

Oct. 11, 1966

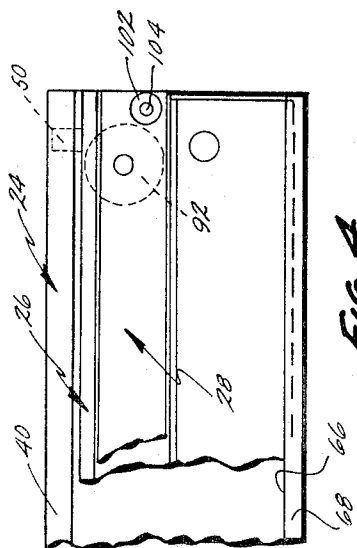
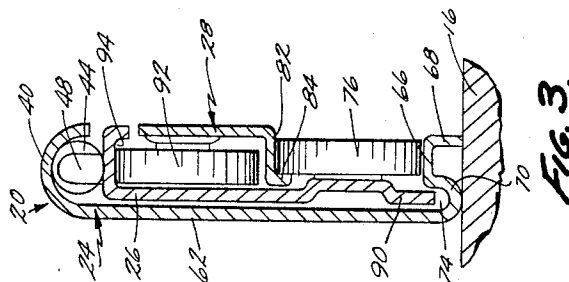
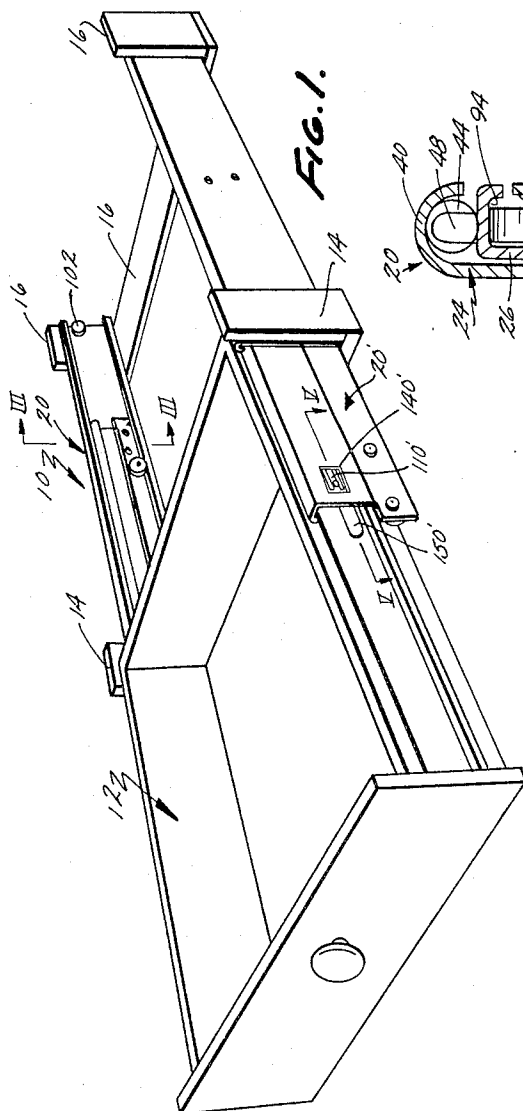
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DRAWER RAIL ASSEMBLY

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2 Sheets-Sheet 1



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2 Sheets-Sheet 2

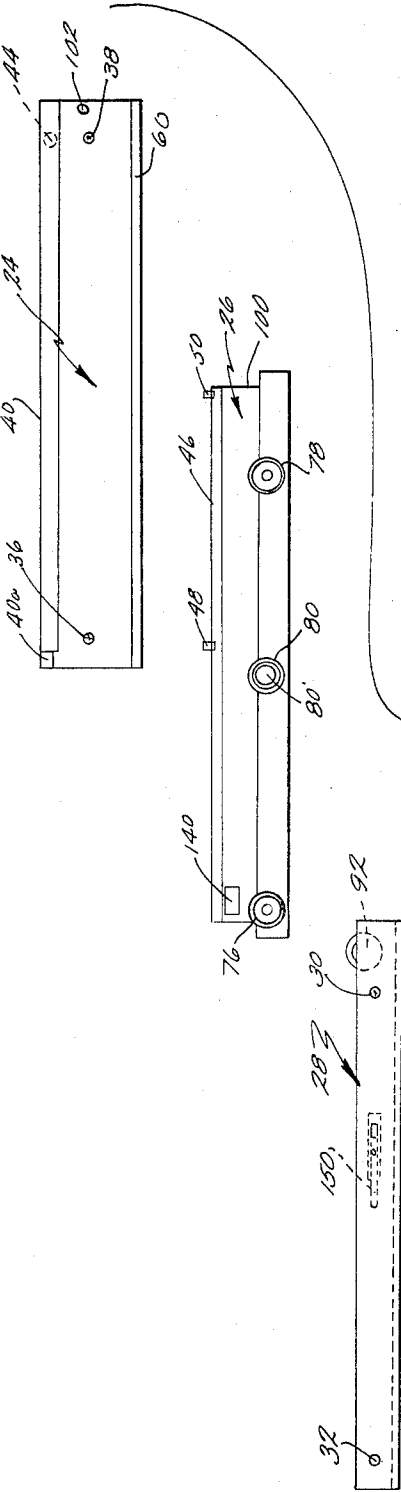


FIG. 2.

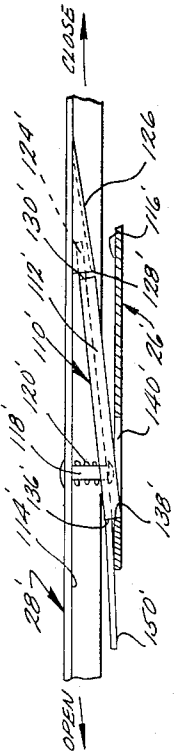


FIG. 5.

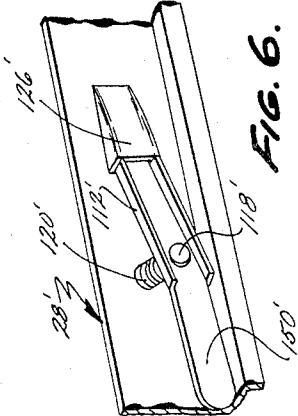


FIG. 6.

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## DRAWER RAIL ASSEMBLY

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This invention relates to a progressive drawer rail assembly, and more particularly to a heavy duty, substantially full extension drawer rail assembly having a unique narrow rail dimension requiring minimum cabinet side space.

Progressive drawer rail assemblies employing a cabinet rail, a drawer rail, and an intermediate rail on each side of the drawer, when fabricated for heavy duty purposes, conventionally have a substantial thickness. These heavy duty rail assemblies, to support about 100 lbs. or so in extended position, and to have a long useful life, should utilize wheel type rollers rather than simple balls, especially where the stress is maximum. Balls have proven to cause short drawer rail life and early breakdown. The balls constantly and gradually deform the tracks, causing the extended drawer to slip unacceptably, and causing the components to either release or bind, depending upon their particular position. Preferably, the wheel type rollers for heavy duty rail assemblies should have ball bearing mountings.

Wheel type rollers, especially quietly operating polymeric rollers, and particularly those employing ball bearing mountings, must have substantial width to be durable and effective. Further, the metal rails forming channel tracks for the wheels to support them and keep them in position, must have substantial thickness, especially at the track forming portions. This is necessary to withstand the constant concentrated stresses of the load applied through the rollers to the tracks. Consequently, as is widely known in the trade, when these factors are all properly considered and incorporated into the structure, the fabricated and assembled full extension heavy duty progressive drawer rail assembly has a substantial thickness. Normally, this is much greater than 1/2 inch for conventional size drawers. Partial extension drawers have less thickness, normally around 1/2 inch, since the smaller stresses enable use of smaller components and lighter gauge materials.

Cabinet manufacturers today are requiring that even full extension heavy duty rail assemblies have a thickness no greater than that of the non-heavy duty, non-full extension assemblies so that all cabinets and drawers can be made of the same dimensions to be universal. This uniform dimensional criterion means that all must have the same side space clearance between the sides of the drawers and the cabinet, to receive the rail assembly. To do this while still employing present drawer rail construction causes a drastic sacrifice in the drawer rail useful life, and/or ease of operation, and/or progressive opening action, and/or heavy duty capacity. Consequently, a substantial problem has been presented to the industry to provide a high quality, heavy duty, full extension, progressive drawer assembly that can be placed in a substantially small side clearance, for example, of about 1/2 inch.

Heavy duty drawer rail assemblies also frequently exhibit another particular problem which occurs with respect to the stop mechanism at full open position. A rapidly opened, heavily loaded drawer imparts a sharp and substantial impact force to the relatively small stop which must instantly halt the drawer and its load. With wheel

roller type assemblies, the stop often assumes the form of an element attached to one rail and positioned in the path of a portion of another rail. The impact upon stopping applies the force to the attached stop and to its attachment means, for example a rivet. Repeated impact blows with hundreds or thousands of openings of the drawer can readily cause early failure. This is not really surprising in view of the conditions presented, although it does present a substantial problem. As can be realized, since the drawer rails should be removable from the intermediate rails, so that the drawer itself can be removed from the cabinet assembly, these stop elements are normally quite delicate to be manually shiftable for release of the drawer. If a rigid element such as a pin is secured as a stop, the rails cannot be readily disassembled.

It is an object of this invention to provide a novel, heavy duty, progressive, substantially full extension drawer rail assembly that can actually be made without sacrificing any of its characteristics of heavy duty capacity, progressive action, substantially full extension, and rigid durable construction employing wheel type roller elements.

Another object of this invention is to provide a novel drawer rail assembly having wheel type rollers for optimum rolling support, having capacity to support, guide, and retain the wheel elements in proper relationship, but being of an overall thickness less than that normally required since not requiring channel type roller tracks to keep the rollers on the track and prevent disassembly between the intermediate rail and the case rail.

Another object of this invention is to provide a full open rail stop mechanism that is especially advantageous on heavy duty drawer rail assemblies, and wherein the substantial impact blow is transferred directly from the drawer rail to the intermediate rail rather than being applied to the attachment means for the stop. No stress is imparted to the attachment means for the stop itself, so that its useful life is very great. This even allows a delicate spring assembly to be employed for the stop assembly, making its manual shifting very simple for removal of the drawer with its drawer rails from the remaining components of the rail assembly.

These and several other objects of this invention will become apparent upon studying the following specification in conjunction with the drawings in which:

FIG. 1 is a perspective view of a drawer shown fully extended from a simulated cabinet, and utilizing two of the novel sets of rail assemblies of this invention;

FIG. 2 is a perspective exploded view of the case rail, drawer rail and intermediate rail of one set of rails;

FIG. 3 is a sectional view of one set of rails in the drawer rail assembly in FIG. 1, taken on plane III—III, but showing the rails in retracted (unextended) position;

FIG. 4 is a fragmentary elevational view of the rear portion of the rail assembly with the rails at fully closed position;

FIG. 5 is a sectional view of the full open stop assembly of the drawer rail assembly in FIG. 1, taken on plane V—V; and

FIG. 6 is a perspective view of a portion of one drawer rail and the stop lever thereon.

Referring now specifically to the drawings, the complete drawer assembly 10 illustrated in FIG. 1 includes a conventional drawer 12 which normally is to be mounted in a cabinet which is here shown in skeletal fashion by a pair of upright, U-shaped, spaced cabinet supports 14 and 16. The drawer is mounted to the cabinet and extensible with respect thereto to a substantially full open position as illustrated in FIG. 1, by a pair of rail assemblies 20 and 20', one being a mirror image of the other.

Only one of these rail assemblies will be described, since a description of the other would constitute mere repetition.

The drawer rail assembly 20 comprises three rails, specifically, case rail 24, intermediate rail 26, and drawer rail 28. The inside face of the drawer rail, i.e. that shown in FIG. 2, is mounted flat against the outside face of the drawer side wall (FIG. 1) by suitable screws inserted through openings 30 and 32 at opposite ends of the rail. Likewise, case rail 24 is normally mounted to the inside of the case or cabinet as by suitable screws inserted through openings 36 and 38 on opposite ends of the rails.

The case rail includes a rolled upper edge 40 forming a downwardly opening groove or slot which receives a rolling ball element 44 that rides along the upper surface 46 formed by the rolled upper flange edge on the intermediate rail 26. This ball is retained between spaced pins 48 and 50 secured to the intermediate rail in the center and at the rear end. The front end 40a of rolled edge 40 has a smaller diameter curvature to intersect the groove inside the rolled edge 40 to form a stop means for pin 48 at full extension of the intermediate rail with respect to the case rail. Pins 48 and 50 project upwardly into the downwardly opening groove in edge 40 when these two rails are assembled.

The lower edge portion 60 of case rail 24 has a particularly unique construction. More specifically, referring to FIG. 3, the lower edge construction which projects from the main body 62 of case rail 24, projects laterally therefrom beneath the other two rails. The bottom edge portion is shaped like the numeral 5 lying prone on its face. The upper cross bar of the 5 has its free edge along the cabinet base 16, and its arcuate bottom curve also rests against the cabinet. The flat back surface 66 of the lower edge is actually elevated by leg 68 and the quarter circular arcuate portion 70 of the 5 curve. The track surface 66 between them is thus elevated above the bottom-most edge of the assembly, and above the cabinet surface, while supported on both sides by these legs. The curve of which leg 70 forms one-half is actually a semi-circular arcuate curve in cross section, which blends directly into the main body portion 62 of case rail 24. This curved portion not only serves in combination with leg 68 to support track surface 66 in an elevated position, but also forms the depressed retention groove 74 below the track surface. The groove has an upwardly opening elongated mouth parallel to the track surface, adjacent to it, and positioned intermediate the track surface and the main body portion 62 of the case rail.

It will be noted that the track surface possesses no upwardly projecting flange, even on its outer edge, to form a channel type track for rollers 76, 78 and 80 (FIG. 2).

All three of these rollers are rotatably mounted on the intermediate rail, and positioned between this elevated track surface of the case rail and the bottom cooperating track surface 82 along the bottom edge of drawer rail 28. The drawer rail also includes a depending flange 84 on the inner edge of track surface 82 to orient the drawer rail with respect to the intermediate rail. Great load stress is normally applied to the wheel type rollers 76, 78 and 80, especially frontal roller 76. Therefore it has ball bearing mounting means. Central roller 80 has slight vertical play on its mounting axis pin 80' to allow it to float vertically slightly, and provide a constant driving action for the progressive opening of the rail assembly. It is in contact with the case rail and the drawer rail at all positions of the drawer. Roller 78, although in contact with the case rail constantly, is only in contact with the drawer rail when in the almost closed position. Roller 76, in constant contact with the drawer rail, is only in contact with the case rail at almost closed position.

The stress applied by these roller elements to the track necessitates particular track structure to prevent it from deforming. This has been found with experience. Thus, leg 68 is vertical, being normal with respect to track sur-

face 66. On the other hand, since the groove 74 must include side walls that extend down and then upwardly again, it has been found that for rolled construction, to achieve proper strength for leg 70, this entire structure should be curved arcuately. Thus, the particular rail bottom configuration resembling the numeral 5 lying prone on its face is important.

Since track surface 66 contains no upwardly projecting flange, the great increase in thickness this would cause in the overall assembly is prevented, thereby achieving the thin dimension.

The intermediate rail is retained in assembled position with respect to the case rail by having a depending lower edge flange 90 project downwardly below the lower periphery of rollers 76, 78, and 80 and into groove 74 behind and beneath track 66. Any tendency for rollers 76, 78, and 80 to slip off track 66 is prevented by this interfit.

Another elevated wheel type roller 92 is mounted to the drawer rail at the rear end thereof, to interfit within the channel type downwardly opening track surface 94 formed on the upper edge of the intermediate rail. This bears a load when the drawer is fully extended. Since this channel however, can be formed in the intermediate rail within the thickness dimensions of the assembly, it need not be specially formed. It does not present the problem which the conventional channel along the bottom of the case rail presented, to receive the outwardly mounted rollers 76, 78, and 80.

When the drawer rail assembly is in the completely closed position, as illustrated for example by the fragmentary drawings in FIG. 4, the off set back edge 100 on the rear of the intermediate rail abuts the resilient stop element 102. This element is fixed by rivets 104 to the back edge of the case rail. Furthermore, simultaneously, the periphery of upper roller 92 rotatably mounted on drawer rail 28 also abuts this stop element. Thus, the entire assembly is stopped at full closed position by this one resilient element.

In operation of this assembly, drawer 12 is extended out of cabinet 16-14 by pulling on the drawer handle. This extends the two, like rail assemblies 20 and 20'. As each rail assembly extends, each drawer rail moves at twice the speed of the intermediate rail due to contact with the propulsion roller 80 rotatably mounted in the central portion of the intermediate rail, and contacting, in conventional fashion, both the case rail and the drawer rail during the entire extension. Rollers 76, 78, and 80 roll along the flat track surface 66 on the case rail and at times against the upper adjacent track surface 82. They are maintained from lateral movement off the track by the interfit of flange 90 with groove 74.

The intermediate rail is originally assembled with the case rail prior to the attachment of stop 102. The intermediate rail extends with respect to the case rail until stop 48 abuts turned under end 40a of rolled edge 40 of the case rail. Each drawer rail extends with respect to the case rail until its special stop mechanism 110 or 110' for respective rail sets 20 and 20', abuts with the cooperating means of the outer end of the respective intermediate rail.

This particular stop mechanism on each side includes an elongated latch element 112' which is oriented laterally diagonally between the outer surface 114' of the drawer rail 28', and the inner surface 116 of intermediate rail 26'. This element is attached to drawer rail 28' by a pin 118' extending through both elements with clearance therebetween. A compression coil spring 120' is mounted around pin 118' between the back surface of element 112', and surface 114' of the drawer rail. This spring biases the stop element 112' to the most diagonal position illustrated in FIG. 5 which it can assume. This stop or latch element includes a tongue 124' on one end projecting into the slot at one end of the boss deformed from the wall of the drawer rail. Box 126' includes a stop surface 128' to contact the integral shoulders 130'

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astraddle tongue 124', so that thrust applied axially of element 112' is imparted directly to the integral stop deformed from the side of the drawer rail. This element 112' is retained stably in its diagonally oriented position, generally along the elongated dimension of the rail. Its pair of outwardly extending shoulders causes it to have a generally U-shaped cross section, with the one end of the shoulders forming the noted abutment surface means 130' and the opposite end forming abutment surfaces 136' which cooperate in one position with stop surface 138' that is really the front edge of opening 140'. This opening is die cut into the front of the intermediate rail.

The stop relation in FIG. 5 occurs with full extension of the rail. Spring 120' biases element 112', and more specifically surfaces 136', into interengagement with surface 138' by forcing it through opening 140. When drawer rail 28' is pushed closed in the direction of the arrow shown in FIG. 5, the tapered back edge of stop shoulders on element 112' will contact the back edge of opening 140' in the intermediate rail. This presses the element 112' laterally toward the drawer rail against the bias of spring 120', so that the element slides over pin 118' to ride along the inside surface 116' of the intermediate rail.

When the drawer is opened, however, and drawer rail 28' is pulled to the extended position, as soon as element 112' approaches opening 140', spring 120' biases the element into the opening to cause a contacting abutment between abutment surface 136' and stop surface 138'. This causes the impact of the loaded drawer to be applied, not to pin 118' that suspends the element, but directly from the drawer rail to the intermediate rail by abutment of surfaces 136' and 138' and surfaces 130' and 128'. This applies it directly to boss 126' on the drawer rail and the integral body of the intermediate rail so that no stress is applied to fragile parts, but to the basic components of the rail assembly. The trust on the intermediate rail is in turn imparted to the case rail through the pin 48 (or 48') and curled edge 40a. If desired, a resilient bumper may be placed between these last two elements.

If it is desired to remove the drawer with its rail from the assembly, it is only necessary to shift each of the stop mechanisms by depressing the extended tabs 150' and 150 out of openings 140' and 140, against the bias of their springs, to disengage abutment surface (136') from stop surface (138'), and allow the drawer to be retracted and removed.

The novel construction achieves a heavy duty assembly which can carry remarkably heavy loads, and which has been found to be useful over many thousands of cycles with no significant wear. The rollers distribute the load and stand up well. The rollers do not slip from the novel track construction on the case rail, even though the tracks do not have upstanding flanges, but rather, are retained in proper relation even though the structure has an overall thickness substantially less than that normally necessary.

The stop mechanism has an extended useful life since it does not apply the impact force to the delicate attachment means, but rather applies the force directly to the body of the rails for maximum useful life. Additional advantages other than those specifically cited above may readily occur to those in the art upon studying the particular preferred form of the invention illustrated.

It is also conceivable that certain minor deviations in structural details may be provided on the structure within the inventive concept. Hence, the invention is not intended to be limited to the preferred construction shown, but only by the scope of the appended claims and the reasonably equivalent structures to those defined therein.

I claim:

1. A drawer rail assembly comprising: a drawer rail, a case rail, and an intermediate rail; said rails having rolling elements therebetween, including wheel type rollers

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at least between said case rail and said drawer rail and rotatably mounted to said intermediate rail; the bottom edge of said case rail projecting away from the main rail body, beneath said drawer rail and intermediate rail, forming a track surface for said rollers; said track-forming bottom edge having an elongated upwardly open groove between said main rail body and said track surface; and said intermediate rail having a lower edge projecting down beyond the periphery of said rollers and beyond said track surface into said groove to prevent significant lateral movement of said intermediate rail that would cause disengagement of said rollers from said track surface.

2. A thin line drawer rail assembly comprising: a drawer rail, a case rail, and an intermediate rail; said rails having rolling elements therebetween, including wheel type rollers at least between said case rail and said drawer rail and rotatably mounted to said intermediate rail; the bottom edge of said case rail including an elongated elevated track surface for said rollers, spaced from the mounting body of said case rail by an intermediate elongated retention groove parallel to said elevated roller track surface; and said intermediate rail having a lower edge portion projecting down beyond the periphery of said rollers and beyond said track surface into said groove to prevent substantial lateral movement of said intermediate rail that would cause disengagement of said rollers from said elevated track surface.

3. A drawer rail assembly comprising: a drawer rail, a case rail, and an intermediate rail; said rails having rolling elements therebetween, including wheel type rollers at least between said case rail and said drawer rail and rotatably mounted to said intermediate rail; the bottom edge of said case rail including an elongated elevated track surface for said rollers, spaced from the mounting body of said case rail by an intermediate elongated retention groove parallel to said elevated roller track surface; said intermediate rail having portions received by said groove; said elevated track surface having spaced elongated depending support legs on opposite sides thereof, with the leg adjacent said groove also forming one wall of said groove.

4. The assembly in claim 3 wherein said groove is formed by an integral arcuately configured portion of said intermediate rail.

5. A progressive drawer rail assembly comprising: a drawer rail, a case rail, and an intermediate rail; said rails having rolling elements therebetween, including wheel type rollers rotatably mounted to said intermediate rail; said rollers including a progressive driver roller in engagement with both said drawer rail and case rail during extension thereof; said case rail having an upright main mounting portion, and a bottom edge portion; said bottom edge portion being shaped in cross section like a 5 lying prone on its face; the elevated flat back surface of said prone 5 forming an elevated track surface underlying said rollers; the cross leg of said 5 forming one support leg for said track surface; the arcuate curve of said prone 5 forming a second support for said track surface, and also an elongated, upwardly open retention groove between said track surface and said main case rail portion; and said intermediate rail having depending flange portions extending beneath said rollers into said groove to prevent said rollers from slipping off said elevated track surface.

6. In an extensible drawer rail assembly having a drawer rail, a case rail, and an intermediate rail, a full-open stop assembly comprising: a first stop surface integral to the outer end portion of said intermediate rail; a second stop surface integral to the central portion of said drawer rail; said stop surfaces approaching each other with rail extension; a stop element oriented laterally diagonally between said drawer rail and intermediate rail and generally aligned with said stop surfaces; means suspending said element on one of said drawer and intermediate rails; said element having stop abutting ends to engage said stop surfaces and cause direct impact force transmission from said drawer rail stop surface to said intermediate rail stop surface

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without imparting force to said element suspension means; and said element being manually releaseable from one of said surfaces to allow further extension and removal of said drawer rail from said intermediate rail.

7. In a drawer rail assembly including a drawer rail, a case rail, and an intermediate rail, a full-open stop assembly operable between said rails, comprising: a first vertically oriented stop surface integrally formed into the outer end portion of said intermediate rail; a second, vertically oriented stop surface centrally of and integrally formed into said drawer rail; a binding element and means suspending said element on said drawer rail, said binding element extending longitudinally between said drawer rail and intermediate rail to engage both of said stop surfaces at its ends with full opening of said drawer rail to cause direct impact force transmission from said drawer rail stop surface to said intermediate rail stop surface; biasing means operable on said element to bias it toward a laterally diagonal stop position between said stop surfaces; said element normally being depressed against said biasing means between said drawer rail and intermediate rail; an opening in said intermediate rail adjacent said first element to enable said element to be shifted partially thereinto by said biasing means to engage said first stop surface and said second stop surface at full open position to thereby stop relative extension of said rails.

8. In a drawer rail assembly including a drawer rail, a case rail, and an intermediate rail, a full-open stop assembly operable between said rails, comprising: an opening in the outer end portion of said intermediate rail, with an edge forming an integral stop surface; a boss deformed into the central portion of said drawer rail, and having a severed edge forming a second vertically oriented inte-

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gral stop surface; said stop surfaces approaching each other with rail extension; a binding element extending longitudinally between said drawer rail and intermediate rail to engage both of said stop surfaces at its ends with full opening of said drawer rail to cause direct impact force transmission from said drawer rail stop surface to said intermediate rail stop surface; a pin extending through said element and said drawer rail while allowing said element to be moved laterally thereon a limited amount; said element including a finger on one end extending into said severed boss; a spring between said drawer rail and element and around said pin to bias the second end of said element toward said intermediate rail; said element having abutment surface means on said one end adjacent said second stop surface, and having second abutment surface means adjacent its second end for abutment with said first stop surface; said element normally being depressed against the bias of said spring by being pressed between said drawer rail and intermediate rail; at full extension of said rails, said second abutment surface means being biased into said opening and into engagement with said first stop surface; and said element being manually depressible against the bias of said spring to release said element from said first stop surface and allow removal of said drawer rail from said intermediate rail.

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