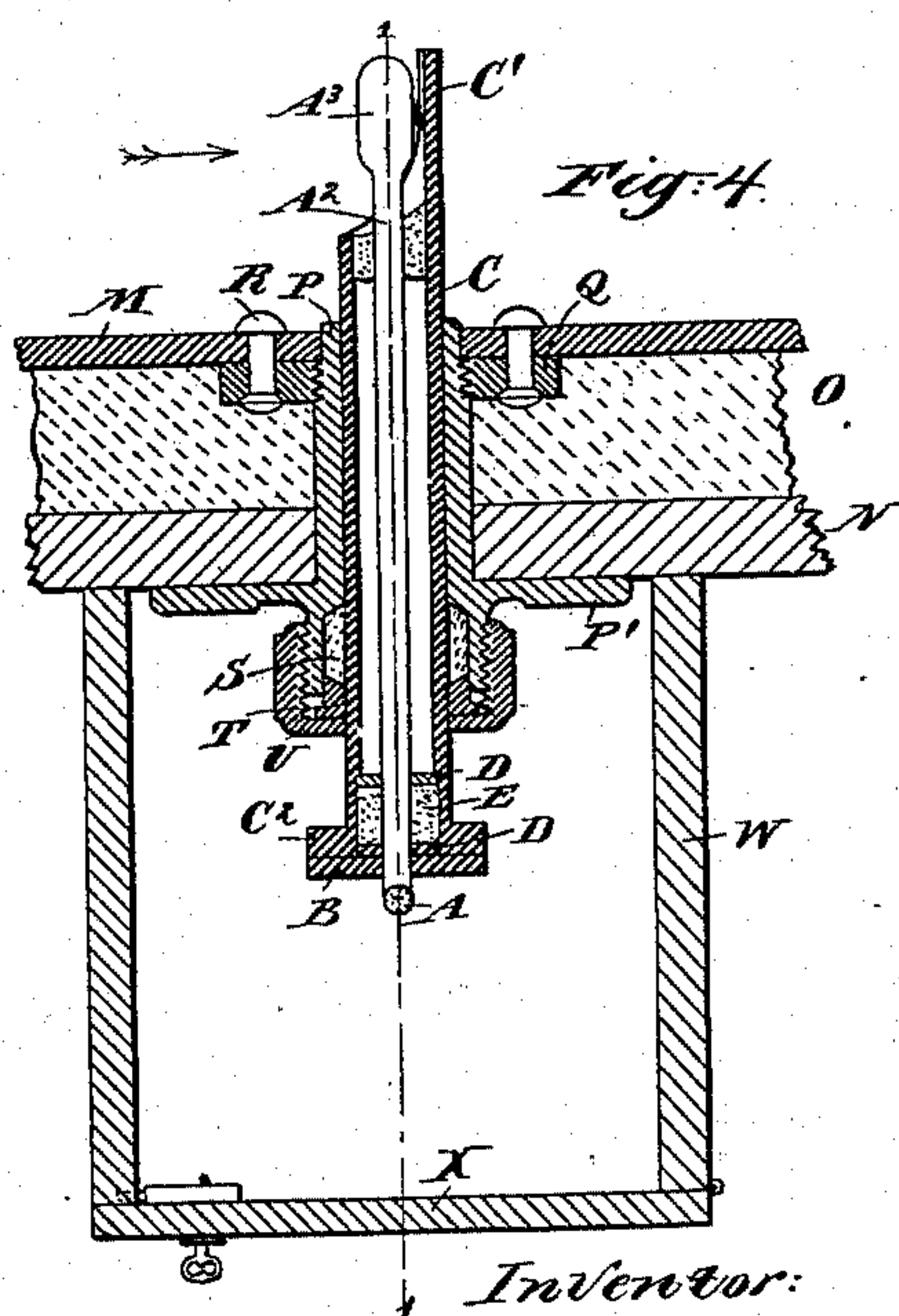
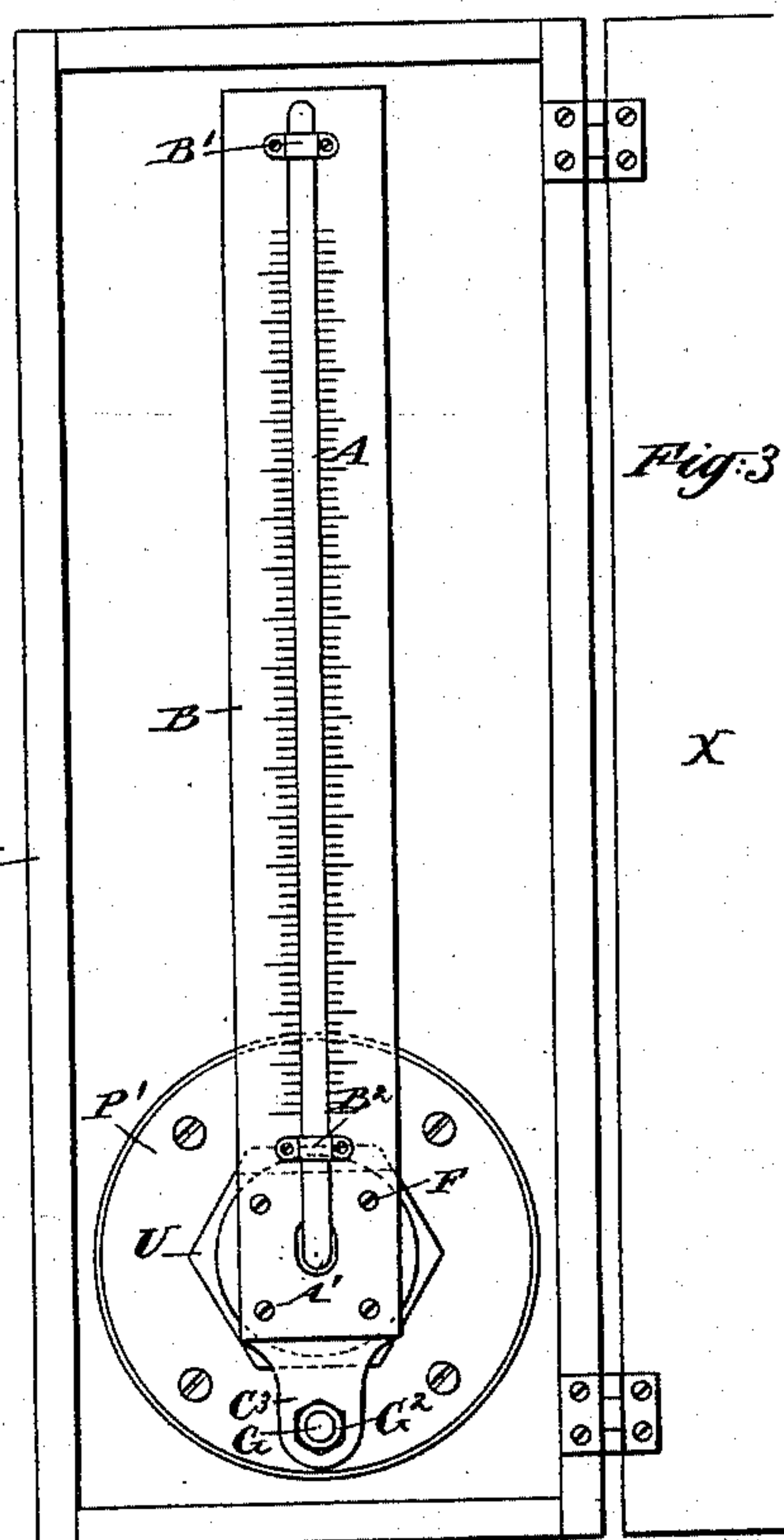
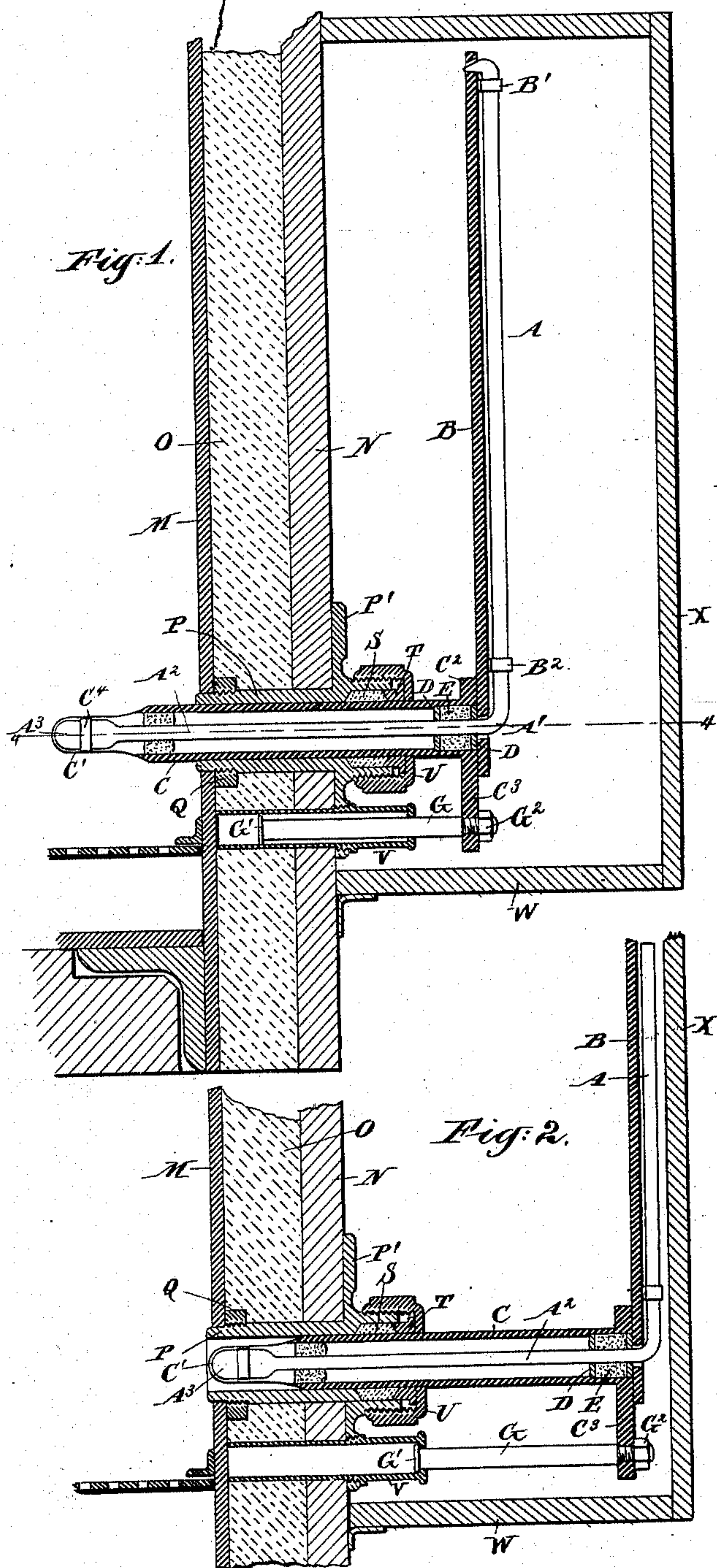


(No Model.)

M. BYRNE.  
THERMOMETER.

No. 518,442.

Patented Apr. 17, 1894.



Witnesses:  
Charles R. Searle,  
M. J. Boyle.

Inventor:  
Michael Byrne  
By his attorney  
Homer Dyer Stearns



# UNITED STATES PATENT OFFICE.

MICHAEL BYRNE, OF NEW YORK, N. Y.

## THERMOMETER.

SPECIFICATION forming part of Letters Patent No. 518,442, dated April 17, 1894.

Application filed August 21, 1893. Serial No. 483,598. (No model.)

*To all whom it may concern:*

Be it known that I, MICHAEL BYRNE, a citizen of the United States, residing in the city and county of New York, in the State of New York, have invented a certain new and useful Improvement Relating to Thermometers, of which the following is a specification.

The invention applies to all that class of apparatus in which it is required to ascertain the temperature of material in a fluid or semi-fluid condition. It is especially important in connection with mash-tubs and converters in the manufacture of beer. I have devised provisions for mounting a properly formed thermometer in a slide so that its bulb can be at one period thrust into the space into the interior of the tub and exposed to the temperature of the contents, and at another period drawn out into a position in which it is effectually shielded against any liability to contact with the mashing machinery or with any appliances which may be used in cleaning or otherwise treating the interior of the vessel. I equip the device with a stuffing-box arranged to prevent leakage and allow the required movements, and with a guide and check which insure its upright position and limit the extent of its motion.

The accompanying drawings form a part of this specification and represent what I consider the best means of carrying out the invention as applied to a mash-tub.

Figure 1 is a vertical section on the line 1—1 in Fig. 4. Fig. 2 is a similar view of a portion, showing the thermometer drawn out and protected. Fig. 3 is a front view, and Fig. 4 is a horizontal section on the line 4—4 in Fig. 1.

Similar letters of reference indicate corresponding parts in all the figures where they appear.

A is the upright tube or stem, A' a bend therein and A<sup>2</sup> a sufficiently long horizontal extension, which may be of the same diameter as the main tube A. These parts are made as in other thermometers of a single piece of clear glass. The end of the horizontal arm A<sup>2</sup> is formed into a bulb A<sup>3</sup> which performs the ordinary functions of a thermometer bulb—inclosing a quantity of mercury which fills the bulb and the horizontal extension A<sup>2</sup> and rises to a variable height in

the flat bore of the tube A according as the temperature of the bulb A<sup>3</sup> shall be raised or lowered.

B is a sufficiently extended plate of brass or other strong material, graduated to indicate the temperature.

B', B<sup>2</sup>, are straps which hold the tube A firmly in position relatively to the plate.

I incase the horizontal extension A<sup>2</sup> in a corresponding sufficiently larger horizontal tube C, the inner end C' of which is peculiarly formed to hold the bulb reliably and expose it to the temperature of the mash. The outer end is equipped with a stout flange C<sup>2</sup> from which an arm C<sup>3</sup> extends downward, and the interior is counterbored a little distance to receive two washers D, D, inclosing between them a compressible packing E. The plate B is rigidly secured to the outer face of the flange C<sup>2</sup> by screws F. The thermometer bulb A<sup>3</sup> is delicately but reliably held to the extended end C' by a slight metal strap C<sup>4</sup>.

The space between the interior of the tube C and the horizontal arm A<sup>2</sup> may be left empty, as shown, and any solid material which enters may be washed out at each cleaning of the tub, or it may, if preferred, be filled with plaster or other suitable material. G is a metal pin secured to the arm C<sup>3</sup> and extending parallel to the arm A<sup>2</sup>. It has a head G' and is adapted to perform important functions in maintaining the thermometer in an upright position and limiting the extent to which it may be shifted inward and outward.

M is the boiler-iron body or main shell of the mash-tub.

N is the ordinary exterior lagging of wood and O is the ordinary filling, as fossil meal, or other suitable material which is a good non-conductor of heat.

P is a casting inserted through all these parts M, N O; its interior forms a slide-way in which the smoothly finished tube C may be readily shifted inward and outward. It is screw-threaded near its inner end and receives a correspondingly threaded-collar Q which is tightly and strongly secured to the tub M by rivets R. Fig. 4 inserted through lugs on such collar. At its outer end is a stuffing-box having packing S, a gland T and screw-threaded cap U. This insures against



any leakage of the contents of the tube. The casting P is provided also with a broad flange P' which applies against the outer face of the lagging N and is secured by screws.

5 Visa hollow casing tapped through the flange P', extending through the lagging N and insulating material O. It incloses the pin G with its head G' and serves both as a guide and a stop for the movement of the thermometer. It  
10 guides it to insure that the tube A stands upright in all positions. It serves as a stop by receiving the head G' against the interior of its closed outer end when the thermometer is drawn out to a sufficient extent to insure that it  
15 is entirely protected within the casing P, and it strikes against the tank iron M and limits the further motion when the thermometer has been forced inward to its fullest proper extent. When the tube C with the thermome-  
20 ter firmly attached is thrust inward, it carries the bulb of the thermometer sufficiently far into the interior of the tub to enable the thermometer to indicate the temperature of the contents with absolute accuracy. When  
25 it is drawn out, the bulb and adjacent parts C' of the inner end of the tube are entirely within the casing P and protected.

In some branches of manufacturing it may be preferable to make the graduations blind  
30 so that unauthorized persons will not learn by inspection the temperatures employed. The temperature will usually be confined to a very limited range and the ratio of the bulb to the interior of the tube A may be larger than is  
35 usual with ordinary thermometers so that the graduations will be wide apart. There may be a box with a door secured by lock and key to prevent the thermometer being examined, and especially to prevent its being shifted in  
40 position by any unauthorized person. Such box is indicated by W and the door by X.

Whenever it is desired to remove the thermometer for repairs, or for other purpose, it is necessary simply to take off the nut G<sup>2</sup>,  
45 which secures the pin G and leaving this pin in its case V to slide the tube C with the attached thermometer outward from the casing P. After examination or repairs the parts may be restored again to position for use by  
50 the reverse movements, and the pin G being again firmly secured by applying and tightening the nut G<sup>2</sup> all is again ready to serve as before.

Modifications may be made by any good  
55 mechanic without departing from the principle or sacrificing the advantages of the invention.

Parts of the invention can be used without the whole.

60 In mash-tubs and other apparatus used in manufacturing, there is usually a current in

the liquid, and the direction of such current can be known with certainty. I have extended the inner end C' of the tube C a little beyond the bulb A<sup>3</sup> and located such extension on the side which is not exposed to the current. This provides that the bulb may be well supported and yet exposed directly to the impact of the particles of liquid so that the bulb shall attain the temperature  
70 of the latter rapidly and certainly. I can change the construction of these parts so as to expose the bulb equally to currents from all directions or to shield it entirely from all currents.

75 It will be understood that under all ordinary conditions the temperature of all the parts will be practically uniform with that of the liquid contents of the tub.

I attach importance to the fact that the  
80 thermometer may be moved so far outward that the bulb is received within the thickness of the tub, leaving the entire interior of the tub absolutely clear for cleaning or any other purpose.

I claim as my invention—

1. A thermometer extending through the shell arranged to indicate on a scale on the outside the temperature obtaining in the interior, in combination with provisions as the  
90 sliding tube C inclosing casing P and stuffing box S, for allowing such thermometer to be moved inward and outward through such shell, all substantially as herein specified.

2. A thermometer extending through the  
95 shell, arranged to indicate on a scale on the outside the temperature obtaining in the interior, in combination with provisions as the sliding tube C inclosing casing P and stuffing box S, for allowing such thermometer to be  
100 moved inward and outward through such shell, and with the inner end of the tube C formed as shown to support the bulb of the thermometer and expose such bulb to the current of fluid or semi-fluid in the tub, all  
105 substantially as herein specified.

3. The combination with a mash-tub or analogous vessel, of a movable thermometer arranged to allow its bulb to stand in the interior of the vessel or to be withdrawn at will,  
110 in combination with the pin G having a head G' arranged to perform the double function of a guide and a stop for the thermometer, all substantially as herein specified.

In testimony that I claim the invention  
115 above set forth I affix my signature in presence of two witnesses.

MICHAEL BYRNE.

Witnesses:

CHARLES R. SEARLE,  
M. F. BOYLE.