

April 11, 1944.

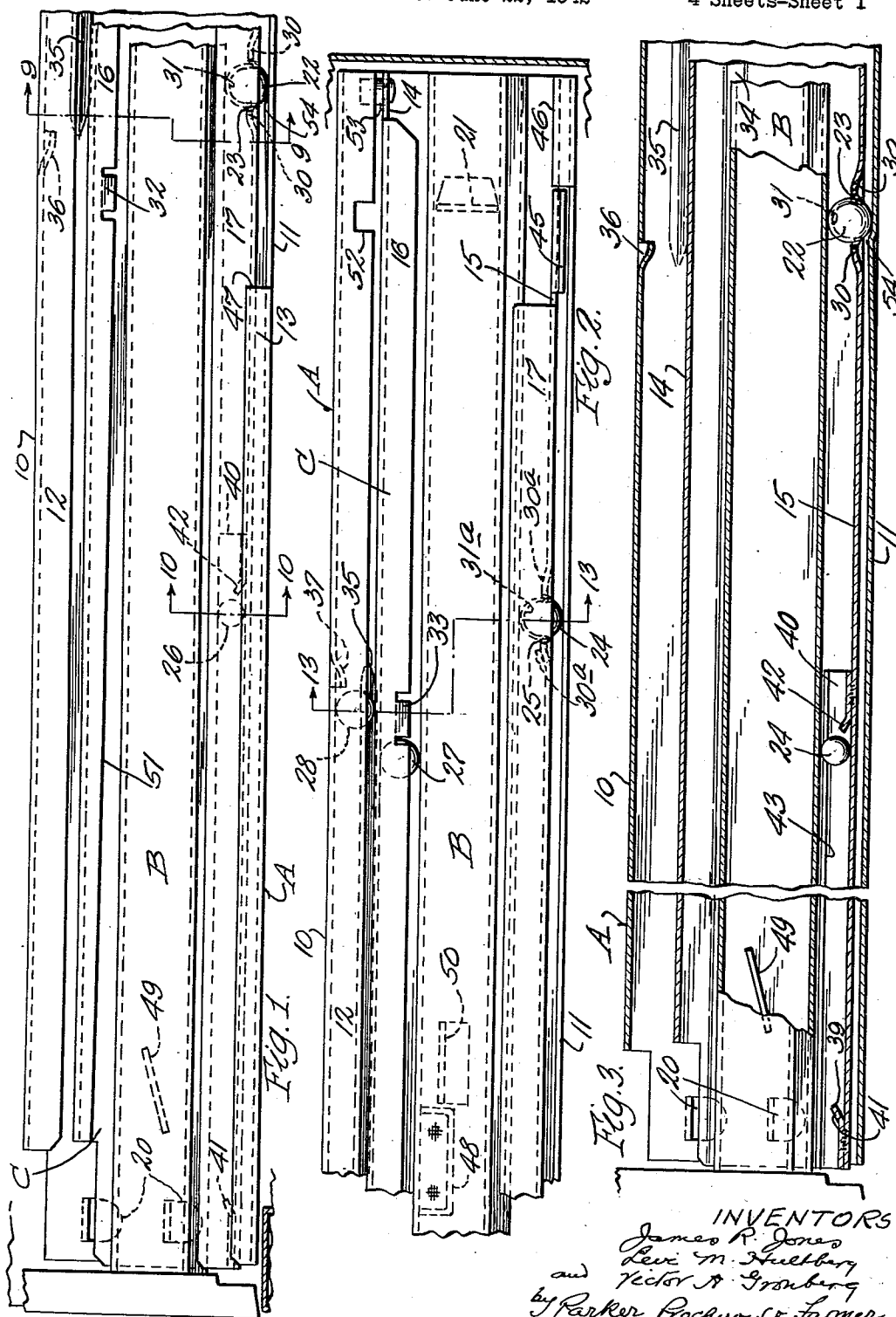
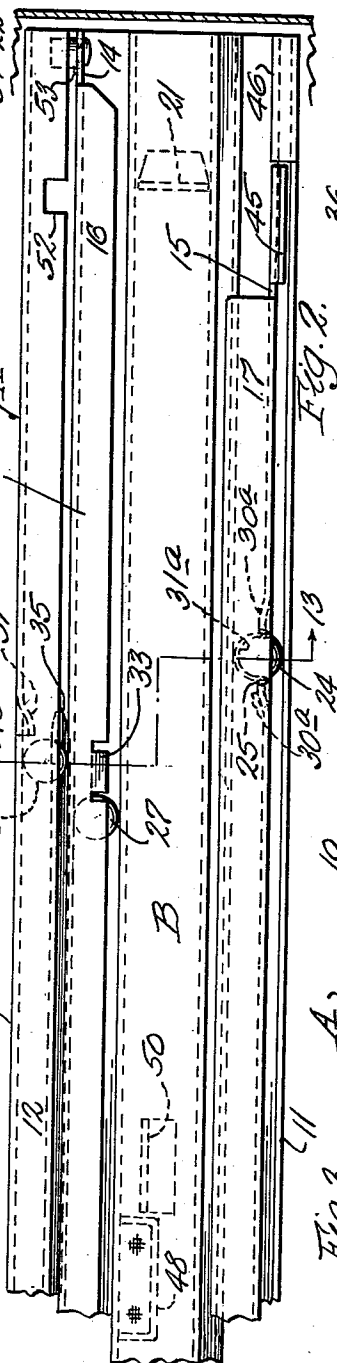
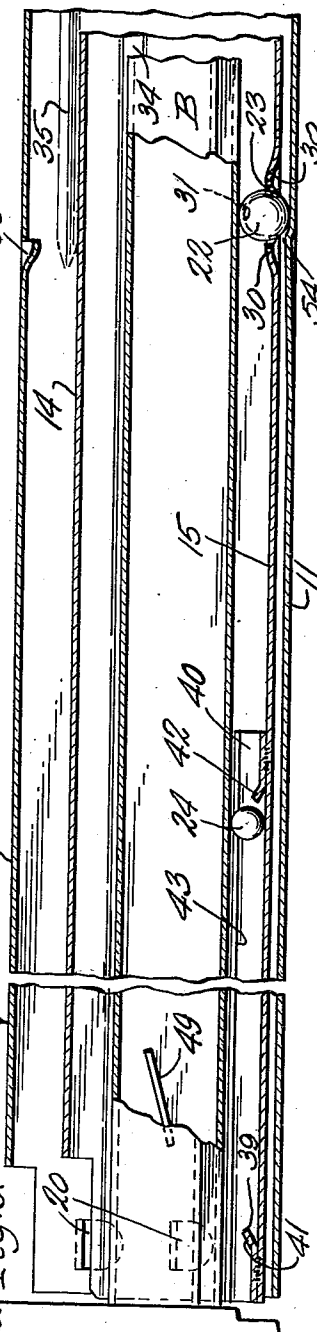
J. R. JONES ET AL

2,346,167

PROGRESSIVE SUSPENSION FOR DRAWERS AND THE LIKE

Filed June 22, 1942

4 Sheets-Sheet 1



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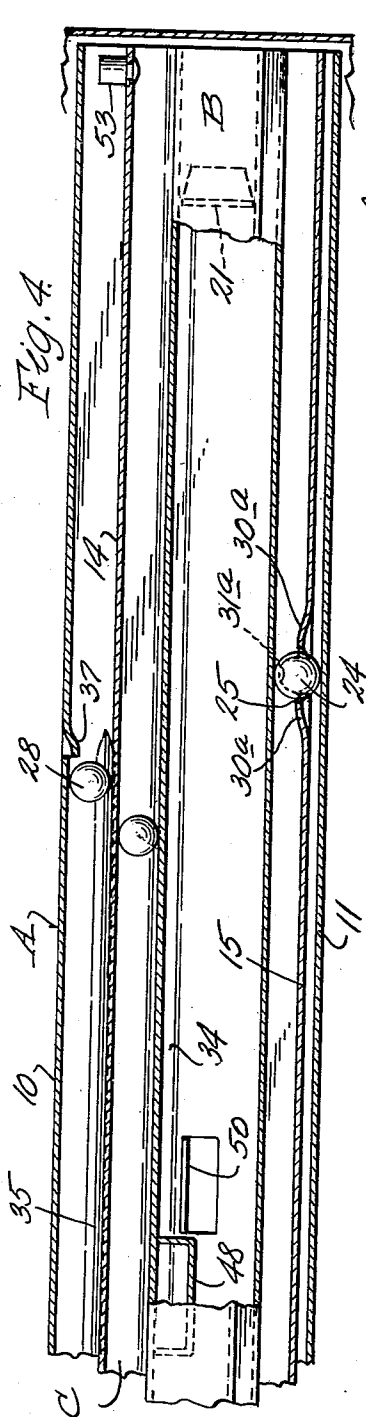
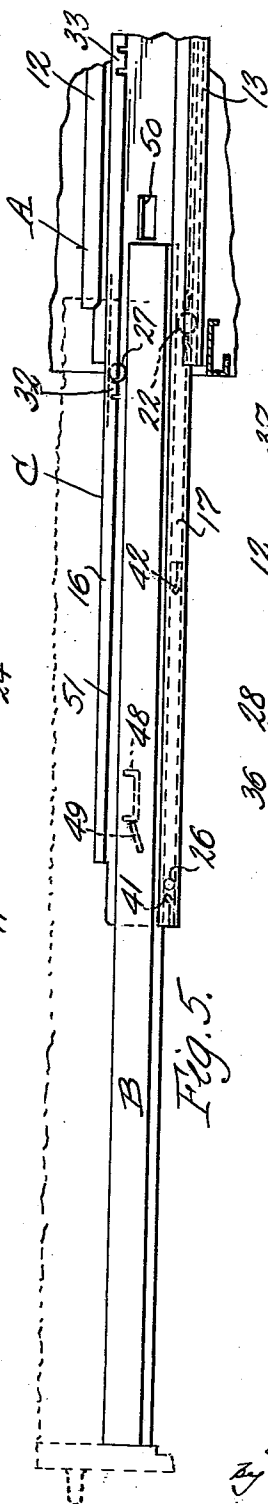
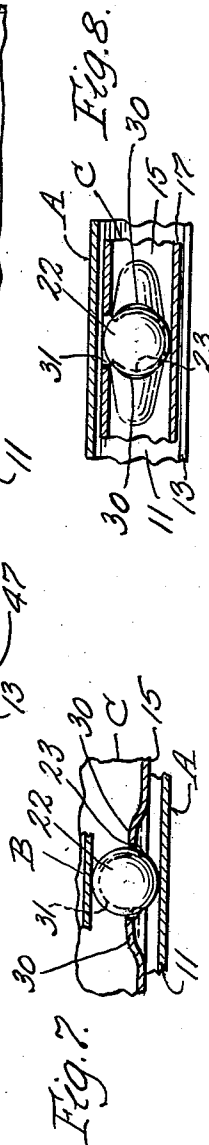
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PROGRESSIVE SUSPENSION FOR DRAWERS AND THE LIKE

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4 Sheets-Sheet 2



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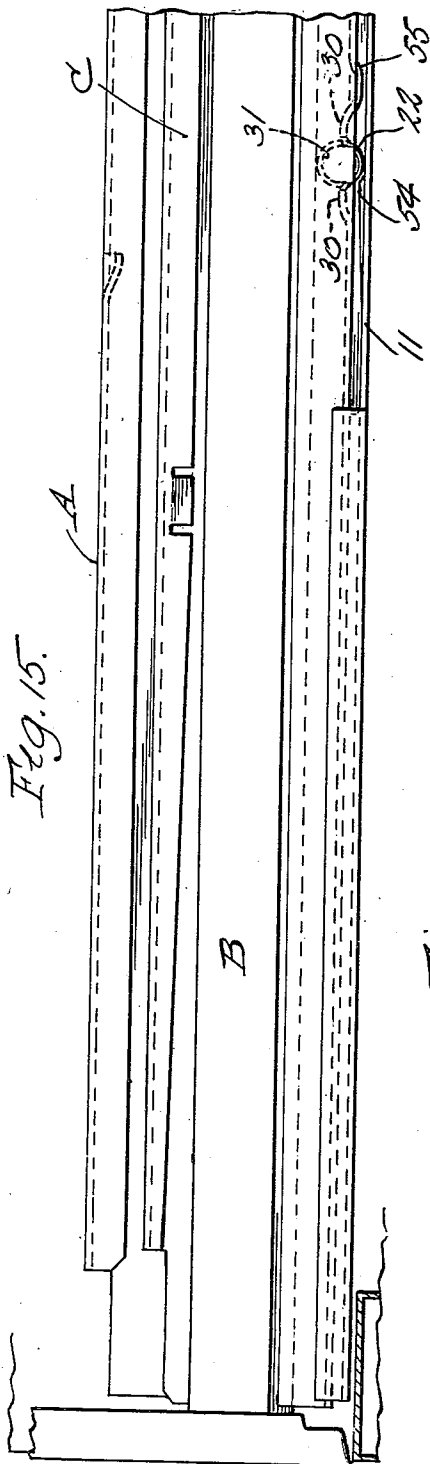
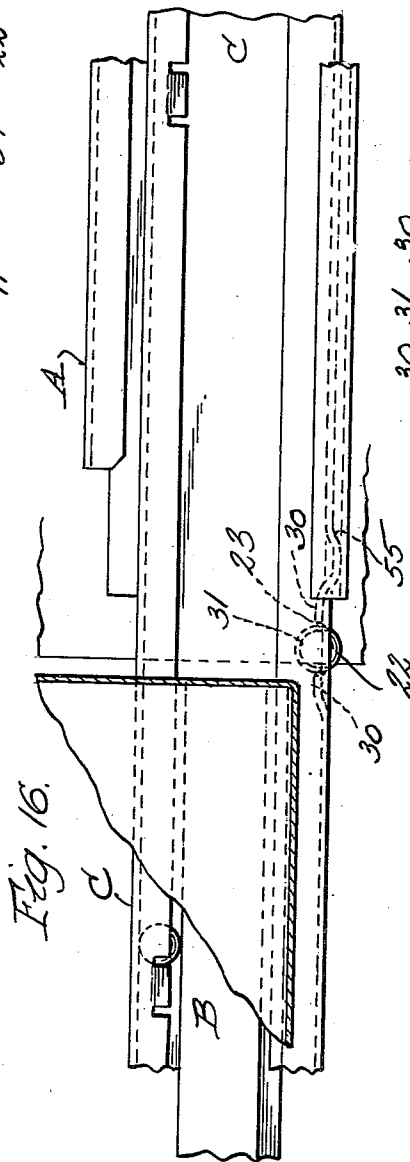
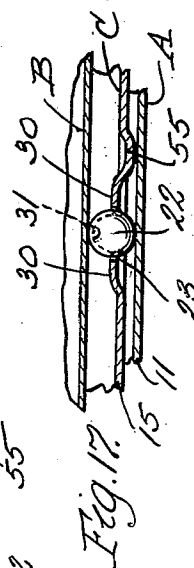
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PROGRESSIVE SUSPENSION FOR DRAWERS AND THE LIKE

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4 Sheets-Sheet 4



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2,346,167

PROGRESSIVE SUSPENSION FOR DRAWERS
AND THE LIKE

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9 Claims. (Cl. 45—77)

This invention relates to improvements in anti-friction or ball bearing suspensions or guides of the progressive type, employed for slidably supporting file drawers and analogous slidable elements, which comprise a stationary or case rail or member, a movable rail or member on the drawer, and an intermediate, floating or extension member or rail which, when the drawer is moved in or out, travels in the same direction as the drawer, so that when opening the drawer the floating member will be automatically projected to extend out of the case and maintain the drawer horizontal when it projects for a considerable distance out of the drawer case. In this specification, for the sake of clarity and brevity of description, the slidable element and the movable member or rail are respectively called the drawer and the drawer rail, but it is not thereby intended to necessarily restrict the suspension to use with drawers as distinguished from other slidable elements with which the suspension is adapted to be used.

One object of the invention is to provide a practical and desirable anti-friction, progressive suspension for drawers and the like, which is of improved, novel construction.

Other objects of the invention are to produce a progressive suspension of the side arm type which requires no cross ties or means for holding in place the cooperating parts of the guides at opposite sides of the drawer, and which occupies less space than previous suspensions; also to provide an anti-friction or ball bearing, progressive suspension which is of a self-contained construction in which the several rails can be separated or removed without the use of tools, and the bearing elements or balls will be retained in place or prevented from escape when the parts are separated or dismantled; in which the retainers and stops for the bearing balls or elements are formed by integral parts of the suspension rails, thus reducing the number of parts of the device; which is of a design or construction that can be produced economically; and in which the cooperating guide members interlock in such a way as to be retained in place when in use, while nevertheless permitting them to be readily separated or removed, without the use of tools, for cleaning and lubricating purposes.

With the above and other objects and advantages in view, which will hereinafter appear, preferred embodiments of our invention, disclosed in the accompanying drawings, are hereinafter de-

scribed and the novel features of the invention are set forth in the appended claims.

In said drawings:

Figs. 1 and 2 are inside elevations of the front and rear portions respectively, of the cooperating parts at one side of a drawer of a suspension embodying our invention.

Figs. 3 and 4 are views of the parts respectively shown in Figs. 1 and 2, but showing longitudinal, sectional elevations thereof, these Figs. 1-4 showing the position of the parts when the drawer is closed.

Figs. 5 and 6 are views similar respectively to Figs. 1 and 2, but on a smaller scale, and showing the position of the parts when the drawer is open.

Fig. 7 is a longitudinal section on line 7-7, Fig. 13, showing the main propeller ball and its retaining means.

Fig. 8 is a sectional, plan view thereof on line 8-8, Fig. 13.

Fig. 9 is a transverse, sectional elevation on the plane of line 9-9, Fig. 1, showing the guide means at opposite sides of a drawer.

Fig. 10 is a transverse section on line 10-10, Fig. 1.

Fig. 11 is a front elevation of the parts of the suspension at one side of the drawer.

Fig. 12 is a transverse section of the extension rail detached.

Fig. 13 is a transverse section on line 13-13, Fig. 2.

Fig. 14 is a fragmentary elevation showing the position of the extension rail for removing it from the stationary rail.

Fig. 15 is an elevation, similar to Fig. 1, but showing a slightly modified construction embodying the invention, with the parts in the position occupied when the drawer is closed.

Fig. 16 is a sectional elevation of the same showing the position of the parts when the drawer has been pulled out to its outermost position.

Fig. 17 is a fragmentary, longitudinal section thereof, showing the main propeller ball and adjacent parts.

Referring first to the embodiment of the invention shown in Figs. 1 to 14, the suspension comprises a case or stationary guide rail, a drawer rail, and a floating or extension rail with their cooperating antifriction bearing elements or balls at each of the opposite sides of the drawer, when the suspension is applied to drawers or relatively wide slidable elements requiring lateral support,

but the cooperating guide means at opposite sides of the drawer are alike, except for being reversed in position, and the following description of the guide means at one side of the drawer will suffice for an adequate understanding of the construction and operation of the suspension.

A represents the case rail, B the drawer rail and C the extension or floating rail. Each of the rails is preferably of channel shape in cross section, as shown. The case rail is stationarily secured in the drawer case or cabinet with the open side of the channel facing toward the adjacent side of the drawer and has laterally extending top and bottom flanges 10 and 11 provided respectively with downturned and upturned edge flange portions 12 and 13. The extension rail C is of substantially similar channel shape and faces in the same direction, having top and bottom lateral flanges 14 and 15 provided respectively with downturned and upturned edge flange portions 16 and 17, but the rail C is of less vertical depth than the case rail, adapting it to be placed within the case rail, with its lower edge portion confined laterally in the channel formed between the web and upturned bottom flange portion of the case rail, and its top edge located below the bottom edge of the downturned top flange portion 12 of the case rail. The drawer rail, as shown, faces oppositely to the other two rails, with its flanges extending away from the drawer, to the side wall of which the web of the rail may be fixedly secured by spot welding or in any other suitable manner. The lower portion of this rail is of stepped form, or made of less width than its upper portion thus adapting this reduced lower portion to be inserted and confined laterally in the bottom channel portion of the extension rail between the web and the upturned bottom flange portion thereof, with the top edge of the drawer rail located below the edge of the downturned top flange portion of the extension rail C.

The case rail may be stationarily mounted in the drawer case or cabinet in any usual or suitable way, as for instance, by the usual lugs 20 and 21 at the front and rear ends of the rail, adapted to be removably engaged in slots in upright supporting parts at the front and rear portions of the case.

The drawer and extension rails are mounted in the case rail to travel lengthwise relatively thereto and to each other by antifriction or rolling bearing elements, preferably arranged as follows:

22 represents a main propeller ball carried by the extension rail substantially mid-way between its ends and extending through and loosely confined in an opening 23 in the bottom flange of the rail, and 24 represents another ball similarly confined in an opening 25 in a bottom flange of the extension rail, at a point about half-way between the ball 22 and the rear end of the rail. These balls 22 and 24, which are preferably of the same diameter, are arranged to bear and roll on the bottom flange of the case rail, and the bottom flange of the drawer rail bears on the tops of the balls, so that when the drawer is moved outwardly or inwardly, one or both of the balls 22 and 24, depending upon the position of the drawer, will be rotated by the drawer rail and, in rolling on the case rail, will propel the extension rail in the direction of movement of the drawer rail, but at half the rate of travel thereof. A third bearing ball 26 is arranged in the front portion of the extension rail between the bot-

tom flange thereof and the bottom flange of the drawer rail, so that the drawer rail is adapted to bear on and roll this ball on the bottom flange of the extension rail and support the forward end of the drawer rail, while a fourth bearing ball 27 is arranged between the rear portions of the top flanges of the drawer and extension rails. These balls 26 and 27 provide antifriction bearings between the drawer and extension rails and retain these rails practically parallel or limit tilting of the drawer rail in the extension rail in the relative longitudinal travel movements of the rails. Another, or fifth, bearing ball 28 is arranged to roll between and bear against the top flanges of the extension and case rails at the rear portion of the suspension and thus cooperates with the other balls in retaining the extension and case rails in substantial parallelism or limiting the tilting of the extension rail relatively to the case rail.

The propeller ball 22 is preferably retained in place in its hole 23 in the bottom flange of the extension rail by integral parts of the channel walls of the rail disposed so as to engage the ball and prevent escape of the same through the open side of the channel formed between the web and upturned flange of the rail, or through the hole 23. Preferably the bottom flange of the rail is embossed to provide blisters 30 or bosses 30 projecting up from the channel bottom in front and in rear of the ball, and an opening or slot 31 is made in the web, or one of the wall portions of the rail between which the ball lies, and into which slot the ball extends at one side. These bosses 30 are formed so that the edges thereof, or of the hole 23, which are spaced apart slightly less than the diameter of the ball, will engage the ball below its center and prevent the ball from dropping downwardly through the hole 23 in the rail flange, and the upper edge of the slot 31 in the rail web is so formed and proportioned as to engage the side of the ball above its center and, this edge of the slot being spaced less than the diameter of the ball from the upturned flange portion of the rail at the opposite side of the ball, prevents movement of the ball upwardly out of the open mouth of the channel. These parts are best shown in Figs. 7, 8 and 13. The ball is thus retained loosely in place in the hole 23 in the rail and, while allowed slight free movement both vertically and horizontally, is prevented from escape from the rail when the parts of the suspension are separated or the intermediate rail is removed from the case rail. The ball is adapted to engage the raised edges of the bosses 30 near its equator and is thus provided increased bearing surfaces for engagement in propelling the rail forwardly and rearwardly in the case rail. The lower rear, supporting or balancing ball 24 is similarly retained in place in its opening in the bottom of the rail by integral parts of the rail walls, including upwardly projecting bosses 30a on the bottom flange of the rail, and a similar slot 31a in the web of the rail.

The ball 27 is adapted to roll freely for a limited distance between the top flange or edge of the drawer rail and top flange of the extension or floating rail, its travel being limited by front and rear stops 32 and 33, preferably formed by slitting the downturned flange 16 and bending inwardly the lugs left between the slits, and the ball is retained in place between the stops in the channel formed between the web

and downturned top flange of the extension rail by an inwardly projecting longitudinal bead or rib 34, Figs. 9 and 12, which is an integral embossment of the web of the rail. Similarly, the ball 28 between the upper rear portions of the extension and case rails is retained in place in the upper channel of the rail by an inwardly projecting, longitudinal bead or rib 35 formed by an integral, embossed portion of the rail web. The distance which this ball is permitted to roll along between these rails is limited by front and rear stops 36 and 37, preferably formed by integral bosses bent inwardly and downwardly from the horizontal portion of the top flange of the case rail.

Preferably, the bearing ball 26 between the lower forward portions of the drawer and extension rails is arranged to roll freely in a longitudinal slit or opening 39 in the horizontal bottom flange of an angle strip 40, which is fixed, as by spot welding, in the bottom channel of the extension rail between its upturned bottom flange portion and the web. The rolling travel of this ball 26 along the extension rail is limited by the up-bent end edges 41 and 42 of the opening 39 in the guide strip 40, and the ball is retained in place in the groove or channel formed between the vertical flange of the guide strip 40 and the up-bent lower rail flange by bending inwardly the upper edge of the vertical flange of the guide strip, as indicated at 43. Therefore, this ball cannot escape from its channel or raceway thus formed.

Thus, the several balls are retained in position and prevented from escaping, getting out of place or being lost when the rails of the suspension are separated or removed one from the other. It will be noted that all of the balls, with the exception of the ball 28 between the rear portions of the case and extension rails are carried by and retained on the extension rail.

In and out movements or travel of the drawer and extension rails are limited or arrested by stop means, and preferably as follows: Near its rear end, a portion of the upturned bottom flange of the extension rail is bent outwardly forming a stop-piece 45 which projects laterally into an opening or cutout portion of the upturned bottom flange of the case rail. By engagement of the stop 45 with the upstanding rear part 46 of the case rail bottom flange, the inward movement of the extension rail is arrested. Its outward travel is limited or arrested by engagement of the stop 45 with the rear end 47 of the upstanding front portion of the flange 13 of the case rail. Travel of the drawer rail on the extension rail is arrested by a stop piece 48 suitably formed or secured in the channel of the drawer rail about mid-way between its ends and arranged to travel between and engage front and rear stop lugs or parts 49 and 50, preferably formed by tongues bent out from the web of the extension rail. Outward and inward travel of the drawer rail and drawer to which it is attached, is thus limited or determined.

When the drawer has been pulled out nearly to the limit of its forward movement, the drawer rail can be disengaged from the extension rail to permit the removal of the drawer from the case, by lifting the front end of the drawer so that the stop 48 on the drawer rail will pass over the front stop 49 on the extension rail, thus permitting the complete removal of the drawer from the case.

To permit this upward tilting of the drawer sufficiently to clear the stop 48 from the stop 49, the forward portion 51 of the downturned top flange of the extension rail is tapered or inclined forwardly and upwardly, thus giving the necessary clearance between the top edge of the drawer rail and downturned flange of the extension rail.

To permit the removal or disengagement of the extension rail from the case rail, a notch 52 is preferably formed in the rear portion of the downturned top flange of the case rail, wide enough for passage therethrough of a retaining stud 53 fixed to the rear end portion of the extension rail and projecting up therefrom at the inner side of the downturned flange portion 12 of the case rail. By moving the extension rail forwardly until said stud 53 is located opposite this notch, and then tilting the extension rail laterally or outwardly with reference to the case rail, the stud can be passed through the notch and the extension rail can be then lifted to disengage its lower edge from the upturned bottom flange 13 of the case rail. In this way, the rails can be disassembled or removed one from another and can be reassembled by reversing the operations, and no tools are necessary to accomplish the dismantling or reassembling. This makes cleaning and lubricating of the suspension a simple, quick and easy task. A low hump 54 is shown on the bottom flange of the case rail just ahead of the propeller roller 22 when the drawer is closed. This tends to retain the drawer in closed position in a well known manner.

The suspension constructed as shown and described constitutes an economical production design, being composed of the minimum number of parts, and, because of the formation of the ball retaining and stop means by integral portions of the guide rails, the use of parts requiring fastening means or devices for securing them in place is practically eliminated. In assembling the bearing balls into the suspension, they can be forced into the channels of the rails between their retaining parts by suitable means or devices, which will eliminate the hazard of fumbling the balls, as might occur if attempting to force the balls in place by hand. No portions of the suspension project underneath the drawer, so that it is possible to extend the side of the drawer down to within the normal working clearance of the bottom of the suspension, and thus the suspension occupies less space than previous suspensions of comparable desirability. The guide rails are held interlocked in place without the necessity of any cross ties or members between the guide means which are located at the opposite sides of the drawer. The extension rail is retained in place in the case rail, and the drawer rail in the extension rail. Nevertheless, the drawer rail can be removed from the extension rail, and the extension removed from the case rail quickly and easily for cleaning and lubricating, without the use of any tools. By the described arrangement of the bearing balls, and having the balance or supporting ball 24, which is in rear of the main propeller ball 22, of the same diameter as the latter, the progressive action of the suspension is always positive, which has been found not to be the case in previous somewhat similar suspensions, in which the rear balance ball is of smaller diameter than the main propeller ball. Furthermore, there was a considerable amount of clatter with the smaller balance ball. This objection is removed by the construction herein disclosed, which is much smoother and quieter in operation. The construction shown in Figs. 15-17 may be

substantially the same as above described, except for a slight modification, which is preferred when it is desired to adapt the drawer to be pulled out to a position in which its full length projects out of the case, i. e., with its rear end wall at or outwardly beyond the case front. This modification consists in providing the extension rail C with a boss or hump 55 on the underside of its bottom flange, just in rear of the propeller ball 22, and adapted to bear on and support the forward part of the extension rail and parts carried thereby when the rail has been moved forwardly far enough for the ball 22 to pass off of the front end of the case rail A.

We claim as our invention:

1. In a progressive suspension for slidably supporting drawers and the like, comprising a stationary rail, and movable drawer and extension rails, and rolling bearing elements for supporting said drawer and extension rails for relative movement from said stationary rail, the improved construction in which each of said stationary and extension rails is of channel shape having top and bottom flanges provided respectively with downturned and upturned flange portions, said extension rail is arranged with its lower portion extending into the channel between the web and upturned flange portion of the stationary rail and with its top edge below the downturned top flange portion of the stationary rail, said drawer rail has a lower portion of reduced width which extends into the channel between the web and the upturned flange portion of the extension rail, and certain of said bearing elements are arranged respectively between the top flanges of said stationary and extension rails and of said extension and drawer rails and hold the rails in interlocked engagement

2. In a progressive suspension for slidably supporting drawers and the like, comprising a stationary rail, and movable drawer and extension rails, and rolling bearing elements for supporting said drawer and extension rails for relative movement from said stationary rail, the improved construction in which each of said stationary and extension rails is of channel shape having top and bottom flanges provided respectively with downturned and upturned flange portions, said extension rail is arranged with its lower portion extending into the channel between the web and upturned flange portion of the stationary rail and with its top edge below the downturned top flange portion of the stationary rail, said drawer rail has a lower portion of reduced width which extends into the channel between the web and the upturned flange portion of the extension rail, and certain of said bearing elements are arranged respectively between the top flanges of said stationary and extension rails and of said extension and drawer rails and hold the rails in interlocked engagement, a stud projects up from said extension rail at the inner side of the downturned top flange portion of the stationary rail, and said downturned flange portion has therein a notch through which said stud projection is adapted to pass laterally and allow disengagement and removal of said extension rail from said stationary rail.

3. In a progressive suspension for slidably supporting drawers and the like, comprising a stationary rail, and movable drawer and extension rails, and rolling bearing elements for supporting said drawer and extension rails for relative movement from said stationary rail, and including a ball carried by said extension rail and having

rolling contact with said other two rails, the improved construction in which said extension rail is of channel form having a web and flange that form walls at opposite sides of said ball and a bottom wall with a hole through which said ball extends, said rail having integral parts of said channel-forming walls which are spaced apart less than the diametrical dimension of the ball and are disposed to engage the ball at opposite sides of a diametrical plane through the ball and prevent it from passing through said hole or out of the open side of said channel.

4. In a progressive suspension for slidably supporting drawers and the like, comprising a stationary rail, and movable drawer and extension rails, and rolling bearing elements for supporting said drawer and extension rails for relative movement from said stationary rail, the improved construction in which said extension rail has a web and a bottom flange with an upturned flange portion forming a channel, said bearing elements include balls extending through holes in said bottom flange of said extension rail and having rolling contact with said other two rails, and each of said balls is retained in place in said extension rail and prevented from passing through said hole or out of the open side of said channel by integral portions of the walls forming said channel which are spaced apart less than the diametrical dimension of the ball and are disposed to engage said ball at opposite sides of a diametrical plane through the ball.

5. In a progressive suspension for slidably supporting drawers and the like, comprising a stationary rail, and movable drawer and extension rails, and rolling bearing elements for supporting said drawer and extension rails for relative movement from said stationary rail, including a ball carried by said extension rail and having rolling contact with said other two rails, the improved construction in which said extension rail has a flange with a hole through which the ball extends and walls at opposite sides of the ball, one of which has a slot into which the ball projects, and said flange has integral parts at the opposite sides of said hole and spaced apart a distance less than the diameter of said ball, which parts and the edge of said slot are disposed to engage said ball and prevent it from escape through said hole and from between said walls.

6. A progressive guide suspension for drawers and the like comprising channel-shaped stationary and extension rails each having top and bottom flanges provided respectively with downturned and upturned flange portions, said extension rail being arranged in said stationary rail with the bottom portion of the extension rail extending and confined between the upturned flange and web of the stationary rail, a drawer rail having a reduced lower edge portion extending and confined between the upturned flange portion and web of the extension rail, rolling bearing elements arranged to movably support the drawer and extension rails from the bottom flange of said stationary rail, rolling bearing elements which are arranged respectively between the top flanges of the drawer and extension rails and of the extension and stationary rails and hold said rails in interlocked engagement with each other, a stud projecting up from said extension rail at the inner side of said downturned top flange portion of the stationary rail, and a notch in said downturned flange portion through which said stud can pass laterally and allow dis-

engagement and removal of said extension rail from said stationary rail.

7. A progressive guide suspension as set forth in claim 6, in which said extension and drawer rails have stop projections adapted to engage to limit the forward travel of said drawer rail, and said downturned top flange portion of the extension rail is tapered forwardly and upwardly whereby when the drawer rail is moved forwardly, it can be tilted upwardly to allow the stop on the drawer rail to pass said other stop and the drawer rail to be removed forwardly from the extension rail.

8. In a progressive suspension for slidably supporting drawers and the like, comprising a stationary rail, and movable drawer and extension rails, and rolling bearing elements for supporting said drawer and extension rails for relative movement from said stationary rail, the improved construction in which said extension rail is of channel shape having a bottom flange with an upturned flange portion, said bearing elements include balls extending through holes in said bottom flange of said extension rail and having rolling contact with said other two rails, an angle guide strip is secured in the forward part of

the channel formed by the bottom flange of the extension rail, a ball is arranged to roll between the bottom flanges of the extension and drawer rails in a longitudinal slot in a bottom flange of said guide strip, and a vertical flange of said guide strip has an inturned lip which retains the ball in place in said extension rail.

9. In a progressive suspension for slidably supporting drawers and the like, comprising a stationary rail, and movable drawer and extension rails, and rolling bearing elements for supporting said drawer and extension rails for relative movement from said stationary rail, and including a ball carried by said extension rail and having rolling contact with said other two rails, the improved construction in which said extension rail has a hump protruding below its bottom side back of said ball and adapted to bear on an underlying portion of said stationary rail and partially support said extension rail when the extension rail has been moved forwardly sufficiently for said ball to pass off of said stationary rail.

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