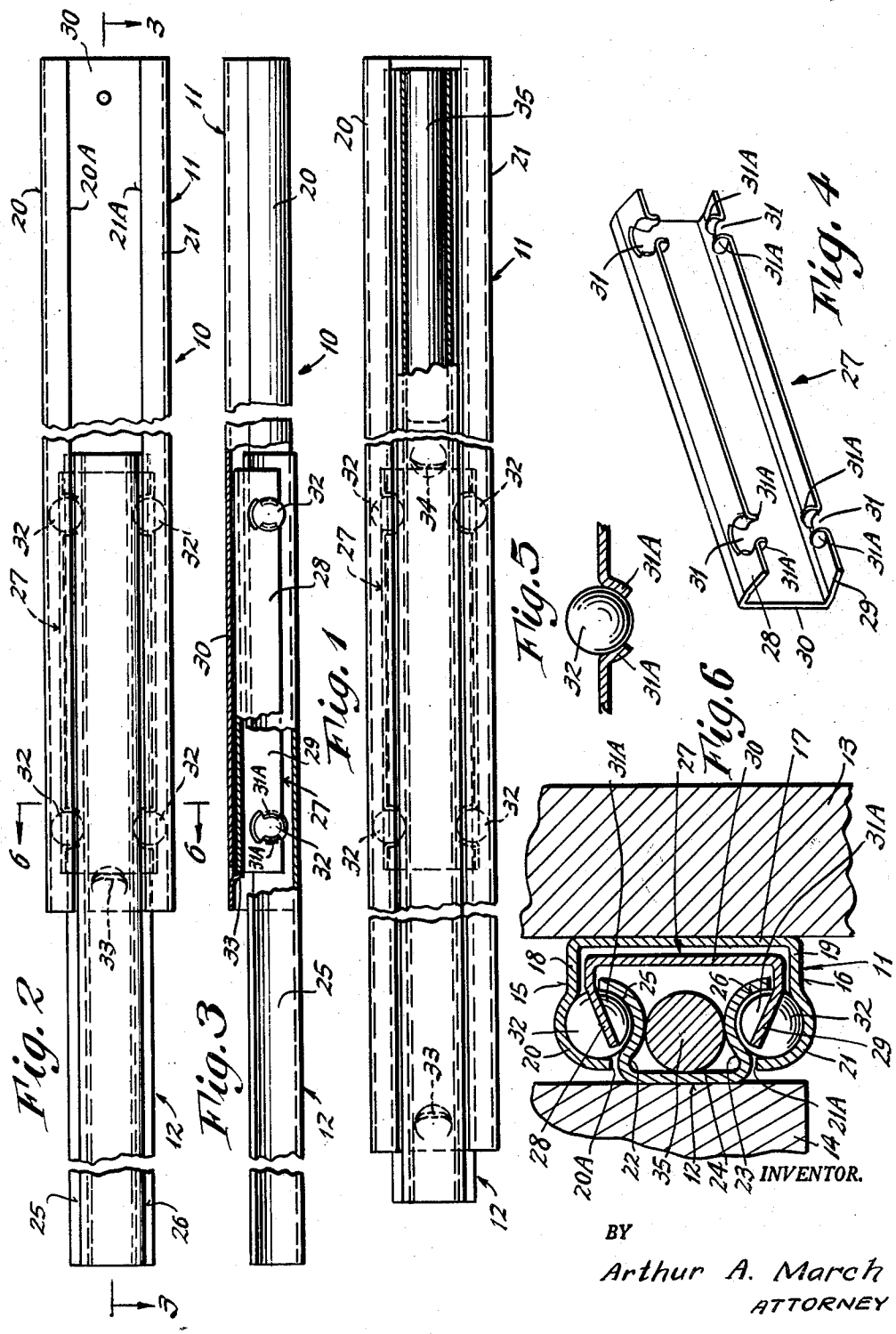
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DRAWER SLIDE

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DRAWER SLIDE

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This invention relates in general to a suspension type drawer slide, and more specifically to improvements in a drawer slide having relatively movable ball-bearing mounted slide members.

Suspension type drawer slides of the class to which the instant invention relates comprise in general an outer channel shaped slide member and an inner channel shaped slide member, the latter being slidably received within the former. To facilitate relative sliding movement therebetween a ball retaining, floating carrier is interposed between the inner and outer slide members. In ball-bearing mounted slides of this type the side walls or flanges of the respective inner and outer channel members are formed with cooperating and complementary arcuate shaped bearing grooves or tracks which extend along the length of the respective slides. The respective grooves are positioned with respect to the floating carrier so as to render the ball bearings carried therein in rolling engagement with respective slides within their bearing tracks.

Heretofore, in drawer slides of the class above described, the floating carrier comprised simply a channel shaped member having straight flange portions, apertured for the reception of the ball bearings carried therein. With this type of carrier construction the upper flange edges of the floating carrier, of necessity, extended between the inner and outer slides and beyond the surface of the ball bearings retained therein. Consequently, the outer marginal edge portions of the outer slide members were spaced a substantial distance from the inner slide member; and as a result the ball-bearing groove or track defined by the flange portions of the outer slide encompassed only a relatively limited fragmentary portion of the outermost surface of the ball bearing disposed in rolling engagement therewith. Experience has shown that with the construction of the type, above described, there was a tendency, in the event of an overloaded drawer attached to such slides, of the ball bearings popping out of the bearing grooves defined between the flanges of the outer and inner slide members in the extended or protracted position of the drawer slide. If this occurred, the drawer slide was rendered virtually useless as the ball bearings could not be repositioned without a complete dissassembly of the drawer slide.

To overcome this difficulty additional structural means have been proposed and used to prevent the spread between the inner and outer slides which caused the balls to pop out of their tracks. Generally this means included a C bracket which was connected to the inner slide for movement therewith, and which bracket was arranged to embrace the flanges of the outer slide. While feasible such construction increased the manufacturing cost of the drawer slide, as additional metal fabricating and assembly operations were required.

Extending the arcuate track of the outer slide of the given constructions was not feasible as this would tend to alter overall dimensions or specifications of the drawer slide, thus rendering the resulting drawer slide useless for cabinets of standard constructions and specifications.

Therefore, the object of this invention is to provide a relatively simple, practical and positive operating drawer slide of the ball-bearing type which is constructed and arranged so as to prohibit the dislodging of the ball bearings in the event of an overloaded drawer when the latter is in its extended or protracted position.

Another object of this invention is to provide an improved floating and ball bearing retaining means constructed and arranged with respect to the inner and outer slides so as to eliminate the popping of the ball bearings in the extended position of the slide in the event of drawer overload.

A feature of this invention resides in the provision that the above object is attained without increasing the gauge thickness or relative strength of the material from which a comparable prior known slide is formed and without altering the overall dimensions or sizes of a comparable slide. Therefore, another of the features of this invention resides in the provision that the drawer slide of the instant invention is readily adapted to the specifications of existing or standard filing cabinet type constructions.

Another object of this invention is to provide a ball-bearing suspension type drawer slide having a minimum of parts in which it is relatively simple in construction, inexpensive to fabricate, and positive in operation.

Other features and advantages will become more readily apparent when considered in view of the specifications and drawings in which:

FIG. 1 is a plan view of a drawer slide assembly in accordance with this invention illustrated in a normal drawer retracted position;

FIG. 2 is a plan view illustrating the drawer slide in the extended or protracted position;

FIG. 3 is a longitudinal section view taken along line 3—3 of FIG. 2;

FIG. 4 is a perspective view of the floating slide carrier detail;

FIG. 5 is a fragmentary detail illustrating the ball-bearing retaining means of the carrier detail; and

FIG. 6 is a sectional view taken along line 6—6 of FIG. 2.

Referring to the drawings, there is illustrated the improved drawer slide construction 10 of this invention. Drawer slides of this type are generally used in single or multi-drawer filing cabinets and the like.

The drawer slide 10 of this invention comprises essentially an outer slide member 11 and a telescoping inner slide member 12. In accordance with this invention, one of the slide members is adapted to be fixed to a cabinet and the other slide member secured to a drawer adapted to slide in and out of the cabinet. It will be understood that either member may be connected to either the cabinet or the drawer. However, for purposes of description it will be considered that the outer slide member 11 is fixed to the cabinet 13 by suitable fastening means such as screws or the like, and that the inner slide member 12 is fixed to the movable drawer 14, and thus rendered slidable relative to the outer slide 11.

As best seen in FIG. 6, the outer slide member 11 comprises a channel shaped structure having a pair of side walls or flanges 15 and 16, and a web or bottom wall portion 17 interconnected between the flanges 15 and 16. Each side wall 15 and 16 is provided with a substantially straight wall portion 18, 19, each of which is disposed normal to the web portion 17. Extending beyond the straight wall portion 18, 19, the respective side walls 15, 16 are formed with an outwardly bowed or arcuate ball retaining track or groove 20, 21 that extend coextensively along the length of the slide 11.

The inner slide member 12, which is telescopically mounted within the outer slide member 11, comprises a complementary channel shaped member. It consists of an elongated member having a pair of side walls or flanges 22, 23 interconnected by a web portion 24. As seen in FIG. 6, the side flanges 22, 23 of the inner slide 12 bow inwardly to define a complementary arcuate ball retaining groove or track 25, 26 extending coextensively along the length of the inner slide. In FIG. 6 it will be

seen that the edges 20A, 21A of the bearing groove or tracks 20, 21, of the outer slide member 11 are disposed contiguously to the juncture defined by the web 24 and the side walls 22, 23 of the inner slide 12.

To facilitate the sliding or telescoping action between the inner and outer slide members 11 and 12, a movable ball bearing retaining carrier is interposed between the inner and outer slide members 11 and 12. In accordance with this invention the carrier 27 of the illustrated embodiment comprises a channel shaped member having inwardly inclined flanges 28, 29 and an interconnecting base portion 30. As shown in FIG. 6, the base portion 30 is disposed adjacent to web 17 of the outer slide 11, and between the straight wall portions 18, 19 normal to web 17. The inclined flanges 28, 29 are directed toward the juncture defined by the side walls 22 and 23 and the web 24 therebetween of the inner slide 12.

In accordance with this invention the flanges 28 and 29 of the carrier 30 are provided with a notch 31 positioned adjacent each end thereof to form a seat for the ball bearings 32. Each of the notches is formed with a strike-up portion 31A located at the edges of the notches, and as shown, the strike-up portions 31A are bent inwardly of the carrier 27. An important feature to be noted is that the notch is formed so that a portion of the ball extends beyond the edges of flanges 28, 29.

In the illustrated embodiment, four ball bearings 32 are employed for disposing the carrier 27 in rolling engagement and movable relative to the outer slide 11. The inner slide 12 in turn is slidably received with the flanges 28, 29 of the carrier 27, with the inner surfaces of the ball bearings engaging the bearing tracks 25, 26 of the inner slide member 12.

In accordance with this invention it is to be noted that the construction of the carrier 27 and the arcuate bearing tracks 20 and 21 of the outer slide member 11 is such that the arcuate tracks 20 and 21 embrace a substantial portion of the ball bearing rolling surface. This is rendered possible due to the particular carrier construction. With the construction described it will be apparent that the ball bearings 32 are disposed in off center relationship with respect to the respective bearing seats 31, formed in the carrier flanges 28 and 29, and that the respective bearings 32 are positively locked by the arcuate flanges 20, 21 of the outer slide member 11. With construction described and illustrated it will be apparent that the slide carrier 27 arrangement permits the bearings 32 to have a major or substantial portion of their outer surfaces encased by the arcuate groove or track 20, 21 defined by the outer slide 11. Thus, by arranging the construction so that the outer track 20, 21 may be extended to encompass more of the bearings 32, the extended arcuate track provides increased strength for a given gauge thickness of a slide material. Because of the construction described a positive retaining means for the ball bearings 32 is afforded without the addition of structure to prevent the popping out of the ball bearings 32 in the event of an overloaded drawer extended to the protracted position. Also the latter result is attained without effecting the overall specifications of the drawer slide, thus rendering it readily adapted to standard cabinets.

In the construction described the carrier 27 is disposed in rolling engagement with the outer slide member 11, and the inner slide member 12 is disposed in rolling engagement with the carrier 27. To limit the relative movement of the slide members 11 and 12 so as to prevent accidental withdrawal of the inner slide member from the outer slide member a stop means is provided. Stop means, as herein illustrated comprises tabs 33, 34 which is stamped out of the web 17 of the outer slide member and which are bent inwardly of the slide member 11 to form an abutment to limit the movement of carrier 27 in either direction. Stop abutment 33 is disposed ahead of the carrier 27, and stop abutment 34 is disposed behind the carrier. The forward abutment 33 limits the carrier in the extended position of the drawer slide, and the rearwardly disposed abutment or stop 34 limits the carrier in its retracted position. Thus when the carrier strikes either of stops 33 or 34, relative movement between the carrier 27 and the outer slide 11 is ceased. When this occurs the rolling friction is no longer present between the carrier and the respective slides 11 and 12. Thus the sliding friction comes into play to restrict further relative movement between the inner and outer slide members 11 and 12. To further enhance resistance between relative movement between the drawer slides 11 and 12, in the extended position of the drawer slide a length of round stock 35 is disposed between the flanges or side walls 22 and 23 of the inner slide member adjacent the end portion thereof. The stock 35 tends to increase the rigidity of side walls of the inner slide member, and thus cooperates therewith to enhance the sliding friction to prohibit further relative movement between slides at the limit of the inner slide travel by preventing flexings of the side flanges 25, 26. With the arrangement herein described, the construction of the slide carrier 27 enables the arcuate construction of the respective ball bearing tracks of the outer slide member to extend over the center of the ball bearing to encase a substantial portion thereof, and thus positively lock the bearing within the track. With the described construction it will be noted that the strength and rigidity of the drawer slide is enhanced without increasing the strength of the slide material or the gauge thickness of the metal from which it is constructed, and without increasing the overall dimensions thereof.

While the instant invention has been disclosed with reference to a particular embodiment for practicing the same, it is to be appreciated that the invention is not to be taken as limited to all of the details thereof as modifications and variations thereof may be made without departing from the spirit or scope of the invention.

I claim:

1. A drawer slide construction comprising an elongate outer channel-shaped slide member, said slide member having a pair of side walls, each of said side walls having an arcuate bearing track formed along the outer marginal portion thereof, a floating carrier slidably mounted within the side walls of said outer slide member, said carrier including a channel-shaped member having side flanges spaced from the side walls of said outer slide member, a plurality of ball bearings carried by each flange of said carrier, each of said flanges having formed therein a bearing retainer defined by inwardly bent strike-up portions for retaining and preloading each of said ball bearings between the bearing track formed in the side walls of said outer slide member and the strike-up portions of said carrier, the outer surface of said ball bearings projecting beyond the free edge of the carrier flanges, and an inner slide member slidably carried between the flanges of said carrier, said inner slide including a channel-shaped member having side walls each formed with a complementary bearing track therein, the complementary bearing track of said inner slide being disposed in rolling engagement with the ball bearings carried by said carrier, means formed in said outer slide to form a stop for limiting movement of said carrier relative to said outer slide member, and the arcuate bearing track along the respective side walls of the outer slide member extending about a substantial portion of circumference of the bearing disposed in rolling engagement therewith and beyond the free edges of the carrier flanges carrying said bearings.

2. A drawer slide comprising an elongate outer channel-shaped slide member having a pair of side walls, each of said side walls having an arcuate bearing track formed along the outer marginal portion thereof, a floating carrier slidably mounted within the side walls of said outer slide

member, said carrier including a channel-shaped member having inwardly inclined side flanges spaced from the side walls of said outer slide member, a plurality of ball bearings carried by each flange of said carrier, each of said flanges having formed therein a bearing retainer defined by inwardly bent strike-up portions for retaining and preloading each of said ball bearings between the bearing track in the side walls of said outer slide member and the strike-up portions of said carrier, the outer surface of said ball bearings projecting beyond the free edges of the inclined carrier flanges, and said ball bearings being retained by said carrier in an outside offset center relationship with respect to the respective flanges of said carrier, an inner slide member slidably carried between the inclined flanges of said carrier, said inner slide including a channel-shaped inner slide member having side walls each formed with a complementary bearing track, the complementary bearing track of said inner slide being disposed between the flanges of said carrier and in rolling engagement with the ball bearing carried therein, and means formed in said outer slide to form a stop for said carrier to limit relative movement therebetween.

3. A drawer slide construction comprising an elongate outer channel-shaped slide having a pair of side walls, each of said side walls having an arcuate bearing track formed along the length thereof, a relatively shorter floating carrier slidably mounted within the side walls of said outer slide, said carrier including a channel-shaped member having a base and integrally connected inwardly inclined side flanges spaced from the side walls of said outer slide, a plurality of ball bearings carried by each inclined flange of said carrier, each of said carrier flanges having fomed therein a bearing seat defined by inwardly bent strike-up portions for retaining and preloading each of said ball bearings between the bearing track formed in the side walls of said outer slide member and the strike-up portions of said carrier, the outer surface of each of said ball bearings projecting beyond the edges of the inclined carrier flanges, said ball bearings being retained in outside offset center relation with respect to the respective flanges of said carrier, an inner slide member slidably disposed between the inclined flanges of said carrier, said inner slide including a channel-shaped member having opposed side walls each formed with a complementary arcuate bearing track extending along the length thereof, the complementary bearing track of said inner slide being disposed between the flanges of said carrier in rolling engagement with the ball bearing carried therein, and means formed in one of said slide members to form a stop for limiting relative movement between the respective components of the slide construction, and the arcuate bearing track of the outer slide member extending about a substantial portion of the circumference of the ball bearing disposed in rolling engagement therewith.

4. A drawer slide construction comprising:

(*a*) an elongate outer channel-shaped slide member having a flat web portion and spaced integrally connected side walls,

(*b*) each of said walls having a portion disposed normal to the web portion of said outer slide member and

(*c*) the outer marginal portion of said side walls defining an outwardly bowed arcuate bearing track extending along the length of said member,

(*d*) a relatively short slide carrier adapted to slide along the length of said outer slide member

(*e*) said carrier including a channel-shaped member having a base portion and integrally connected inwardly inclined flanges,

(*f*) the longitudinal edges of said carrier flanges being spaced inwardly of the ends of the arcuate track defined by the side walls of the outer slide member,

(*g*) a ball seat formed adjacent the ends of the carrier flanges, said ball seats being formed by inwardly bent strike-up portions,

(*h*) a ball bearing positioned in each of said ball retaining seats,

(*i*) said ball bearing being retained in an outside offset center relationship with respect to the flanges of said carrier, the outer surface of said ball bearings extending beyond the edges of said carrier flanges,

(*j*) an inner channel-shaped slide member having a web portion and connected spaced side walls,

(*k*) each of said side walls of said inner slide member being formed with a complementary arcuate bearing track,

(*l*) the inner slide member being disposed between the flanges of said carrier in rolling engagement with said ball bearings,

(*m*) said outer and inner slide members being disposed so that the outer ends of said slide bearing track overlie the ends of the carrier flanges and are disposed contiguous the junction defined between the web and adjacent side walls of said inner slide member,

(*n*) whereby the arcuate bearing track of the outer slide member extends about a major portion of the respective ball bearing surfaces disposed in rolling engagement therewith to prevent dislodgement of the ball bearing from said bearing tracks defined between the side walls of said slide members,

(*o*) and stop means defining an abutment connected to one of said slide members for limiting the movement of said carrier in either the extended or retracted position of said slide members.

5. A drawer slide construction comprising:

(*a*) an elongate outer channel-shaped slide member having a flat web portion and spaced integrally connected side walls,

(*b*) each of said walls having a portion disposed normal to the web portion of said outer slide member and

(*c*) the outer marginal portion of said side walls defining an outwardly bowed arcuate bearing track extending along the length of said member,

(*d*) a relatively short slide carrier adapted to slide along the length of said outer slide member,

(*e*) said carrier including a channel-shaped member having a base portion and integrally connected inwardly inclined flanges,

(*f*) the longitudinal edges of said carrier flanges being spaced inwardly of the ends of the arcuate track defined by the side walls of the outer slide member,

(*g*) a ball seat formed adjacent the ends of the carrier flanges, said ball seats being formed by inwardly bent strike-up portions,

(*h*) a ball bearing positioned in each of said ball retaining seats,

(*i*) said ball bearing being retained in an outside offset center relationship with respect to the flanges of said carrier, the outer surface of said ball bearings extending beyond the free longitudinal edges of said carrier flanges,

(*j*) an inner channel-shaped slide member having a web portion and connected spaced side walls,

(*k*) each of said side walls of said inner slide member being formed with a complementary arcuate bearing track,

(*l*) the inner slide member being disposed between the flanges of said carrier in rolling engagement with said ball bearings,

(*m*) said outer and inner slide members being disposed so that the outer end of said slide bearing tracks overlie the ends of the carrier flanges and are disposed contiguous the junction defined between the web and adjacent side walls of said inner slide member,

(*n*) whereby that the arcuate bearing track of the outer slide member extends about a major portion of the respective ball bearing surfaces disposed in rolling

engagement therewith to prevent dislodgement of the ball bearing from said bearing tracks defined between the side walls of said slide members,

(*o*) stop means defining an abutment connected to one of said slide members for limiting the movement of said carrier in either the extended or retracted position of said slide members,

(*p*) and a bar stock connected between the side walls of the inner slide member adjacent the end portion thereof to enhance the rigidity thereof.

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