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BAROMETER

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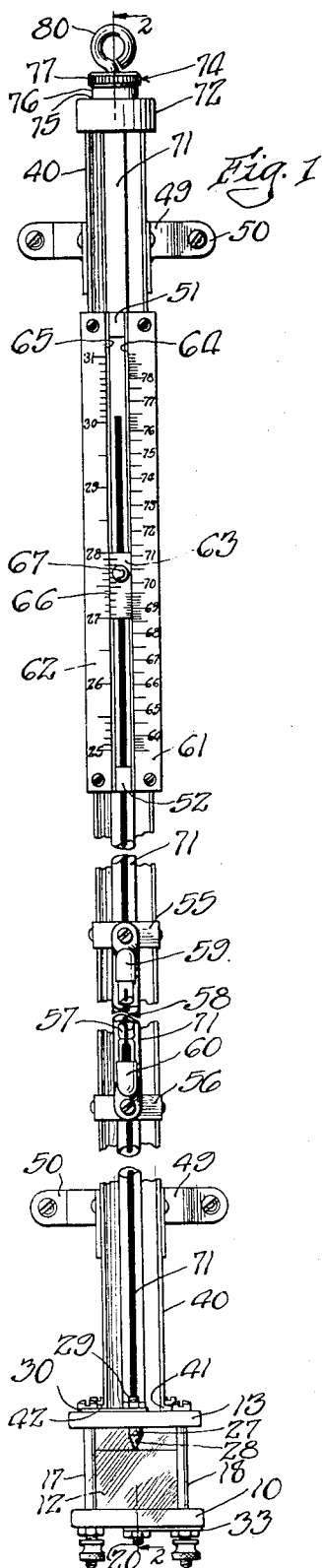
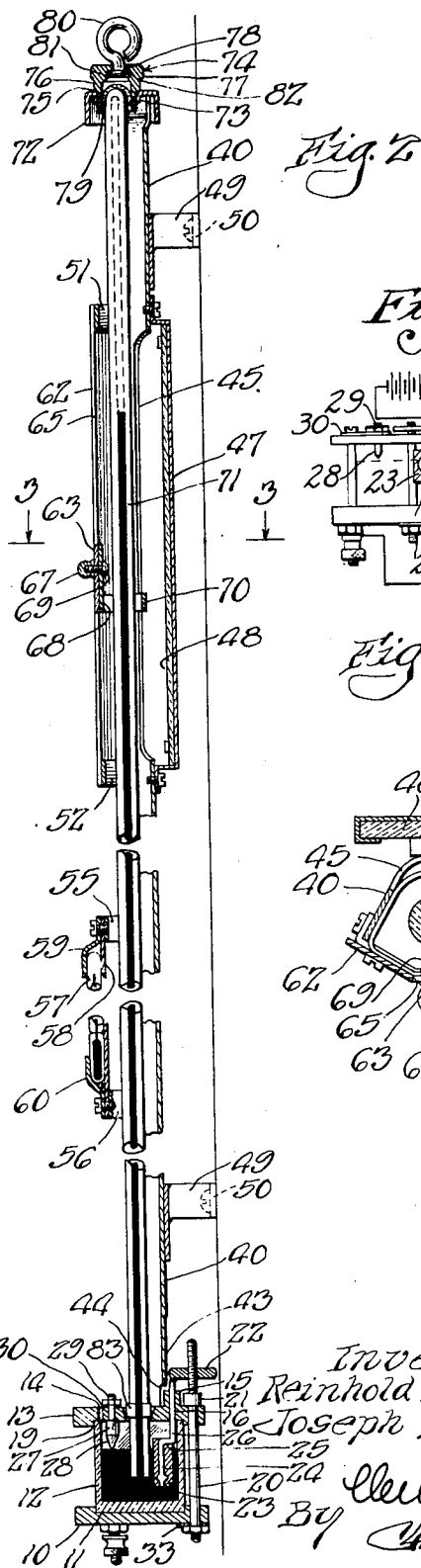


Fig. 4

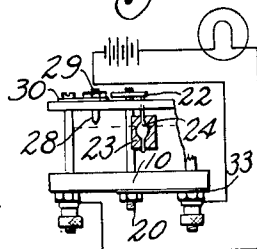
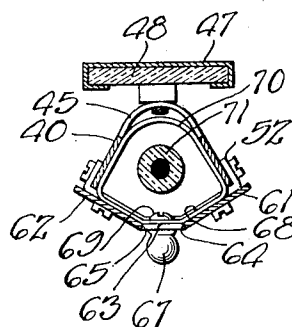


Fig. 3



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BAROMETER

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7 Claims. (Cl. 73—4)

The present invention relates to tube instrumentalities and has primarily to do with a protective support for a tube and a cistern or basin for use in a barometer, the latter including means for modifying the liquid level therein. Other features include improved means for facilitating obtaining a correct lower level for the mercury, also an improved vernier in association with a barometer tube.

In the employment of barometers, adjustments and correction, because of difference in temperature, atmospheric pressure and other factors, are necessary. One of the objects of the present invention is to provide an arrangement whereby adjustments may be made to obtain a predetermined level of mercury in the cistern at the beginning of any observation, and the provision of novel means whereby level modification may be quickly secured without movement of the barometer tube or of the cistern.

An additional object of the invention is the provision of a new and novel electrical circuit in association with the barometer whereby a critical adjustment therein may be had, the present invention differing from the usual circuit in the employment of fewer parts in the circuit and the total elimination of insulating washers and the like.

A further object of the invention is an improvement in the vernier associated with the reading scales, and providing a three-point reading of the top mercury level.

A difficulty which has been encountered with barometers of the tube type is adequate protection for the barometer tube. Another object of the invention, therefore, is to provide a protective housing for the barometer tube and at the same time provide an open construction making the mercury column visible over its entire length.

A further object of the present invention is the provision of a new and unique structure for a barometer cistern.

A still further object of the invention is a novel arrangement of barometer cistern and an adjustable float therein.

These objects, and such other objects as may hereinafter appear, are obtained by the novel construction, unique arrangement, and improved combination of the several elements constituting the invention, one form of which invention is illustrated in the accompanying single sheet of drawing, hereby made a part of this specification, and in which:

Figure 1 is a front elevation, part of the

tube and housing being broken away to confine the drawing to a single sheet;

Figure 2 is a longitudinal section, on the line 2—2 of Figure 1;

Figure 3 is a transverse section on the line 3—3 of Figure 2; and

Figure 4 is a schematic drawing of the electrical circuit used in the present form of the invention.

Like reference characters are used to designate similar parts in the drawing and in the description of the invention hereinafter given.

For convenience, the several figures may be read conjointly.

It is thought advisable to take up the parts independently of one another and by a description of the several parts eventually completely describe an assembled instrumentality.

Beginning will be had at the bottom of the device. There is a base or bottom plate 10 which has a pocket or dished out portion 11. Through said base plate 10, which may be molded of bakelite or any other suitable dielectric, there are three vertical apertures spaced one hundred twenty degrees apart.

Seated in such dished out portion 11 is a glass or other suitable cistern or cup 12, the upper or top portion of which is open. Said cistern 12 should be of a proper thickness of glass, and the bottom thereof should fit in the dished out portion 11 in a snug manner. When it is considered desirable, a washer or pad (not shown) for protective purposes may be placed in the seat 11 to protect the fragile material of the cup 12.

Above the cistern is a second plate 13. This plate which is also of a dielectric has there-through three vertical apertures one hundred twenty degrees apart registering with and complementary to the vertical apertures through the bottom plate 10.

In addition, there is provided through said top plate 13, an aperture at the center thereof having constricting walls to receive the mercury tube, an aperture to receive a pointer or indicator, and a second small aperture 14 which is allowed to remain open. This is an air hole. At the rear of plate 13 and preferably upon the top of the plate is a boss 15 through which boss and the material of the plate another vertical aperture 16 is provided.

There are several smaller screw holes drilled in the top surface of the plate 13, the purpose of which is to receive screws to maintain

a channelled member practically surrounding the mercury tube in position.

To assemble the bottom plate 10, the cistern 12, and the top plate 13, there are provided three long screws, two of which, 17 and 18, may have slotted heads. Said bolts 17 and 18 extend from the top plate 13 to the bottom plate 10 through two of the registering one hundred twenty degrees apart apertures therein. Nuts are on the bolts 17 and 18 and thereby the top and bottom plates 13 and 10 are drawn closely about the cistern 12, the shanks of bolts 17 and 18 project beyond said nuts. There may be in association with bolt or screw 18 a connector strip later to be described. The top plate 13 has a dished out under-section 19 which closely surrounds and seals the top of cistern 12. Intermediate the top edge of the cistern 12 and the top plate 13, a suitable packing or washer may be inserted but this is not necessary and is not shown.

The screws or bolts 17 and 18, referred to, as previously indicated, extend beyond the nuts therein to provide threaded shanks upon which knurled nuts are screwed, these latter being intended for the purpose of attaching electrical contacts or wires to the screws 17 or 18 when an open and closed circuit is employed for determining the accuracy of the mercury level adjustment in the cistern 12. At the rear, there extends through the top and bottom plates 13 and 10, a third bolt or screw 20 having both ends threaded, there being a collar 21 thereon at the internal extremity of the top threaded portion. At the lower part, there is a suitable nut similar to that on members 17 and 18. At the upper end of bolt 20, the collar 21 engages the top plate 13 in the same manner as the head of bolts 17 and 18.

On the threaded shank, above said collar 21, is a thumb nut or disk 22, the diameter of which is such that it extends over the boss 15 to engage on its under surface the end of a member passing through aperture 16 and secured to a float now to be described. The diameter of member 22 is such that it is readily adjusted and permits the finger and thumb used in adjusting it up and down bolt 20 a substantial leverage.

Within the cistern 12 is a crescent shaped float 23 of suitable material, but preferably is a bakelite or another substance which will not amalgamate with mercury. In a suitable aperture or channel 24 therein, which channel 24 terminates in a groove 25 at the top of the float, is an elbowed rod 26, the lower end of which is provided with suitable means for securing it in the float 23. The elbow in the rod is seated in the groove 25 to insure the float from axial movement about the rod 26. The upper section of the rod 26 which is parallel to the lower section but not in alignment therewith extends upwardly through the aperture 16 in the boss 15 in the top plate 13 and terminates in a position so that its upper end engages the under surface of the thumb nut 22 riding on the upper threaded shank of the back bolt 20.

By the rotation in one direction of said nut 22, pressure is applied to the float 23, which is normally partly submerged in the mercury in the cistern 12, to force said float further into the mercury. The extent of the immersion of said float is accurately determined by adjustment of the nut 22, which is rotated in the opposite direction to allow the float to rise, thus permitting of

fine adjustments for close work with a barometer. As the float rises, the mercury level in cistern 12 falls and as the float is forced downwardly, the mercury level rises.

In the top plate 13 is an indicator or pointer comprising a body 27 having one pointed end 28, the body generally being cylindrical. The other end of said body 27 terminates in a shank 29 which is threaded, the threads extending through an aperture in the top plate 13 heretofore mentioned, so that the indicator or pointer 27 may be secured in position by a suitable nut. Once the member 27 is adjusted to a proper position, for example, so that the end 28 of pointer 27 becomes the zero of the scales referred to later as attached to the upper part of the upright frame 40, it is maintained in such fixed adjustment without changing.

An electrical circuit may be provided in connection with this particular arrangement of plates, cistern, pointer and bolts in the following manner. The indicator needle 27 is of conductive material while the top plate is of bakelite or other dielectric material. From beneath the nut securing said indicator 27 in position, there extends across the top plate 13 a strip of conductive material 30 which terminates beneath the head upon the bolt 17, the bolt extending through such strip and making electrical contact therewith. As the top and bottom plates 13 and 10 are of bakelite or other insulatory material, an electrical circuit is established by the indicator 27, strip 30 and bolt 17 from the tip of pointer 28 of the indicator 27 through the indicator 27 itself, through said strip 30 and through the bolt 17 to any wire which may be attached to the latter by a thumb nut which rides on the lower and threaded end of said bolt 17.

The float adjusting rod 26 is of metal. Its fastening means in the float 23 is also of metal or its lower end is exposed to contact with the mercury in the cistern 12. Some of the mercury in such cistern is always in contact with the end or a portion of the side surface of said rod. The top end of said rod 26 is always in physical contact with the thumb nut 22 riding upon the bolt 20 which bolt 20 at its lower end engages a conductive strip 33. Said strip 33 extends to the adjacent screw or bolt 18, the strip 33 being secured in position by the flat nuts on the lower ends of bolts 18 and 20. The bolt 18 is adapted to be physically connected to an electrical circuit by a contact or wire. In such circuit there is a source of electrical energy, such as a battery, and an alarm device, such as an electric lamp, see Figure 4. By attaching such connector about the threaded end of bolt 18 or wrapping a wire to the circuit around said threaded shank on said bolt and applying thereover a thumb nut as shown, electrical connection is established.

To close the electrical circuit across the cistern 12, it is necessary to bring mercury therein to a contacting level with the end 28 of the indicator 27. The closing of the circuit immediately causes the lighting of the lamp, or operates some other selected signal. By such arrangement an adjustment of the mercury level much finer than can be gauged by the naked eye is obtainable.

Reference should now be had to the frame for supporting and protecting the barometer tube.

This frame comprises a strip of metal 40 bent or folded to give a V-shaped channel. At its

lower end, there are lateral extensions 41 and 42 from such channel member through which there are apertures or screw holes. Said apertures register with the screw holes in the top plate 13 and through which suitable screws are threaded into the top plate 13, to secure said frame 40 firmly upon said top plate 13.

That portion of the upright member 40 adjacent to the bottom end thereof and at the angular juncture between the sides thereof is cut away in two stages as is indicated at 43 and 44, so that the thumb nut 22 controlling the position of the float 23 will not come in physical contact with the material of member 40 and to make ample room for the boss 15 which projects from top plate 13.

Near the top of frame 40 a section of the material is cut at 45 along the angular fold therein, the purpose of this cut-out 45 being to permit light to illuminate the mercury column through the frame 40, thereby to facilitate reading the top mercury level.

While direct light is generally quite helpful in reading a top mercury level, it has been found desirable to attach to the back of the casing 40 a frame 47, having its upper and lower ends attached to the material of the frame member 40 above and below the cut-out portion 45, the frame 47 providing a support and holder for a plate 48 of porcelain, white opaque glass, or other material, so that the top level of the mercury may be read by means of the diffused light coming from this white surface through the aperture 45, a distinct advantage over reading with direct light playing on the frame 40.

The upright 40 may be provided with two or more wall brackets 49 comprising straps of metal secured to the back of the channelled member 40 and projecting to each side thereof, the arms 50 of said brackets having screw apertures adjacent their ends. These brackets may be omitted if desired.

Across the front of the V-shaped member 40 are four transverse strap members, the two upper transverse members 51 and 52 being spaced to support short scales 61 and 62 which have a length equal to the ordinary variations of the barometer height and whose zeros are the metal point 28 held in the ceiling plate 13. These scales in conjunction with the vernier plate 63 are used to measure the height of the mercury. In the present form, the scales 61 and 62 comprise two separate and independent members arranged in parallelism, one giving the barometric reading in inches and fractions thereof, and the other in millimeters. The two lower transverse members, 55 and 56, are used to support a thermometer 57.

Reference will be had first to the thermometer 57. Intermediate the transverse members 55 and 56 is a metallic or other opaque strip 58. At each end of said strip and secured thereto are pockets 59 and 60. Between said pockets, which receive respectively the top and bulb end of the thermometer, is the thermometer 57, the mercury column in which is readily readable against the opaque strip 58. The thermometer 57 comprises a glass tube with a capillary bore and a suitable bulb reservoir at the bottom thereof. Any suitable packing material may be placed in one or both pockets 59 and 60 to insure the glass ends of the thermometer against contact with metal. A suitable thermometric scale is blown or etched in the tube of the thermometer 57. To secure the strip 58

and each of the pockets 59 and 60 in position, screws pass through each of the pockets and the opposed ends of the strip into the material of the transverse members 55 and 56. Preferably, the thermometer is placed in position well below the lowest top level of mercury possible under ordinary atmospheric conditions, this position being selected for convenience and to prevent the thermometer from interfering with the ready reading of the top mercury level.

The inner edges of said scales 61 and 62, each of which is secured to a transverse member 51 and 52 at each end by a screw, are parallel. Therebetween is a sliding member 63. Each of the inner edges of the scales 61 and 62 has a track 64 and 65 formed thereon and the sliding member 63 at each of its sides, has a groove 66 to receive said tracks.

On the median line of said sliding member 63, generally called a vernier, is a knob 67 which is internally threaded and of convenient external configuration for handling. At the back of the scales 61 and 62 and adapted to slidably engage said scales is a flat spring member 68 having at its center an aperture through which a screw 69 is inserted, said screw extending into the knob 67 after projecting through said vernier 63.

Said spring 68 which has a lower section from which projects a strip 70 extending to and partly around the barometer tube 71, is held against accidental displacement by tightly engaging the backs of the scales 61 and 62. The extension about the barometer tube, provides additional but not undue frictional engagement whereby such vernier 63 is held in any adjusted position without danger of being accidentally dislodged. Thus, to read the mercury level, the bottom of the vernier 63 is sighted with the bottom of the extension 70 which is horizontally parallel therewith, so that a three point reading with the top of the column of mercury may be had, insuring great accuracy. When preferred, the vernier 63 and extension 70 may have their positions reversed whereupon the level of the mercury is read from the tops of vernier 63 and of extension 70.

Said vernier at each of its vertical sides carries scales corresponding to those on the adjacent inch or metric scales to facilitate easy reading in respect to either scale 61 or 62.

At the top of said upright member 40, the material of which may be suitably cut at the angle of the fold therein and expanded to facilitate attachment, is a generally rounded cap 72 which is secured to the upright member 40 by spot welding or by bolts passing through cap 72 into part 40, or in any other suitable fashion.

The central portion of said cap member 72, which is of sheet material shaped to form, is turned inwardly to provide a threaded flange 73. Into said internally threaded flange 73, a screw cap 74 is adapted to be inserted, said cap 74 having a threaded portion terminating in shoulders 75, an enlarged section 76, and a second larger section 77, there being through the center of said cap 74 an aperture 78 which expands as the bottom of the cap is approached.

In the enlarged portion of said aperture 78 is disposed a rounded or hemispherical head or support 79 which is adapted to engage the top of the barometer tube 71. The head 79 is generally of leather, and may be of other material, but is adapted to snugly fit upon the barometer tube 71 and hold the glass tube away from

contact with the internal base of the metallic cap 74. Through the aperture above referred to, an eye bolt 80 extends, the eye bolt having at its end an enlarged portion 81 resting upon shoulders 82 formed at the termination of the smaller section of aperture 73 by the enlargement thereof, such eye bolt 80 being adapted to swing freely and relatively to the cap 74 itself, so that the barometer may be moved rotatively to the cap, or the eye bolt relatively to the barometer, as needs may require.

The barometer tube 71 has near its bottom a ring 83 which rests in the conical aperture in the center of the plate 13. The tube 71 is held in position in said seat or aperture by screwing the cap 74 into position thereover in flange 73, the tightness of the fit of cap 74 over the end of the tube 71 determining the force used to seat the tube.

We claim:

1. In a barometer, a cistern for mercury, plates of dielectric material above and below said cistern, bolts of conductive material through said plates and having means for connection to the terminals of an electric signal circuit, a float carrying conductive material in said cistern, one of said bolts being in electrical connection with said float, a pointer in the upper plate and extending toward the mercury in said cistern, said pointer being in electrical connection with another of said bolts, and means manipulating said float for changing the level of the mercury in said cistern.

2. In a barometer, a cistern for mercury, plates of dielectric material forming the top and bottom of said cistern, one of said plates having a pointer extending downwardly into said cistern, a float in said cistern and having conductive material exposed to the mercury in said cistern, bolts of conductive material intermediate said plates, a connector between said pointer and one of said bolts, and a second connector between said float and another of said bolts, said second connector providing means for raising and lowering the position of said float in the mercury in said cistern.

3. In a barometer, a base comprising a cistern, plates at the top and bottom thereof, a float in said cistern and having rod means extending upwardly through said top plate, connecting members between said plates, and means upon one of said connecting means engaging said rod means to regulate the position of said float.

4. The combination in a barometer, of a cistern, a float therein, a rod extension upon said float, and means external to said cistern engaging said extension for controlling the position of said float.

5. A barometer comprising a tube, a cistern to receive the end of said tube, a plate intermediate said tube and said cistern, a float in said cistern and extending partly around said tube, and means on said plate engaging said float to regulate the position of said float in the mercury in said cistern.

6. A barometer comprising a tube, a housing therefor having an elongated longitudinal opening at its rear, a member removed from said housing and at the rear of said elongated opening for providing diffused light, a scale in association with said housing for indicating the level of the mercury in said tube, and a vernier movable relatively to said scale with a reading edge having a path of movement within the horizontal plane of said diffusing body.

7. A barometer comprising a tube, a housing therefor having an elongated longitudinal opening at its rear, a light diffusing member away from said housing and at the rear of said elongated opening, a scale in association with said housing for indicating the level of mercury in said tube, a vernier movable relatively to said scale, and a second member movable with said vernier and at the rear of said tube, said vernier and member having horizontally parallel reading edges within the horizontal plane of said diffusing body.

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