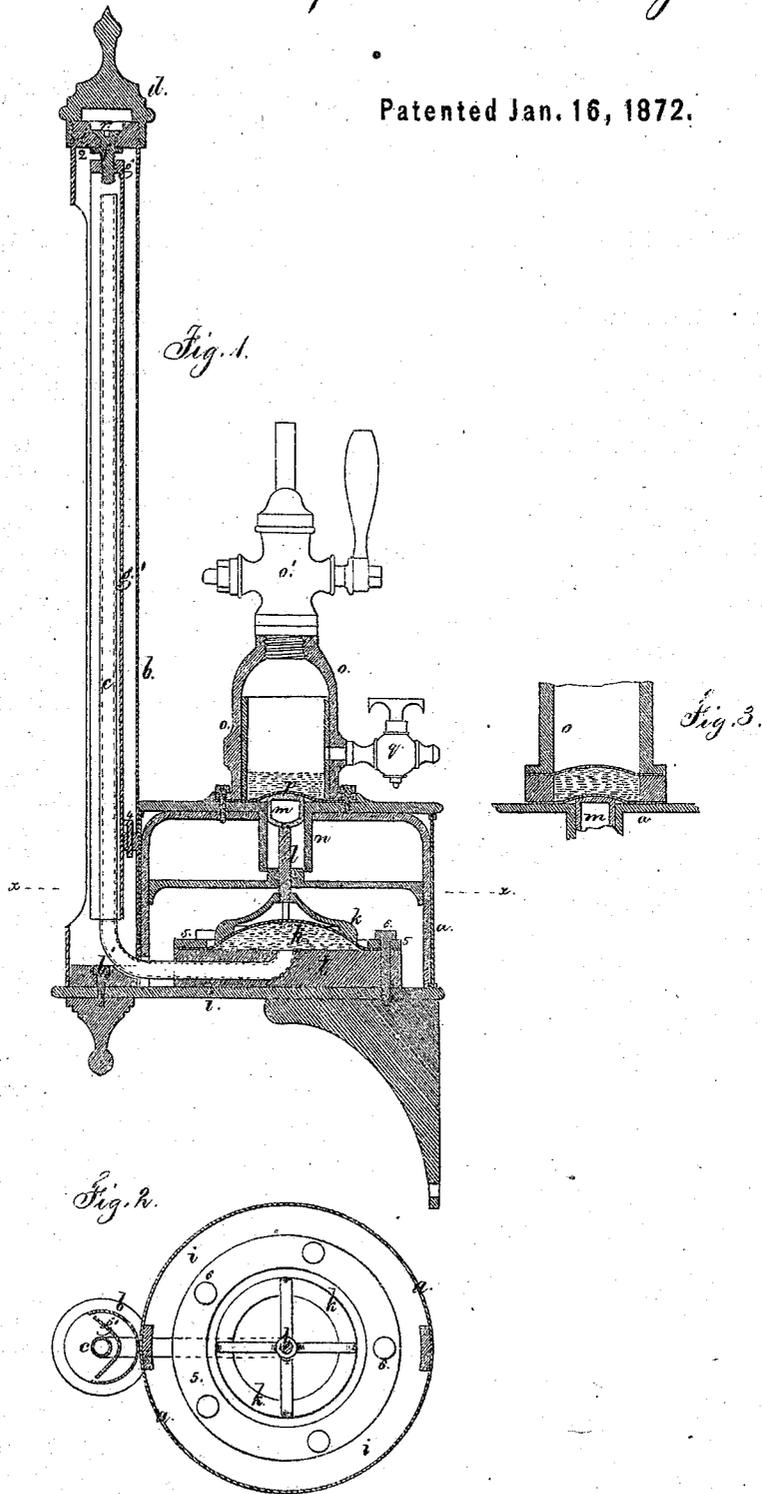


Jefferson Brown Jr.
Impt. in Steam Gauges

No. 122,700.

Patented Jan. 16, 1872.



Witness
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UNITED STATES PATENT OFFICE.

JEFFERSON BROWN, JR., OF NEW YORK, N. Y.

IMPROVEMENT IN PRESSURE-GAUGES.

Specification forming part of Letters Patent No. 122,700, dated January 16, 1872; antedated January 10, 1872.

To all whom it may concern:

Be it known that I, JEFFERSON BROWN, JR., of the city and State of New York, have invented and made a new and useful Improvement in Steam-Gauges; and the following is declared to be a full and correct description thereof.

Steam-gauges have been made in which mercury is used to indicate the pressure of steam by its temperature. These are liable to be broken, and are objectionable because they have to be applied directly to the boiler.

The pressure of steam has also been indicated by a column of mercury, the steam pressing upon a small piston or diaphragm and the column of mercury acting upon a large piston or diaphragm; but there was no opportunity to adjust the scale, and the mercury expanded or contracted under change of temperature and varied the indication.

The nature of my invention consists in a column of mercury that is balanced and stands at a given level in the bulb and column, so as not to be much affected by heat, as heretofore, and an adjustable scale is provided that indicates the pressure of steam. The steam acts, by its pressure, against a small piston, and the same is connected to a head or disk that acts upon the mercury-bulb; said bulb being made of flexible material, so as to yield to the pressure and force the mercury up in a tube a distance proportioned to the relative pressures; and when the parts are at rest the mercury in the bulb and tube subside to nearly the same level, thereby preventing a change of indication by variations in temperature.

In the drawing, Figure 1 is a vertical section of my gauge, and Fig. 2 is a sectional plan at the line *x x*.

a is a metal cylinder, on the side of which is attached the vertical open cylinder *b* that forms the support and shield for the mercury-tube *c*. The open cylinder *b* is secured by the screw *b'* to the base *i* of the gauge. The cap *d* is screwed upon the top of the shield, and the ring *e* is immovably fastened to the shield *b*. The screw-pin *f* passes through the center of the ring *e* into the top piece *g* of the metal scale piece *g'*, which passes down behind the glass tube, and is guided at the bottom by the socket and pin *4*. The pressure-divisions are

marked upon the face of this scale. The head of the screw-pin *f* fits in a recess in the ring *e*, and a collar, *r*, on the pin *f*, under the ring *e*, prevents said pin from rising when it is turned so that the scale is adjusted up or down; and when set the space *r* above the head of the pin *f* can be filled with wax and sealed to detect any tampering with the scale. The tube of the column *c* extends through the side of the cylinder *a* and block *t* of hard rubber upon the bottom of the cylinder *a*, and connects with the reservoir or segmental bulb *h* of mercury, formed by a disk of kid or other flexible material, secured at its edges to the block *t* by a ring, *5*, and bolts *6*, some of which bolts pass through the block *t* into the base or support *i* of the gauge. The annulus or disk *k* is nearly as large in diameter as the segmental bulb *h*, and sits upon the same. This annulus is connected to the central vertical pin *l*, on the upper end of which is the small head or piston *m*. The cylinder *n* passes down into the cylinder *a* around the head *m*, and said head *m* slides freely in this cylinder *n*, the stem *l* being guided so that the annulus *k* is kept in a central position upon the bulb *h*. The annulus or disk *k* and head *m* are of the proper relative size, and the pressure of the steam acts upon the head *m* and is balanced by the short column of mercury, the pressure thereof in the segmental bulb *h* being upon a greater surface than that of the steam upon the head *m*. The dome-shaped cylinder *o* is secured by flanges upon the top of the cylinder *a* over the head *m*, and a cock, *o'*, on the top of the cylinder *o* admits steam from the boiler. The cylinder *o* is lined with hard rubber or other material impervious to mercury. I cover the head *m* with a flexible diaphragm, *p*, secured by the flanges of the cylinder *o*; and upon this diaphragm *p* I place a small quantity of mercury, which receives and communicates to the head *m* the pressure of steam, and prevents the sediment from the boiler injuring the diaphragm *p*, and enables me to readily blow off the collection of sediment in the cylinder *o* through the cock *q*, provided for that purpose, the mercury remaining at the bottom.

When the gauge is used on vessels a curved pipe from the cock *q* should be provided above

the top of the mercury, so that the motion of the vessel shall not throw the mercury into the cock *g*.

The mercury in the cylinder *o* might be placed in a ring of hard rubber, and be covered by a disk of flexible material, in which case the cylinder *o* need not be lined with rubber. (See Fig. 3.)

The gauge is attached, by the base *i*, to any convenient place, and the connection made with the boiler by a pipe to the cock *o'*; and the adjustable scale can be accurately set and sealed by the proper parties, and after thus having been set it cannot be tampered with without breaking the seal. In case of any derangement of the parts or fouling of the cylinder, it can be readily removed and access had to the parts without disturbing the mercury-column.

The bulb *h*, when formed of kid leather, will allow air to pass through in filling the gauge with mercury, which, hence, can be done from the top of the tube; but the mercury will not pass through the kid under the pressure to which it is subjected. The bulb *h* being in the form of a flexible bag, the mercury therein and in the column are at the same level when the gauge is at the zero mark, and that

regardless of the temperature; hence, the pressure will be accurately denoted by the height of column, according to the relative areas of the piston *m* and annulus *k*, there being very little loss of power by friction or the stretching of elastic diaphragms, as heretofore usual.

I claim as my invention—

1. The flexible segmental bulb *h*, arranged in relation to the column *c*, annulus or disk *k*, and piston *m*, in substantially the manner and for the purposes specified.

2. The cylinder *o* containing mercury above the piston or head *m*, and connected with the steam-pipe and with the blow-off cock *g*, in combination with the annulus or disk *k*, bulb *h*, and column *c*, substantially as set forth.

3. In a pressure-gauge having an adjustable scale, I claim the construction of the hole of the adjusting-screw with a countersunk head for the reception of a seal, with the cap *d* for its protection, as shown.

Signed by me this 9th day of June, A. D. 1870.

JEFFERSON BROWN, JR.

Witnesses:

GEO. D. WALKER,

GEO. T. PINCKNEY.

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