

[54] SLIDE ASSEMBLY

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Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 300,773, Oct. 25, 1972, abandoned.

[52] U.S. Cl. 308/3.6; 108/83; 312/341 NR

[51] Int. Cl.² F16C 17/00

[58] Field of Search 108/83; 308/3.6; 312/348, 312/341 NR, 334, 346, 347

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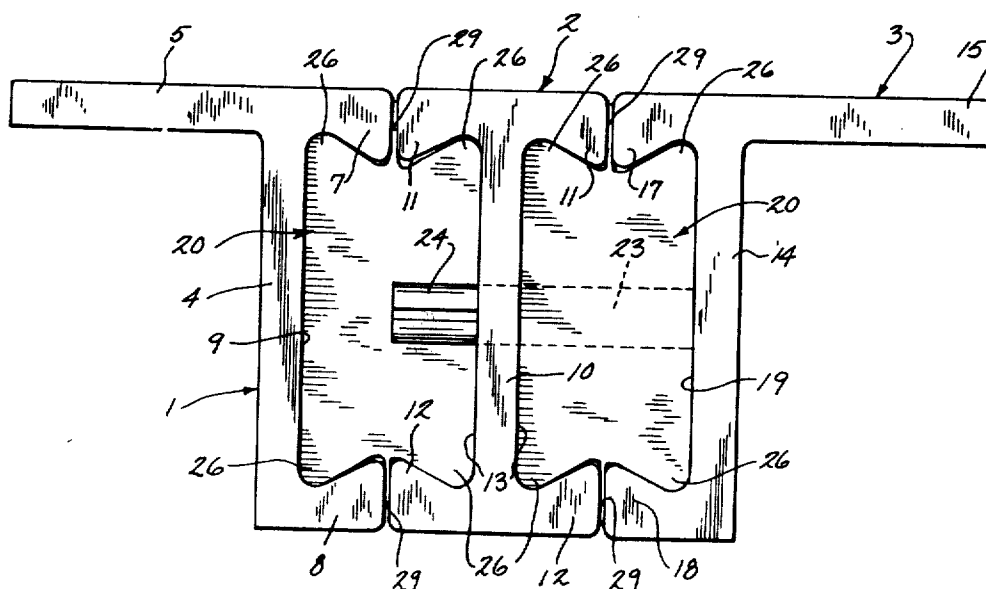
Primary Examiner—Charles J. Myhre

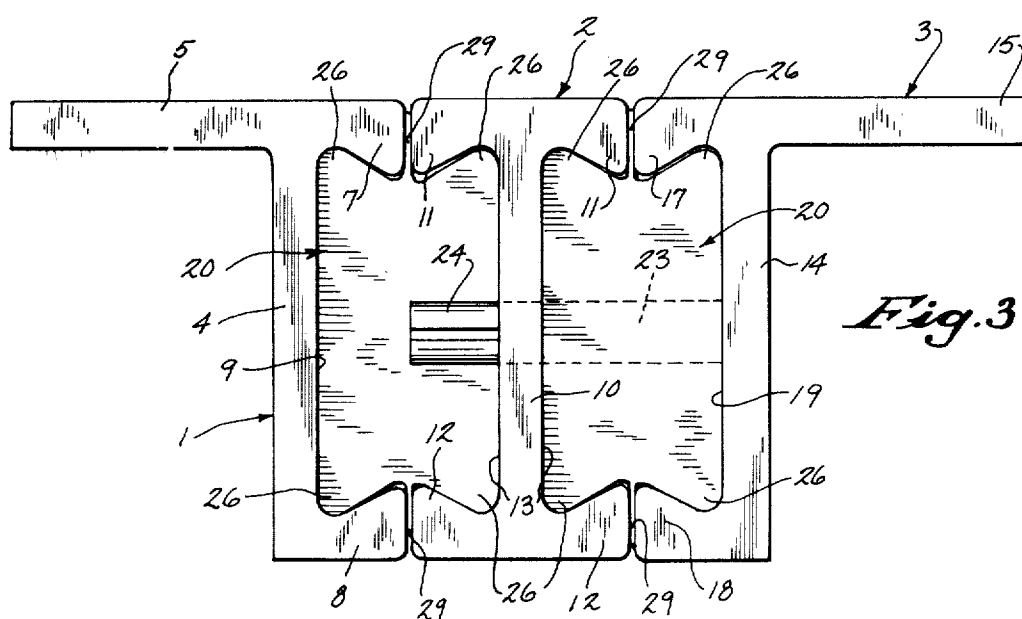
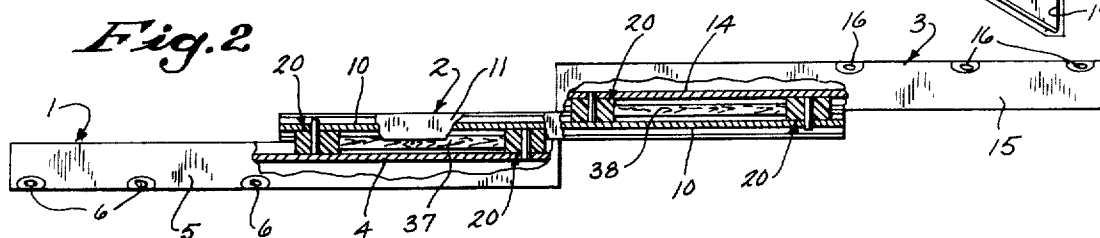
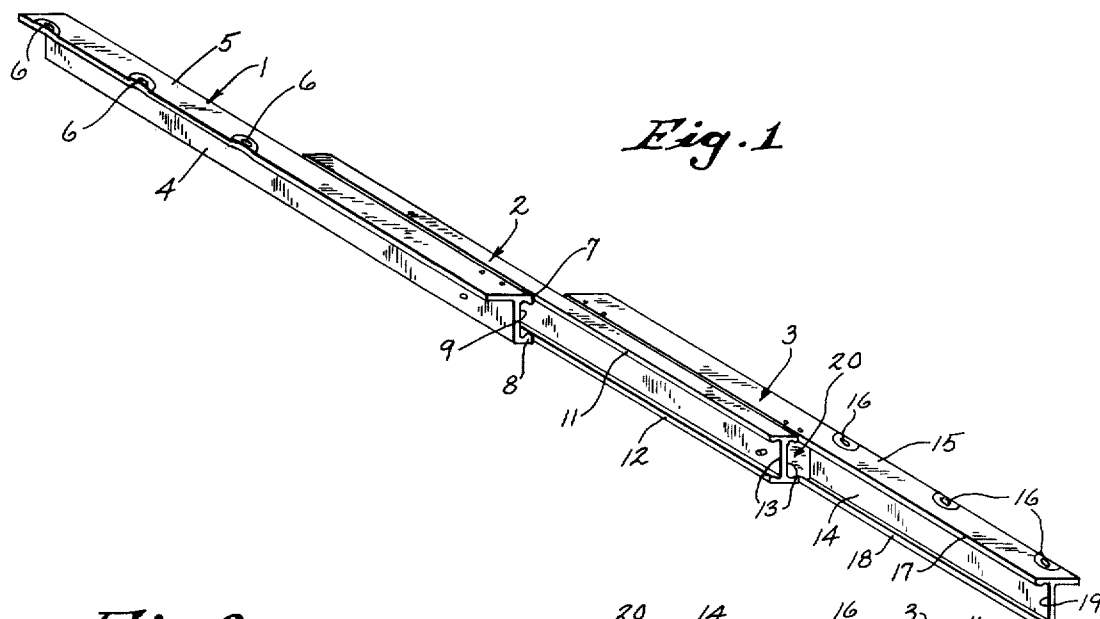
Assistant Examiner—R. H. Lazarus

[57] ABSTRACT

A slide assembly having particular use for extension tables. The slide assembly includes a series of slide members disposed in interconnected side-by-side relation, with each slide member adapted to move relative to the adjacent slide member between a retracted and extended position. The side surfaces of the slide members are provided with longitudinal female dovetail grooves and blocks having mating male dovetail portions, are secured to one slide member and freely slidable within the groove of the adjacent slide member. Each block has thin longitudinal extensions or fins disposed between adjacent opposed longitudinal edges of the slide members to provide smooth and noiseless sliding action.

15 Claims, 9 Drawing Figures





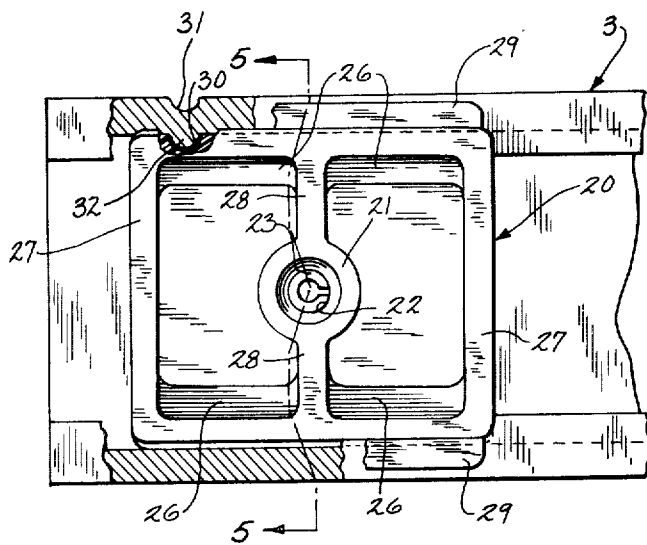


Fig. 4

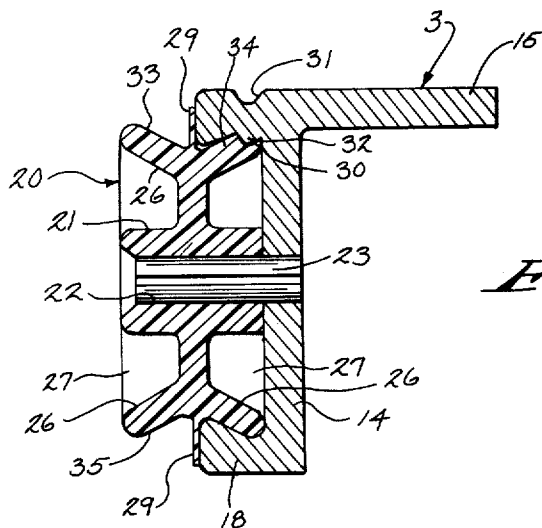


Fig. 5

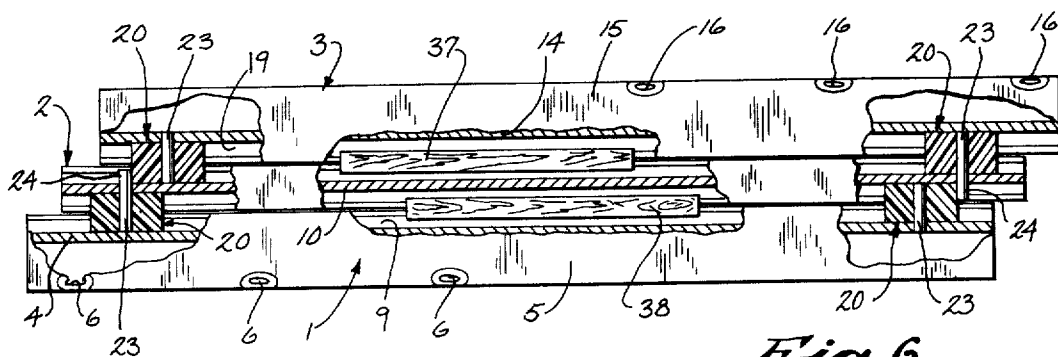
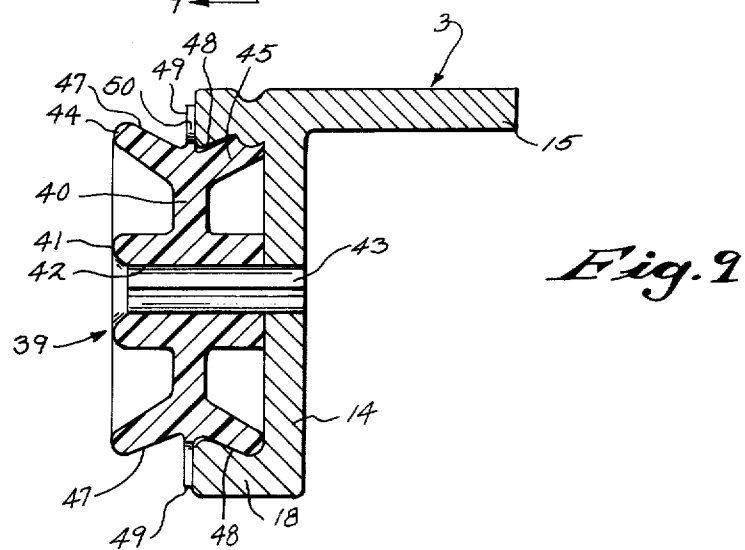
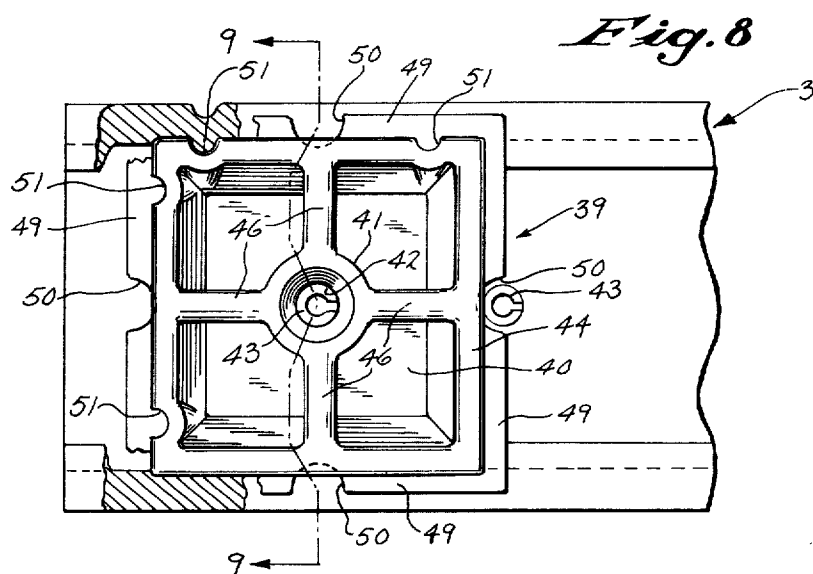
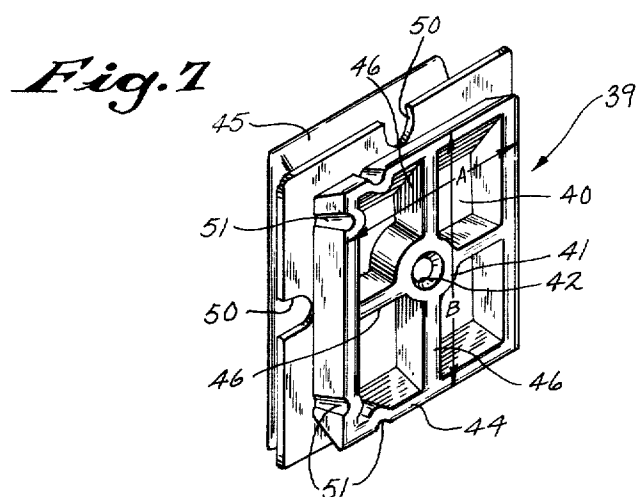


Fig. 6



SLIDE ASSEMBLY

This application is a continuation-in-part of application Ser. No. 300,773, filed Oct. 25, 1972 now abandoned, and entitled Slide Assembly.

BACKGROUND OF THE INVENTION

A slide assembly is utilized with an extension table to permit the ends of the table to be extended or moved apart and enable additional leaves to be inserted between the extended ends to increase the overall table area. In the normal slide assembly, one of the slide members is secured to one end of the table, while another slide member is secured to the other end of the table, so that when the table ends are moved apart the slide assembly will extend and provide a support for the additional leaves.

When the slide assembly is in the extended position, it must bear a substantial weight or load, and in the past problems have arisen in connection with the strength, warping and bending of the slide members. Formerly wood slides were used almost exclusively, but wood slides have the disadvantage that they are subject to warpage due to heat and humidity changes, and warpage can result in jamming of the slide members. More recently steel slides have been employed which have the advantage of not being affected by moisture and thus the problem of warping is eliminated. While the steel slides provide a reduction in bulkiness over wood slides, they are relatively heavy and are also subject to corrosion.

SUMMARY OF THE INVENTION

The invention is directed to a lightweight slide assembly which has improved smooth and noiseless sliding action. According to the invention, the slide assembly includes a series of extruded aluminum slide members which are positioned in interconnected side-by-side relation with each slide member adapted to slide relative to the adjacent slide member between a retracted and extended position. The side surfaces of the slide members are provided with longitudinal female dovetail grooves, and plastic blocks, preferably formed of a self-lubricating plastic material having a low coefficient of sliding friction, such as an acetal resin, are formed with opposed male dovetail portions which mate with the female dovetail grooves of the slide members. Each block is secured within the groove of one slide member and is freely slidable within the groove of the adjacent slide member.

To provide improved smooth and noiseless sliding action, each block is provided with a pair of opposed longitudinal fins or extensions which extend between the adjacent opposed longitudinal edges of the slide members. The fins prevent metal-to-metal contact between the longitudinal edges of the slide members, eliminating galling of the metal as well as jamming or sticking of the slide members due to temperature or humidity variations.

The slide assembly of the invention is a compact, lightweight unit having a smooth sliding action which is not affected by temperature or humidity variations.

As a further advantage, the slide assembly is relatively inexpensive to manufacture due to the use of a number of identically shaped components.

Other objects and advantages will appear in the course of the following description.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the slide assembly of the invention;

FIG. 2 is a plan view of the slide assembly with parts broken away in section and showing the slide assembly in the extended position;

FIG. 3 is an enlarged end view of the slide assembly;

FIG. 4 is an enlarged side elevation of one of the slide members with parts broken away and showing the attachment of the block to the slide;

FIG. 5 is a section taken along line 5—5 of FIG. 4;

FIG. 6 is a view similar to FIG. 2, showing the slide members in the retracted position.

FIG. 7 is a perspective view of a modified form of the block;

FIG. 8 is a side elevation of one of the slide members with parts broken away in section and incorporating the block of FIG. 7; and

FIG. 9 is a section taken along line 9—9 of FIG. 8.

DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 shows a slide assembly which is composed of three slide members 1, 2 and 3, which are adapted to slide relative to each other between retracted and extended positions. The slide assembly, as shown in FIG. 1, is adapted to be associated with an extension table with the slide members 1 and 3 being secured to the table ends. As the table ends are moved apart to an extended position, the slide assembly will extend with the central slide member 2 extending across the gap between the table ends to support the added table leaves.

The slide member 1 is provided with a vertical web 4 and a flange 5 extends outwardly from the upper edge of the web 4 and is provided with a series of mounting holes 6 through which the slide member 1 is attached to the end of the extension table. In addition, the slide member 1 is provided with an upper flange 7 and a lower flange 8 which extend inwardly toward the slide member 2, and in combination with the web 4, define a female dovetail groove 9.

The central slide member 2 is provided with a vertical web 10 and a pair of upper flanges 11 extend outwardly in opposite directions from the upper edge of the web 10, while a pair of lower flanges 12 extend outwardly from the lower edge of the web 10. The flanges 11 and 12 in combination with the vertical web 10 define a pair of female dovetail grooves 13 on either side of the slide member 2.

The slide member 3 has a structure similar to that of slide member 1 and comprises a vertical web 14, and a flange 15 extends outwardly from the upper edge of the web 14 and is provided with a series of mounting holes 16.

Slide member 3 is also formed with an inwardly extending upper flange 17 and an inwardly extending lower flange 18 which, in combination with web 14, define a female dovetail groove 19.

Blocks 20 having opposed male dovetail portions are disposed in mating relation with the female dovetail grooves 9, 13 and 19 of the slide members 1-3. Each block 20 is fixed within the groove of one of the slide members and is adapted to be freely slidable within the groove of the adjacent slide member. The blocks 20 are formed of a material having a low coefficient of sliding friction and which will not appreciably change its di-

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mensions under temperature and humidity changes. It has been found that acetal resin sold under the trademark Delrin provides a very satisfactory material for use as the blocks 20.

Each block is provided with a central hub 21 having a hole 22 and a spring pin 23 having a C-shaped cross section extends through the hole 22 and through an aligned hole in the web of the slide member to lock the block to the slide member. FIGS. 4 and 5 best illustrate this construction and show the block 20 secured to slide member 3. The attachment of blocks 20 to the slide members 1 and 2 is similar to that shown with respect to slide members 3. As shown in FIG. 6, two of the pins 23 associated with the blocks 20 attached to slide member 2 are provided with projecting ends 24 which serve as stops to limit the retracting movement of the slide members and prevent the slide members from running out. With the three-piece slide assembly as shown in FIG. 6, the projecting pin end 24, shown at the left hand end of FIG. 6, provides a stop to limit the inward or retracting movement of the slide member 3, while the projecting pin end 24 shown at the right hand portion of FIG. 6 is adapted to engage the block 20 connected to the slide member 1 to provide a stop for the inward movement of the slide member 2. The C-shape provides a spring return for the pin 23, urging the pin toward a larger diameter and thereby effecting a positive locking action to the block 20 and slide member.

As best illustrated in FIG. 5, each block is provided with diverging upper and lower ends 26 which define the male dovetail portions which mate with the female dovetail grooves 9, 13 and 19 in the slide members. In addition, each block is provided with a pair of vertical side edges 27 which extend between the upper and lower diverging ends 26 and a central reinforcing wall 28 is connected between the hub 21 and the diverging ends 26.

As an important feature of the invention a pair of fins or extensions 29 extend outwardly from the upper and lower ends of each block 20 and are adapted to be received between the adjacent longitudinal edges of the flanges on the slide members. As shown in FIG. 3, the fins 29 act to separate the flanges 7 and 11 and 8 and 12 of the slide members 1 and 2 and also serve to separate the flanges 11 17 and 12 and 18 of the slide members 2 and 3. Fins 29 prevent metal-to-metal contact between the slide members, thereby insuring smooth and noiseless sliding action and preventing the possibility of jamming or sticking due to temperature or humidity variations.

To firmly position each block 20 to the respective slide member, the upper edge of each block is provided with a recess or dimple 30. By striking the upper flange of the slide member, the aluminum is deformed forming a recess 31 in the upper flange surface and a corresponding projection 32 in the lower surface which is received within the recess 30 in the block to thereby lock the block with respect to the slide member. In addition to properly locating the block 20 with respect to the slide member, the action of deforming the aluminum serves to drive the block toward the lower flange of the slide member. As the block bears tightly against the lower flange of the slide member, any tendency for the slide members to sag when extended is eliminated.

As best illustrated in FIG. 4, the upper surfaces 33 and 34 of the upper ends 26 of the blocks are provided with different angularity. Similarly, the lower surfaces

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35 and 36 of the lower diverging ends 26 are located at different angles with respect to vertical plane. While the female dovetail grooves 9, 13 and 19 in the slide members have an identical cross sectional configuration, the difference in the angularity between the diverging surfaces 33 and 34 and between surfaces 35 and 36 acts to provide a wedging type of prestressing action so that as the central slide member 2 is extended it will be wedged upwardly at a slight upward angle to the horizontal. When the weight of the leaves and any other load is applied to the extended central slide member 2, it will then lower to a generally horizontal position.

To limit the extended movement between the slide members 1-3, wooden or plastic blocks 37 and 38 can be located within the mating dovetail grooves, as shown in FIG. 6. The blocks 37 and 38 provide stops to limit the outward or extended movement of the slide members. Other forms of stops can be used in place of blocks 37 and 38. For example, the vertical webs of the slide members can be provided with punched out tabs which project laterally of the webs and serve in a similar manner as stops.

The retracted position of the slide assembly is shown in FIG. 6, and as previously described, the projecting pin ends 24 serve as stops to limit the inward or retracted movement of the slide members. FIG. 2 shows the extended position of the slide assembly with the blocks 37 and 38 being engaged by the corresponding blocks 20 to limit the extended movement of the slide members.

FIGS. 7-9 illustrate a modified form of the invention in which a generally square block 39, similar to block 20 of the first embodiment, is fixed within the groove of one of the slide members and is adapted to be freely slidable within the groove of the adjacent slide member. As in the case of blocks 20, the blocks 39 are formed of a plastic material having a low coefficient of sliding friction.

Each of the blocks 39 is provided with a central wall 40 and a hub 41 having a hole or bore 42 extends outwardly in opposite directions from the wall 40. A spring pin 43, similar in structure and function to pin 23, extends through the hole 42 and through an aligned hole in the web of the slide member to lock the block 39 to the slide member. As described in connection with the first embodiment, certain of the pins 43 have projecting ends which provide a stop to limit the sliding movement of the slide members.

Flanges 44 and 45 diverge outward from the entire periphery of the wall 40 and the diverging flanges define male dovetail portions which mate with the female dovetail grooves 9, 13 and 19 in the slide members. Reinforcing webs 46 extend between the central hub 41 and the diverging flanges 44 and 45.

The diverging surfaces 47 and 48 of the flanges 44 and 45, respectively, are located at different angles with respect to a vertical plane, as described with respect to surfaces 35 and 36 of blocks 20. The difference in angularity between the surfaces 47 and 48 acts to provide a wedging type of prestressing action so that as the central slide member 2 is extended it will be wedged upwardly to a slight angle to the horizontal.

As in the case of the previous embodiment, an outwardly projecting fin or extension 49 extends around the entire periphery of the block 39 between the diverging flanges 44 and 45. The fin 49 serves to separate the flanges 7 and 11 and 8 and 12 of the slide members

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1 and 2 and also separate the flanges 11 and 17 and 12 and 18 of the slide members 2 and 3.

As illustrated in FIG. 6, the portion of the fin 49 extending along each side edge of the block is provided with a notch 50 and depending on the position of the block 39 with respect to the slide member, one of the notches, as illustrated in FIG. 8, will receive the end of the spring pin 43 of another block to form a stop. Due to the notch 50, the pin 43 will bear against the body of the block rather than the fin 49, to provide the stop.

The portions of the diverging flange 44 extending along two adjacent side edges of the block are provided with a pair of dimples or recesses 51, similar to the dimples 30, as previously described. The flanges of the slide members 1-3 are deformed into the recesses 51 in the block to thereby lock the block with respect to the slide member.

While the block 39 is shown as being substantially square one dimension of the block, indicated by A, can be slightly greater than the dimension B. As for example, the dimension A can be 0.010 inch greater than the dimension B. As the slide members are formed of extruded aluminum, the tolerance of the female dovetail grooves can vary slightly throughout the extrusion run as the dies become somewhat worn. Thus, the difference in length between the dimensions A and B enables the block to compensate for this variation in tolerance of the aluminum extrusion and maintain a proper sliding relationship between the block 39 and slide members. For example, when using the extrusions from the beginning of an extrusion run, the block can be positioned so that the larger dimension A is inserted within the female dovetail grooves in the slide members, as illustrated in FIG. 6, and if the fit becomes snug in slide members formed later in the extrusion run, the blocks can be rotated 90° so that the block is inserted with the dimension B in the female dovetail grooves, which will then provide the necessary clearance for proper sliding action. The block 39 can be marked in any desired manner to visually indicate the dimensions A and B. As the notches 50 and dimples 51 are provided in all four sides of the block, the block can be rotated through any position and inserted within the female dovetail groove.

While the above description is illustrative of the slide assembly of the invention as being associated with an extension table, it is contemplated that the slide assembly can be used in any application where it is desired to slide one component relative to a fixed component, such as for example, drawers, shelves, under-counter dishwashers, compactors, and the like. The slide assembly can be used with two or more slide members depending on the particular application.

The construction of the plastic blocks 20 and 39, including the fins or extensions 29 and 49, provides an improved smooth and noiseless sliding action.

As the slide members are preferably constructed of extruded aluminum, the unit is compact, light in weight and will not be influenced by humidity and temperature variations.

Various modes of carrying out the invention are contemplated as being within the scope of the following claims particularly pointing out and distinctly claiming the subject matter which is regarded as the invention.

I claim:

1. A slide assembly, comprising a first slide member, a second slide member disposed to slide relative to said first slide member between a retracted and an extended position, each slide member including a web and a pair

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of flanges extending outwardly from the ends of the web, the flanges of said first slide member being in proximate abutting relation to corresponding flanges of the second slide member, the flanges of each slide member in combination with the web defining a female dovetail groove extending longitudinally of the slide member, a first block secured with the groove of the first slide member and freely slidable within the groove of the second slide member, a second block secured within the groove of the second slide member and freely slidable within the groove of the first slide member, opposite sides of each block having opposed male dovetail portions mating with the female dovetail grooves of said slide members, each male dovetail portion including an inclined surface that intersects the inclined surface of a second male dovetail portion at a central groove, and a fin extending outwardly from each groove with each fin having a pair of generally flat opposed surfaces with one of said opposed surfaces being disposed flatwise against the flange of said first slide member and the other of said opposed surfaces being disposed flatwise against the flange of said second slide member, to prevent contact between said flanges.

2. The slide assembly of claim 1, and including a pin extending through said first block and engaged within an opening in the web of the first slide member, said pin extending beyond the web of said first slide member in a position to be engaged by said second block and thereby limit the sliding movement of the second slide member.

3. The slide assembly of claim 1 wherein each fin extends substantially the length of the block.

4. The slide assembly of claim 3, wherein the fins of each block lie in a common plane.

5. The slide assembly of claim 1, wherein the blocks are formed of a plastic material having a low coefficient of sliding friction.

6. A slide assembly, comprising a first slide member having a first longitudinally extending guideway and having a first surface bordering said guideway, a second slide member disposed to slide relative to the first slide member between a retracted and extended position, said second slide member having a second longitudinally extending guideway facing the first guideway and having a second surface bordering the second guideway and facing said first surface, a first block secured within the first guideway and freely slidable within the second guideway, a second block secured within the second guideway and freely slidable within the first guideway, each slide member having a vertical web and a pair of spaced flanges located at the ends of said web, said flanges in combination with said web defining said guideways, and a pin disposed within aligned openings in each block and the web of the respective slide member, and end of said pin extending beyond the web of the slide member in a position to be engaged by a second block slidable with respect to that slide member and thereby limit the sliding movement of said second block.

7. The slide assembly of claim 6, wherein said pin is generally C-shaped in cross section, said C-shape providing a resilient action to urge the pin into tight bearing engagement with the block and the slide member.

8. A slide assembly, comprising a first slide member, a second slide member disposed to slide relative to said first slide member between a retracted and an extended position, each slide member including a web and a pair

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of flanges extending outwardly from the ends of the web, the flanges of said first slide member abutting corresponding flanges of said second slide member, the flanges of each slide member in combination with the web defining a female dovetail groove extending longitudinally of the slide member, a first block secured within the groove of the first slide member and freely slidable within the groove of the second slide member, a second block secured within the groove of the second slide member and freely slidable within the groove of the first slide member, each block having a pair of opposed male dovetail portions mating with the female dovetail grooves of said slide members, recess means disposed in the periphery of one of the male dovetail portions of a block, and a projection disposed on a flange of the slide member and projecting inwardly from said flange and received within said recess means to lock said block to the slide member.

9. The slide assembly of claim 8, wherein each side of each block is provided with an upper diverging flange and a lower diverging flange which in combination define a male dovetail portion, said recess means being located in the upper surface of an upper diverging flange.

10. The slide assembly of claim 8, wherein each block is formed with a central opening disposed in alignment with an opening in the web of the corresponding slide member, and a pin disposed within the aligned openings to secure the block to the slide member.

11. The slide assembly of claim 8, wherein each male dovetail portion includes an inclined surface that intersects an inclined surface of a second male dovetail portion at a central groove, said recess means being a generally circular depression formed in one of said inclined surfaces.

12. A slide assembly, comprising a first slide member, a second slide member disposed to slide relative to said first slide member between a retracted and an extended position, each slide member including a web and a pair of flanges extending outwardly from the ends of the web, the flanges of said first slide member abutting

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corresponding flanges of the second slide member, the flanges of each slide member in combination with the web defining a female dovetail groove extending longitudinally of the slide member, a first block secured within the groove of the first slide member and freely slidable within the groove of the second slide member, a second block secured within the groove of the second slide member and freely slidable within the groove of the first slide member, each block having four sides and having a pair of outwardly diverging surfaces extending substantially completely around all four sides of the block and defining a pair of opposed male dovetail portions mating with the female dovetail grooves of said slide members, and an outwardly projecting fin disposed between said diverging surfaces and extending substantially continuously around all four sides of said block, portions of said fin located at opposite sides of the block being disposed between abutting flanges of the sliding members to prevent contact between said flanges.

13. The slide assembly of claim 12, wherein at least two adjacent sides of each block are provided with a depression, and a projection disposed on each slide member and engaged with the respective depression to lock each block to the respective slide member.

14. The slide assembly of claim 12, wherein said slide assembly also includes a pin extending through each block and engaged within an opening in the web of the respective slide member, the pin associated with said first block projects beyond the web of the respective slide member in a position to be engaged by the second block to thereby limit the sliding movement of said second block, the portions of said fin extending along at least two adjacent sides of the second block each having a notch disposed to receive the projecting end of the pin of the first block.

15. The slide assembly of claim 14, wherein the length of one pair of opposed sides of the block is slightly greater than the length of the other pair of opposed sides.

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UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 3,927,918
DATED : December 23, 1975.
INVENTOR(S) : EDWARD J. DOBBRATZ

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the Abstract, line 9 Cancel "fireely" and substitute therefor ---freely---, Column 5, line 63, Cancel "subjet" and substitute therefor ---subject---, Column 6, line 7, Cancel "with" and substitute therefor ---within---, Column 6, line 18, Before "groove" insert ---central---, Column 7, line 20, Cancel "deverging" and substitute therefor ---diverging---.

Signed and Sealed this

twenty-third Day of March 1976

[SEAL]

Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents and Trademarks