Dec. 12, 1933. D. E. HUNTER 1,938,908

MOUNTING FOR SLIDING DRAWERS

Filed Nov. 5, 1932 2 Sheets-Sheet 1

Fig. 1

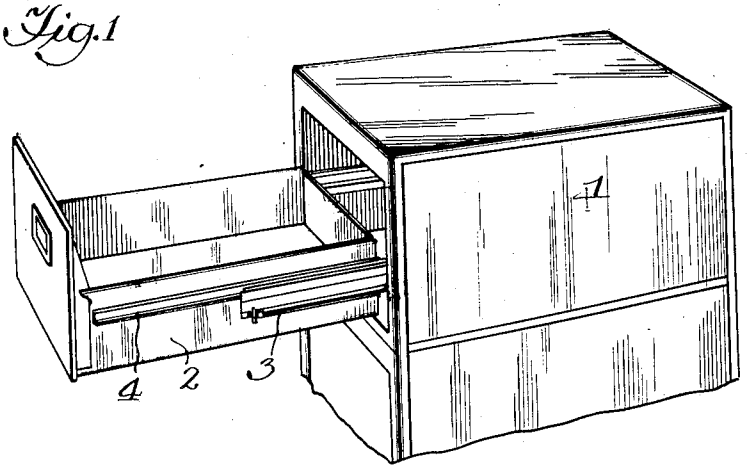


Fig. 3

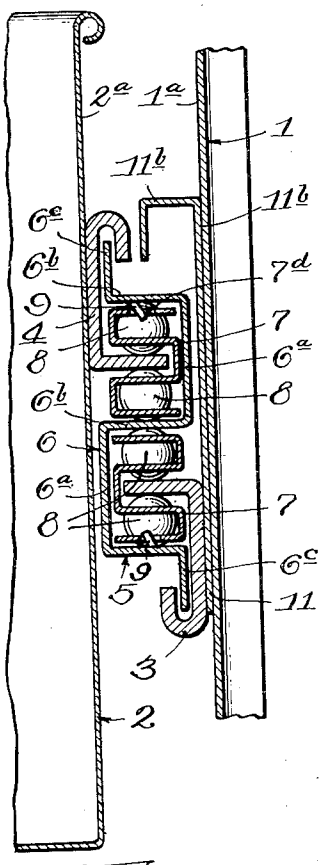
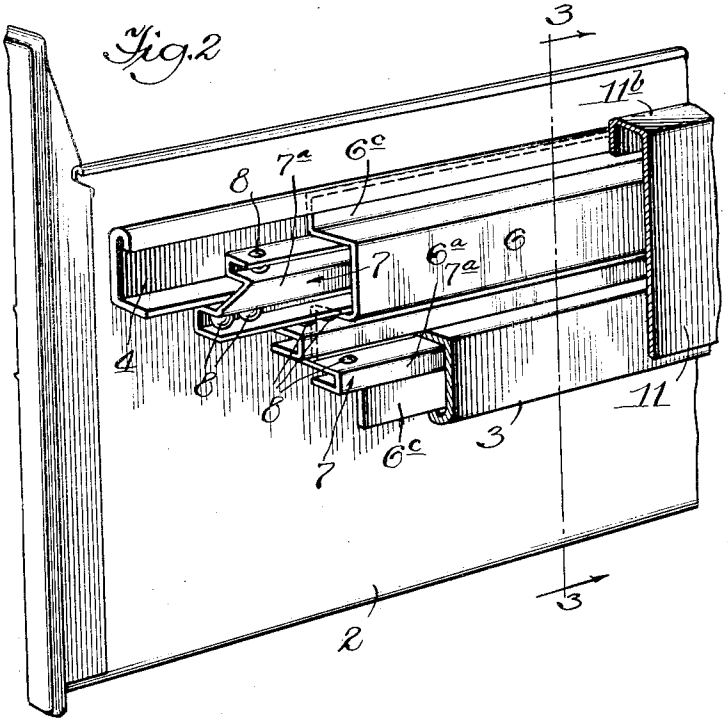


Fig. 2



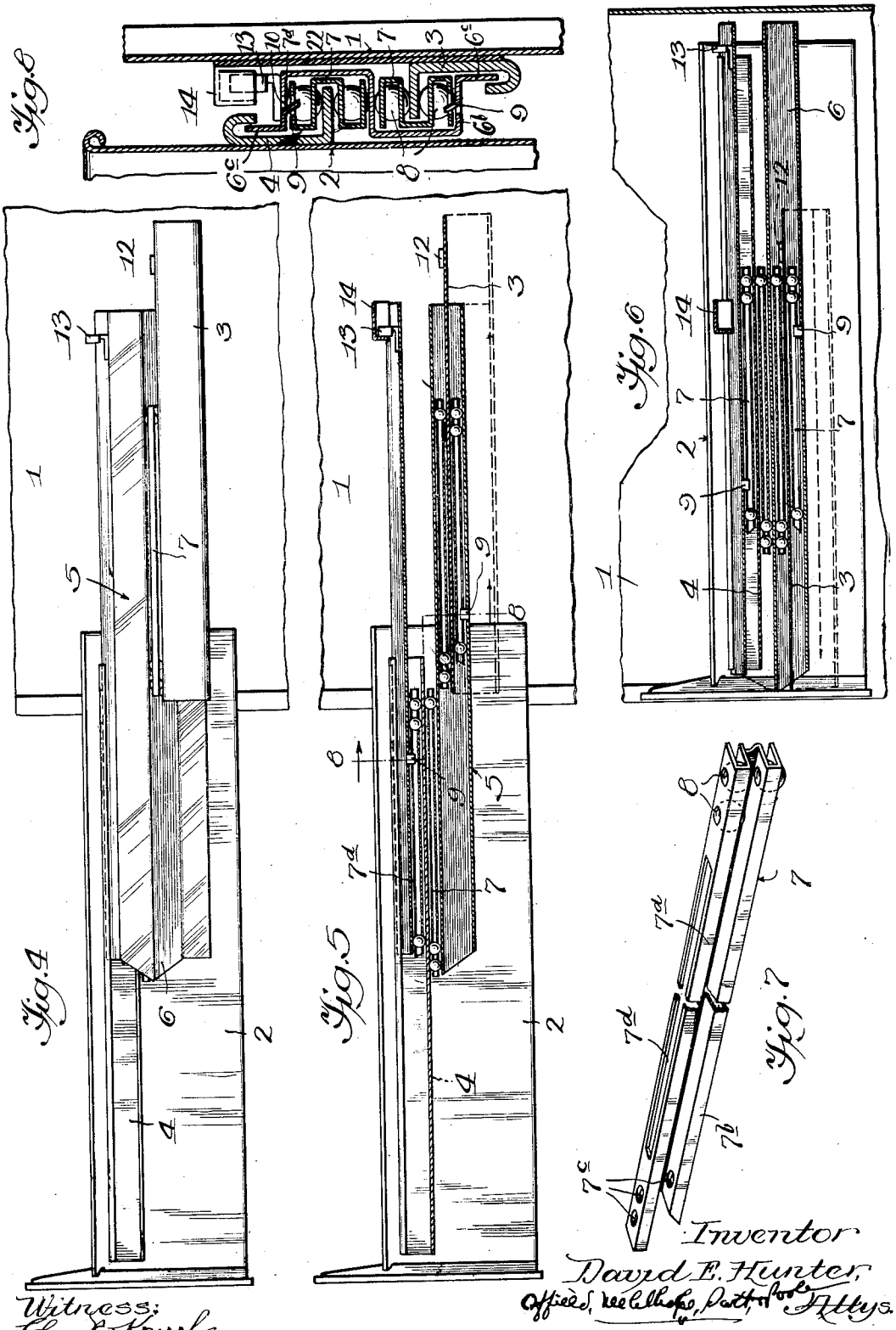
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MOUNTING FOR SLIDING DRAWERS

Filed Nov. 5, 1932 2 Sheets-Sheet 2



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Patented Dec. 12, 1933

1,938,908

UNITED STATES PATENT OFFICE

1,938,908

MOUNTING FOR SLIDING DRAWERS

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Application November 5, 1932. Serial No. 641,455

10 Claims. (Cl. 45—77)

This invention relates to improvements in mountings for sliding drawers, and more particularly to extensible supports for drawers used in filing cabinets and the like.

The more common mounting for drawers used in filing cabinets utilizes what is commonly called an extension slide which permits the drawer to be withdrawn its full length from the casing or cabinet. Thus instead of a drawer sliding on fixed tracks or guideways, an intermediate extension is provided, the drawer sliding on the extension and the latter sliding on stationary tracks on the sides of the drawer compartment and moving inwardly and outwardly with the drawers. Moreover, since the drawers are subject to heavy loads and frequent operation, anti-friction rollers are usually provided for promoting easy and smooth operation, but invariably these rollers require periodic lubrication to maintain them in proper working order and to avoid excessive wear.

The necessity of lubrication is regarded as a distinct disadvantage, for it places the burden on the user of attending to the lubrication, with the result that either the oil is likely to be applied improperly or in excessive amounts, or else not at all. Thus in the first instance, a condition is created which causes soiled hands, clothing and drawer contents, and in the second, faulty operation, increased wear and shorter life of the equipment. The desirable construction for the drawer mounting, therefore, is obviously one that insures smooth operation and prolonged life of the equipment, without the necessity of lubrication, and the object of this invention is to provide such a construction.

In the accompanying drawings,

Figure 1 is a perspective view of a casing showing a drawer unit in extended position;

Figure 2 is an enlarged perspective view of the parts of the drawer support, as they appear with the wall of the casing removed;

Figure 3 is a view in vertical section taken on line 3—3 of Figure 2;

Figure 4 is a view in side elevation of the drawer mounting, with the drawer fully extended, and the wall of the casing removed;

Figure 5 is a view similar to Figure 3, but with the extension member shown in vertical section;

Figure 6 is a view similar to Figure 5 with the drawer closed;

Figure 7 is a perspective view of one of the ball retainer bars; and

Figure 8 is an enlarged detail view in vertical section taken on line 8—8 of Figure 5.

The casing 1 is preferably of metal and represents any enclosure in which a drawer 2 is slidably mounted. The drawer is also of a metal construction having the usual bottom, side and end walls.

The side walls 1^a of the casing are spaced a short distance from the side walls 2^a of the drawer, and within the vertical spaces between them are located the extensible supports or bearings for the drawer. Briefly, the support consists of a horizontal track member 3 fixed to the inner surface of the side wall 1^a of the casing, a corresponding track member 4 fixed to side wall of the drawer and parallel with the casing track member 3 but elevated a short distance above it, and finally an extension slide assembly 5 interposed between the two track members 3 and 4, and forming the direct bearing for the drawer track member 4, and in turn being supported upon the casing track member 3.

The general arrangement of fixed track members and intermediate extension slide presents nothing new, so that the novel features reside in the design and assembly of the extension slide. In this connection also it will be observed that it is common to provide stops wherever sliding movement between parts is to be limited in extent, and also bumpers to cushion the impact of the drawer when closed or opened. Likewise suitable locks are used for securing the drawer in place after mounting within the drawer compartment and to permit its removal. It will, therefore, be understood that these features will be provided without special reference being made to them.

Referring now to the extension slide assembly, it will be seen that it is made up of three main parts namely, a slide bar 6 and a pair of ball bearing retainer bars 7, 7, the latter being identical in construction, but in assembly are reversed edge to edge, that is, the bottom becomes the top edge, and vice versa.

The slide bar is stamped from sheet metal of a gauge somewhat lighter than that of the track bars 3 and 4, and of about the same length. In section, the slide bar has what might be termed an extended square S-shaped contour, that is to say, its central portion is made up of longer vertical webs 6^a, 6^a and shorter horizontal webs 6^b, 6^b bent at right angles to each other in the form of an upright letter S, with vertical flanges or extensions 6^c, 6^c projecting upwardly and downwardly from the extreme ends of the top and bottom horizontal webs 6^b. As thus formed, the bar provides two shallow channels, one above the other facing laterally in opposite directions, with the flanges 6^c, 6^c offset laterally in parallel vertical planes, the upper flange lying adjacent the wall of the drawer, and the lower flange adjacent the wall of the casing, as shown in Figure 3.

The bearing retainer bars 7 are stamped from elongated sheets or strips of still lighter gauge metal and bent lengthwise along parallel lines spaced at practically equal distances apart into what may be termed a double S-shaped section, that is, with two channels 7^a, 7^a at top and bottom

facing laterally in the same direction, with a channel 7^b between facing in the opposite direction.

One end of each bar is preferably cut obliquely or mitered, while the opposite end is square, and inwardly from each end are punched three pairs of holes 7^c so grouped that when the blank sheet or strip is bent into final form, two pairs will be located one above the other in the transverse webs of the upper and lower channel section 7^a and nearest the ends of the bar, while the third pair will be located just inwardly from the endmost pair in the same section, except that at the mitered end the third pair of holes is located in the upper channel section 7^a, and at the square end the third pair is located in the lower channel section, as clearly shown in Figure 7. Thus there are three groups of oppositely disposed pairs of holes at each end of the retainer bar, and in these pairs of holes are inserted steel ball bearings 8, the same being the usual hardened steel balls of a diameter slightly greater than that of the holes and the depth of the channels, so that the balls are free to revolve therein without dropping out. Moreover, along the upper longitudinal edge of the blank a narrow slot 7^d is punched in the metal, the same being somewhat shorter than the blank, and which, when the blank is shaped into its channel bar form, is located in the outer web of the upper channel section 7^a, although as will be presently seen, the slot may be either at the top or bottom, depending on its ultimate position when assembled in the slide bar 6.

Now, as clearly shown in Figure 3, two of the retainer bars 7 are inserted in the oppositely facing channels of each slide bar 6 (there being one on each side of the drawer), but in reversed order, the retainer bar in the upper channel having its slotted web uppermost and its oblique end forward or at left of the assembly (Figure 2), and the other bar is inserted in the lower channel with its slotted web lowermost but with its oblique end also at the forward or left end of the assembly.

In order to hold the retainer bars 7 in the channels of the slide bar 6, lugs 9 are punched in the upper and lower horizontal webs 6^b, 6^b of the slide bar, the upper lug being located approximately a distance of one-third the length of the slide bar inwardly from its forward end, and the lower lug more nearly midway between its ends (Figures 5 and 8), and then bent inwardly, that is, one downwardly and the other upwardly so as to project through the slots 7^d in the adjacent horizontal webs of the two retainer bars. To permit the ready insertion of the retainer bars, a narrow bar or flat tool is inserted through holes 10 in the slide bar formed in punching out the lugs 9 and against the narrow strip of metal between the slots 7^d and the outer edges of the retainer bars which, being relatively yieldable, can be forced out of their normal planes sufficiently to allow the lugs 9 to engage the slots. These lugs thus serve to hold the retainer bars in place and also limit the endwise movement of the same relative to the slide bars.

Once inserted, then the ball bearings 8 in the retainer bars bear against the top and bottom faces of the channels of the slide bar, with a free rolling contact in an endwise direction and also permit of a limited lateral shifting sufficient to allow the moving parts to properly align themselves and thus avoid any binding or frictional resistance to the free running movement of the drawer.

Referring now more in detail to the mounting of the assembled extension slide in the casing and the drawer upon the slide, the construction of the fixed track members 3 and 4 will first be described. Each of these track members is a strip of metal bent generally into an L-section, to form a track flange and a supporting flange, the latter bearing flatwise against the wall of the casing or drawer as the case may be, and the free edge of the latter bent over double in the same direction as the track flange to provide a U-shape channel opening toward said track flange. Thus in the case of the casing track member 3, the same is welded or otherwise secured in horizontal position to the inner surface of the casing side wall, with its track flange along its upper edge and projecting inwardly to eventually extend into the outwardly facing center channel of the lower retaining bar, with the ball bearings 8 held in the upper and lower channels bearing against both faces of the track flange. Moreover, the upwardly facing U-shaped channel along the lower edge of the track member is engaged by the vertically depending flange 6^d of the slide bar 6 and serves as a guide therefor in its relative endwise sliding movement. Also by preference, there is associated with the casing track member an auxiliary guide member in the form of an L-shaped metal strip 11 having a relatively wide supporting web 11^a bearing against the casing wall, with its lower marginal portion underlying the casing track member 3 and having an inverted U-shaped projecting flange 11^b located some distance above the track flange, such that it extends inwardly just above the upper web 6^b of the slide bar with a clearance space between. This member 11 serves as a guide for the slide bar assembly, although it is not an essential part thereof.

The drawer track member 4 is quite similar to the track member 3, the chief difference being its reversal so that the guide channel 4^c along the free edge of the supporting flange 4^a is above the track flange 4^b. Similarly also the track flange 4^b extends toward the slide bar, but in this case engages the center channel of the upper retainer bar and has bearing contact with the ball bearings 8 above and below.

Thus it will be observed that the complete assembly is supported on or by the ball bearings, that is to say, the drawer tracks rest on the slide bar through the medium of one group of ball bearings and the slide bar contacts with the casing track members through another group, thereby introducing the easiest running type of anti-friction devices. Moreover, there is a rolling contact at every point of support, inasmuch as the drawer not only rolls on the slide bar, which in turn rolls on the casing tracks, but there is a relative endwise rolling movement between the slide bar proper and the retaining bars, as well as between the retaining bars themselves. This will be evident from the following discussion of the action of the supporting members as the drawer is pulled out from its closed position as shown in Figure 5.

In closed position the weight of the drawer and contents is uniformly distributed over the entire length of the tracks, so that the slide bar 6 is located symmetrically with respect to drawer and both track members 3 and 4, and the ball retaining bars 7 are positioned one above the other and practically midway between the ends of the slide bar. Now, as the drawer is moved outwardly, the drawer track members roll on the upper retaining bar 7, and the latter simultaneously rolls forward on the slide bar 6, which also slides forward but at a less speed. Likewise the slide bar rolls on

the lower retainer bars 7, and the latter necessarily moves forward but at a rate still slower than the slide bar, with the result that from drawer track to casing track there is a uniform telescopic extension of the parts of the extension slide assembly. Similarly on the closing of the drawer, a corresponding telescopic retraction occurs, with the parts returning to their original positions. It may be stated at this point that the relative endwise movement or extension of the slide assembly is limited to the full opening of the drawer by the provision of suitably located stops which prevent the parts from extending relative to each other beyond certain limits in both directions. Thus at the rear end of the casing track 3 is a stop member 12 (Figures 4, 5 and 6) adapted to form an abutment against which the lower ball retainer bar 7 strikes when the drawer is closed. Similarly at the rear end of the slide bar 6 and mounted on its upper horizontal web 6^b is an upstanding lug 13 adapted to contact with a fixed stop 14 secured to the wall of the casing, the same having the form of an L-section welded to the casing in inverted position, with the projecting web bent downwardly at its forward end into the path of the lug 13 (Figure 8). This latter arrangement of lug and stop member limits the outward sliding movement of the drawer, acting first on the slide bar which in turn controls the travel of the ball retainer bars 7, 7 by means of the lugs 9, 9.

Manifestly, as the drawer is pulled further and further from the casing, the load undergoes a redistribution at the several points of support, until at the extreme limit of withdrawal it is completely removed from the casing, and an entirely different combination of forces is brought into play. Thus in Figure 5 it will be noted that when the drawer is fully extended, the load is concentrated at four points, namely, where the four groups of ball bearings are located, these points being spaced at intervals throughout the path of the drawer. The effect of this load distribution is to set up a cantilever action in the extension slide assembly, with forces acting to set up a major turning moment in a counter-clockwise direction about its center, although minor turning moments in the same direction are set up about the center of the two retaining bars 7, 7. Thus the load acts vertically downward at the outer end of the forwardly extended retainer bar 7, this downward force results in an upward force being exerted at the rear end of the retainer bar against the slide bar, and a downward force of the slide bar itself against the forward end of the lower retainer bar, which in turn transmits the load to the casing track 3 at its forward end accompanied by an upward force exerted through the rear end of said bar against the under face of the track.

Thus with the load distributed at the points and in the directions indicated, it is to be noted that the ball bearings 8 are grouped at these points in such manner that two balls are on one side and a single ball on the other side of the track members, the two being on the side toward which the force of the load is exerted. Thus, the upper retainer bar has the forward group of ball bearings grouped with two above and one below the drawer track 4, with the reversed arrangement at the rear end, while the lower retaining bar has its group of balls arranged with two below and one above at the forward end and the reverse at the rear end.

In this way provision is made for the proper distribution of the load in all positions of the drawer, with a view of affording the maximum of free running and smooth action under heaviest loads, and since ball bearings support the load throughout, there is no necessity for oiling, inasmuch as there are no surfaces in sliding contact or rollers journalled on one part and travelling on another. In short, the novel design herein set forth properly supports the load under all conditions, and by proper distribution minimizes the wear at vital points, thus insuring long life with smooth performance without attention and without lubrication.

Having set forth a preferred embodiment of my invention,

I claim:

1. In a sliding drawer mounting, the combination with a casing and drawer of track members mounted on said casing and drawer in parallel vertically spaced relation, an extension slide member having a pair of channel portions facing laterally in opposite directions, bearing retainer bars mounted within each channel portion of said slide member, each having ball bearings rotatively supported thereby and arranged to effect a rolling contact between said retainer bars and said slide bar, each of said retainer bars embracing one of said track members and having rolling contact therewith through the medium of said ball bearings.

2. In a sliding drawer mounting, the combination with a casing and drawer of track members mounted on said casing and drawer in parallel vertically spaced relation, an extension slide member having a pair of channel portions facing laterally in opposite directions, bearing retainer bars fitting within each channel portion of said slide member, groups of ball bearings rotatively mounted in said retainer bars and along opposite edges thereof for rolling contact with the opposed faces of the channel portions of said slide member, each retainer bar embracing one of the track members and having rolling contact therewith through the medium of said ball bearings.

3. In a sliding drawer mounting, the combination with a casing and drawer of fixed track members mounted on said side walls of casing and drawer and provided with track flanges extending at right angles into the space between said walls and spaced apart vertically, an extension slide member shaped to form a pair of vertically disposed channels facing toward said track members, bearing retainer bars fitting within the channels of said extension member, each having groups of ball bearings rotatively supported adjacent each end, at least two of each group of bearing balls being arranged one above the other for bearing contact with said slide member, and to embrace the flange of one of said track members.

4. In a sliding drawer mounting, the combination with a casing and drawer of fixed track members mounted on said side walls of casing and drawer and provided with track flanges extending at right angles into the space between said walls and spaced apart vertically, an extension slide member shaped to form a pair of vertically disposed channels facing toward said track members, bearing retainer bars fitting within the channels of said extension member, each having groups of ball bearings rotatively supported adjacent each end, at least two of each group of bearing balls being spaced apart one above the other in bearing contact above and

below with the horizontal surfaces of their respective channels, and each retainer bar embracing the flange of one of said track members with ball bearings interposed between the same and said slide member.

5. In a sliding drawer mounting, the combination with a casing and a drawer of fixed track members mounted on the side walls of said casing and drawer in vertically spaced relation, and provided with track flanges extending at right angles into the space between said walls, and an extension slide assembly interposed between said track members and comprising a slide member extending parallel with said track members and embracing the same transversely and shaped to provide channels opening laterally in opposite directions, a pair of ball retainer bars having ball bearings rotatively supported along the marginal portions thereof with a space therebetween, said retaining bars being mounted within said channels of the slide member with the ball bearings in contact with said slide member, one of said retainer bars embracing the flange of the drawer track member and the other the flange of the casing track member, with the bearing balls thereof in contact with the opposite faces thereof.

6. In a sliding drawer mounting, the combination with a casing and a drawer, of fixed track members mounted on the side walls of said casing and drawer and provided with track flanges extending at right angles into the space between said walls and spaced apart vertically, and an extension slide assembly interposed between said track members and comprising a slide member extending parallel with said track members and embracing the same transversely and shaped to provide channels opening laterally in opposite directions, a pair of ball retainer bars shaped to provide parallel marginal channels and an intermediate channel and having ball bearings loosely supported in the outermost channels, said retaining bars being mounted within said channels of the slide member for endwise movement therein with the ball bearings in contact therewith, each of said track flanges projecting into the intermediate channel of the adjacent retainer bar and having contact on both faces with the balls thereof.

7. In a sliding drawer mounting, the combination with a casing and a drawer, of fixed track members mounted on the side walls of said casing and drawer and provided with track flanges extending at right angles into the space between said walls and spaced apart vertically, and an extension slide assembly interposed between said track members and comprising a slide member extending parallel with said track members and shaped to provide vertically offset channels opening laterally in opposite directions and toward said track members, a pair of ball retainer bars, each consisting of sheet metal strips shaped to provide a pair of marginal channels facing in the same direction, and an intermediate channel facing in the opposite direction, said retainer bars having groups of ball bearings loosely supported in the marginal channels and having rolling contact with the slide member and with said track members, the flanges thereof projecting into the intermediate channels of said retainer bars and having bearing contact with the balls above and below the same.

8. In a sliding drawer mounting, the combination with a casing and a drawer of fixed track members mounted on the side walls of said casing and drawer and provided with track flanges extending at right angles into the space between said walls and spaced apart vertically, and an extension slide assembly interposed between said track members and comprising a slide member extending parallel with said track members and shaped to provide channels opening laterally in opposite directions toward said track members, a pair of ball retainer bars, each consisting of sheet metal strips shaped to provide a pair of marginal channels facing in the same direction, and an intermediate channel facing in the opposite direction, said retainer bars having groups of ball bearings adjacent each end and rotatively supported in holes formed in the horizontal webs of the marginal channels for rolling contact with the slide member, the flanges of each track member projecting into the intermediate channel of the adjacent retainer bar and having bearing contact above and below with the balls thereof.

9. In a sliding drawer mounting, the combination with a casing and drawer of fixed track members mounted on the side walls of said casing and drawer and provided with track flanges extending at right angles into the space between said walls and spaced apart vertically, and an extension slide assembly interposed between said track members comprising a slide member of sheet metal bent lengthwise to form a pair of parallel channels facing laterally in opposite directions toward the casing side wall and the drawer side wall, respectively, and vertically extending offset marginal flanges adjacent the side wall toward which the adjacent channel faces, ball retaining bars extending lengthwise of the channels in said slide member and having marginal channels and a central channel, groups of bearing balls rotatively mounted within the marginal channels adjacent the ends of each retainer bar, each group having rolling contact with the slide member and the track flange projecting into the central channel of the adjacent retainer bar, and each of said track members having a U-shaped marginal channel adapted to receive the adjacent marginal flange of the slide member.

10. In a sliding drawer mounting, the combination with a casing and a drawer of fixed track members mounted on the side walls of said casing and drawer and provided with track flanges extending at right angles into the space between said walls and spaced apart vertically, and an extension slide assembly interposed between said track members comprising a slide member of sheet metal bent lengthwise to form a pair of parallel channels, one facing laterally toward and embracing the casing track member, and the other facing toward and embracing the drawer track member, ball retaining bars extending lengthwise of the channels in said slide member and having groups of bearing balls loosely mounted adjacent the ends thereof and adapted to contact with said slide member and said track members, the balls of each group being arranged in a predetermined order to properly transmit the load of said drawer to the casing through the medium of said extension slide assembly.

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