E. SZEKELY.

MANOMETER.

APPLICATION FILED MAR. 7, 1918.

1,352,038.

Patented Sept. 7, 1920.

2 SHEETS—SHEET 1.

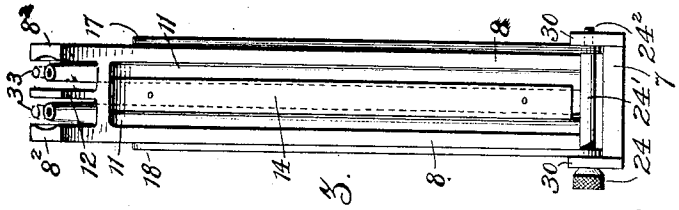


Fig. 3.

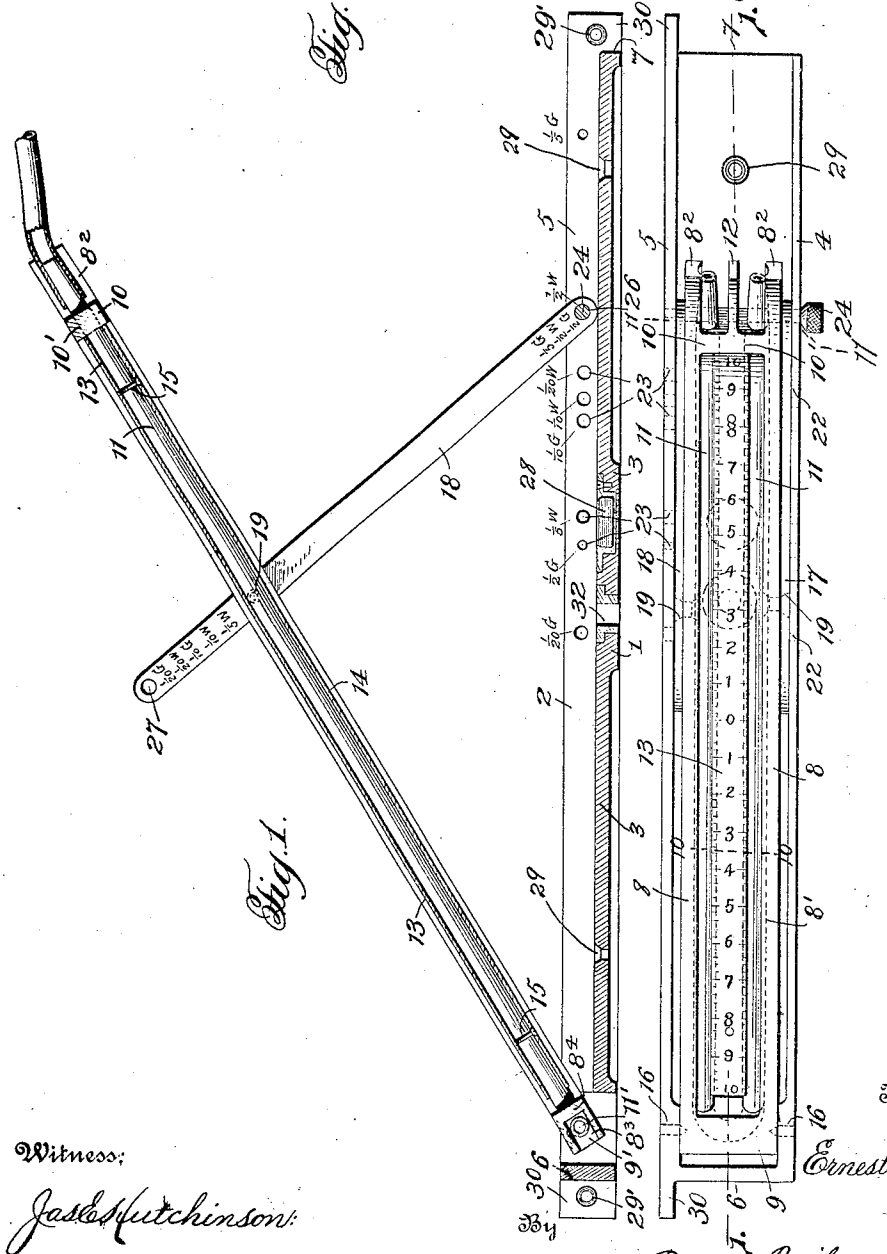


Fig. 2.

Fig. 1.

Witness:

Jas. E. Hutchinson.

Inventor:

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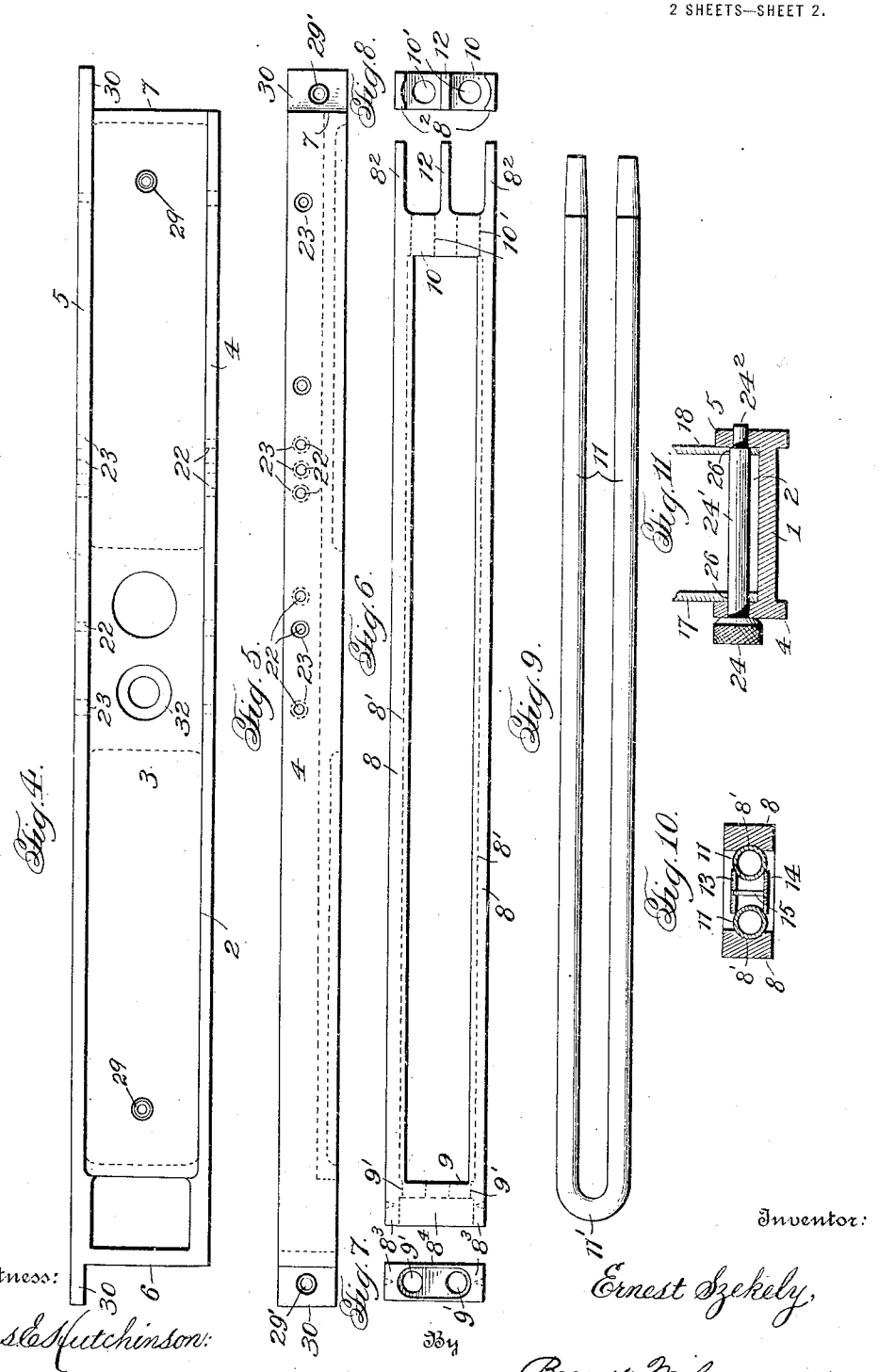
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UNITED STATES PATENT OFFICE.

ERNEST SZEKELY, OF DETROIT, MICHIGAN, ASSIGNOR TO AMERICAN BLOWER COMPANY, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN.

MANOMETER.

1,352,038. Specification of Letters Patent. Patented Sept. 7, 1920.

Application filed March 7, 1918. Serial No. 221,008.

To all whom it may concern:

Be it known that I, ERNEST SZEKELY, a citizen of Hungary, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Manometers, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to manometers of the general type in which a U or similar tube containing an indicating liquid is employed.

The object of the invention is to provide an improved device of this nature of simple construction in which provision is made for readily adjusting and supporting the tube at different angles or slants and thus varying the sensitiveness of the device to suit different conditions of pressure whereby the device is useful over a large range of pressures.

Another object of the invention is to provide an improved manometer of the character referred to adapted to be readily adjusted to compensate for the difference in the specific gravities of different indicating liquids that may be employed in the instrument whereby the indications given on the scale by the indicating liquids other than that one of the indicating liquids that is selected as a standard for measurement, which is usually water, will correspond to the indications or readings given on the scale when the indicating liquid, water or other liquid that may be chosen as a basis is employed as the indicating liquid.

A further object of the invention is to provide an improved device, of the nature referred to, capable of being folded together in compact form when not in use.

The invention, with other objects and advantages thereof, and the particular combination and arrangement of parts comprising the same will be understood from the following detailed description when considered in connection with the accompanying drawings forming part hereof and illustrating one embodiment of the invention.

In the drawings:

Figure 1 is a longitudinal section on line 1—1 of Fig. 2.

Fig. 2 is a top plan view.

Fig. 3 is an end elevation.

Fig. 4 is a detail top plan view of the base.

Fig. 5 is a side elevation of the base.

Fig. 6 is a detail top plan of the tube supporting frame.

Fig. 7 is a detail elevation of one end of the tube supporting frame.

Fig. 8 is a detail elevation of the other end of the tube supporting frame.

Fig. 9 is a detail view of the U-tube.

Fig. 10 is a transverse section on the line 10—10 of Fig. 2.

Fig. 11 is a detail sectional view on the line 11—11 of Fig. 2.

In the drawing, I have illustrated by way of example a specific embodiment of the invention. It will be understood, however, that variations of and minor changes in the particular construction shown, and the carrying out of the invention in other forms as will appeal to those skilled in the art and falling within the scope of the appended claims may be made without departing from the spirit of the invention.

The invention comprehends the use of a main support or base, a tube carrying frame pivotally connected at one end to the base, an inclined support or brace connected with the base and with the tube carrying frame, and adapted to maintain the tube carrying frame at different angles or inclinations of adjustment, and means indicating different adjustments of the inclined support or brace to obtain certain degrees of sensitiveness of the column of liquid in the U tube.

Referring to a detail description of the drawings wherein like reference characters designate corresponding parts throughout the several views, 1 designates the base provided with a longitudinal recess or chamber 2 in the upper face thereof, the base being shown as a casting comprising the bottom plate 3, and side and end walls or flanges 4—5, 6—7.

The tube carrying frame, which is substantially rectangular shape, consists of side bars 8 and transverse connecting end portions 9—10. The side bars of the frame are properly spaced and their inner faces 8′ formed concave, as shown, to receive therebetween the legs 11 of the U tube, the end portions of the legs 11 of the tube fitting in openings 9′—10′ in the transverse end portions 9—10, and the portion 11′ of the tube resting against the outer side face of the transverse end portion 9. The tube is inserted in position in the frame from one end

thereof through the openings 9′ in the transverse end portion 9 and snugly fits the frame portions, the tube being held in position in the frame by frictional engagement. The side bars 8 have portions 8^2 extending beyond the transverse portion 10 alongside of the upper end portions of the legs 11 of the U tube, and 12 is a partition plate extending outwardly from the end portion 10 centrally of the portions 8^2. The side bars 8 have end portions 8^3 extending beyond the transverse connecting end portion 9 and connected with said portions 8^3 are webs or portions 8^4 forming therewith a recess or pocket for the portion 11′ of the U tube.

Associated with the U tube is a scale plate 13 marked in inches and fractions above and below the zero point or water level. The scale plate 13 is clamped in position between the legs 11 of the U tube at one side thereof by a plate 14 disposed opposite to the scale plate at the other side of the tube, and screws 15 extending from said plate 14 and engaging the scale plate. By loosening the screws 15 the scale plate may be adjusted along the face of the tube to position the zero point of the scale at the level of the liquid in the tube.

The tube carrying frame is pivotally connected at one end to the base 1 between the side flanges 4—5 thereof by pivot screws 16 extending through the side flanges 4—5 and engaging opposite side bars of the frame. The pivot screws extend in longitudinal alinement with the lower transverse portion 11′ of the U tube, so that in the angular adjustment of the frame, the angular adjustment of the U tube is always about the lower transverse portion 11′ of the tube as the pivotal axis of movement.

17—18 designate inclined supporting or brace members connected with the base 1 and with opposite side bars 8 of the tube carrying frame and adapted to hold the tube carrying frame in different angular positions of adjustment to obtain different degrees of sensitiveness of the liquid in the U tube. The brace members 17—18 are pivotally connected intermediate their ends at points at one side of the longitudinal centers thereof by pivot pins 19 so that the portions of the inclined supporting or brace members at opposite sides of their pivots are of different lengths. Means is provided for detachably connecting either of the ends of the inclined supporting or brace members 17—18 with the base 1 at different points along the base. Each side flange of the base has a plurality of apertures 22—23 located at intervals along the same, some of the apertures being larger than others. 22 designates the smaller apertures and 23 the larger apertures. The apertures of the respective flanges are disposed opposite each other in pairs with a small aperture 22 of one flange at one side of the base opposite a large aperture 23 in the flange at the other side. 24 designates a securing pin adapted to detachably engage any pair of apertures in the flanges, and either apertures 26 or 27 provided in opposite end portions of the inclined supporting or brace members 17—18. The pin 24 has an inner portion 24′ of a size in cross section to fit the larger aperture 23, and an outer reduced end portion 24^2 of a size in cross section to fit the smaller aperture 23. As will be understood by alining the apertures in the ends of the inclined supporting or brace members 17—18 with different pairs of apertures in the base flanges 4—5, and applying the securing pin 24, the inclined supporting or brace members can be readily adjusted to maintain the tube carrying frame at various slants or angles of inclination. It will be noted that both ends of the brace members are adapted to be alternately connected with the base, and as the portions of the inclined supporting or brace members at opposite sides of their pivotal connection with the tube carrying frame are of different lengths, a wide range of adjustment is afforded. By the special construction of securing pin 24 and the particular arrangement of the large and small apertures 22 and 23 in the flanges, certain adjustments of the inclined supporting or brace members can only be made by the insertion of the securing pin from different sides of the base, provision being thus made for distinguishing certain adjustments from each other and preventing confusion in making the adjustment intended.

Associated with the side flanges 4—5 of the base, and with opposite end portions of the inclined supporting or brace members is indicia or indicating marks denoting different degrees or ratios of sensitiveness of the liquid in the tube for the various adjustments of the inclined supporting or brace members.

It will be understood that various adjustments may be provided for the brace members to support the tube carrying frame at different slants or inclinations. In the drawings is illustrated a number of adjustments when water is to be used in the U tube as the indicating liquid and also a number of adjustments of the brace members, when gasolene is to be used as the indicating liquid, the two sets of adjustments being so related as to compensate for the difference in the specific gravities of water and gasolene so that when the latter liquid is employed as the indicating medium, the readings obtained on the scale of the U tube will be the same as the readings when water is employed as the indicating liquid. The indicia or indicating marks may take any suitable form and may be applied to the parts in any suitable way. In the drawings

the apertures in the base flanges 4—5 are marked beginning from the left as follows: $\frac{1}{20}$ G; $\frac{1}{2}$ G; $\frac{1}{5}$ W; $\frac{1}{10}$ G; $\frac{1}{10}$ W; $\frac{1}{20}$ W; $\frac{1}{2}$ W; $\frac{1}{5}$ G. The opposite end portions of the brace members bear respectively the markings $\frac{1}{5}$ G; $\frac{1}{2}$ W; $\frac{1}{2}$ G; and $\frac{1}{20}$ G; $\frac{1}{20}$ W; $\frac{1}{10}$ G; $\frac{1}{10}$ W; $\frac{1}{5}$ W; as shown, these markings apply to the end portions of the inclined supporting or brace members denoting which end portions of the brace members are to be connected at the different pairs of apertures 22—23 along the base to obtain the degrees or ratios of sensitiveness indicated by the markings applied to said apertures.

As will be understood, the open end portions of the U tube are adapted to be connected with a pipe, conduit or the like, to measure the pressure of air, gases, etc., passing through the same in accordance with the well known practice. Suitable flexible connections between the ends of the U tube and the pipe or conduit are provided which permit of the angular adjustment of the tube carrying frame. In the drawings the ends of the tube are shown tapered to facilitate the coupling of rubber tubing 34, the latter being indicated in a general way.

In the use of the device if it is desired to use water in the U tube, and the pressure is such that one half slant or an angle of 45° for the tube carrying frame is the most suitable, then the inclined supporting or brace members are positioned as shown in the drawings by matching up the apertures marked $\frac{1}{2}$ W with the corresponding aperture in the flange 4 of the base. If now with the tube carrying frame in this position the scale of the tube reads 2.5 then the corresponding actual pressure will be $\frac{1}{2}\times 2.5$ or 1.25″ water gage.

If the inclination desired is $\frac{1}{5}$, the inclined supporting braces are swung around their pivots and the openings in the opposite ends of the brace members matched up with the apertures in the base flanges marked $\frac{1}{5}$. If the reading in this case should be 2.5 on the tube scale, it would indicate that the actual pressure connected to the manometer is $\frac{1}{5}\times 2.5$ which would be .5.

If gasolene is used in the tube as the indicating liquid and $\frac{1}{5}$ slant seems desirable, the inclined supporting or brace members are again reversed, the end portions of the inclined supporting or brace members bearing the mark $\frac{1}{5}$ G is placed in alinement in the aperture in the base flanges marked $\frac{1}{5}$ G. If the reading should be 2.5, then it would represent a pressure of $\frac{1}{5}\times 2.5$ which would be .5 water gage.

28 designates a round spirit level of conventional form mounted in the base 1.

The base is provided with screw apertures 29 in the base plate 3, and also with connecting flanges 30 having screw apertures 29′ providing for the ready attachment of the device to both vertical and horizontal supports. The base is also equipped with a thimble 32 threaded to fit the threaded stems of tripods of standard type whereby the same may be readily connected thereto.

The tube carrying frame is of a size to be received in the longitudinal recess 2 of the base, and by removing the securing pin 24, and folding the supporting or brace members 17—18 alongside of the side bars 8 of the tube carrying frame, the frame and brace members when the device is not in use can be folded down into the longitudinal recess of the base.

If desired stoppers 33 of rubber or the like may be inserted in the open ends of the tube to retain the indicating liquid therein when the device is not in use.

It will be noted that the construction hereinbefore described is of a very simple, compact nature that can be manufactured at little expense and is useful over a large range of pressures, and with liquids of different specific gravities.

What I claim is:

1. A device of the class described including a supporting base, a tube carrying frame pivotally connected with the base and adapted to be positioned at different inclinations, an inclined support or brace connected with the base and with the tube carrying frame, the connection of the inclined support or brace with one of said parts being adjustable whereby the angle of inclination of the tube carrying frame may be changed and the sensitiveness of the device varied, and indicating marks on that one of the parts to which the brace is adjustably connected said indicating marks denoting adjustments of the inclined support or brace member for obtaining certain degrees of sensitiveness of the device.

2. A device of the class described including a supporting base, a tube carrying frame pivotally connected at one end with the base, an inclined support or brace pivotally connected at one side of the center thereof to the tube carrying frame, and means for detachably connecting either end of the inclined support or brace with the base to vary the angle of inclination of the tube carrying frame.

3. A device of the class described including a supporting base, a tube carrying frame pivotally connected at one end with the base, an inclined support or brace pivotally connected at one side of the center thereof to the tube carrying frame, and means for detachably connecting either end of the inclined support or brace with the base at different points along the base to vary the angle of inclination of the tube carrying frame.

4. A device of the class described including a supporting base, a tube carrying frame

pivotally connected at one end with the base, an inclined support or brace pivotally connected at one side of the center thereof to the tube carrying frame, and means for detachably connecting either end of the inclined support or brace with the base to vary the angle of inclination of the tube carrying frame, the base and brace member being provided with indicia denoting the connection of the different end portions of the inclined support or brace at different points along the base to obtain certain degrees of sensitiveness of the device.

5. A device of the class described including a supporting base, a tube carrying frame pivotally connected at one end with the base, an inclined support or brace pivotally connected near one end portion thereof with the tube carrying frame, means for detachably connecting the inclined support or brace at the other end thereof with the base at different points along the base to vary the inclination of the tube carrying frame, the detachable connection at some of the points along the base having structural characteristics distinguishing the same from the connection at other points along the base.

6. A device of the class described including a supporting base, a tube carrying frame pivotally connected at one end to the base, parallel brace members at opposite sides of the tube carrying frame, said brace members being pivotally connected near one end portion with the tube carrying frame on opposite sides of the latter, and means for detachably connecting the other ends of the brace members with the base at different points along the base, said means comprising upstanding flanges at opposite sides of the base, each flange having a plurality of apertures located at different points along the same, the apertures of the respective flanges being arranged opposite each other in pairs, the brace members having openings in their lower ends adapted to be positioned in alinement with the pairs of apertures in the flanges and a pin adapted to detachably engage the apertures in the flanges, and in the ends of the brace members.

7. A device of the class described including a supporting base, a tube carrying frame pivotally connected at one end to the base, parallel brace members at opposite sides of the tube carrying frame, said brace members being pivotally connected near one end portion with the tube carrying frame on opposite sides of the latter, and means for detachably connecting the brace members with the base at different points along the latter, said means comprising upstanding flanges at opposite sides of the base, each flange having a plurality of apertures located at different points along the same, some of the apertures in each flange being larger than others, and the apertures of the respective flanges being disposed opposite each other in pairs with a small aperture of one flange at one side of the base opposite a large aperture in the flange at the other side of the base, the brace members having openings in the lower ends thereof to be positioned in alinement with the pairs of openings in the flanges and a pin adapted to detachably engage the apertures in the flanges, and the apertures in the ends of the brace members, said pin having an inner portion of a size in cross section to fit the larger apertures in the flanges, and having an outer portion of less size in cross section to fit the smaller apertures in the flanges.

8. A device of the class described including a supporting base, a tube carrying frame pivotally connected with the base, and means for maintaining the tube carrying frame in different angular positions of adjustment, said tube carrying frame being of substantially rectangular shape and having spaced side bars and transverse end connecting portions, the inner faces of the side bars of the tube carrying frame being formed concave, and the end connecting portions of the frame being provided with pairs of openings, and a U tube fitting in the frame between the side bars thereof with the ends of the tube engaging the openings in the transverse connecting end portions of the frame.

9. A device of the class described including a supporting base, a tube carrying frame connected with the base to be positioned at different angles of inclination, means for maintaining the tube carrying frame in different positions of adjustment, a U tube supported in the frame, a scale plate secured to the U tube between the legs thereof at one side of the tube, and means for adjustably securing the scale plate to the tube comprising a plate disposed opposite the scale plate at the opposite face of the tube and clamp screws connecting the plates together.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

ERNEST SZEKELY.

Witnesses:
W. V. Baker,
R. J. Tevkowsky.