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P. E. KLOPSTEG ET AL

1,632,084

MERCURIAL BAROMETER

Filed Dec. 1, 1922

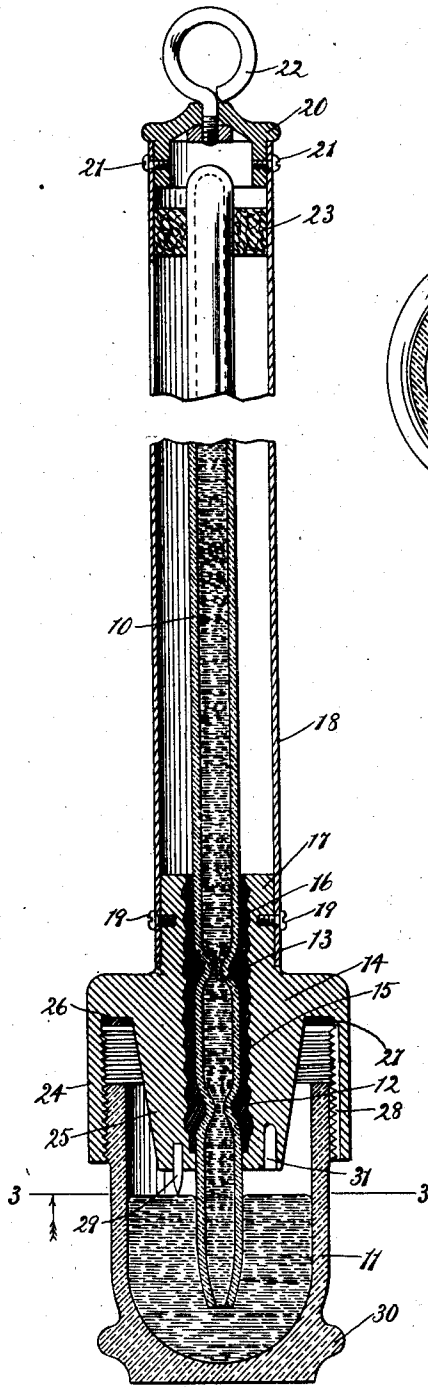


Fig. 1.

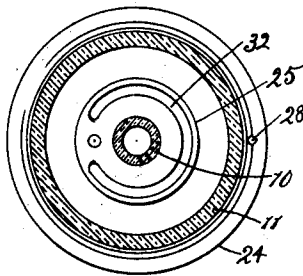


Fig. 3.

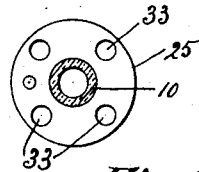


Fig. 4.

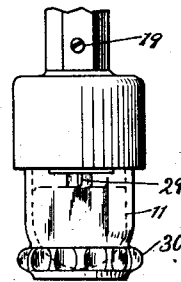
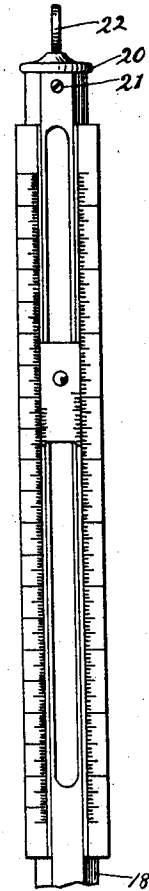


Fig. 2.

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# UNITED STATES PATENT OFFICE.

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## MERCURIAL BAROMETER.

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It has heretofore been proposed to provide mercurial barometers with cisterns so mounted that the combined capacity of the tubular columns and the cisterns could be reduced to the approximate volume of the mercury contained when the instruments were to be stored or shipped, but no means were provided where rigid cisterns were used to permit the mercury to expand without breaking the instruments. Consequently a rise in temperature became a serious menace and made the storage or shipment of barometers both hazardous and expensive.

The principal object of this invention is to provide a yielding cushion that will permit the expansion due to rises in temperature incident to the circumstances of commerce and use without injury to the barometers.

Further objects of our invention will become apparent as the disclosure proceeds and the description is read in connection with the accompanying drawings illustrating a selected embodiment of the invention and in which

Figure 1 is a vertical section of a mercurial barometer made according to the invention;

Fig. 2 is a side elevation of such a barometer;

Fig. 3 is a transverse section taken on the line 3—3 of Fig. 1; and

Fig. 4 is a view similar to Fig. 3 illustrating a modified form.

The type of barometer selected for illustrating the invention consists principally of a tube or column 10 and a cistern 11 suitably connected by some sort of supporting structure. As illustrated the lower end of the column is constricted adjacent to the terminal opening and just above the column is reduced in a plurality of places as indicated at 12 and 13. A collar 14 having a roughened interior 15 surrounds these reduced portions and suitable cement 16 is laid between the collar and the column and secures them together. The reduced portions of the column serve to give the cement a grip and also to damp oscillations of the mercury in the column.

The collar has an upwardly extending flange 17 preferably hexagonal in cross section to conform to the shape of the enclosed

housing 18 which is secured thereto by screws 19 or the like fastening devices. The upper end of the housing receives a cap 20, also secured thereto by screws such as 21, and this cap is equipped with a swiveled eye 22 or the like to permit the barometer to be conveniently suspended from an overhead support. The upper end of the column is held in place within the housing by a spacer 23 of cork or the like which surrounds the column and fits closely within the housing.

In the preferred construction the lower portion of the collar takes the form of an annular flange 24 surrounding a frusto-conical portion 25. The interior of the flange 24 is threaded to receive corresponding threads on the transparent cistern 11. Between the flange 24 and the portion 25 is an annular shoulder 26 against which a gasket 27 of felt or the like carried by the upper end of the cistern can be pressed to seal the cistern against the escape of mercury or the ingress of air. The screw threads between the collar and the cistern may be made sufficiently loose to admit the air needed to force the mercury up in the column, but we prefer to provide the flange 24 with one or more grooves or slots 28 that will permit free communication with the atmosphere when the cistern is in lowered position. The frusto-conical portion 25 is equipped with an ivory point 29 which indicates the position of the lower level for the mercury.

When it is desired to store or ship the barometer the cistern 11 is screwed upwardly until the gasket 27 is clamped against the shoulder 26 and the space within the cistern and the column sealed tightly. The knurled flange or the like 30 at the lower portion of the cistern will ensure proper gripping in this operation. If a little excess mercury is in the cistern when it is started on its upward movement a corresponding amount of mercury will be forced out through the grooves or slots 28 as the parts assume their closed position and this will ensure the elimination of air that might otherwise find its way into the column during the storage or shipment of the instrument.

In order to permit the enclosed or confined mercury to expand upon a rise in temperature, one or more air pockets 31 are

provided preferably in the frusto-conical portion 25 of the collar 14. As shown in Figs. 1 and 3, a somewhat annular recess 32 is made in the end of the collar, while in Fig. 4 one or more recesses 33 are used. The form of recess or pocket is largely immaterial, but preferably it is of such small area that the mercury will trap the air contained and prevent it from working out of the pocket and into the tube 10 without making it necessary to use any other closure. By using a narrow annular recess such as 32 the capillary action will cause the mercury to close the pocket so far as any escape of air is concerned and still the expansion of the mercury will be relieved by a compression of the contained air. Like results will follow the use of a recess or a plurality of recesses such as shown at 33. Those skilled in the art will readily arrange and construct the cushion either in a wall of the inclosure or as an independent unit placed in the enclosure so as to permit the expansion made necessary by the circumstances of commerce.

The collar 14 is preferably made of bakelite or similar material and the cistern is made of glass, celluloid or other transparent and moldable material. This permits these parts to be made by casting, which reduces the cost of manufacture very greatly. The cistern can be made sufficiently heavy to stand all the strains of use and at the same time permit the entire lower portion of the instrument to be visible from all angles.

We claim as our invention:

1. In a mercurial barometer the combination of a column open at one end, a collar fixed to the column adjacent to the open end and having an air pocket therein, and a cistern threadedly engaged with the collar and communicating with the column and the air pocket.

2. In a mercurial barometer the combination of a column open at one end and having a constricted portion adjacent thereto, a collar having a roughened interior and surrounding said column, cement securing

said collar to said column, said collar having an air pocket therein, and a cistern communicating with said column and air pocket and threadedly engaged with said collar.

3. A mercurial barometer comprising a barometer tube, a mounting therefor, a mercury cistern, said cistern being adjustable relative to the mounting and tube to force out the air normally resting on top of the mercury in the cistern, thus forming a solid continuous filling of mercury for the space in both cistern and tube, there being cushioning means provided in said space to allow expansion of the mercury otherwise filling said space.

4. A mercurial barometer comprising a mounting, a mercury cistern adjustable in the mounting, a barometer tube fixed in the mounting with its open end constantly below the top surface of the mercury in the cistern but continuously kept open in all the adjustments of the cistern relative to the mounting, the cistern being adjustable in the mounting to a position where the air normally resting on the top of the mercury in the cistern may be forced from the cistern, thus forming a continuous filling of mercury for the space in both the barometer tube and cistern, there being provided cushioning means in said cistern to allow for temperature expansion of the mercury otherwise filling said space.

5. In a mercurial barometer the combination of a mounting, a cistern adjustable therein, a barometer tube fixed to the mounting with its open end located to be kept open to all adjustments of the cistern, the cistern being adjustable to expel the air normally resting on the surface of the mercury, thus forming a solid continuous filling of mercury for the space in both the cistern and tube, there being provided in said space and air pocket with a capillary opening thereinto to allow for temporary expansion of the mercury in said space.

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