

Dec. 19, 1961

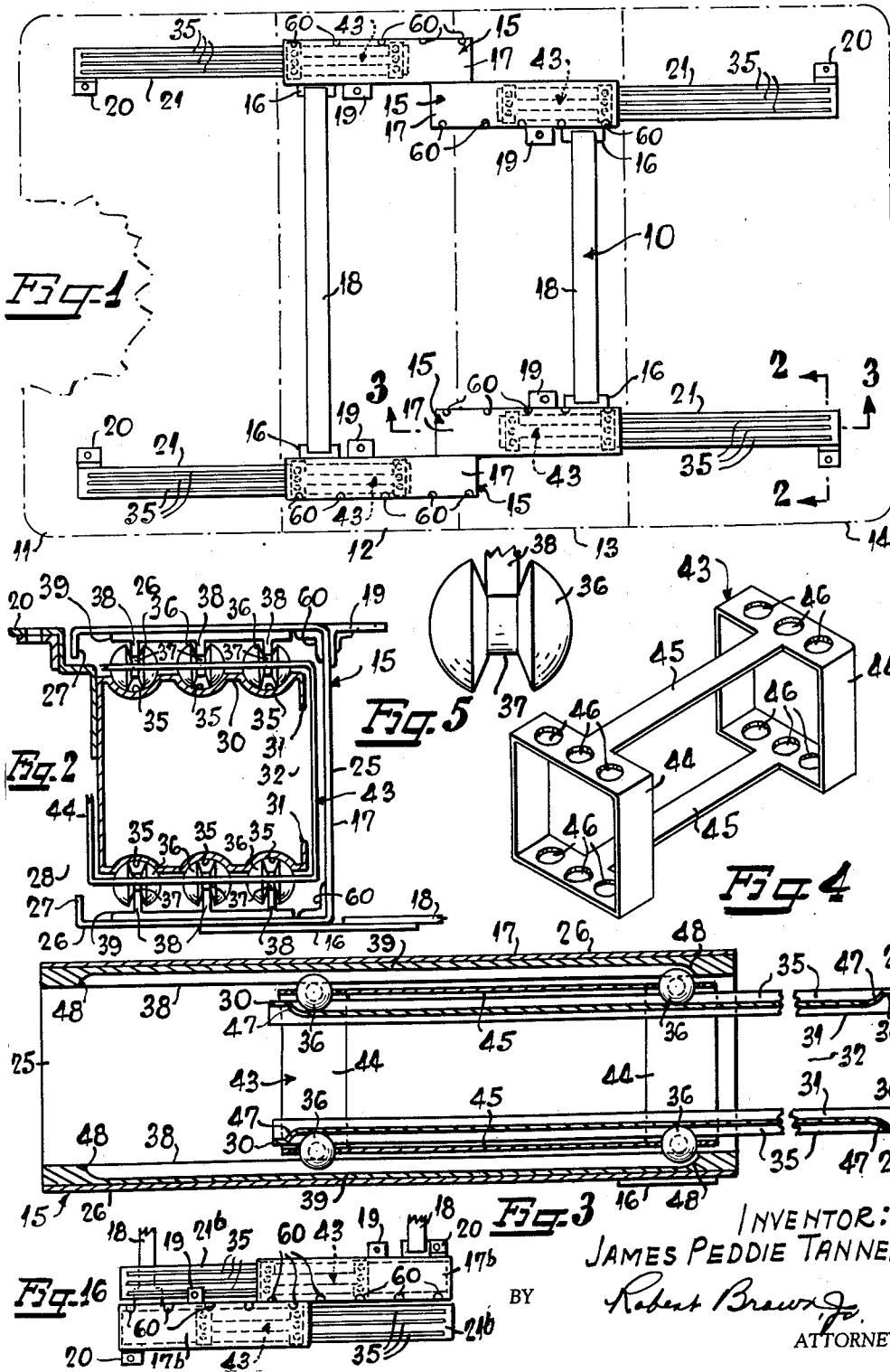
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3,013,849

ANTI-FRICTION TABLE SLIDES

Filed Aug. 24, 1959

2 Sheets-Sheet 1



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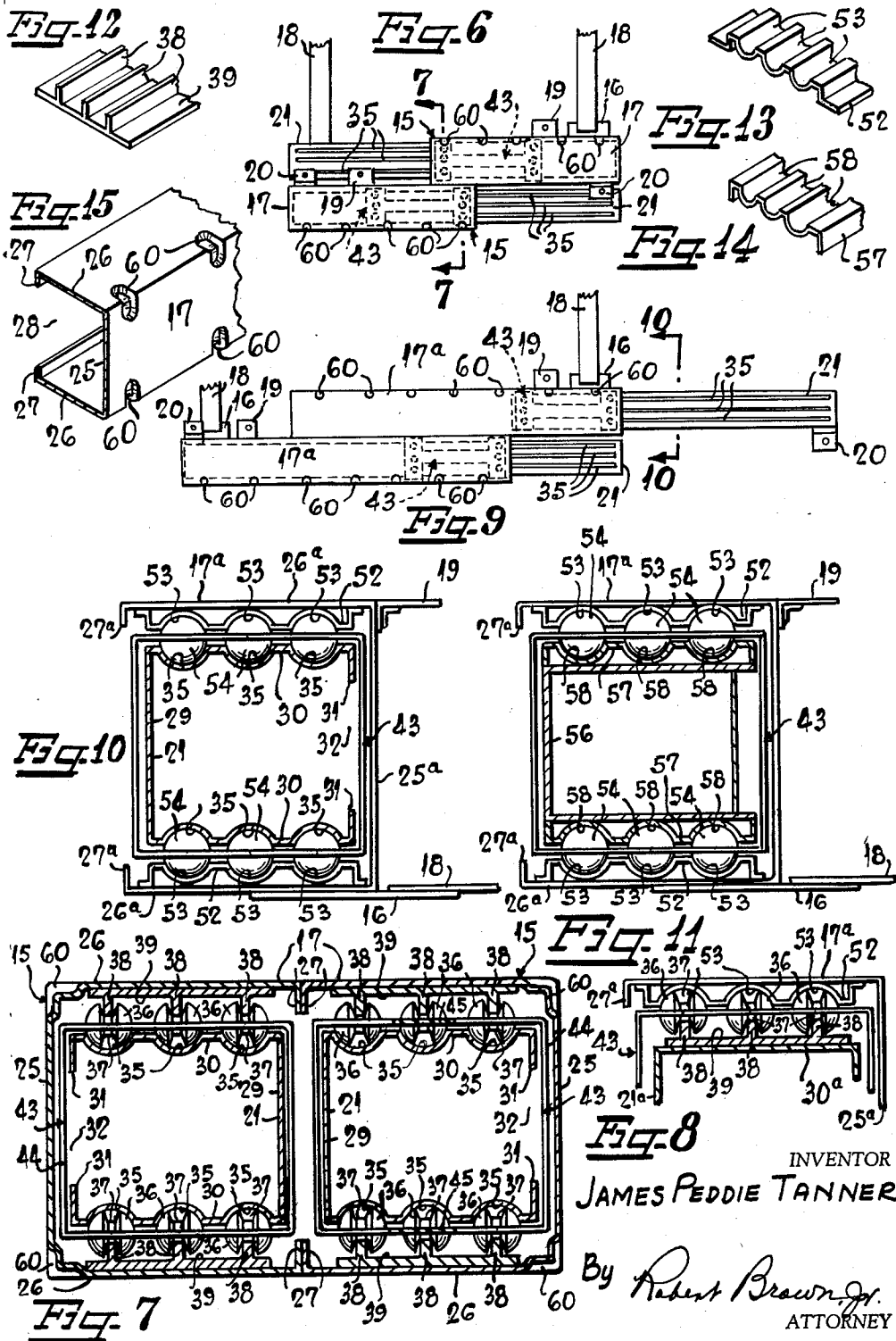
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2 Sheets-Sheet 2



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3,013,849

ANTI-FRICTION TABLE SLIDES

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11 Claims. (Cl. 311-71)

This invention relates to extension tables, and more especially to table slides comprising a pair of bars movable longitudinally relative to one another and equipped with specially designed antifriction means capable of eliminating undesirable transverse play between said bars when the table is extended and retracted.

It is an object of this invention to provide a table slide constructed from two telescopically mounted bars, which bars have interposed therebetween an improved ball and track arrangement designed to facilitate relative longitudinal movement of the bars and to substantially eliminate relative transverse movement.

It is another object of this invention to provide antifriction means for telescopic table slides, in which spaced balls and a track for the latter are inserted between the telescopically moving members. By providing insertable balls and tracks, the clearances between the relatively moving parts can be easily checked and adjusted before the tracks are secured in fixed position. More specifically, during the assembly of the slide parts the balls and tracks may be inserted between the telescopic members for the purpose of ascertaining whether the proper clearances exist, but without fixedly securing the inserted parts in position. If further adjustment is unnecessary the inserted members are then fastened in position. If, however, adjustment should be necessary, the inserted members are removed for the required alteration upon the inserts rather than upon the telescopic members.

It is another object of this invention to provide a table slide of the type described above, in which a plurality of rotary bodies are inserted between the telescopic members, each of said bodies having two concentric surfaces of revolution for respectively engaging the two telescopic members. In this type of construction, each of the rotary bodies will travel different distances with respect to the respective telescopic members thereby permitting one telescopic member to be shorter than the other.

It is still another object of this invention to provide an antifriction table slide composed of a pair of telescopically mounted channel members arranged one within another with their respective flanges disposed in parallel spaced relation and on opposite sides of the antifriction bodies, in combination with means forming a part of the outer channel member for reinforcing the flanges thereof against spreading. Such reinforcement maintains the tracks of the outer channel firmly against the antifriction bodies to insure a close rolling fit between the channel members.

Some of the objects of the invention having been stated, other objects will appear as the description proceeds when taken in connection with the accompanying drawings, in which,

FIGURE 1 is a plan view of one embodiment of my improved table slide assembly, showing the slides thereof in extended position and the outline of a table top in dot-dash lines;

FIGURE 2 is an enlarged transverse sectional view taken along line 2-2 in FIGURE 1;

FIGURE 3 is an enlarged longitudinal sectional view taken along line 3-3 in FIGURE 1;

FIGURE 4 is an isometric view showing a cage for holding the antifriction balls in fixed relative positions between the relatively movable channel bars of the table slide;

FIGURE 5 is an enlarged detail view showing an anti-

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friction ball and its relationship to an inserted track adapted to be attached to the outer channel bar;

FIGURE 6 is a plan view similar to a portion of FIGURE 1, but showing the table slides in retracted positions;

FIGURE 7 is an enlarged transverse sectional view taken along line 7-7 in FIGURE 6;

FIGURE 8 is a sectional detail view similar to the upper portion of FIGURE 2, but showing a modified embodiment of the invention in which an inserted track is attached to each of the proximate flanges of the telescoped channel members;

FIGURE 9 is a plan view similar to FIGURE 6, but showing another modified embodiment of the invention, one of the table slides therein being extended and the other retracted;

FIGURE 10 is an enlarged transverse sectional view taken along line 10-10 in FIGURE 9;

FIGURE 11 is an enlarged transverse sectional view of another modified embodiment of the invention similar to that shown in FIGURE 10, but showing an inserted track attached to each of the proximate flange surfaces of the telescoped channels;

FIGURE 12 is an isometric detail view of one type of track insert employed in the form of invention shown in FIGURES 1, 2, 3, 6, 7 and 8;

FIGURE 13 is an isometric detail view of a portion of another type of track insert employed in the forms of invention shown in FIGURES 8 through 11;

FIGURE 14 is an isometric detail view of another type of track insert employed in the form of invention shown in FIGURE 11;

FIGURE 15 is an isometric view showing the manner in which the flanges of the outer channel member are reinforced;

FIGURE 16 is a plan view of a modified form of slide assembly similar to FIGURE 6, but showing the outer channel bars secured back-to-back one to another.

Referring more particularly to the drawings, the numeral 10 denotes a table slide assembly adapted to support table top sections 11, 12, 13 and 14, shown in dot-dash lines. The table slide assembly comprises four extensible slide supports 15 arranged in two substantially parallel pairs and beneath the opposite ends of the transversely disposed top sections. The supports 15 of each pair have the ends thereof overlapped and secured together by any suitable means such as welding.

In order to secure the paired supports 15 in spaced parallel positions, gusset plates 16 are welded or otherwise secured to the bottom of the outer telescopic member 17 of each support 15, said gussets having the opposite ends of transversely disposed bars 18 secured thereto by welding or the like.

Angle brackets 19 are also secured to the outer telescopic members 17 for detachably supporting center top sections 12 and 13. Similar angle brackets 20 are secured to the ends of inner telescopic members 21 for supporting the end top sections 11 and 14.

The structure of each slide support 15 is either identical or opposite hand, and therefore only one of these supports will be described. In the drawings, the inner and outer telescopic members 17 and 21 are shown with a U-shaped or channel cross-section. It is to be understood, however, that other suitable types of cross-section may be employed without departing from the spirit of the invention.

The outer telescopic channel member 17 comprises a vertically disposed web portion 25 with upper and lower parallel flange portions 26 extending laterally therefrom, the outer edges of said flanges being turned inwardly toward one another as at 27 thereby providing a slot or opening 28 extending the length of the outer channel member.

The antifriction means disposed between the respective flanges is designed to travel a greater distance relative to the inner telescopic member 21 than to the outer supporting telescopic member 17, thereby permitting the length of the latter to be reduced. A detailed description of the structure for effecting this differential movement follows.

The inner channel member 21 is positioned within outer channel member 17 with the respective flanges 30 and 26 disposed in spaced parallel relationship. The flanges 30 of the inner channel member 21 each have formed therein a plurality of parallel elongated tracks or grooves 35, each of said grooves having a substantially circular cross-section conforming to a portion of the outer periphery of a spherical ball 36. Ball 36 has a concentric circular groove 37 therein whose radius is less than that of the spherical ball. The bottom of groove 37 is adapted to roll upon a longitudinal rib or track 38 integral with one face of a filler plate 39, there being three such ribs arranged parallel to one another and positioned opposite to parallel grooves 35 in flange 30 of the inner telescopic member 21 (FIGURES 2 and 12). The filler plates 39 are secured to the inner surfaces of flanges 26 of outer telescopic member 17. Thus it is seen that the antifriction balls 36 which separate the telescopic channel members each has two concentric surfaces of revolution of different diameters. The surface of revolution of the larger diameter, that is the periphery of ball 36, rolls in groove 35 formed in the flange of inner telescopic member 21; while the surface of revolution of lesser diameter, that is the bottom of groove 37, rolls upon rib 38 attached to the outer member 17. The distance travelled by ball 36 relative to members 21 and 17 will therefore be in direct proportion to the respective diameters of the surfaces of revolution on ball 36.

Heretofore it has been customary to form oppositely disposed parallel grooves in the proximate flanges of the inner and outer telescopic members for the reception of antifriction balls. Such a practice has often proved unsatisfactory, especially where specifications require exact rolling contact between the members. Where the grooved tracks are formed in the channel flanges, any irregularity is difficult if not impossible to correct so that perfect fits will always occur between the balls and the tracks. This difficulty has been overcome in the present invention by providing at least one of the ball tracks as a separate unit which may be inserted or removed until the desired fit is obtained. Where adjustment or alteration is necessary, the inserted track may be removed for correction before fixedly attaching the same to the channel flange.

Accordingly, the filler plate 39 and the ribs 38 formed thereon are constructed as a separate unit which may be inserted or removed as desired until a perfect rolling contact exists between the balls 36 and the oppositely disposed tracks 35 and 38.

It should also be noted that when a perfect fit has been obtained, the lateral deviation of the inner member 21 from its longitudinal path of travel is prevented by spacing at least two balls 36, or sets of balls 36, a substantial distance apart longitudinally of tracks 35 and 38. In the present embodiment, the upper flanges 26 and 30 are separated by two spaced triple-ball sets. Likewise the lower flanges 26 and 30 are separated by two identically spaced triple-ball sets.

The four triple-ball sets are retained by a cage 43, which cage causes the balls to move in unison when the telescopic members are extended or retracted. Cage 43 comprises two substantially square continuous bands 44 which closely surround the inner channel member 21 at spaced points along the latter, said bands being secured in their spaced relative positions by means of longitudinally disposed connecting bars 45. Each of the bands 44 has circular openings 46 therein in which the balls 36

are adapted to loosely fit. The upper and lower endless spaced bands 44 and the balls 36 retained thereby, move longitudinally of and between the two members 17 and 21 as the slide is extended and retracted.

In order to limit the longitudinal travel of inner member 21 relative stationary supporting outer member 17, the ends of groove 21 are closed as at 47 and the ribs 38 have projections 48 at the opposite ends thereof. When the inner channel member reaches the limit of its travel, the caged spaced balls 36 will become wedged between portions 47 and 48 to prevent further travel (FIGURE 3).

FIGURE 8 shows a modified form of construction in which outer and inner telescopic members 17a and 21a respectively, have insertable tracks attached to the proximate flange faces thereof. Also in this embodiment, the movement of the antifriction balls relative to the stationary telescopic member is greater than their movement relative to the movable telescopic members. The latter feature is a reverse arrangement from that shown in the first embodiment of the invention.

The inner telescopic member 21a has the previously described filler plate 39 attached to its flange 30a, said plate having its ribs 38 contacting the bottoms of grooves 37 in balls 36 (FIGURE 12). The flange 26a of the outer member 17a also has attached to its inner surface a track 52, said track being preferably formed from sheet metal material and provided with longitudinally disposed circular grooves 53 which, in turn, are oppositely disposed and parallel to the ribs 38 (FIGURE 13). The periphery of the balls 36 roll in track grooves 53 attached to the outer stationary member 17a, while the ball groove 37 of a small diameter rolls on rib 38 attached to the movable member 21a. The balls 36 will, therefore, travel a greater distance relative to the stationary support member 17a than it will relative to movable member 21a, thus necessitating a relatively long stationary support and a relatively short extensible member.

FIGURES 9 and 10 show a modified form of the invention comprising the inner telescopic member 21, previously illustrated and described in connection with FIGURES 1 through 7, positioned within the outer telescopic member 17a, illustrated and described in connection with FIGURE 8. Spherical balls 54 fit between the oppositely disposed grooves 35 and 53 of the inner and outer members 21 and 17a respectively. Since the balls 54 are provided with only one surface of revolution, the cage 43 and the balls retained thereby will travel the same distance relative to each of the inner and outer members.

FIGURE 11 shows another modified form of the invention comprising outer channel member 17a and the associated inserted ball track 52, illustrated and described in connection with FIGURES 9 and 10, in combination with an inner telescopic member 56. Member 56 has upper and lower parallel flat surfaces disposed in spaced parallel relation to the inner surfaces of the upper and lower flanges 26a of outer member 17a.

The upper and lower parallel surfaces of member 56 each have an inserted track 57 secured thereon (FIGURES 11 and 14), said track being formed preferably of sheet metal and having parallel longitudinal grooves 58 formed therein, which grooves are disposed opposite and parallel to grooves 53 of outer member 17a. As in FIGURES 9 and 10, balls 54 have only one surface of revolution, and therefore the ball assembly will travel the same distance relative to the respective inner and outer members. The embodiment shown in FIGURE 11, however, provides insertable tracks attachable to both the inner and outer telescopic members, thereby facilitating the construction of a slide with optimum working clearances at minimum labor and expense.

FIGURE 15 is a detail view showing the manner of reinforcing the flanges of the outer channel members to prevent spreading thereof as the inner channel member

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travels longitudinally therein. It is here noted that outer channel 17 is provided with crimps 60 at the junction lines between web portion 25 and the outstanding flanges 26. Crimps 60 are properly spaced so as to give maximum rigidity for any particular channel section and without increasing the weight of the latter. By providing such reinforcements at these critical points, the use of a heavier channel section is unnecessary to obtain a slide of the desired rigidity. The tracks are thus held firmly against the balls.

The outer channel members of the other embodiments of the invention are similarly provided with reinforcing crimps 60.

FIGURE 16 shows a slightly different manner of assembling the slides, in which two crimped outer channel members 17b are secured together web-to-web in overlapping relation. In the preceding embodiments, the respective flanges of the two channel bars are secured together face-to-face. The operation and construction of the two types are essentially the same except for the minor rearrangement of brackets 20 made necessary by reversal of the positions of the channel webs.

In the drawings and specification, preferred embodiments of the invention are shown, and although specific terms are employed they are not intended for purposes of limitation, the scope of the invention being set forth in the following claims.

I claim:

1. A retractable table slide, comprising a first elongated bar, a second elongated bar longitudinally overlapping said first bar, antifriction means separating said bars comprising at least two spherical balls spaced longitudinally of and between the proximate surfaces of the overlapped portions of said bars, each of said balls having a circular groove therein concentric with the ball center with a diameter less than the diameter of the ball, a longitudinally extending track secured to one of said proximate bar surfaces, the circular groove of each of said balls rollably engaging said track along said lesser diameter, said other proximate bar surface having an elongated groove therein extending parallel to said track, the spherical periphery of each of said balls rollably engaging said elongated groove, whereby upon relative movement of said bars said balls will move at different rates of speed relative to each of the respective bars, and means including said spaced spherical balls for maintaining said bars parallel to a common axis during relative longitudinal movement thereof.

2. A retractable table slide, comprising an elongated channel bar having two spaced substantially parallel flanges, a second elongated channel bar having two spaced substantially parallel flanges, the flanges of said second bar fitting between and paired in spaced relation with the flanges of said first bar thereby providing two sets of paired flanges, at least two spherical balls spaced longitudinally between the proximate surfaces of each of said sets of paired flanges, each of said balls having a circular groove concentric with the ball center with a diameter less than the diameter of the ball, and a longitudinally extending track secured to one of the proximate flange surfaces of each of said sets, the circular groove of each of said two spaced balls rollably engaging said track along said lesser ball diameter, said other proximate flange surface of each of said sets having an elongated groove therein extending parallel to said track, the spherical periphery of each of said balls rollably engaging said elongated groove, whereby upon relative movement of said bars the balls will travel different distances relative to each of the respective bars.

3. A retractable table slide according to claim 2, and further comprising two endless bands surrounding said second channel member and longitudinally movable along the spaces between the two sets of paired flanges, each of said bands being provided with openings for loosely retaining at least one of said balls between each set of the

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paired flanges, and means for maintaining said bands at a fixed distance apart.

4. In a retractable table slide provided with an elongated channel bar having two spaced substantially parallel flanges, and a second elongated channel bar having two spaced substantially parallel flanges, the flanges of said second bar fitting between and paired in spaced relation with the flanges of said first bar thereby forming two sets of paired flanges, an improved means for mounting said bars for relative longitudinal movement, comprising at least two longitudinally spaced rotary bodies interposed between each set of paired flanges, each of said spaced bodies of said sets having two concentric surfaces of revolution of different diameters, the surface of revolution of larger diameter rollably engaging one of the proximate surfaces of its associated paired flanges, and the surface of revolution of smaller diameter rollably engaging the other of the proximate surfaces, whereby upon relative movement of said bars the rotary bodies will travel different distances relative to each of the respective bars.

5. In a retractable table slide provided with a first elongated bar and a second elongated bar longitudinally overlapping said first bar, an improved means for mounting said bars for relative longitudinal movement, comprising at least two longitudinally spaced rotary bodies interposed between the overlapped portions of said bars, each of said bodies having two concentric surfaces of revolution of different diameters, the surface of revolution of larger diameter rollably engaging one of the proximate surfaces of said overlapped bar portions, and the surface of revolution of smaller diameter rollably engaging the other proximate surface of said overlapped bar portions, whereby upon relative movement of said bars the rotary bodies will travel different distances relative to each of the respective bars, and means including said spaced rotary bodies for maintaining said elongated bars parallel to a common axis during relative longitudinal movement thereof.

6. In a retractable table slide provided with an elongated channel bar having two substantially parallel flanges, and a second elongated channel bar also having two spaced substantially parallel flanges, the flanges of said second bar fitting between and paired in spaced relation with the flanges of said first bar thereby forming two sets of paired flanges, an improved means for mounting said bars for relative longitudinal movement, comprising at least two longitudinally spaced rotary bodies interposed between each set of paired flanges, each of said bodies having two concentric surfaces of revolution of different diameters, an elongated insert member having one face thereof attached face to face to at least one of the proximate flange surfaces of each paired set of flanges, the opposite face of said insert member having integral there-with a longitudinally extending rib rollably engaged by said surface of revolution of lesser diameter, the other of said proximate flange surfaces being provided with a longitudinally disposed groove parallel to said rib, said last-named groove being engaged by said surface of revolution of larger diameter, whereby upon relative longitudinal movement of said bars the rotary bodies will travel different distances relative to the respective bars.

7. In a retractable table slide provided with an elongated channel bar having two spaced substantially parallel flanges, and a second elongated channel bar also having two spaced substantially parallel flanges, the flanges of said second bar fitting between and paired in spaced relation with the flanges of said first bar thereby forming two sets of paired flanges, an improved means for mounting said bars for relative longitudinal movement, comprising at least two longitudinally spaced balls interposed between each set of paired flanges, track means carried by the respective proximate flange surfaces of each said set and rollably engaged by diametrically opposed surfaces of the spaced balls for maintaining said bars parallel to a

common axis during said relative longitudinal movement, said last-named means including at least one elongated insert member interposed between the balls and one of the proximate flange surfaces of the set, means for securing said insert member to its associated flange, a pair of endless bands surrounding said second channel bar and longitudinally movable along the spaces between the two sets of paired flanges, each of said bands being provided with openings for loosely retaining at least one of said balls between each set of paired flanges, and means for maintaining said bands a fixed distance apart.

8. In a retractable table slide provided with an outer elongated channel bar having a web and two spaced substantially parallel flanges extending laterally from said web, said slide also provided with an inner elongated channel bar telescopically mounted relative to said outer bar having a web and two spaced substantially parallel flanges extending laterally from its web, the flanges of said inner bar fitting between and paired in spaced relation with the flanges of said outer bar thereby forming two sets of paired flanges, an improved means for mounting said bars for relative longitudinal movement, comprising at least two longitudinally spaced balls interposed between each set of paired flanges, track means carried by the respective proximate flange surfaces of each said set and rollably engaged by diametrically opposed surfaces of the spaced balls for maintaining said bars parallel to a common axis during said relative longitudinal movement, said last-named means including at least one elongated insert member interposed between the balls and one of the proximate flange surfaces of the set, means for securing said insert member to its associated flange, and reinforcing means disposed at spaced points longitudinally of said outer channel member and connecting the intermediate portion of each laterally extending flange of the outer channel member with an intermediate portion of the web of said outer channel member, whereby in each said flange set the spreading of the outer flange away from the inner flange will be additionally resisted.

9. A retractable table slide according to claim 8 wherein each of said spaced reinforcing means comprises ad-

joining portions of said web and of one of said laterally extending flanges, said portions being displaced downwardly inwardly of the outer channel member and forming a diagonal brace abridging the junction line between the web and laterally extending flange.

10. In a retractable slide provided with an elongated channel bar having two spaced substantially parallel flanges, and a second elongated channel bar also having two spaced substantially parallel flanges, the flanges of said second bar fitting between and paired in spaced relation with the flanges of said first bar thereby forming two sets of paired flanges, an improved means for mounting said bars for relative longitudinal movement comprising, at least two longitudinally spaced balls interposed in the space between each set of paired flanges, track means carried by the respective flange surfaces of each said set and rollably engaged by diametrically opposed surfaces of the spaced balls for maintaining said bars parallel to a common axis during said relative longitudinal movement, said last-named means including at least one elongated insert member interposed between the balls and one of the proximate flange surfaces of the set, and means for securing said insert member to its associated flange.

11. A retractable table slide according to claim 10 wherein the means for maintaining the bars parallel to a common axis includes an elongated insert member interposed between each proximate flange surface and the balls of the set, and means for securing each said insert member to its associated flange.

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