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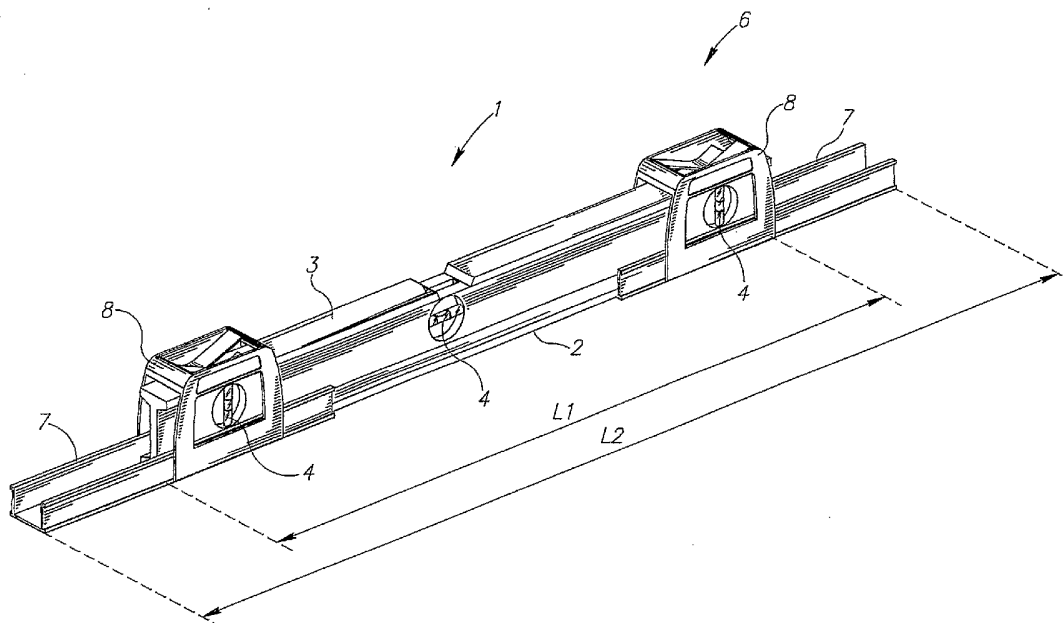
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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: EXTENSION SET FOR A SPIRIT LEVEL



(57) Abstract: Accessory extension set including attachment means for selectively and conveniently securing a pair of discrete elongated spirit level extenders at opposite ends of a spirit level for extending its nominal working length. The spirit level extenders are preferably extruded U-shaped channel aluminum profiles for slidingly receiving either an inverted U-shaped clamp or an elastic strap provided with tensioning means.

EXTENSION SET FOR A SPIRIT LEVEL

Field of the Invention

The invention is in the field of the spirit levels.

5 Background of the Invention

Craftsmen typically possess only a single spirit level selected to be suitable for most of their needs but on occasion require a spirit level with a longer working length than the nominal working length of the spirit level in their possession. US Patent No. 4,130,943 to Talbot, US Patent No. 4,894,925 to
10 Langmaid, US Patent No. 4,928,395 to Good, US Patent No. 5,249,365 to Santiago, US Patent No. 5,433,011 to Scarborough et al, US Patent No. 5,442,864 to Erman, US Patent No. 5,617,641 to Aarhus, US Patent No. 6,041,510 to Huff, US Patent No. 6,279,240 to Bonaventura, Jr., and US Patent Application Publication No. US2002/20116833 to Hollenbeck illustrate and
15 describe extension means for selectively extending spirit levels.

Summary of the Invention

The present invention is for an extension set for extending the nominal working length of a spirit level by the provision of a pair of elongated U-shaped spirit level extenders each selectively and conveniently securable at its opposite
20 ends. An extension set in accordance with the present invention can be readily implemented using different designs for selectively and conveniently securing a spirit level extender at the end of a spirit level. An extension set in accordance with the present invention can be freely used in difficult working environments, for example, a carpenter's workshop, a building site, and the like, and does not
25 leave residual marks on a spirit level as may be left when using the extension set illustrated and described in US Patent Application Publication No. US2002/20116833. An extension set in accordance with the present invention

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may be sold as an accessory item suitable for use with existing box section spirit levels and I-beam spirit levels. An extension set in accordance with the present invention may be available with spirit level extenders of different lengths and widths. Similarly, an extension set in accordance with the present invention may
5 be available with attachment means for use with spirit levels of different heights.

Brief Description of the Drawings

In order to understand the invention and to see how it can be carried out in practice, preferred embodiments will now be described, by way of non-limiting examples only, with reference to the accompanying drawings in which similar
10 parts are likewise numbered, and in which:

Fig. 1 is a perspective view showing the use of an extension set in accordance with a first preferred embodiment of the present invention for extending the nominal working length of a standard box section spirit level;

Fig. 2 is a perspective view of a spirit level extender and an inverted U-
15 shaped clamp of the extension set of Figure 1;

Fig. 3 is an end view of an assembled spirit level extender and U-shaped clamp adjacent a standard box section spirit level;

Fig. 4 is a perspective view of an assembled spirit level extender and attachment means in accordance with a second preferred embodiment of the
20 present invention; and

Fig. 5 is a perspective view of an assembled spirit level extender and attachment means in accordance with a third preferred embodiment of the present invention.

Description of Preferred Embodiments

25 Figure 1 shows a standard I-beam section spirit level 1 having an elongated leveling face 2 for setting on a surface, and a face 3 opposite the leveling face 2. The spirit level 1 has three bubble vials 4 deployed along its length including a central bubble vial with its longitudinal axis co-directional

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therewith, and at least one lateral bubble vial with its longitudinal axis perpendicular to the spirit level's longitudinal axis. One of the lateral bubble vials is formed with the so-called PlumbSite® feature illustrated and described in commonly assigned US Patent No. 6,449,859 to Zugel et al. The leveling face 2 may be flat or formed with a longitudinal groove for placing on a pipe, a post, and the like. The leveling face 2 defines a nominal standard working length L1 of, say, 24" in the case of an imperial sized spirit level or, say, 30cm in the case of a metric sized spirit level. The spirit level 1 is extendible to a working length L2>L1 by an accessory extension set 6 including a pair of discrete spirit level extenders 7 and a pair of discrete inverted U-shaped clamps 8 (constituting attachment means) for mounting on the spirit level extenders 7 such that sections thereof underlay the spirit level 1 and the remaining sections thereof protrude lengthwise.

Figure 2 shows that a spirit level extender 7 is an extruded U-shaped channel aluminum profile 9 with a top surface 11 on which a spirit level's leveling surface 2 is intended to be placed upon, a bottom surface 12 to be placed on a surface whose inclination is to be determined, and exterior major side surfaces 13A and 13B each formed with a female dovetailed channel 14. A spirit level extender's top surface 11 and bottom surface 12 are suitably machined to about 0.001" flatness so as not to degrade a spirit level's leveling accuracy. Spirit level extenders 7 can be provided in different lengths in the order of say, 12"±4" or the metric equivalent.

A clamp 8 includes a pair of crossbeams 16A and 16B connecting a pair of opposite side walls 17A and 17B whose interior major side surfaces 18A and 18B are each formed with a male dovetailed channel 19 for slidingly insertion into a female dovetailed channel 14. A clamp 8 has a cantilevered clamping member 21A resiliently hinged on the crossbeam 16A and extending lengthwise toward the opposite crossbeam 16B, and a cantilevered clamping member 21B resiliently hinged on the crossbeam 16B and extending lengthwise toward the

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opposite crossbeam 16A. The clamping members 21 have lowermost apexes 22A and 22B best seen in Figure 3 towards their free ends.

Figure 3 shows that an inverted U-shaped clamp 8 defines an upright rectangular shaped space 23 on its sliding insertion along a spirit level extender 7. Clamping members' apexes 22 define a height H1 purposely designed such that a spirit level's height $H2 > H1$ by, say, 0.2", whereby a spirit level's opposite face 3 bears against the clamping members' apexes 22 on the sliding insertion of the spirit level 1 along the spirit level extender 7 through the upright rectangular shaped space 23 to urge the resiliently hinged clamping members 21 outward whereupon they apply a counter pressure thereon for securing the spirit level 1 therein.

Figure 4 shows an elastic strap 24 with one end 24A (not shown) fixedly mounted on a runner 26 (not shown) for sliding insertion into the female dovetailed channel 14 of a spirit level extender's left exterior major side surface 13A and its other end 24B formed with a pair of eyes 27 for hooking onto a pair of hooks 28 provided on a runner 29 for slidingly insertion into the female dovetailed channel 14 of the spirit level extender's other exterior major side surface 13B whereby the elastic strap 24 can be tensioned over a spirit level 1 for securing it in the spirit level extender 7. Alternatively, the hooks 28 may be discrete items. Alternatively, the hook-eye arrangement can be replaced by a complementary male female Velcro® arrangement 31 (see Figure 5). The elastic strap 24 with suitable tensioning means (together constituting attachment means) is advantageous over the clamps 8 insofar as it can be readily employed for use with spirit levels having a greater range of spirit level heights H2.

While the invention has been described with respect to a limited number of embodiments, it will be appreciated that many variations, modifications, and other applications of the invention can be made within the scope of the appended claims. For example, other attachment means may be employed for securely and conveniently attaching a spirit level extender at one end of a spirit level.

Claims:

1. Extension set for use with a spirit level having an elongated leveling face for setting on a surface and a face opposite the leveling face, the leveling face
5 defining a nominal working length of the spirit level, the extension set comprising:

(a) a pair of discrete elongated spirit level extenders for placing on the surface, each spirit level extender having a U-shaped channel for lengthwise accommodating an end section of the spirit level with its leveling face facing
10 towards the surface and its opposite face facing away therefrom; and

(b) attachment means for selectively interengaging exterior major side surfaces of a spirit level extender so as to apply pressure on the section of the spirit level's opposite face bounded on either side thereby for securing the spirit level therein,

15 said pair of spirit level extenders being selectively securable at opposite ends of the spirit level so as to extend lengthwise beyond its leveling face thereby extending its nominal working length.

2. The extension set according to claim 1 wherein a spirit level extender is
20 an extruded U-shaped channel profile having exterior major side surfaces each formed with a channel for slidably receiving said attachment means.

3. The extension set according to claim 1 wherein said attachment means is constituted by an inverted U-shaped clamp having a pair of crossbeams
25 connecting a pair of opposite side walls for interengagement with a spirit level extender's exterior major side surfaces to define an upright rectangular shaped space through which a spirit level is slidably insertable, and at least one resiliently hinged clamping member for applying pressure on the section of the spirit level's opposite face bounded on either side by the spirit level extender on

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sliding insertion of the spirit level along the spirit level extender's U-shaped channel through the upright rectangular shaped space.

4. The extension set according to claim 3 wherein each clamping member of
5 said at least one clamping member is cantilevered from a crossbeam toward the opposite crossbeam.

5. The extension set according to claim 3 wherein said clamp's pair of
opposite side walls are slidingly insertable along a pair of channels formed on a
10 spirit level extender's exterior major side surfaces to define said upright rectangular shaped space.

6. The extension set according to claim 1 wherein said attachment means is
constituted by an elastic strap having opposite ends attachable to a spirit level
15 extender's exterior major side surfaces and fastening means for tensioning said elastic strap over a spirit level bounded on either side by the spirit level extender for securing the spirit level therein.

7. The extension set according to claim 6 wherein said tensioning means is
20 constituted by a hook-eye arrangement.

8. The extension set according to claim 6 wherein said tensioning means is
constituted by a male female Velcro® strap arrangement.

25 9. The extension set according to claim 6 wherein at least one end of said elastic strap is mounted on a runner slidingly insertable along a channel formed on a spirit level extender's exterior major side surface.

10. Extension set substantially as described hereinabove and as shown in the
30 attached drawings for use with a spirit level.

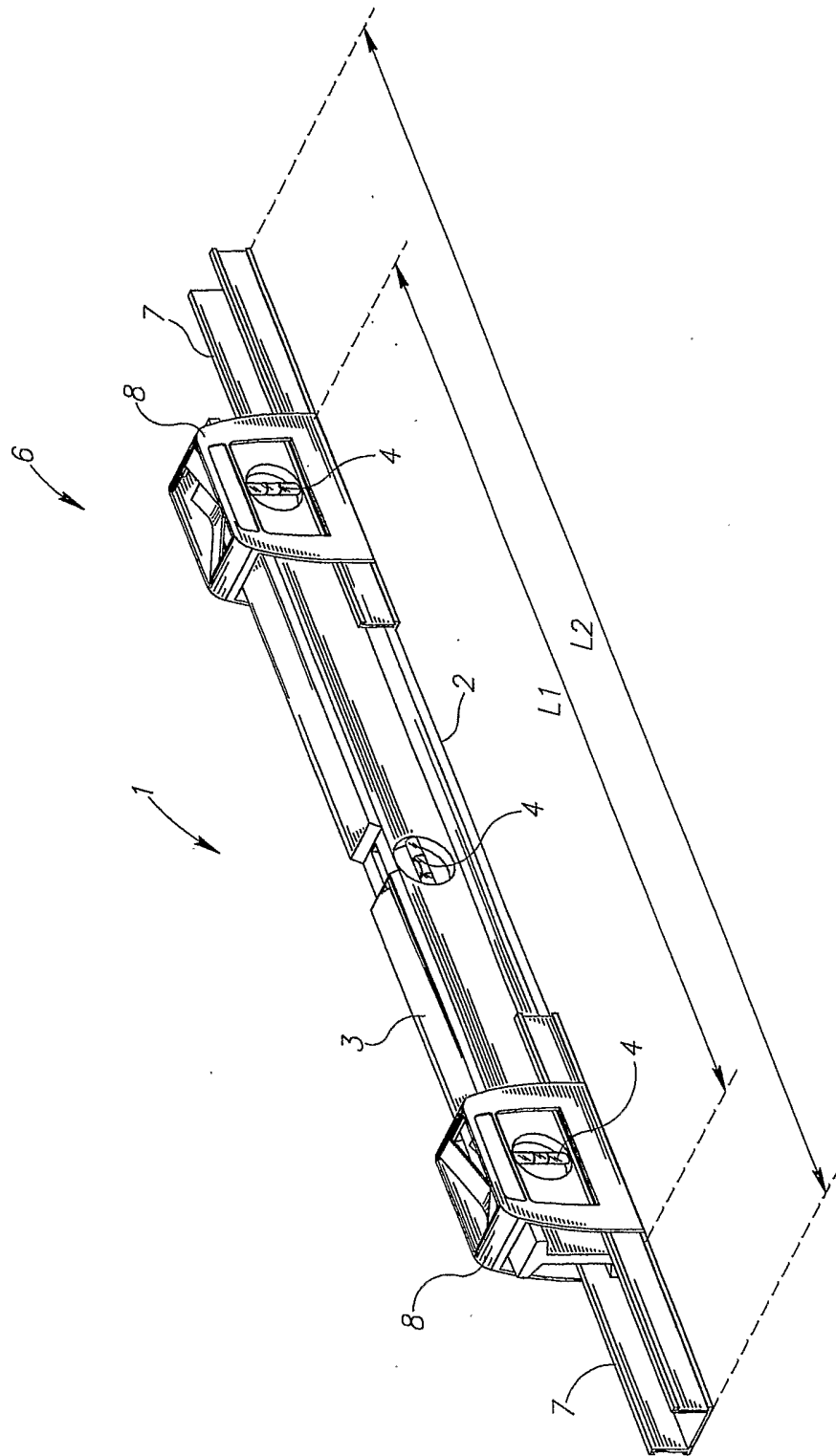


FIG.1

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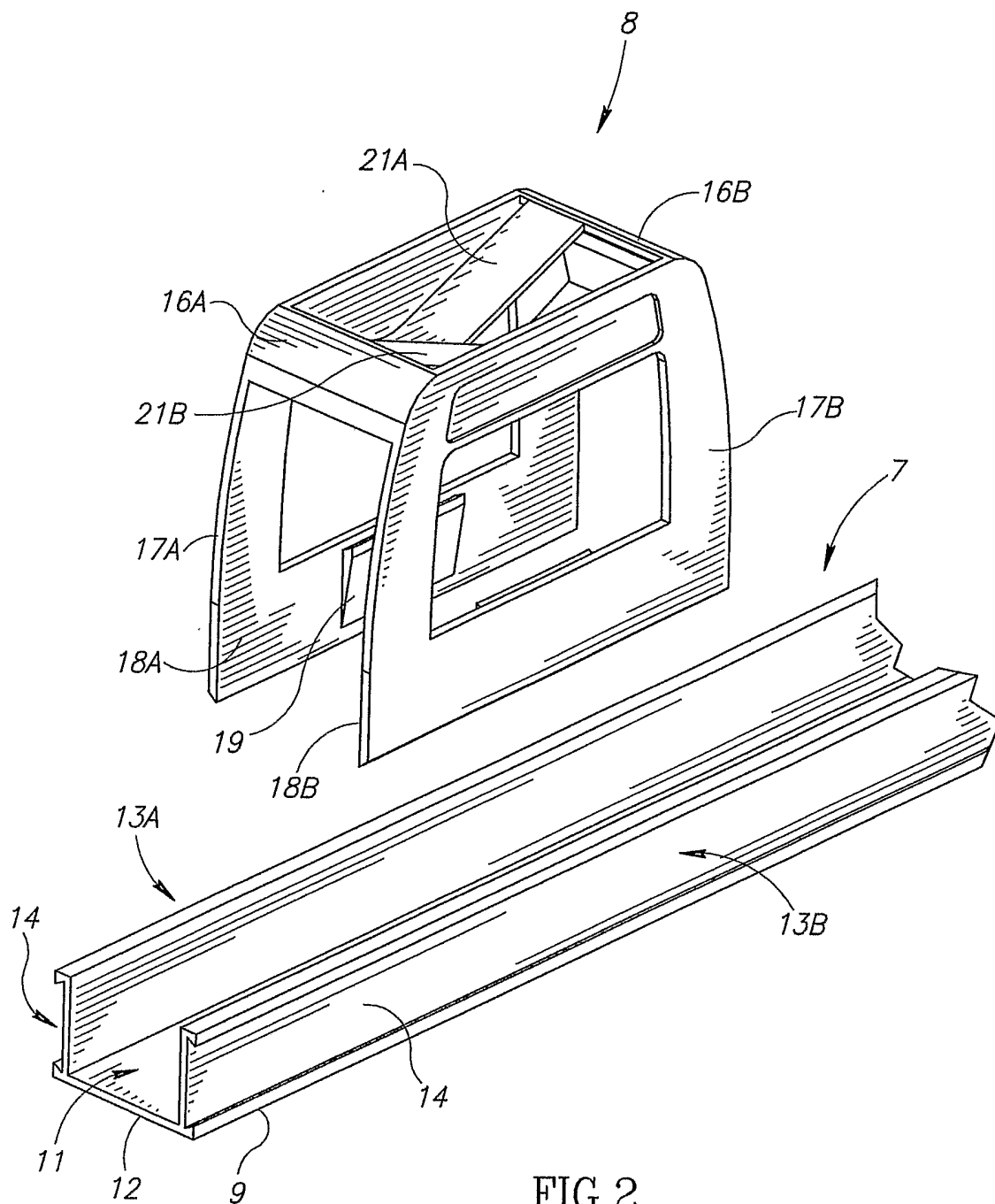


FIG. 2

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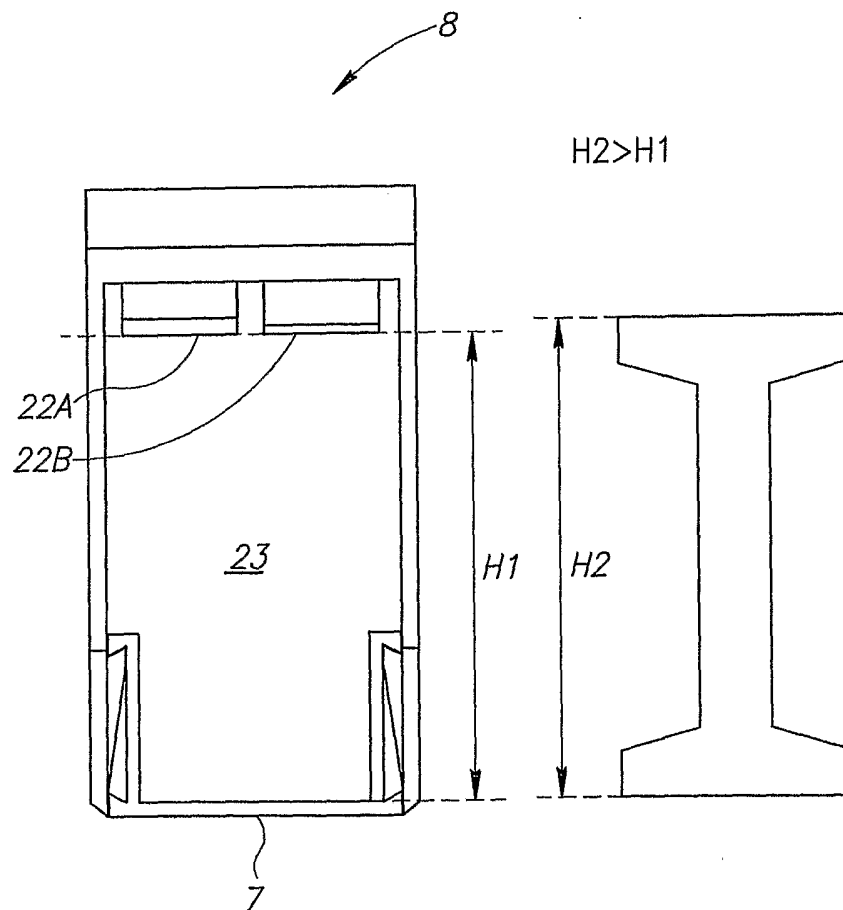
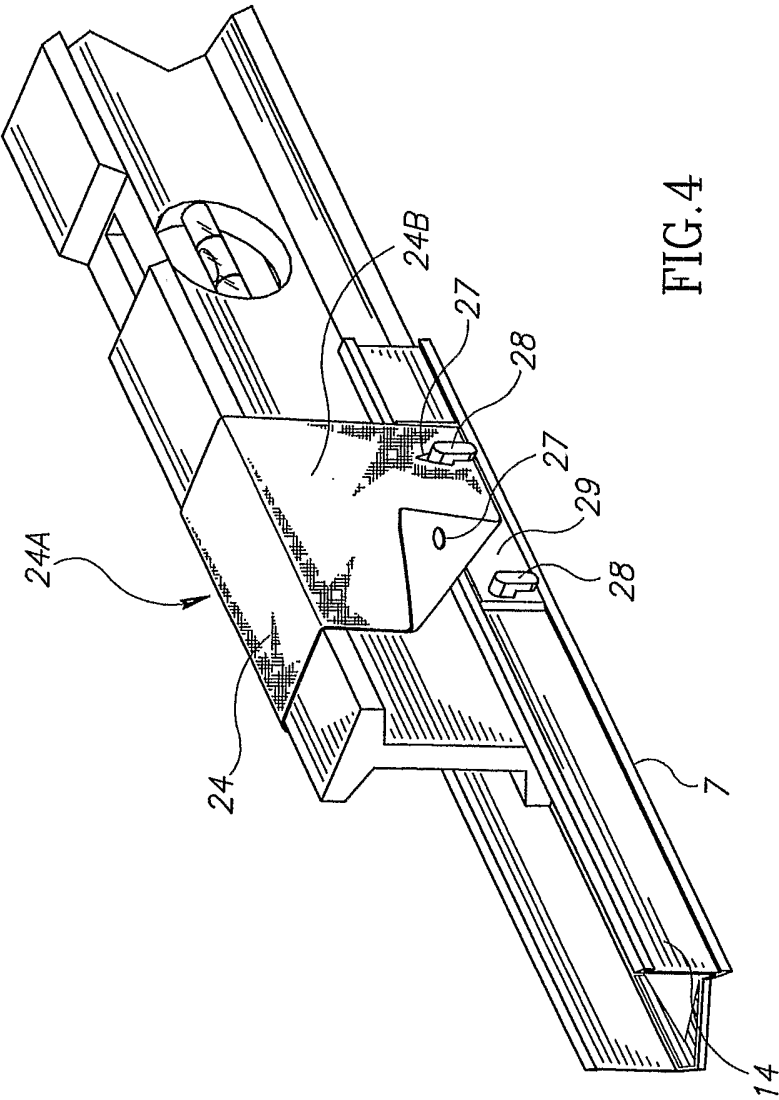


FIG.3



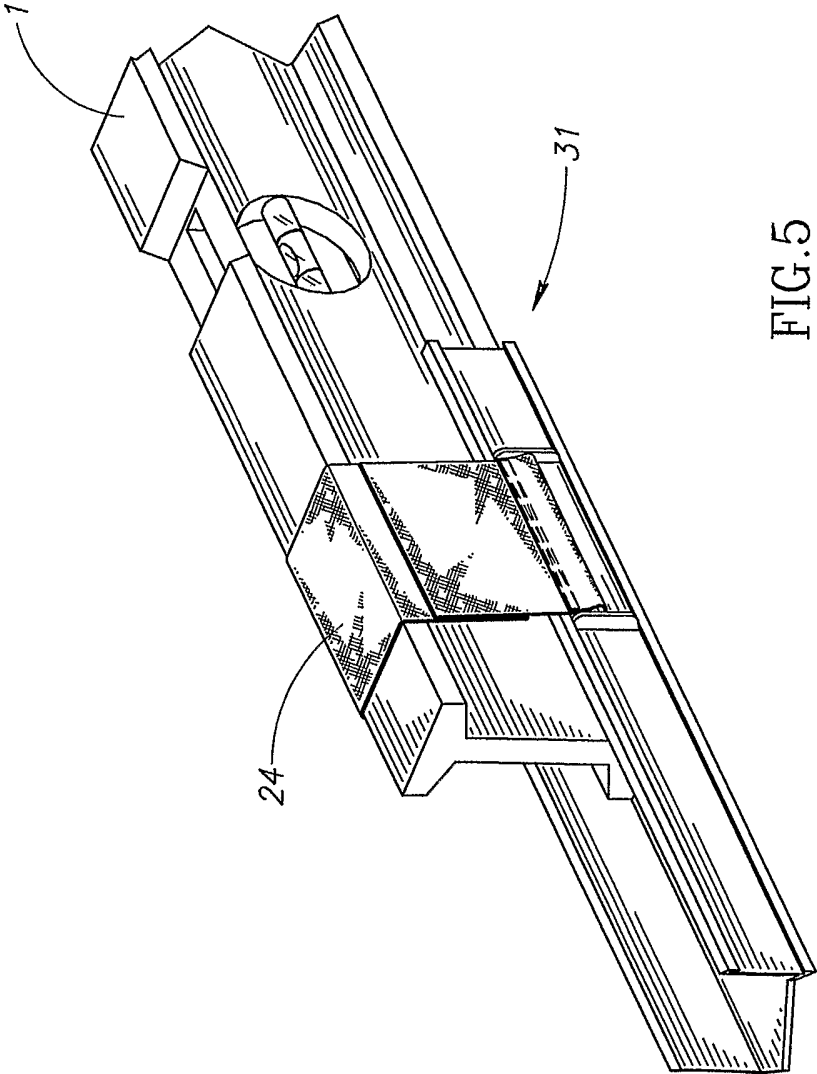


FIG.5

INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 G01C9/26

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G01C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 41 43 268 A (SCHMIDT MARTIN) 27 May 1992 (1992-05-27) column 3, line 37 -column 4, line 60 figures 1-5 ----	1-10
A	US 3 648 378 A (THINGSTAD HANS KRISTIAN ET AL) 14 March 1972 (1972-03-14) column 1, line 53 -column 2, line 33 abstract; figures 1-4 ----	1-10
A	US 2002/116833 A1 (HOLLENBECK GERALD R) 29 August 2002 (2002-08-29) cited in the application abstract; figure 1 -----	1-10



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

* Special categories of cited documents :

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report		Publication date	Patent family member(s)	Publication date
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