it known that I, JAMES L. HASTINGS, of Bellefonte, Centre county, in the State of Pennsylvania, have invented a new and useful Improved Low-Water Gage and Alarm, of which the following is a full and exact description.

The object of my invention is an instrument to indicate the stage of water in the boiler, and to alarm by a signal both high and low water; also, to so separate the action of alarm and indicator that either may be operated without the other, and to so simplify the structure that derangement will be unlikely to occur.

It therefore consists in a fitting or shell provided with a screw-threaded portion adapted to screw into a proper socket or plate on the boiler, so that the interior of said shell is placed in connection with the interior of the boiler, and within said shell a pivoted lever, one end of which is coupled to a float-rod to actuate the mechanism of the indicator and alarm, and the other end coupled to said mechanism.

It also consists in a valve-chamber, preferably cored out in casting said shell, and two valves, one above and the other below said lever, so that one will be opened by the upward movement of the same to indicate high water, and the other be opened by a downward movement of said lever to indicate low water, and a signal-whistle is connected with said chamber.

It also consists in an indicator rock-shaft with a cleft-arm projecting laterally to embrace the end of the pivoted lever above named, whereby the indicator-hand may be moved to indicate the rise and fall of the float.

It also consists in an indicator-spindle provided with means whereby power may be applied externally to operate the interior mechanism to test the operative condition of the parts.

That others may fully understand the structure and operation of my device, I will particularly describe it, having reference to the accompanying drawings, wherein—

Figure 1 is a sectional perspective view of a steam-boiler with my indicator and alarm attached. Fig. 2 is a longitudinal section. Fig.

3 is a transverse section through the valve-chamber.

A is the boiler, which may be of any approved or appropriate style or description. B is the float, preferably a hollow sphere of copper, as is customary. The float B is attached to the indicator and alarm apparatus by a rod, C.

D is the metallic shell, which incloses and supports the operative mechanism of my apparatus. At its rear it is provided with the hollow stem *d*, with a screw-thread upon its outer side, whereby it is attached to the boiler, and the square or angular part *e*, whereon a wrench may be applied when attaching or detaching the apparatus. Exterior to the square *e* there is the valve-chamber *f*, which I prefer to form in the wall of the shell D by cores in the casting; but it may be made separate and attached, if desired. The chamber *f* extends from the upper side around to the lower side of the shell, and is provided with two valves, *g h*, which are closed by springs against steam-pressure, and may be so graded as to open when said pressure exceeds the safe limit. They are screwed and kept in place by the screw-caps *i j*, and either of them may at any time be removed without disturbing the remainder of the apparatus by the removal of said cap. The alarm-whistle *k* takes steam from the chamber *f*, and sounds whenever either of the valves *g h* is open.

At the front of the shell D there is a chamber, *t*, within which the indicator rock-shaft *m* is placed, and said chamber is closed at the front by the dial-plate *n*, through the center of which said rock-shaft projects to bear the index-hand *o*. The exterior face of the dial *n* is provided with suitable graduation-marks, so that as said index is moved over them the position of the float B and the elevation of the water-line within the boiler will be indicated.

The float-rod C is securely attached to the end of the lever P, which is mounted upon a horizontal pivot, *q*, the ends of which are rigidly secured in the walls of the shell D, so that said lever may move freely in a vertical plane, but not in any other. The front end, *r*, of said lever P projects through into the chamber *t*, where it engages with a cleft arm or lever, *s*,

which projects laterally from the rock-shaft spindle *m*, and thereby causes said rock-shaft to partially rotate with every vertical movement of said lever.

5 The stems of the valves *g* and *h* project into the interior space of the shell *D*, and are adjusted in length, so that when the lever *P* has moved either up or down to the determined limit of low or high water the said lever will
10 encounter one or the other of said valve-stems, as the case may be, and by the movement of the lever, as the water-level either falls below or rises above said predetermined "safe" line, one or the other of said valves will be opened,
15 and the escaping steam will sound the alarm-whistle *k*.

A pipe, *T*, may be inserted in the side of the shell *D*, to couple with a steam-gage, if desired.

20 The cleft in the lever *s* is rounded on its interior surface, so as to avoid lost motion in the various positions which it bears to the lever *P*, and when great accuracy is required a ball-and-socket connection may be made, as
25 shown.

The front end of the rock-shaft *m* is provided with a square, *u*, so that when it is desired to test the operative condition of the valves a wrench may be applied to operate
30 said parts by exterior force.

The under face of the dial surrounding the orifice through which the stem of the rock-shaft passes is countersunk, and the shoulder
35 *v* of the rock-shaft is correspondingly conical, so that said shoulder constitutes a valve seated against the dial to prevent the escape of steam while permitting a rotary movement without undue friction.

The valves *g* *h* are closed by springs or
40 weights against the steam-pressure, and said springs may be so graded that the valves will open when an unsafe pressure has been attained, and the alarm then sounded will indicate the fact that pressure is too high.
45 When the alarm is sounded it is, of course, required to interpret it by consulting the dial-indication. If it indicates high or low water, the index will show that fact. If the index shows a proper stage of water the alarm indi-
50 cates undue pressure.

The utility of such a device is felt when the fireman neglects his business, becomes careless, and allows the water to get low, or, on the other hand, pumps the boiler full of cold water.
55 In many cases, also, he is required to perform after-work which causes him to be absent from his post at times when he should be attending to the boiler. By the use of this device the water cannot get below the low-water line
60 without notifying all connected with the establishment, and so also in the case of high water.

In the use of this indicator the water-level can be kept nearly at one point, and, by preventing extremes in the use of the pump, a
65 great saving of fuel can be made.

The operation is as follows: The float hav-

ing been connected to the lever by screwing the rod into the socket thereof and placing it so that the center of the sphere (the float) is
70 on the low-water line in the boiler, the valves are then adjusted by filing off the stems, so that they will be opened by the pressure of the lever caused by the rise or fall of the float at the height or depth of water that it is desired
75 to carry.

The index-finger is set at low-water with the float—*i. e.*, if three inches is declared low water the float and finger are placed at three
80 inches, as stated, the center of the float in the boiler at three inches, and the index-finger pointing at three inches on the dial, and the upper valve regulated to open at that point; so, also, if eight inches is declared high-water, the lower valve is adjusted to open when
85 the water and float have reached that level. The opening of either valve causes the signal-whistle to blow.

The index-finger shows at all times the stage of the water in the boiler.

The attachment is made high up on the boiler in the dry steam, and the leverage, being twenty-four to thirty inches, is so great
90 that it is impossible to stick the valves by corrosion or otherwise so that they will not work.

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

1. The lever *P*, pivoted by a horizontal transverse rod passing through it, upon which
100 it turns or is oscillated in a vertical plane by the motion of the float, combined with the rock-shaft *m* and index-indicator, in the manner shown.

2. The valves *i* *j*, placed one above and the
105 other below in the steam-chamber *f*, the outer end of the stem of each secured in a cap, in which it moves, and a spring attachment to the stem for holding the valve on the seat, combined with the pivoted lever *P*, actuated by the float
110 *B*, for the purpose set forth.

3. The rock-shaft *m*, one end of which has a bearing and moves in the shell of the device, the other in the dial, forming the stem
115 of a valve, *i*, of which the disk forms the seat, substantially for the purpose set forth.

4. The lever *P*, with its extension *V*, combined with the rock-shaft *m* and its cleft-arm
120 *s*, for the purpose of moving in connection with the outer end of float-lever, as shown, and for the purpose as stated.

5. The shell *D*, provided with the steam-chamber *f*, which extends around from the top to the bottom of said shell, and is provided
125 with two valves, *g* *h*, the stems whereof project inwardly into said shell and are adjusted to encounter the lever *P* when the float *B* has reached the high and low water limit, respectively, combined with the alarm-whistle
130 *k*, whereby the same alarm serves to indicate either high or low water, as the case may be.

6. In a dial-indicator of high and low water, a steam-chamber, *f*, and alarm-whistle *k*, combined with an actuating float and lever,

combined with two valves, *g h*, in said chamber *f*, closed against steam-pressure by springs or weights, and capable of being opened by said lever at the high or low water limit, or
5 by the steam-pressure at safety-limit, whereby the same whistle may sound an alarm to indicate either high or lower water or unsafe pressure, which alarm may be interpreted by the dial-indication, as set forth.
10 7. A dial and alarm indicator provided with an index-spindle having a square at its

outer end, whereon a wrench may be applied to operate the mechanism by exterior force, for the purpose set forth.

8. The steam-chamber *f*, which conducts 15 the steam from the whistle-valve to the whistle-pipe constructed in the wall of case A by means of cores, in the form and manner shown.

JAMES L. HASTINGS.

Witnesses:

J. H. WILLIAMS,

WILBUR F. REEDER.