May 5, 1964 E. C. BULLOCK 3,131,982

EXTENDIBLE DRAWER SUPPORT

Filed March 2, 1962 2 Sheets-Sheet 1

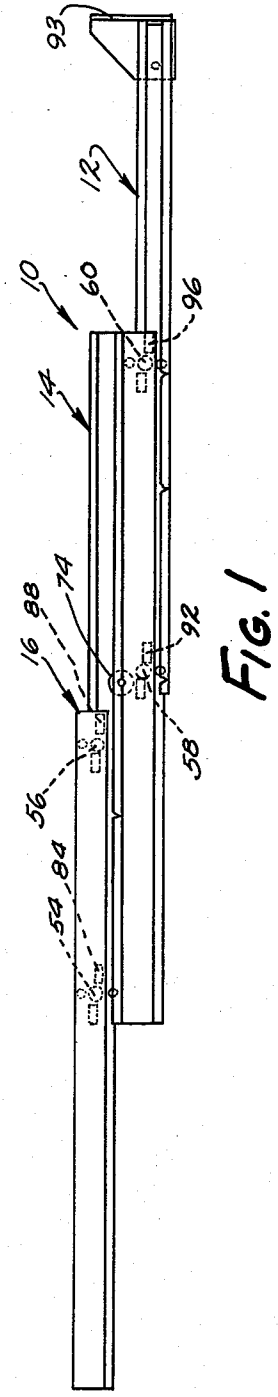

FIG. 1

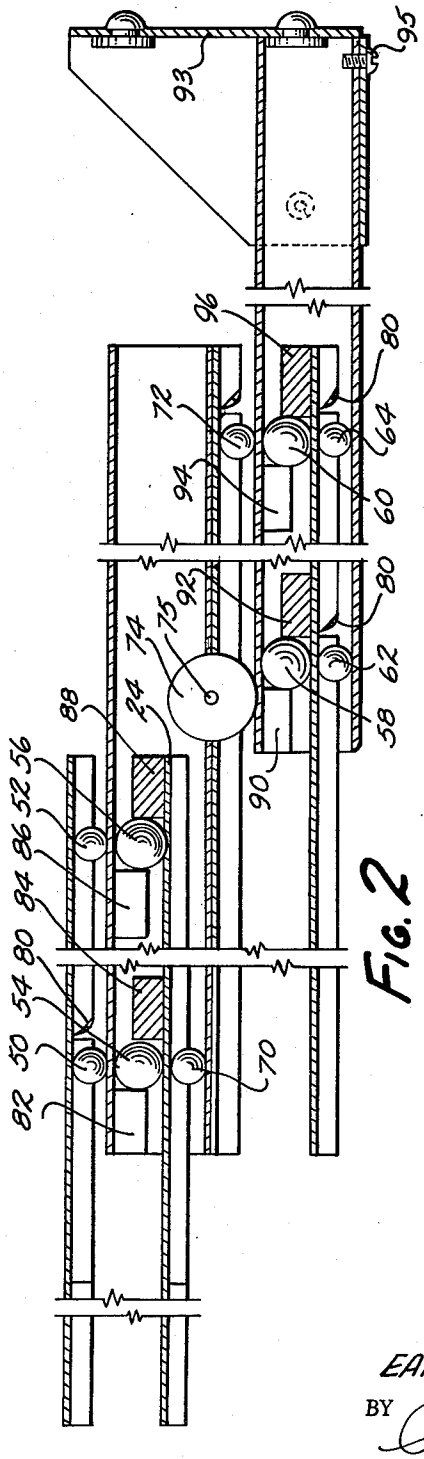

FIG. 2

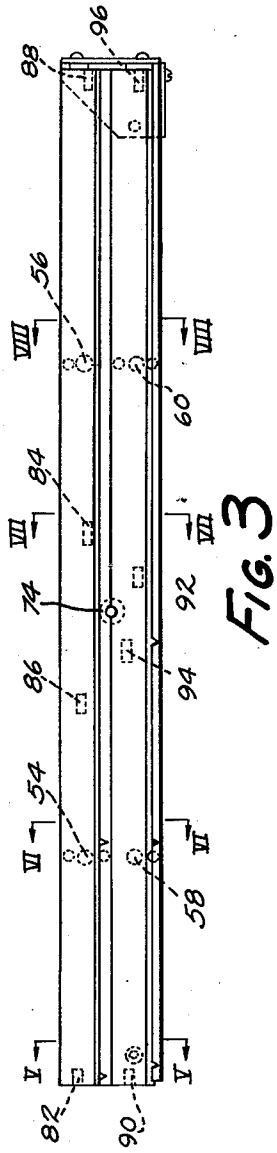

FIG. 3

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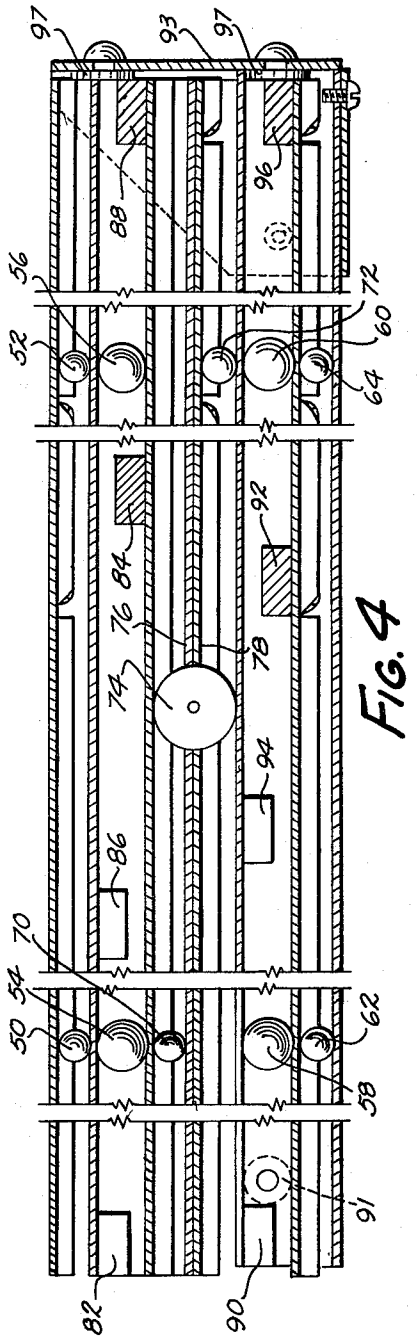

FIG. 4

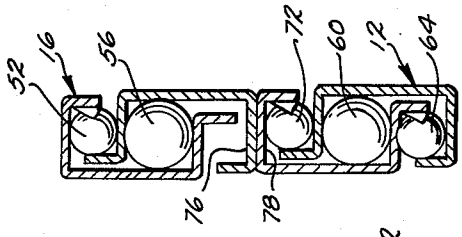

FIG. 8

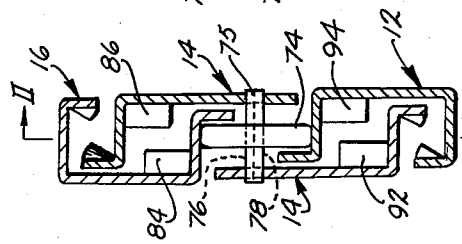

FIG. 7

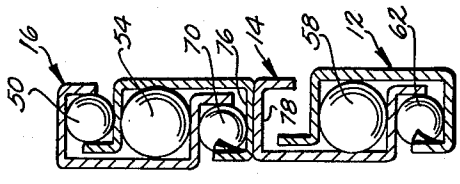

FIG. 6

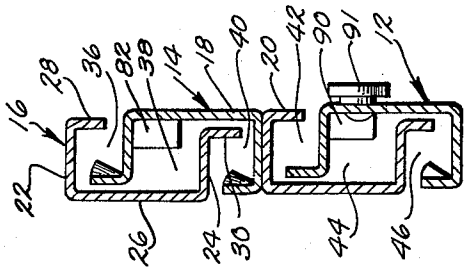

FIG. 5

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EXTENDIBLE DRAWER SUPPORT

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3 Claims. (Cl. 312—339)

This invention relates to extensible drawer supports and more particularly to extensible drawer support rails including a case rail, a suspension rail, and a drawer rail having ball-type separators. This invention is an improvement of my inventive structure in United States Patent No. 2,762,660.

The basic structure includes an assembly in which all three elements, i.e. the drawer rail, the case rail, and the suspension rail are formed from identical channel sections. One channel forms the case rail, one channel forms the drawer rail, and two connected channels form the suspension rail. These are telescopically interfitted to define raceways into which a plurality of balls are placed to separate the elements in a frictionless manner. Serving as the propulsion member between the case rail and the drawer rail in my structure according to the teachings of my above patent, is a freely floating disc-type roller. This structure has been found to be unusually economical to fabricate and assemble. It also possesses excellent alignment characteristics since capable of assuming lateral pressure loads in either direction.

However, this prior structure does possess a disadvantage which is common to most three rail drawer suspensions. This disadvantage results from the fact that the rear of the suspended drawer, even when the drawer is fully extended, remains within the confines of the cabinet or case, thereby causing removal of the rearmost files in a full drawer to be difficult, at best.

The reason why the back end of the drawer remains in the case is as follows: Firstly, the maximum length of the case rail is the length of the cabinet minus the thickness of the drawer front panel which houses the latching and locking mechanism. This latter thickness may be up to an inch or so. Secondly, the case rail, extension rail, and drawer rail are of the same length for maximum capacity. Thus, when the drawer and drawer rail are fully extended, the rail stops are set so that the rear end of the drawer rail (and thus the drawer) still overlaps the front end of the case rail, with the propulsion roller being between the overlapping portions. This overlapping has been necessary to prevent the propulsion roller from being dislodged and/or misaligned with respect to the drawer rail. This latter condition would cause the drawer to jam in the open position. In summation, since the front edge of the case rail is recessed inside the front of the cabinet to allow for the thickness of the drawer front panel, and since the rear end of the drawer rail ordinarily must overlap this recessed case rail, the back end of the drawer rail is substantially within the cabinet even when the drawer is fully extended. If the drawer is made the full length of the drawer rail to take advantage of all available cabinet space, the back end of the drawer also is recessed substantially within the case and never emerges therefrom.

It is an object of this invention to provide an improved structure capable of effecting the fabrication, assembly, and structural advantages of my prior structure, while also enabling the rear of the drawer rail and drawer to be extended to a position clear of the cabinet. This has been accomplished by a modification of the existing parts in the structure so as not to sacrifice the original advantages, while eliminating the extension limitation. The modification constitutes a relatively simple but unobvious change in the prior structure, thereby enabling its

ready incorporation at a relatively low cost. Indeed, the simplicity of the change, compared to the resulting benefit, is the most attractive and unexpectant feature of the modified structure.

Other advantages and objects will be apparent upon sturdying the following specification in conjunction with the drawings in which:

FIG. 1 is a side elevational view of the inside face of the improved structure showing the suspension in extended position;

FIG. 2 is a fragmentary sectional elevational view taken along the plane II—II of FIG. 7 showing the suspension in extended position;

FIG. 3 is a side elevational view of the inside face of the structure showing the suspension in closed position;

FIG. 4 is a fragmentary sectional elevational view taken along plane II—II of FIG. 7 showing the suspension in closed position;

FIG. 5 is a sectional elevational view taken along plane V—V of FIG. 3;

FIG. 6 is a sectional elevational view taken along plane VI—VI of FIG. 3;

FIG. 7 is a sectional elevational view taken along plane VII—VII of FIG. 3; and

FIG. 8 is an elevational view taken along plane VIII—VIII of FIG. 3.

Basically, the invention comprises an extensible drawer suspension unit having a case rail, a suspension rail, and a drawer rail, with a disc-shaped propulsion roller having an axle rotatably and irremovably anchored or mounted to the suspension rail generally in the central portion thereof. The propulsion roller normally contacts both the case rail and the drawer rail by extending through an opening in the suspension rail. The stops between the rails are located to allow drawer rail extension past the end of the case rail, out of contact with the propulsion roller, and out of the case. Thus, the rear end of a full length drawer supported on the drawer rail will emerge from the confines of the case. Since the propulsion disc is anchored to the rail, it cannot become misaligned or dislocated when the drawer rail moves out of contact with it and back into contact with it.

Referring to the drawings, all three rails are formed of a plurality of identical channel sections. More specifically, referring to FIG. 5, drawer rail **16** is formed of one channel, case rail **12** is formed of one channel positioned in an inverse relationship to the drawer channel, and suspension rail **14** is formed of two interconnected, oppositely directed channels **18** and **20** attached as by welding or the like. Each of these channels is generally C-shaped, having a pair of parallel arms **22** and **24** (see channel **16**) connected by a web **26**. At the end of the arms **22** and **24**, remote from web **26**, is a pair of flanges **28** and **30**. These flanges extend in the same direction as each other, and are parallel to web **26**. Flange **30** extends outwardly of the channel while flange **28** extends inwardly of the channel, with outwardly extending flange **30** being offset slightly from inturned flange **28** whereby it is closer to web **26**.

The lower portion of drawer rail **16** is telescopically interfittable with the upper channel section **18** of the suspension rail **14**. Further, case rail **12** is telescopically interfittable with the lower channel section **20** of the suspension rail **14**.

This telescopic interfitting defines six raceways therebetween, with three raceways **36**, **38** and **40** being between the drawer rail and the upper half of the suspension rail, and three additional raceways **42**, **44** and **46** being between the case rail and the lower half of the suspension rail. In the four outermost raceways **36**, **38**, **44** and **46**, two balls are used in each to separate the rails and allow frictionless movement therebetween.

Thus, raceway 36 includes balls 50 and 52, raceway 38 houses balls 54 and 56, raceway 44 houses balls 58 and 60, and raceway 46 retains balls 62 and 64. The two centrally located raceways 40 and 42 each include only one ball, i.e. ball 70 in raceway 40 and ball 72 in raceway 42. Supplying the additional rolling contacting and spacing means in the central raceways is a disc-shaped roller member 74.

Propulsion roller 74 is positioned with a narrow elongated vertical opening extending through the connected arms or legs 76 and 78 of the two channels forming the suspension rail 14. It is rotatably and irremovably mounted or anchored in this position to the suspension rail. This is accomplished by an elongated horizontal opening drilled crosswise through the connected arms 76 and 78 into which axle 75 or propulsion roller 74 is inserted and retained. Thus, the propulsion roller cannot become dislodged out of its position or misaligned even when the drawer rail is extended to the position out of retaining contact with the roller (FIGS. 1 and 2), and then is pushed back into contact with and over the roller upon closing the drawer. The upper portion of roller 74 normally contacts and bears against the lower leg or arm of drawer rail 16 while the lower portion of the roller contacts and bears against the upper leg of case rail 12.

Movement of the rails with respect to each other is limited in the extended position by a plurality of stops. Additional stops are provided to prevent the several balls from moving out of the portion of the rail in which they are intended to operate. For convenience the extension-limiting stops are shown as small blocks attached to the rails as by welding, while the ball-retaining stops are shown as slashed and bent portions of the rails. Obviously, either of these types or equivalent structures may be used for both purposes if desired. Two ball retaining stops 80 are used to retain each of the balls 50, 52, 70, 62, 72 and 64 within the desired portion of the rails. The stops shown as blocks cooperate in pairs to coact with the larger balls to determine the extension limits of the drawer rail and suspension rail. Thus, stops 82 and 84 cooperate with ball 54 and stops 86 and 88 cooperate with ball 56 to control the drawer rail extension on the suspension rail. Stops 90 and 92 cooperate with ball 58 and stops 94 and 96 cooperate with ball 60 to control the suspension rail extension on the case rail.

The case rail is fixedly secured to the case wall in a manner to be described hereinafter. It will be noted that stops 82 and 86 are attached to the upper channel of the suspension rail 14. Stops 84 and 86 are attached to the bottom leg of the drawer rail 16. Stops 92 and 96 are attached to the lower channel of the suspension rail, while stops 90 and 94 are attached to the upper leg of the case rail.

The total suspension supporting means is secured to the case by attaching both the front and back ends of the case rail to the case wall in a conventional manner. At the front end, shoulder rivet 91 may be secured to the case channel and is designed to seat within a keyhole shaped slot in the case frame. At the back end, an L-shaped plate 93 having a rear flange and a bottom flange is secured to the case rail by means of screws 95, and is adapted to attach the rear of the case rail to the case wall. Mounted on the rear flange of the plate is a pair of resilient stops 97 for the drawer and extension rails.

Operation

Right hand and left hand suspension assemblies are mounted to the opposite side walls of the cabinet or case, by securing the case rails to the case as described above. A drawer is then suspended upon the full length of the drawer rails of the assembly. To extend the drawer out of the cabinet for removing files, or replacing files, or other materials, the drawer is pulled. The case rails remain stationary since they are secured to the supporting structure. As the suspension is extended, suspension rails 14 move approximately one-half the distance of the drawer rail movement so that the rear ends of the suspension rails are substantially in the center of the stationary case rails. Thus, balls 72, 60 and 64 support the rear end of the suspension rail in the center of the case rail. The rear ends of the drawer rails move to a position substantially at the center of the suspension rails where respective rollers 74 are located. Consequently, rollers 74 and balls 58 and 62 support the central portions of the respective suspension rails on the front edges of the case rails.

With the novel structure, stops 84 and 86 are sufficiently spaced from the center of the drawer rails and suspension rails so that the rear ends of the drawer rails can be extended past the respective centers of the suspension rails, and past the front ends of the case rails, so that the drawer rails are entirely out of contact with rollers 74. When mounted within a cabinet, this enables the rear end of a drawer (not shown) which is substantially coextensive with the rear end of the drawer rails, to be extended out of and clear of the enclosing case or cabinet. Thereby files can be removed from the rear end of a full drawer with no difficulty due to interference with the cabinet. At this position balls 52 and 56 support the rear of the drawer rail on the suspension rail slightly forward of the center thereof. Further, balls 50, 54 and 70 support substantially the center of the drawer rail on the front edge of the suspension rail. The rollers, even though no longer in contact with the drawer rails, are maintained in their proper position due to their axles anchored to the suspension rails.

When the drawer and thus the drawer rails are again pushed back into the cabinet, rollers 74 are not "bumped" out of the elongated openings in the suspension rails, nor are they shifted so as to become misaligned, since they are held firmly but rotatably anchored to their respective suspension rails because of axles 75 extending through the horizontal holes drilled into the suspension rails. Thus, the rear edge of each leg 24 of the drawer rails merely rides up over each roller 74 to again cause it to act as a propulsion member forcing the drawer to move twice the distance of that of the suspension rail.

It is recognized that slight modifications might be made of this structure without departing from the inventive principles taught. Thus, the structure is not to be limited to the form illustrated, but only by the scope of the appended claims.

I claim:

1. An extensible drawer support comprising the combination of: four channel sections; one section forming a case rail, two sections being interconnected and forming a suspension rail, and one section forming a drawer rail; said drawer rail being telescopically received into one channel section of said suspension rail; said case rail being telescopically received into the other channel section of said suspension rail; said channel sections forming a plurality of raceways; balls positioned in said raceways for separating said rails and creating a rolling contact therebetween; a vertical opening extending through said suspension rail in the center portion thereof; a disc type roller in said opening normally contacting both said case rail and said drawer rail on its periphery; said roller disc being mounted on an axle; said axle being rotatably and irremovably anchored to said suspension rail to prevent vertical and horizontal movement with respect to said suspension rail; and stop elements fixed between said rails allowing the rear end of said drawer rail when extended to move past the front end of said case rail and out of contact with said roller thereby enabling a drawer mounted on said rails to be extended clear of the enclosing cabinet.

2. In a drawer suspension support having four identical channel members, one forming a case rail, one forming a

drawer rail, and two being secured together to form a suspension rail; said drawer rail and said case rail being telescopically interfittable with the two channels of said suspension rail and forming a plurality of raceways between said case rail and suspension rail and between said drawer rail and suspension rail; a plurality of balls in said raceways to separate said rails and allow movement therebetween in a frictionless manner; an opening in the central portion of said suspension rail; a propulsion roller in said opening and contacting on its periphery both said case rail and said drawer rail; said roller having an axle rotatably and irremovably anchored to said suspension rail to prevent vertical and horizontal displacement of said roller when not contacting said drawer rail; and stop means between said rails allowing extension of said drawer rail past the end of said case rail and past the central portion of said suspension rail out of contact with said roller, with said drawer rail being again movable into operating contact wtih said propulsion roller.

3. In a drawer suspension support having four identical channel members, one forming a case rail, one forming a drawer rail, and two being secured together to form a suspension rail; said drawer rail and said case rail being telescopically interfittable with the two channels of said suspension rail and forming raceways between said case

rail and suspension rail and between said drawer rail and suspension rail; a plurality of balls in said raceways to separate said rails and allow movement therebetween in a frictionless manner; a vertical opening in the central portion of said suspension rail; a propulsion roller in said opening and contacting on its periphery both said case rail and said drawer rail; a horizontal axle-receiving opening in said suspension rail across the center of said vertical opening; said roller having an axle rotatably and irremovably mounted in said suspension rail in said horizontal opening to prevent displacement of said roller both vertically and horizontally with respect to said suspension rail, when said propulsion roller is not contacting said drawer rail; and stop means between said rails allowing extension of said drawer rail past the end of said case rail and past the central portion of said suspension rail out of contact with said roller, with said drawer rail being again movable into operating contact with said propulsion roller.

References Cited in the file of this patent

UNITED STATES PATENTS

2,174,181	Rand	Sept. 26, 1939
2,762,660	Bullock	Sept. 11, 1956