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TELESCOPIC VERTICAL LEVEL

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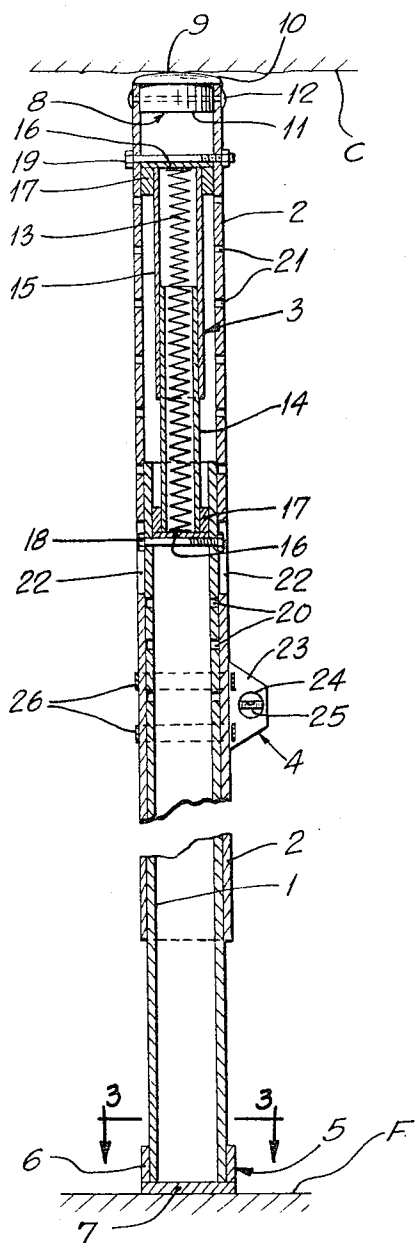


Fig. 2

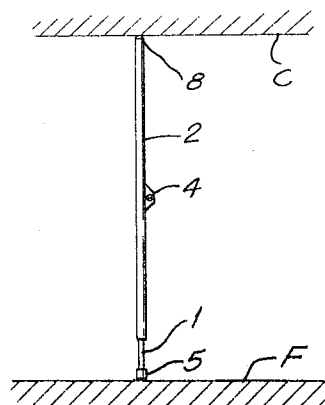


Fig. 1

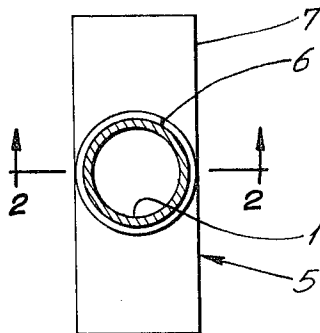


Fig. 3

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TELESCOPIC VERTICAL LEVEL
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The present invention relates to an instrument for use in the building trades and, more particularly, to a vertical level for vertically aligning two points on spaced horizontal surfaces.

For example, to install partitions in an office or apartment building, or the like, a line is first made on the floor and a series of points or a line must be made on the ceiling in vertical alignment with the line on the floor, in order to correctly secure channel members or the like to the floor and ceiling for receiving the partition elements.

It is usual to use a plumb line for correctly marking the ceiling in vertical alignment with the floor or vice versa. However, plumb lines are awkward to use and take time to correctly position the marks, especially in high-rise buildings with wind blowing the plumb line away through paneless window openings.

It is, therefore, the general object of the present invention to provide a vertical level by means of which lines or reference marks may be accurately positioned in vertical alignment on two spaced superposed horizontal surfaces, such as a ceiling and a floor.

Another object of the present invention resides in the provision of a vertical level of the character described, which consists of a telescopic rod carrying a levelling tube and urged into an extended position so as to automatically contact both floor and ceiling surfaces when released.

Another object of the invention resides in the provision of a telescopic vertical level of the character described, which can be adjusted to any desired length range so as to be conveniently used in buildings with different ceiling heights.

Yet another object of the present invention resides in the provision of a vertical level of the character described, which is of simple and relatively inexpensive construction and which can be quickly and easily manipulated by any person without having any previous training in the use of the instrument.

The foregoing and other important objects of the present invention will become more apparent during the following disclosure and by referring to the drawings, in which:

FIGURE 1 shows, in side elevation, the telescopic level of the present invention in position for marking off points on a floor and ceiling in vertical alignment;

FIGURE 2 is a longitudinal section of the telescopic vertical level, taken along line 2-2 of FIGURE 3; and

FIGURE 3 is a cross-section taken along line 3-3 of FIGURE 2.

Referring now more particularly to the drawings in which like reference characters indicate like elements throughout, the level of the present invention comprises an inner main tube 1 and outer main tube 2 in telescopic engagement, a spring assembly 3 to urge tubes 1 and 2 apart and a levelling tube assembly 4 attached to outer tube 2.

Inner main tube 1 protrudes downwardly from the lower end of outer main tube 2 and is provided with a foot pad 5, comprising a sleeve 6 surrounding the lower free end of inner main tube 1 and of the same external diameter as outer main tube 2.

Said pad 5 further comprises a rectangular floor engaging flat plate 7 secured to sleeve 6 and extending at right angles to the long axis of the two tubes 1 and 2;

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the longitudinal edges of slot plate 7 are flush with the outside cylindrical surface of sleeve 6.

A cap 8 is fitted to the upper end of outer main tube 2. Cap 8 has a slightly rounded outer surface 9, the edge 10 of which is flush with the outside face of outer main tube 2. Cap 8 has further a restricted cylindrical plug-like portion 11 fitted within tube 2 and secured therein by means of rivets 12 or the like.

Spring assembly 3 comprises an elongated compression spring 13 fitted within and guided by telescopically engaged inner guiding tube 14 and outer guiding tube 15.

Guiding tubes 14 and 15 together with spring 13 are entirely located within main tubes 1 and 2 and adjustably attached thereto.

More particularly, the outer ends of guiding tubes 14 and 15 are provided with a disc 16 and bushing 17, secured to the respective tubes 14 and 15. A cross bolt 18 and 19 respectively passes through a pair of aligned holes 20 made in inner tube 1 and holes 21, made in outer tube 2 respectively, and serves as abutments for the ends of the spring assembly; that is, the discs 16 abut against the cross bolts 18 and 19 under the action of compression of spring 13.

The head of cross bolt 19 and its nut for securing said bolt to outer tube 2 simply protrudes externally of said outer tube, while the head and nut of bolt 18, which protrude on the outside of inner tube 1, are located within aligned slots 22, made in the outer tube 2, and serve to limit the extent of relative telescopic movement between the two tubes 1 and 2, the bolt head and nut abutting against the ends of slots 22.

The levelling assembly 4 comprises a block 23 having a circular hole 24 in which is set a conventional glass levelling tube 25 filled with liquid and an air bulb, as in conventional levelling tube assemblies, the levelling tube being so adjusted with respect to outer main tubes 1 and 2 that the levelling bulb will lie exactly between the levelling marks when the main tubes 1 and 2 are truly vertical.

Block 23 can be adjustably secured along the length of outer tube 2 by means of two straps 26, made of flexible steel or the like, surrounding the outer tube 2 and passing through openings made in block 23.

Straps 26 are preferably of the hose clamping type, having at one end a socket receiving a threaded bolt, the threads of which engage inclined slots made in the opposite end of the strap to provide a gear action for tightening the straps around tube 2.

As previously noted, the levelling assembly 4 can be adjustably secured to outer tube 2 anywhere along the length of said tube so as to be in a most convenient position for a person standing on a stool or the like for taking a reading of the levelling tube and marking an indication on the ceiling.

The block 23 of the levelling assembly is positioned such that it will extend in a plane at right angles to the long axis of elongated plate 7 of foot pad 5.

In practice, slots 22 have a length of about 4" so as to leave a free relative movement between tubes 1 and 2 of about 3".

Outer tube 2 is provided with a plurality of spaced pairs of aligned holes 21 along the length thereof, and inner tube 1 is similarly provided with equally distant pairs of transversely aligned holes 20 along the length thereof. By inserting cross bolt 19 in a different pair of holes 21, one changes the compression force of spring 13 as desired. The overall length of the assembly of tubes 1 and 2, when in extended position, can be varied in accordance with the ceiling height of the room in which one is working by positioning cross bolt 18 in the desired pairs of transversely aligned holes 20.

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In practice, if one is working, for instance, in a room in which the height between floor F and ceiling C is, say, 8', the instrument in accordance with the invention is adjusted by placing cross bolt 18 in the desired pair of holes 20, so as to have a length of, say, 8'1½" in extended position and 7'10½" in retracted position.

One longitudinal edge of plate 7 of the foot pad 5 is aligned with a mark on the floor, indicating the position of the partition to be erected, and the instrument is moved sideways so as to bring it to the vertical position, which will be shown by the leveling tube 25.

The outer curved surface 9 of cap 8 is allowed to slide on the ceiling surface during vertical adjustment of the instrument. This curved surface can easily slide on rough concrete surface and the like.

When the instrument is truly vertical, a mark is inscribed on the ceiling, along the edge 10 of cap 8. It will be noted that this edge is equally distant from the center line of the instrument as the longitudinal edge of plate 7 of the foot pad 5.

The elongated plate 7 of foot pad 5 maintains the instrument in upright position in a plane perpendicular to the plane passing through the long axis of the levelling tube 25.

To remove the instrument, the latter is simply retracted to clear the ceiling and floor.

While a preferred embodiment in accordance with the present invention has been illustrated and described, it is understood that various modifications may be resorted to without departing from the spirit and scope of the appended claims.

What I claim is:

1. A telescopic vertical level comprising telescopically engaged main tubes, spring means extending within said main tubes, attached thereto and urging the same into extended position, abutment means on said main tubes to limit the extent of relative movement between said main tubes between retracted and extended positions, a levelling tube attached to one of said main tubes with its indicating axis perpendicular to the long axis of said main tubes, means to adjust the position of said abutment means along

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said main tubes to vary the maximum and minimum lengths of the telescopic tube assembly, and means to vary the location of the attachment of said levelling tube to said one of said main tubes along the length of the latter.

2. A telescopic vertical level as claimed in claim 1, wherein said spring means include two telescopic guiding tubes, a compression spring mounted within said guiding tubes and centering discs closing the outer ends of said guiding tubes and fixed to said main tubes.

3. A telescopic vertical level as claimed in claim 1, wherein said main tubes include an inner and an outer tube, said abutment means include a bolt extending through said inner main tube into elongated slots made in said outer main tube, and said means to adjust the position of said abutment means include several spaced pairs of transversely aligned holes made in said inner main tube, said bolt insertable in any one of said pairs of transversely aligned holes.

4. A telescopic vertical level as claimed in claim 3, wherein said outer main tube has several pairs of transversely aligned holes made therethrough, a through bolt passing through one of said pairs of holes and serving as a stop for one end of said spring means inserting said through bolt in another pair of aligned holes causing a change in the compression force exerted by said spring.

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