Oct. 13, 1936. C. G. WAHLSTROM ET AL 2,057,404

LEVEL

Filed Jan. 22, 1936 3 Sheets-Sheet 1

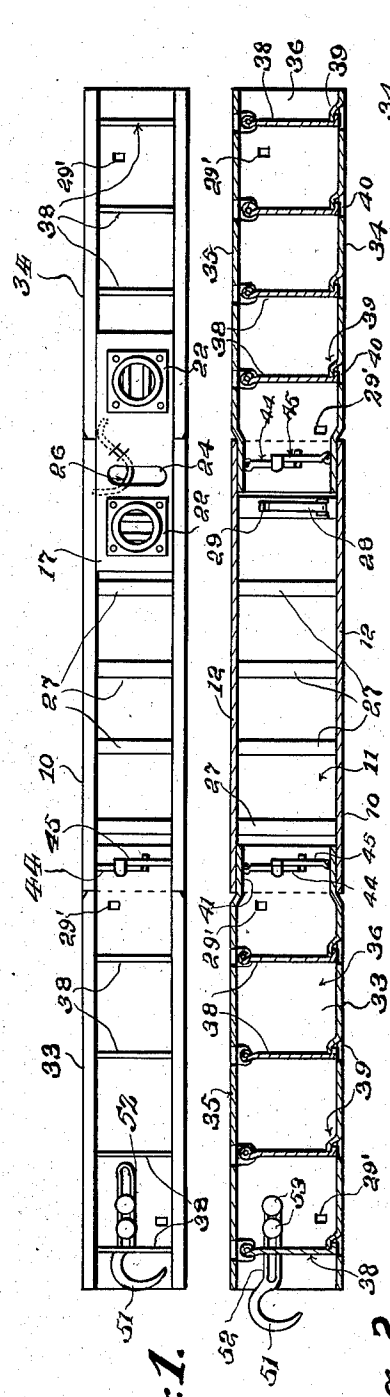


Fig. 1.

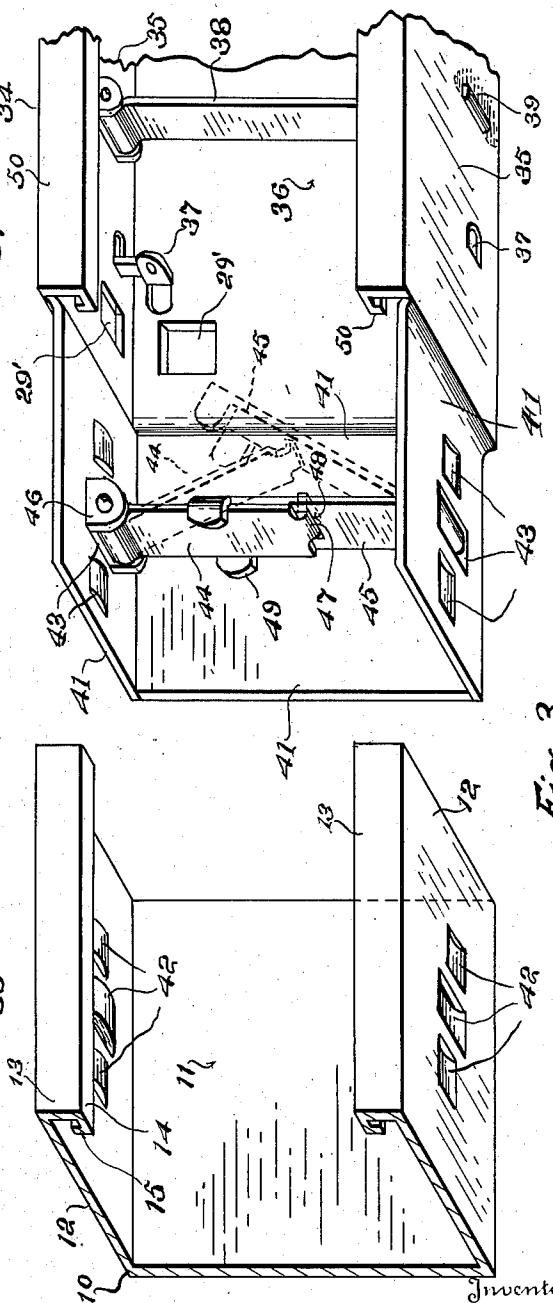


Fig. 3.

Fig. 2.

Inventors:
Charles G. Wahlstrom,
and William Nielsen,
By Christian K. Nielsen,
Attorney

Oct. 13, 1936. C. G. WAHLSTROM ET AL 2,057,404

LEVEL

Filed Jan. 22, 1936 3 Sheets-Sheet 2

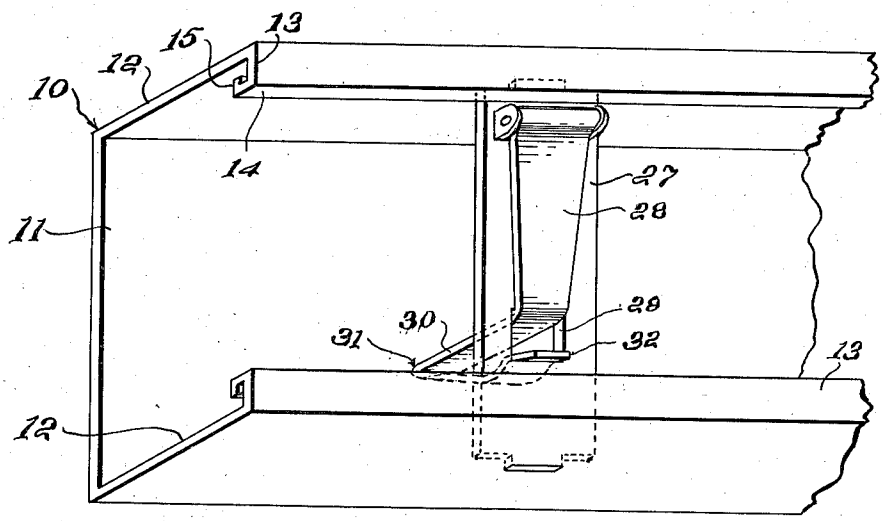


Fig. 4.

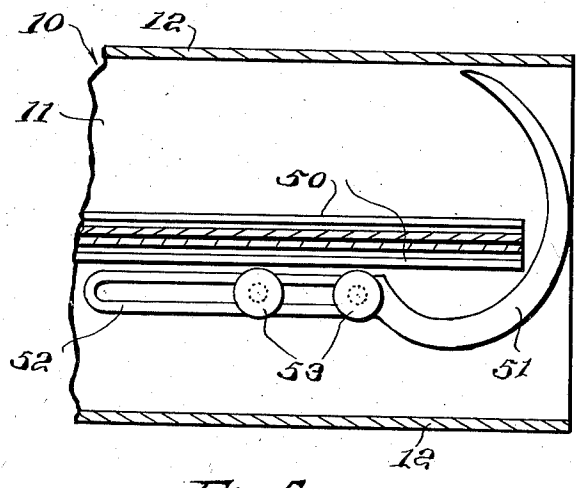


Fig. 5.

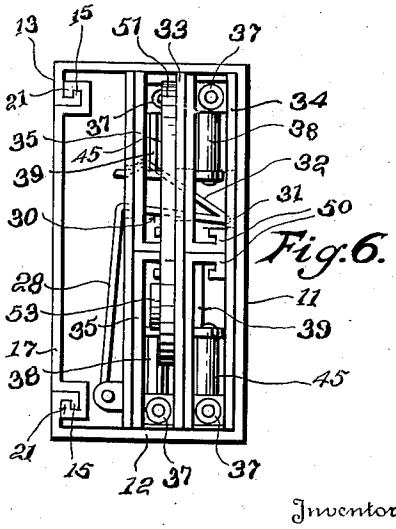


Fig. 6.

Inventors:
Charles G. Wahlstrom,
and William Nielsen,
By Christian R. Nielsen,
Attorney

Oct. 13, 1936. C. G. WAHLSTROM ET AL 2,057,404

LEVEL

Filed Jan. 22, 1936 3 Sheets-Sheet 3

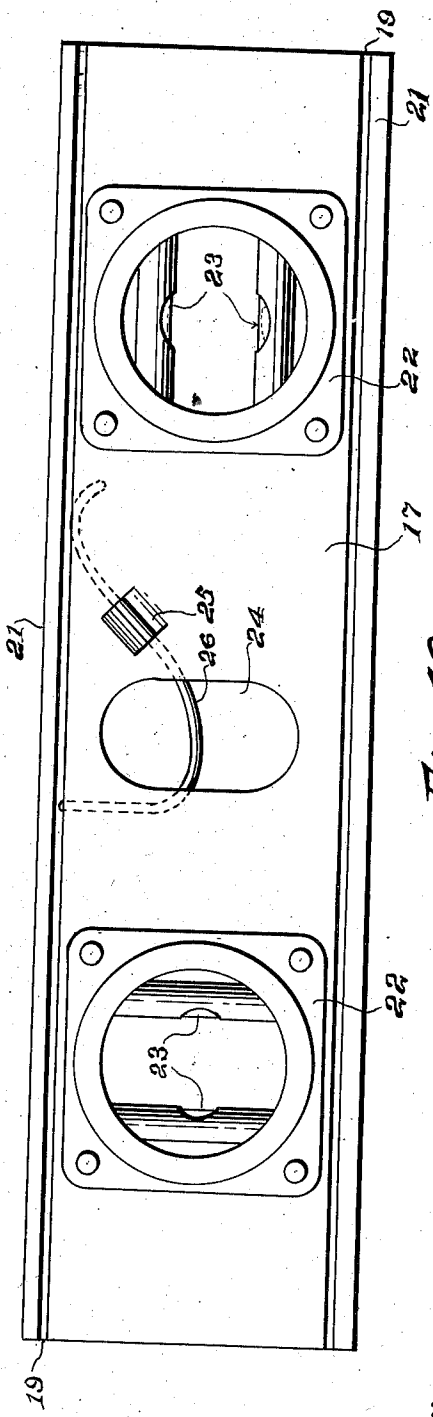


Fig. 10.

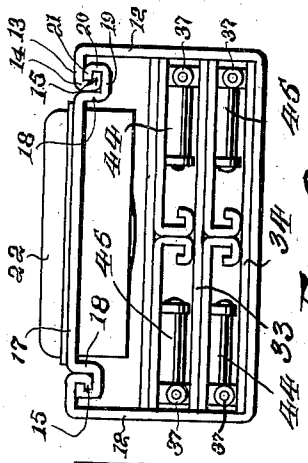


Fig. 8.

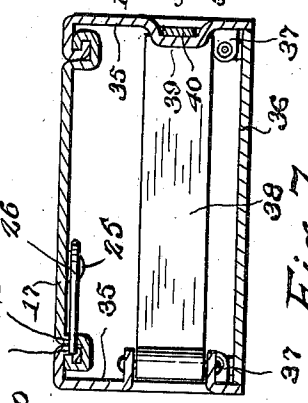


Fig. 7.

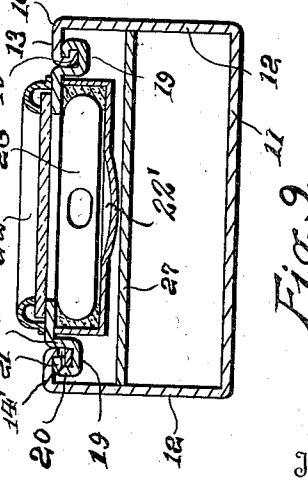


Fig. 9.

Inventors:
Charles G. Wahlstrom,
and
William Nielsen,
By Christian K. Nielsen,
Attorney

Patented Oct. 13, 1936

2,057,404

UNITED STATES PATENT OFFICE

2,057,404

LEVEL

Charles G. Wahlstrom, Brooklyn, and William Nielsen, Hollis, N. Y.

Application January 22, 1936, Serial No. 60,336

9 Claims. (Cl. 33—208)

The invention relates to collapsible carpenters' levels and other tools, and has for an object to present an improved construction in such devices to the end that it may be produced at lower cost and will be efficient and durable, as well as free from liability of mal-adjustment and deformation incident to normal use.

It is an aim of the invention to improve the construction of, and functioning of the spirit level element in such an implement. Another purpose is to present a novel construction to enable the folding of the parts. A further aim is to present a novel and effective means to hold the parts in collapsed and nested relation, and also a novel means to hold the parts in extended operative relation.

An important object is to present a level body which is adapted to be produced from sheet metal or extruded stock.

Additional objects, advantages and features of invention reside in the construction, arrangement and combination of parts involved in the embodiment of the invention, as will appear from the following description and accompanying drawings, wherein

Figure 1 is a top view of a level embodying our invention, extended.

Figure 2 is a horizontal sectional view of the invention.

Figure 3 is a perspective view of the interlocking ends of two sections of the level, detached.

Figure 4 is a similar view of one section and showing a retainer latch to hold the collapsed parts together.

Figure 5 is an enlarged view of the hook device.

Figure 6 is an end elevation of the collapsed and nested assembly.

Figure 7 is a cross section on the line 7—7 of Fig. 1.

Figure 8 is an end elevation opposite the end shown in Figure 6.

Figure 9 is a cross section on the line 9—9 of Fig. 1.

Figure 10 is a top view of the spirit level unit.

There is illustrated a level which may be made up in any desired number of longitudinally connected and detachable units the outermost ones of which may be individually collapsed and inserted in a central unit. In the present instance, there is shown a main central or frame section 10, the body of which is formed integrally of sheet metal, substantially U-shaped in cross section, including a planiform bottom plate 11, and two planiform side walls 12 upstanding thereon at right angles. The walls 12 have at their upper edges inturned horizontal top flanges 13, having inner edges downturned at 14 and recurved as at 15, parallel to the flanges 13, to form guide rails by which a slidable spirit level carrier 17 is supported.

This carrier consists of a single sheet metal plate (see Figures 7 to 10), having its parallel edges bent downward at right angles as at 18 on lines spaced the width of the space between the flanges 13, then at a level with the under sides of the recurved parts 15 the plate edges are bent outwardly as at 19, then upwardly as at 20 and inward, forming rests 21 engaging slidably over the guide rails 15. The body of the plate thus lies flush with the flanges 13, and the slidably interlocked rail and slide parts are within the assembly, protected and concealed. The carrier may be equipped with two or more stock spirit level unit assemblies 22, one being shown arranged with the tube 23 crosswise of the carrier and another with the tubes longitudinally of the carrier. The carrier is centrally formed with a transverse slot 24 of a width to receive the finger for transverse movement therein. Adjacent one side of the slot a diagonal strap, loop or stirrup 25 is pressed downwardly in the metal of the carrier, and inserted through this there is a spring wire 26. The wire extends from the loop toward the middle of the slot and is bent to lie across the slot, so that it may be pressed by the finger in one direction. One end of the wire presses against the downturned part 18, while the end that lies across the slot is extended and bent so that its extremity projects through an aperture 18' in the downbent part 18. The end of the wire may be selectively engaged in spaced apertures 14' formed in the downturned part 14 of the side rails of the level body or frame 10, thereby acting as a lock to retain the carrier 17 at various points of adjustment on the body and connected sections to be described. It may be released by pressure of the finger against the wire exposed at the slot. The level units 22 are of a type which may be set through suitable openings in the carrier 17 so as to lie below the body of the latter and within the level assembly, and preferably we provide a suitable reflector 22' placed to the rear of the level units.

The section 10 has its side walls braced by means of struts 27, which are flat bars permanently secured between the walls slightly above the medial horizontal plane of the level. On one of these next to one end of the section 10 a latch spring 28 is pivoted adjacent one end of the bar, to swing in a plane transversely to the level me-

dially of the bar. An aperture 29 is formed in the strut near its opposite end, and the outer swinging end of the latch is bent downwardly at right angles, forming a latch arm 30 to extend through the aperture into close relation with the bottom 11, being bent sharply backward from this point as at 31, and extended divergently from the keeper to near the strut and being there bent diagonally inward on a line below the strut forming a keeper tongue 32, which may be set partly under the strut beyond the aperture 29, while its extremity extends upward through the opening and is exposed suitably thereabove as a finger piece to enable its digital release, as will be described.

Engaged detachably with the section 10 there are two end sections 33 and 34 each of similar form and size generally in cross section, but having the side walls 35 pivoted to respective bottom plates 36 thereof, so that the walls may swing inward to lie closely over the bottom plate. The hinged connection may be of any approved construction permitting the walls to fold inward from a line flush with the outer bottom face of the plate 36 to an inner position that will permit insertion of the collapsed sections horizontally within the section 10. To hold the walls 35 in extended positions, struts 38 are pivoted on one wall arranged to swing so that their extremities bear against the opposite wall and press it to open position. The lower edges of the walls 35 extend beside the edges of the plate 36, so that these walls are checked in their swinging movement when at right angles to the plate 36, and enable the struts 38 to bind frictionally at their extremities against the opposing wall. The latter is formed with stirrups 39 opposite the pivot of each strut, into which respective lateral tongues 40 on the struts may project so as to hold the walls from being separated further, as well as preventing their collapse. The end portions of the side walls 35 on each of the end sections 33—34 and the bottoms 36 are inset as at 41, so as to fit between the walls 12 of section 10 so that the end sections may be manually inserted in the respective ends of the section 10. In order to lock the sections releasably in their connection, a plurality of lugs 42 are pressed inward in the material of the walls 12 centrally of the parts which telescope over the inset parts of the walls 35, and on the inner parts there are formed slots 43 located to receive the lugs therein snugly when the inset portions are set fully in the section 10. Each inset portion has a spreader means thereon corresponding to the struts 38, but made in two separable pieces 44—45, pivoted permanently between ears 46 at respective sides of the section. The piece 44 is a simple rectilinear lever bar with a lateral tongue 47 at its outer extremity while the piece 45 is a corresponding lever formed with an aperture 48 to receive the tongue 47 and at its end two jaws 49 to frictionally engage over the upper and lower edges of the lever 44 when the two are pressed into parallel relations. The two may be pressed to the dotted position shown in Figure 3, and the tongue 47 slipped out of the aperture 48 after which the two may be swung against their respective walls. In assembly they are reengaged by a reverse manipulation. The location of the aperture and the tongue are such that the walls 35 are forced outward tightly against the walls 12 when the spreader levers are pressed to snug engagement as in full lines in Figure 3.

The bottom plate and side walls of each of the sections 33—34 have apertures 29' at each end to aline with the aperture 29 of the section 10 when the parts are collapsed and sections 33—34 inserted in the section 10 as shown in Figures 6 and 8. Thus, the keeper 30 of the latch spring 28 may extend through each section and so serve to retain the parts together. Each side wall of the end sections is provided with rails 50 at the top edges, similar to and adapted to form continuations of the parts 13—14—15—16 of the section 10.

On one of the end sections a suspension hook 51 is provided, having a rectilinear longitudinally slotted shank 52 attached to the bottom plate 36 by two studs 53 engaged through the slot which frictionally hold the hook for longitudinal sliding movement and support it when extended. The shank is offset from the position of the rail parts 50 when the walls 35 are folded down, and it will be noted that the height of the side walls is such that the opposed walls snugly abut when in such folded position, and rest against the plate 36. The bill of the hook, when at the inner limit of its sliding movement with the parts folded, lies outwardly of and around the ends of the rails 50, and when the hook is extended, it clears the end of the assembled level enough to permit the hook to be engaged over a spike, rod, ladder rung, or other support from which the level may be suspended.

In use, the end sections may be folded as shown in Figures 6 and 8, and the end sections inserted in the section 10, from either end, below the struts 27, the latch spring being raised until they are adjusted in proper position with the apertures 29—29' alined, after which the latch is pressed inward so that the latch arm 30 passes through the apertures and the keeper 32 engages to hold the latch in position until released by pressure against the finger-piece thereof. The carrier 17 is adjusted centrally on the section 10, and the appliance may be then conveniently carried in the pocket or tool chest, and may be shipped without occupying excessive space, as well as involving a minimum liability of damage in handling generally.

To assemble the article for use, the parts are separated by release of the latch 28 and withdrawal of the end sections from the section 10; after which the side walls of the end sections are turned up into parallel relation and the pivoted struts 38 swung across the space between and wedged with their tongues under the stirrups 39. The inset side and bottom portions are then inserted into either end of the section 10 with the rails 50 in alinement with the corresponding parts on the section 10 and the lugs 40 registered with the slots 43. The tongue 47 is then inserted through the aperture 48 and the levers 44—45 pressed to wedged position, so that the sections cannot be accidentally pulled apart, and the article is ready for use. In such use the carrier 17 may be moved slidably from one end to the other and adjusted at the most convenient position for observation or use generally, by releasing the spring lock 26, and it will be automatically secured in adjusted positions by release of the spring.

It will be noted that the openings formed by stamping out the ears 46 for mounting the levers 44—45 form the slot 43 in which the lugs 42 engage to lock the sections together. The body parts of the sections may be made up as channel stock produced by rolling, extrusion, or other-

wise, cut to length and fabricated as described.

We claim:—

1. A sectional frame device comprising a central section having bottom and side walls, end sections having a bottom and side walls hinged thereto and adapted to aline with those of the central section and having inset end portions adapted to fit snugly within those of the central section, means to secure the parts in operative relation end to end, said end sections being foldable to lie side by side within the central section, and means to hold the parts in nested relation.

2. The structure of claim 1 in which pivoted stay members are pivoted on a side wall of the end section, movable into wedging engagement between the two opposite side walls.

3. The structure of claim 1 in which the sections are U-shaped in cross section, a tool element having a slidable mounting fitted between the side walls, and interlocking rails and guide on the walls and mounting.

4. The structure of claim 1 in which the central section has a tool element mounted between the outer edges of the side walls, spaced from the bottom to afford a clearance to accommodate the folded end sections therebetween.

5. The structure of claim 1 in which said means to hold the parts in nested relation consists of a pivoted latch having an arm movable therewith to a position extending through the space for the folded sections within the central section, said sections being apertured to receive the said arm therethrough, and a yieldable keeper device coactive between the latch and frame parts to retain the latch in engaged position.

6. The structure of claim 1 in which the sections are U-shaped in cross section and a tool element having a longitudinally slidable mounting interlocked with the side walls.

7. The structure of claim 1 in which the sections are U-shaped in cross section, a tool element having a longitudinally slidable mounting interlocked with the side walls, a spring mounted thereon having a transversely movable locking device including a longitudinally extending part, said mounting being open over said longitudinally extending part for releasing engagement of the finger with the locking device.

8. The structure of claim 1 in which the sections are U-shaped in cross section, a tool element having a longitudinally slidable mounting coengaged between the side walls, the side walls having edge portions extended inwardly toward each other, then downwardly and outwardly, and said mounting having parts extended downwardly, outwardly, upwardly and inwardly over the last named part of the side walls.

9. The structure of claim 1 in which separate pivoted opposed lever members are pivoted on each side wall of the inserted parts, one lever having an aperture intermediately thereof and the opposed one having a tongue to enter said aperture, the levers being movable into extended position as a toggle pivoted at the tongue and aperture, and being constructed and arranged to coengage to yieldingly lock in operative position.

CHARLES G. WAHLSTROM.
WILLIAM NIELSEN.