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LEVELLING DEVICE

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The invention, in general, relates to means for securing a plurality of members together with a flush tight joint and with aligned or levelled surfaces. More particularly, the invention relates to an improved levelling device affording optimum strength at the junctures of connected flat stock and affording the alignment of surfaces in a minimum of time.

While the present invention is entirely suitable for adaptation to a wide variety of industrial and commercial environments, such as in the levelling of drawing board sections, in the levelling of table sections or extensions, or in the levelling of game board surfaces and the like, the invention has been especially devised for the levelling of counter sections which are surmounted or surfaced with glass or plastic sections for cleanliness, and ready movement of glasses or dishes thereover. Accordingly, but solely for the purposes of illustration and explanation, I shall herein describe the invention in such environment.

A primary object of the invention is to provide an improved levelling device for juxtapositioned flat stock which can be set up, adjusted and tightened in operative position in much less time and yet which affords a flush tight and stronger joint between adjacent pieces of stock with aligned surfaces throughout.

Another object of the present invention is to provide an improved levelling device of the indicated nature which is additionally characterized by the simplicity of its parts, the inexpensiveness of the production thereof, and the lack of maintenance expense for providing indefinitely the desired flush or levelled surfaces between adjacent flat sections or members.

A still further object of my invention is to provide an improved levelling device of the aforementioned character which affords facile and rapid installation as well as facile and rapid alignment of the surfaces of adjacent members by the unskilled equally as by the skilled.

Other objects of the invention, together with some of the advantageous features thereof, will appear from the following description of a preferred embodiment and certain modified embodiments of my invention which are illustrated in the accompanying drawings. It is to be understood, however, that I am not to be limited to the precise embodiments shown, nor to the precise arrangements of the various parts thereof, as my invention, as defined in the appended claims, can be embodied in a plurality and variety of forms.

Referring to the drawings:

Fig. 1 is an exploded view of a preferred embodiment of the present invention.

Fig. 2 is a side elevational assembled view, partly in section, of a preferred embodiment of the invention, as applied to juxtaposed counter sections which are shown in longitudinal section, this view showing the counter sections unaligned.

Fig. 3 is a view similar to Fig. 2 but with the levelling device in final adjustment and showing the surfaces of the counter sections in alignment.

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Fig. 4 is a fragmentary view taken on the section line 4-4 of Fig. 3.

Fig. 5 is a fragmentary bottom plan view of counter sections showing an installation of a preferred embodiment of the invention.

Figs. 6 and 7 are, respectively, fragmentary side elevational and bottom plan views of a modified embodiment of the invention.

Fig. 8 is a side elevational view of a modified embodiment of the invention.

Fig. 9 is a side elevational view of still another modification of the invention.

In its preferred form, the levelling device of my present improvement, as applied to a plurality of pieces of juxtapositioned flat stock, preferably comprises a draw-bolt supported in channels formed in the undersides of said juxtaposed pieces of stock; said draw-bolt having a transverse threaded opening therethrough, together with means adjustably fitting said opening and exerting bearing engagement against the underside of one of said pieces of stock to raise and lower the same with respect to the other and thereby effect alignment of their top surfaces, and means associated with said draw-bolt for finally securing said pieces of flat stock together in end to end abutting relationship with their top surfaces in alignment.

As particularly illustrated in Figs. 2, 3 and 5 of the annexed drawings, the flat pieces of stock 11 and 12 to be connected together in end to end abutting relationship with aligned top surfaces are fashioned by means of a suitable template to afford in the undersides thereof channels 13 and 14, respectively, merging into open-bottom recesses 16 and 17, respectively. These flat pieces of stock 11 and 12 may consist of counter sections, such as bar counter sections or lunch counter sections, each having a top facing 18 and 19 fabricated of glass or of a plastic material to permit facile movement thereover of glassware, dishes and the like. While such bar and lunch counter sections usually are fabricated of relatively hard wood, it is within the purport and scope of the present invention to embody the invention in various substances. That is to say, the invention can be exemplified in flat stock juxtapositioned members fabricated of processed asbestos, or of metal such as portions of the fuselage of an aeroplane, or in any other environment where strong flush joints are required in juxtapositioned elements; it being only necessary to fashion the elements, of whatever material, to afford the channels and recesses above described as well as a groove 20 in one of the juxtaposed elements extending at substantially a right angle to the channel formed in such element.

Each of the channels 13 and 14 is located in each section 11 and 12 at the same distance or depth in the section as in the other so that the axis of the channels are approximately in alignment, and such channels are preferably formed to a circular cross-section of a predetermined diameter. Moreover, the recesses 16 and 17 conveniently are formed to circular cross-section to facilitate tightening of elements with requisite tools, as hereinafter explained, although the recesses are not necessarily formed to circular cross-section but of sufficient area to permit entry and manipulation therein of necessary tools.

In accordance with the present invention, I provide a specially constructed draw-bolt 21 for disposal through the channels 13 and 14 of the adjacently arranged sections 11 and 12, such draw-bolt being illustrated in its preferred form in Fig. 1 of the annexed drawings. As shown, draw-bolt 21 consists of an integral head 22, a shank of circular cross-section having an enlarged section 23 and a reduced adjacent section 24, terminating in a threaded section 26 for the reception of a suitable washer and nut whereby the draw-bolt may be tightly fastened in operative

position. In addition, the specially constructed draw-bolt 21 is formed with a transversely extending threaded opening 27 therein which preferably is formed in the reduced section 24 thereof. Preferably, the enlarged section 23 is formed to a diameter approximating the diameter of the channels 13 and 14 so that a driving fit is had between the draw-bolt and channel 14 of counter section 12 when the draw-bolt is disposed therein for operative use. Disposal of the draw-bolt 21 into the channels 13 and 14 of juxtapositioned sections 11 and 12 is such that the threaded opening 27 of the bolt assumes a position at the bottom of section 11 and in alignment or registry with groove 20 formed in such section, see Figs. 2, 3 and 5 of the drawings. The draw-bolt 21 preferably is so formed, adjacent to the head 22 thereof, with a slot or groove 28 for the reception of a suitable washer to assist in the tightening of the bolt in operative position.

The elements associated with the draw-bolt 21, for effective levelling of the top or outer surfaces of juxtaposed flat pieces of stock or sections 11 and 12, include a threaded pin 31, for adjustable disposal in the threaded opening 27 of the draw-bolt, as well as a leveller plate 32 engageable on pin 31 and operatively associated therewith; the pin 31 and plate 32 being of special construction to effect the results desired to be attained. As shown, pin 31 is formed with a threaded extremity 33 and a slotted head 34 for the reception of tool, such as a screw-driver, whereby the pin may be turned in the threaded opening 27 of draw-bolt 21 to the extent desired. The pin 31 also is so formed as to provide an enlarged shank section 36 thereon in spaced relation to the head 34 thereof thus defining an annular groove 37' between the head 34 and shank section 36. The leveller plate 32 preferably is so formed as to afford a series of slots 37, 38 and 39 therein arranged in spaced relationship and opening from one edge thereof, as clearly shown in Figs. 1 and 5 of the drawings. The plate 32, in operative position, is engaged upon the pin 31 by fitting its central slot 38 into the annular groove 37' of the pin 31, and is secured to the underside of the piece of flat stock or section 11 by means of suitable screws 41 and 42, see Figs. 4 and 5, which pass through the outer slots 37 and 39 of the leveller plate 32. In addition, the elements comprising the draw-bolt 21 include a nut 46 which is threaded onto the threaded extremity 26 of the bolt, together with a washer 47 interposed on the bolt ahead of nut 46, and a washer 48 removably fitted by means of a slot 49 therein upon the bolt 21 in the groove 28 thereof.

Summarizing the foregoing, and to describe the operation of my improved levelling device, two pieces of flat stock or sections 11 and 12, such as counter sections or juxtapositioned plate sections of an aeroplane fuselage, are first fashioned for the reception of the draw-bolt 21. The draw-bolt 21 is inserted into section 12 by driving it into channel 14 thereof with a mallet, and washer 48 is passed through recess 17 of the section and slipped over the draw-bolt at groove 28 to lock the draw-bolt in place. The two sections are then brought into end to end abutting relationship so that the draw-bolt 21 will extend into the channel 13 of section 11 and partially into recess 16 of the section. The washer 47 and nut 46 are loosely mounted on the draw-bolt, care being taken in placement of the draw-bolt that the threaded opening 27 thereof faces toward the bottom of section 11 and is in registry with the groove 20 thereof. Thereafter, the pin 31 is screwed into threaded opening 27 of the draw-bolt through groove 20, the pin being turned down until the slot or annular groove 37' thereof is flush with the bottom of section 11. The screws 41 and 42 are partially screwed into the bottom of section 11 on each side of the groove 20, or location of pin 31, and then the leveller plate 32 is slipped over the

pin 31 and screws 41 and 42. Thereafter, the screws 41 and 42 are cinched up, and the nut 46 tightened on the draw-bolt 21, and the top surfaces of the two sections are aligned by adjusting the pin 31, either turning the same clockwise or counter-clockwise to raise or lower section 11 with respect to section 12 using a wrench or a screw-driver applied to the head 34 of the pin. After surface alignment has been thus effected, the nut 46 is tightened fully and the sections thereafter are maintained in strong end to end abutting relationship with their surfaces level throughout.

It should be understood that the width of the counter sections 11 and 12, or other flat stock which is to be connected together in end to end abutting relationship and with level top or outer surfaces, controls the number of the levelling devices of my improvement which are to be employed transversely of the sections. In some instances, only one levelling device need be used and in others as many as six units, arranged in transverse spaced relationship, may be required. For economy, after the final cinching up of the draw-bolts 21 in operative position, the pin 31 and levelling plates 32 may be removed for use in other levelling devices. The lock washers 47 and 48, together with the tightened nut 46 afford positive retention of each draw-bolt 21 in operative position, and the driving fit of each draw-bolt 21 at each channel 14 of section 12 of the two sections affords an appreciably stronger joint between the two sections with increased strength in shear throughout section 12. The arcuate configuration of the washers 47 and 48 is provided for corresponding arcuate walls of the recesses 16 and 17; it being understood that where the recesses are rectangular in cross-sections, square or flat washers are to be used.

In Fig. 8 of the annexed drawings, I have illustrated a modified embodiment of draw-bolt 121 wherein the integral head is replaced by a threaded extremity 122 similar generally to its opposite extremity for the reception of a standard nut 122' whereby the draw-bolt may be tightened and locked in operative position. With this modification, a locking washer such as the washer 48 of the preferred embodiment is not needed. In this modification, the shank of the draw-bolt is made in all respects similar to the shank of the preferred embodiment except that the threaded hole, designated 127' in Fig. 8, is extended entirely through the reduced portion of the shank rather than only partially into the same.

A further modification of the draw-bolt is shown in Fig. 9, such modification being designated generally by the reference numeral 221. In this embodiment, the shank of the draw-bolt is made of uniform cross-section, and the draw-bolt is constructed with an integral head 222 which may be hexagonal in shape and be slotted, as shown, so that the draw-bolt may be turned with a suitable tool when tightening and cinching up the draw-bolt in operative position; it being understood that a nut 46 and washer 47, see Figs. 6 and 7, are disposed on the threaded extremity of the draw-bolt 221 in the same manner as in the case of the preferred embodiment of draw-bolt 21, see Fig. 1, and also see the showings of Figs. 6 and 7 of the annexed drawings.

In some instances of application, my improvement is exemplified in a modified embodiment as illustrated in Figs. 6 and 7 wherein there are shown a pair of blocks 30 and 30', preferably fabricated of relatively hard wood, which are disposed on the under side and transversely of a pair of counter sections 11 and 12, respectively, or like flat stock, arranged in end to end abutting relationship; suitable screws 35 being employed to secure the blocks 30 and 30' in operative position. Each of the blocks is formed with a longitudinally extending channel 13' and 14' therein, respectively, at corresponding locations in the blocks so that when the blocks are fastened to the underside of the counter sections 11 and

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12 in abutting relationship, the channels 13' and 14' are in axial alignment. Moreover, one of the blocks such as block 30 is formed with a series of spaced holes 20' transversely thereof for the passing therethrough of adjustment pin 31 of the pin and draw-bolt combination; it being understood that a leveller plate 32 is interposed between the head 34 and flange 36, or in recess 37 of the pin 31, in the same manner as in utilizing the preferred embodiment of Figs. 1 to 5, inclusive.

It is to be understood that the appended claims are to be accorded a range of equivalents commensurate in scope with the advance made over the prior art.

I claim:

1. A levelling device comprising, in combination with a pair of sections of juxtaposed flat stock arranged in end to end relationship; each of said sections having a channel therein as well as a recess which merges with said channel and which opens to the underside thereof, one section of said pair of sections having a groove therein opening from its underside and communicating with the channel in said one section, a draw-bolt disposed in said channels of said sections; said draw-bolt having a transverse threaded opening therein in alignment with said groove in said one section, a pin extending through said groove and threadedly fitting said opening in said draw-bolt, a leveller plate engaged by said pin and retained thereby in bearing engagement with the underside of said one section; movement of said pin in one direction effecting the raising of said one section with respect to the other of said pair of sections and movement of said pin in the opposite direction effecting a lowering of said one section with respect to said other section whereby the top surfaces of said sections may be aligned flush with one another to afford a smooth, planar top surface throughout both sections, and means for tightening said draw-bolt in said channels to draw said sections tightly together in end to end abutting relationship and to afford a tight flush joint between said sections.

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2. In combination with a pair of sections of flat stock arranged in end to end abutting relationship and having channels therein, one of said sections having a groove opening from the underside of and communicating with the channel in said one section, a levelling device comprising a draw-bolt fitted in said channels; said draw-bolt having a threaded transverse opening therein in registry with said groove, a pin adjustably disposed in said opening, a leveller plate engaged by said pin and retained thereby in bearing engagement with the underside of said one section; manipulation of said pin effecting adjustment of the level of the top surface of said one section relative to said other section whereby the top surfaces of both sections can be rendered flush, and means for tightening said draw-bolt to draw said sections together in a strong flush joint.

3. A leveller device as defined in claim 1, and wherein said leveller plate extends transversely of said one section so that no tilting of said one section relative to the other of said pair of sections occurs upon movement of said pin in either direction.

4. In a levelling device, a draw-bolt comprising a head, and a shank integral with said head and terminating in a threaded extremity for the reception of a nut; said shank having a transverse interiorly threaded opening therein for adjustable reception of a threaded pin.

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