Feb. 16, 1932. S. KUPFERMAN 1,845,801

UNIVERSAL PLUMB LEVEL

Filed March 9, 1928 2 Sheets-Sheet 1

Fig. 1.

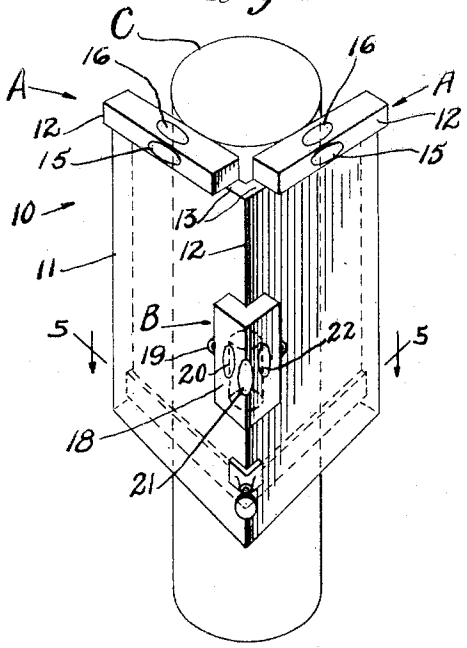


Fig. 4.

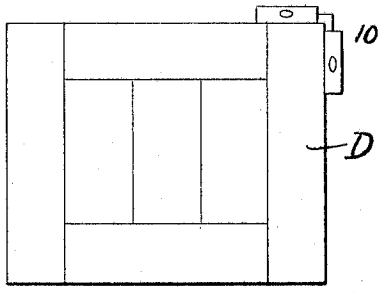


Fig. 5.

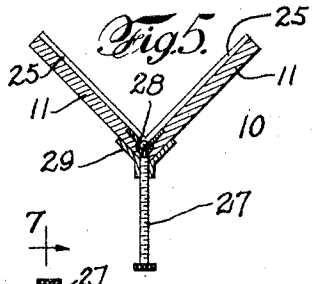


Fig. 2.

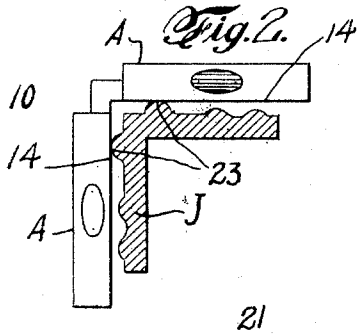


Fig. 6.

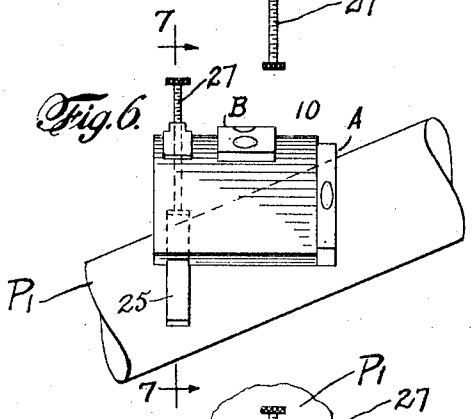


Fig. 3.

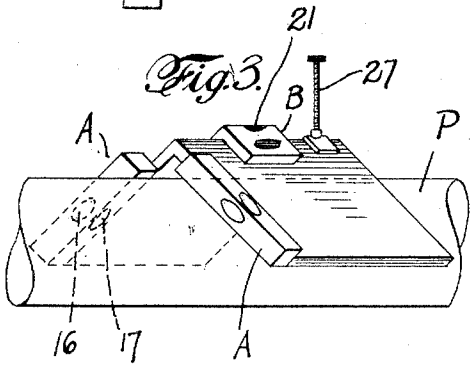
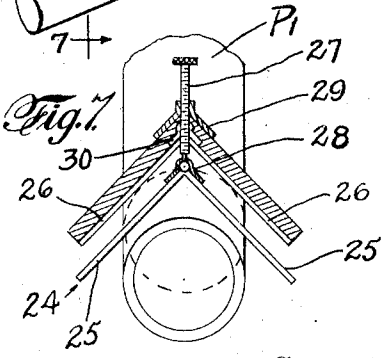


Fig. 7.



Inventor

S. Kupferman

By his Attorneys

Beebe & Schumacher

Feb. 16, 1932. S. KUPFERMAN 1,845,801

UNIVERSAL PLUMB LEVEL

Filed March 9, 1928 2 Sheets-Sheet 2

Fig. 8.

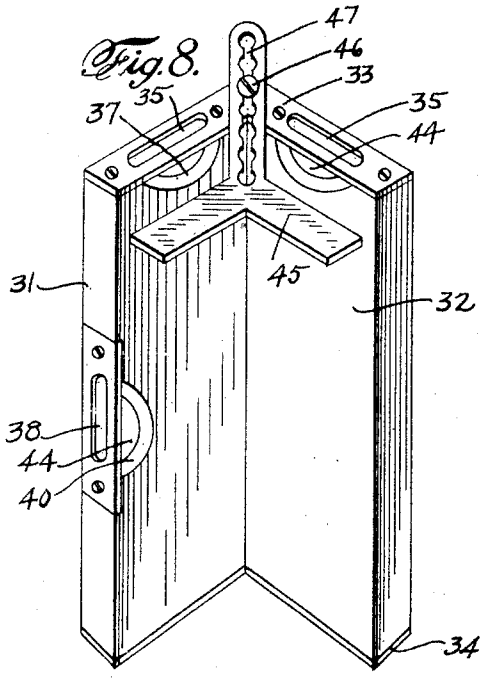


Fig. 9.

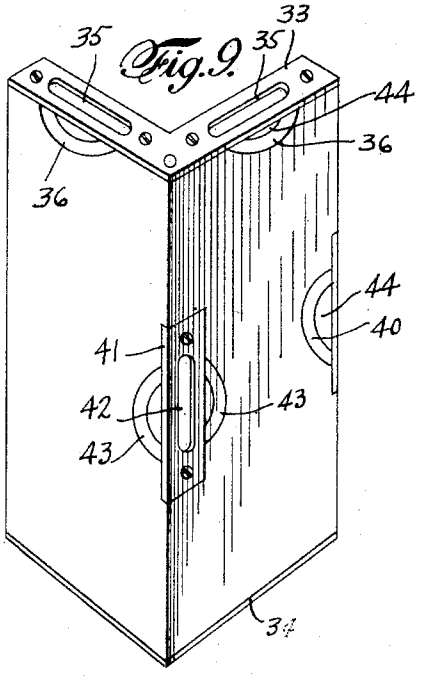
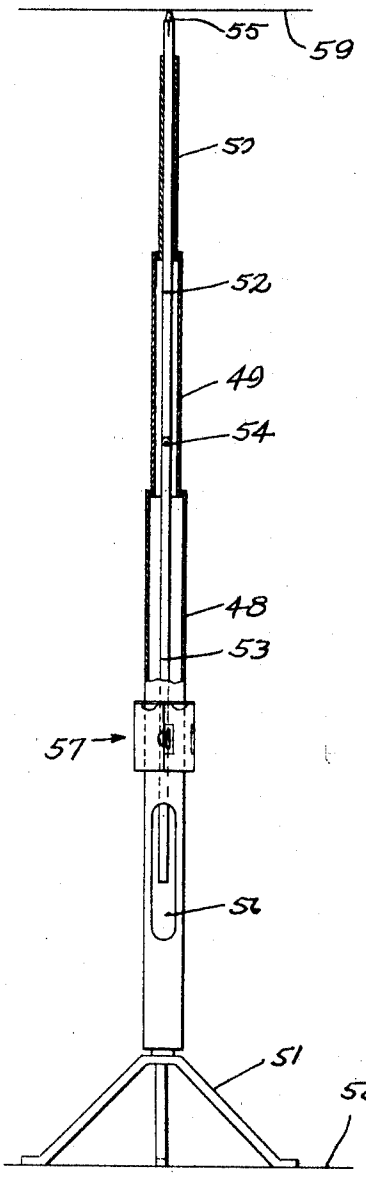


Fig. 10.



Inventor

S. Kupferman

By his Attorneys

Baker & Schumacher

Patented Feb. 16, 1932 1,845,801

UNITED STATES PATENT OFFICE

SOLOMON KUPFERMAN, OF NEW YORK, N. Y.

UNIVERSAL PLUMB LEVEL

Application filed March 9, 1928. Serial No. 260,273.

This invention relates to universal plumb levels.

One object of this invention is to provide a device of the character set forth, including improved means for indicating the true horizontal or vertical position of an object, whether the same be round or of polygonal cross section.

Another object of the invention is the provision of a device of the character described which can be quickly manipulated in a variety of positions for the purpose set forth.

A further object of the invention is to produce a device of the type specified which can be used on rough or irregular conformations, as, for example, a door jamb, and the like.

Still another object of the invention is the production of a device of the class alluded to which can be used to conveniently set a pipe at a predetermined pitch.

Still a further object of the invention is to create a universal level which is simple and inexpensive in construction, and reliable and efficient to a high degree in use.

With the foregoing and other objects in view the invention consists in the arrangement and combination of parts hereinafter described and claimed, and while the invention is not restricted to the exact details of construction disclosed or suggested herein, still for the purpose of illustrating a practical embodiment thereof reference is had to the accompanying drawings in which like reference characters designate the same parts in the several views, and in which—

Figure 1 is a perspective view of an embodiment of the invention showing a typical application of the same in connection with a cylindrical member.

Fig. 2 is a top plan view of the same showing the level used at a door jamb.

Fig. 3 is a perspective view of the universal level applied to a horizontal pipe.

Fig. 4 is a side elevation of an ordinary box with the improved level applied thereto.

Fig. 5 is a transverse sectional view of the level taken on the line 5—5 of Fig. 1.

Fig. 6 illustrates my improvement used on a pipe set at a pitch.

Fig. 7 is a sectional view on the line 7—7 of Fig. 6.

Fig. 8 is a perspective inside view of a modification.

Fig. 9 is a similar outside view of the same, with the pitching member removed.

Fig. 10 is an elevation with parts in section of a further modification.

According to the practice heretofore in vogue, where it was necessary to set a circular column or the like to the true vertical, a level was used in conjunction with a plumb bob. The level was placed at one side of the column, and while the latter was moved according to the indication of the level, the level was shifted around the column. This would naturally continue for an extended period of time, since, as the level was effective for but one vertical plane of column, the operator could not judge how far to move the column to set it most rapidly in vertical relation, and without moving it beyond the vertical. By this invention, the position of the axis of the column is directly indicated. In this way, without shifting the universal level, the column can be moved from a number of directions, with a great saving of time, labor, and effort, and finally an accurate vertical setting attained.

As hereinafter described, the principle of the invention has various other applications, only a few of which are shown.

Referring in detail to the drawings, 10 denotes a device embodying the invention, applied to a column C of circular section. The said device includes a plurality of flat plates 11 rigidly connected together at the apex 12 to form a right angle at every section of the device normal to the line of intersection. When applied to a column C, the flat members 11, irrespective of the diameter of the column, contact the latter along parallel lines of tangency. Geometric planes perpendicular to the said members 11 along the aforementioned lines of tangency intersect at the axis of the column. Accordingly the device 10 accurately gages the axis of the column so as to indicate any inclination of the same in any direction on a single application of the said device to the column. The indicating

means referred to is preferably the usual glass containing a fluid and an air bubble.

Preferably a plurality of level indicators A and B are employed, fixed on the angular structure hereinbefore described. The indicators A are housed in casing 12 mounted on the end edges 13 of the members 11, and extending beyond the outer surfaces of the said members 11, the inner surfaces 14 of the said casings coinciding with the inner surfaces of the members 11. The area of the surfaces 14 is thus available to increase the effective contact with the column C. The said casings are provided each with three sight openings 15, 16, and 17 in the outer, upper, and inner walls thereof. In this way the air bubble can be observed from a number of different directions for maximum convenience to the operator. Thus the column C may be set while observing the air bubbles through openings 16 in both indicator levels simultaneously.

The level indicator B includes an angular casing 18 extending around the vertex 12 of the device 10. The said casing may be secured to the members 11 in any suitable manner, as, for example, by screws 19. Interiorly disposed in the casing 18 is a glass, which may be partially set into a recess in the members 11 at the apex 12. Three sight openings 20, 21, and 22 in the casing 18, permit the air bubble to be observed from three different directions. The opening 21 is at the corner or apex of the said casing for a purpose soon to be described.

In Fig. 2, the device 10 is shown applied to a door jamb J, and registers with the ornamental conformations as shown at 23 for a quick and accurate average indication as to the vertical qualities of the said jamb at both faces thereof.

In Fig. 3 the universal level 10 is shown in use on a pipe P. The sight opening 21 then clearly shows whether the said pipe is horizontal. As hereinbefore described in connection with column C, the device 10 indicates the axis of the pipe, in any angular position thereon, and may therefore be placed arbitrarily on the said pipe, without in any way affecting the accuracy of the leveling.

In Fig. 4 is shown the device 10 applied to a box or crate D of the ordinary type.

To permit the device to be used to set a pipe P1 at a desired pitch, the said device is provided with an auxiliary angle 24 comprising the arms 25 which are normally received in grooves 26 in the members 11 so as to lie within the working faces of the same. The said auxiliary angle 24 is carried by a thumbscrew 27, being mounted thereon by means of a swivel connection 28. The said screw 27 passes throngh the apex of the device 10, being threaded in a bracket 29 secured to said device. A recess 30 in the interior of said device, at the apex thereof, receives the swivel connection 28 when the angle 24 is retracted into the grooves 26. Coacting with the said screw 27 may be provided a suitable scale to indicate the setting of the screw and the consequent pitch of the pipe.

In application the angle 24 and the end of the device 10 remote from the said angle both contact the pipe P1 while the level B is maintained horizontal. The said device may then be moved along the said pipe to take the pitch of the same throughout. The metallic surfaces of the casings A reduce wear on the universal level at the said end thereof.

It is thus seen that I have provided a device that fulfills the objects of the invention and is well adapted to meet the conditions of practical use.

Owing to the light openings provided at each spirit level A, the latter can be readily observed even when the device 10 is applied close to a wall or ceiling, where there is insufficient light or the light comes in a limited stream from but one direction.

In Figs. 8 and 9 is shown a modification comprising two wooden members 31, 32, whose connection is strengthened by the angle pieces 33 and 34 at the ends of the device. The angle piece 33 is formed with openings 35, adjoining openings 36 and 37 being provided in the members 31, 32, at the outside and inside faces thereof. A plate 38 having an opening is set into a side edge of a member 31, and lateral light openings 40 coact therewith. Similarly, a plate 41 is countersunk into the member 31 at the corner of the device, and this member has a spirit level observation opening 42, and light openings 43 in the device. Thus every spirit level can be readily seen no matter how scanty the light may be.

It will be seen that this construction of the angle pieces 33, 34, not only re-enforces the device, but also checks the wear on the wooden members 31, 32, and prevents the wood from chipping at the upper and lower edges. Further these angle pieces protect the spirit tubes 44 and constitute a housing therefor. The angle pieces referred to render the device inexpensive to manufacture and form a neat finish.

For use as a pitching device, the Y member 45 is attached to angle piece 33 by a screw 46 passing through a slot 47. The member 45 may be made as a stamping, and permits the pitching as hereinbefore described to occur whether the level be applied to the upper or lower surface of a cylinder, cone, prism, or pyramid, with each of which it can be advantageously used.

According to the modification of Fig. 10, a plurality of tubular telescopic members 48, 49, and 50 are mounted on a suitable base 51. Extending centrally therethrough are a pair of lengthwise slidable rods 52, 53 hingedly connected together at 54. Of these,

the upper one, namely 52 is snugly engaged in member 51, and carries a chalk 55. The member 48 has an opening 56 through which an operator can move the rods 52, 53 vertically. Mounted on the said member 48 is a universal plumb level 57 made as hereinbefore described. With this device resting on the floor 58 in perfectly vertical condition as indicated by 57, the chalk 55 may make a mark on the ceiling 59 which is vertically above a corresponding point on the said floor. Of course, the telescopic portions 51—53 remain in engagement in any suitable manner, as is well known in the art. This device can be easily collapsed into compact form as is evident from the construction shown.

I claim:

1. A universal level having a plurality of plane members connected together at an angle, in combination with a plurality of spirit levels on the members so positioned in relation to each other as to permit universal applications of the device, one of the levels being positioned at an end of one of the members and at right angles to the line of connection of the members, a second level being located at a side edge of a member remote from the line of connection, and a third level being located along the line of connection outside of said angle, all of said levels being positioned within the surface of the plane members.

2. A universal level having a plurality of plane members connected together at an angle, in combination with a plurality of spirit levels on the members so positioned in relation to each other as to permit universal applications of the device, one of the levels being positioned at an end of one of the members and at right angles to the line of connection of the members, a second level being located at a side edge of a member remote from the line of connection, and a third level being located along the line of connection outside of said angle, and a pitching means pivotally connected to the members at one end thereof and adjustably radially movable with respect to said angle along a plane at an angle to said line of connection.

3. A universal level having a plurality of plane members connected together at an angle, in combination with a plurality of spirit levels on the members so positioned in relation to each other as to permit universal applications of the device, one of the levels being positioned at an end of one of the members and at right angles to the line of connection of the members, and another level positioned along the line of connection outside of said angle, both of the levels being located within the plane members.

4. A universal level comprising a plurality of plane members, angular elements angularly interconnecting said members, and level indicators housed by both arms of an element, said element having openings through which the indicators are visible.

5. A universal level comprising a plurality of substantially plane members angularly connected together along a line, said members having a substantial length in the direction of said line, and a level indicator extending along an outside edge of one of said members between the plane surfaces thereof and at an angle to said line, whereby said indicator is adapted to coact with the other member for indication of a vertical plane, and angle means at said edge of the level angularly connecting the members, one arm of said angle means coacting with its corresponding plane member to form a housing for the indicator.

6. A universal level comprising a plurality of substantially plane members angularly connected together along a line, said members having a substantial length in the direction of said line, and a level indicator extending along an outside edge of one of said members between the plane surfaces thereof and at an angle to said line, whereby said indicator is adapted to coact with the other member for indication of a vertical plane, and angle means at said edge of the level angularly connecting the members, one arm of said angle means coacting with its corresponding plane member to form a housing for the indicator, and a Y member for pitching between said plane members, said Y member lying in a plane at right angles to said line and being adjustable along said plane, and means passing through the leg of the Y member for adjustably securing the same to the angle means.

7. A level including a plurality of plane members intersecting each other at an angle, angle pieces coinciding with the angle between the plane members, each of said angle pieces having a pair of arms, said angle pieces lying along opposite edges of the plane members with said arms secured to the edges of said members, and a sheet metal Y member for pitching lying in a plane at an angle to the line of intersection of the plane members, said Y member having a leg adjustably secured to one of the angle pieces.

8. A device including a pair of members interconnected along a line and at an angle to each other for movement along a pipe, an element for determining the pitch of the pipe, and pivotal means adjustably connecting the element to said members adjacent to said angle and at one end of said line so that the element is movable in a plane at an angle to the line of intersection and between said members, said element being swingable along said plane about the pivot means.

9. A level including a plurality of plane members, angular elements angularly interconnecting said members, and a level indi-

cator, one of said plane members having a recess for receiving the level indicator, said recess being so disposed that an arm of one of the angle elements overlies said recess and said level indicator, and said element having an opening through which the level indicator is visible.

In testimony whereof I affix my signature.

SOLOMON KUPFERMAN.