Aug. 31, 1965 E. C. BULLOCK ETAL 3,203,749

EXTENDIBLE DRAWER SLIDE

Filed July 31, 1963 2 Sheets-Sheet 1

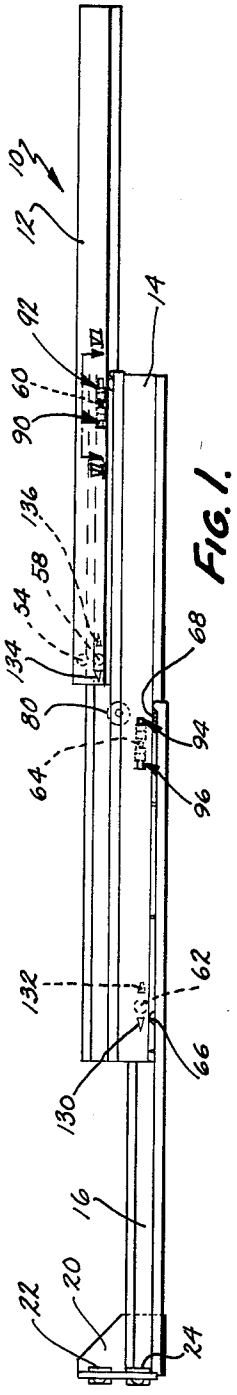

FIG. 1.

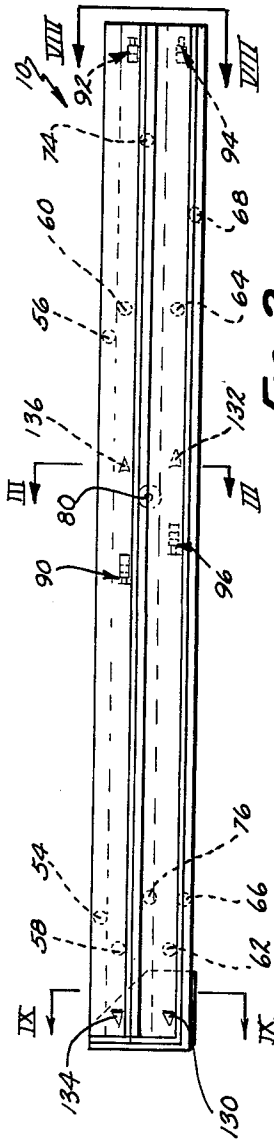

FIG. 2.

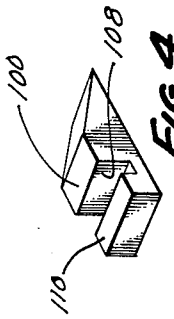

FIG. 4.

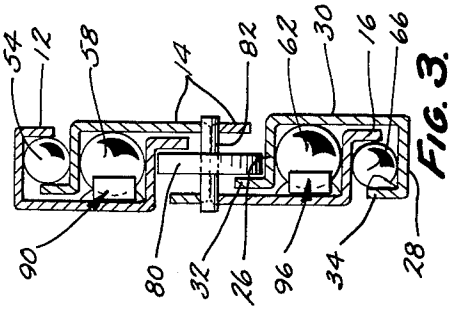

FIG. 3.

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Filed July 31, 1963 2 Sheets-Sheet 2

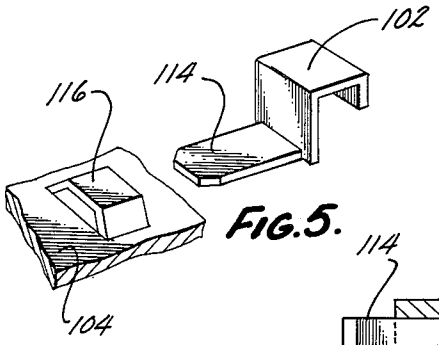

FIG. 5.

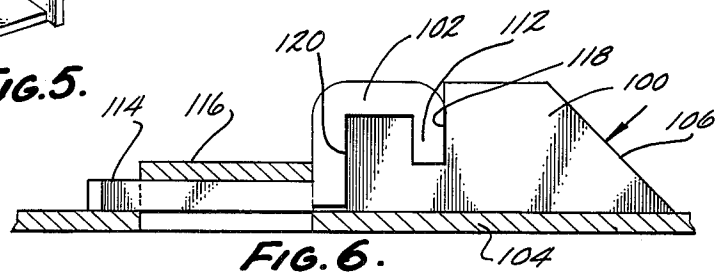

FIG. 6.

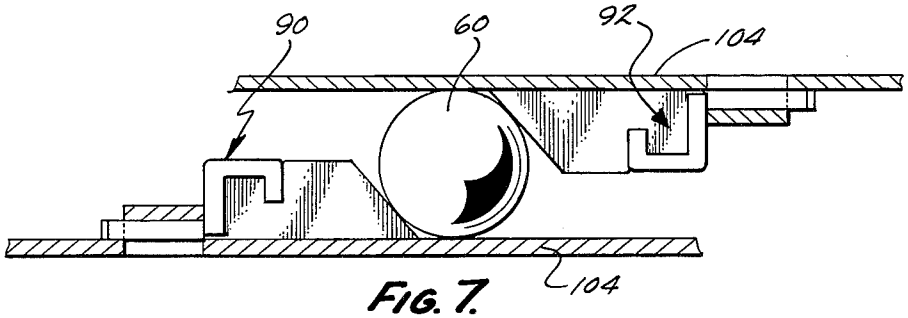

FIG. 7.

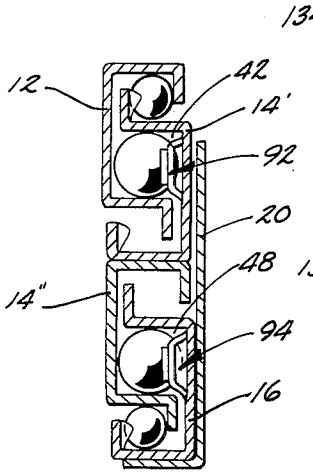

FIG. 8

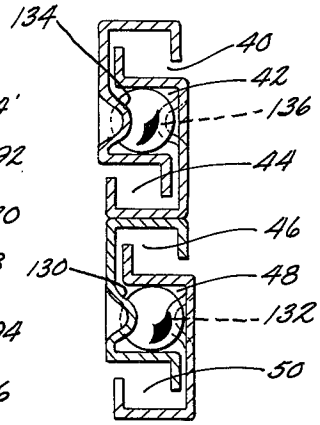

FIG. 9.

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EXTENDIBLE DRAWER SLIDE

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4 Claims. (Cl. 312—339)

This invention relates to extensible drawer supports, and more particularly to extensible drawer support rail assemblies including a case rail, suspension rail, and a drawer rail, and normally employed to support drawers in cabinets such as file cabinets.

The extension of drawer support rails separated by anti-friction means such as balls, is conventionally purposely limited by placing cooperative stops on the rails to abut the opposite sides of the balls. The stops extend into the ball raceways. When the rails are extended to the maximum the balls are each trapped between two of the stop bosses.

When a heavily loaded drawer is extended to the limit, a considerable impact force is momentarily concentrated on the stops to halt the moving drawer. The stops must therefore be extremely sturdy and resistant to shear to withstand this sharp impact force. Failure of the stops, allowing over-extension of the drawer support could readily result in a serious accident. As a consequence, the stops are conventionally formed of rigid metal elements, often integrally formed from the rails themselves.

When these metal stops abut the intermediate steel ball as the drawer reaches maximum extension, the audible "clunk" is very noticeable, and often disturbing throughout the office in which the file cabinet is located. This factor has heretofore been considered an unpleasant but necessary distraction. This concentrated impact force not only results in undesirable noise, but also, and probably more important, it causes jarring and vibration of the entire cabinet framework tending to weaken it.

It is therefore an object of this invention to provide a drawer suspension support having the sturdiness and reliability of a conventional support employing rigid metallic stops, while at the same time achieving an extremely quiet and cushioned stop operation. The traditional "clunk" occurring with extension to the limit, and the accompanying jarring of the framework is actually eliminated.

It is another object of this invention to provide a resilient drawer rail stop assembly that employs a resilient rubber or rubber-like element for cushioned stop abutment, but which is not sheared off by the concentrated impact force due to its unique mounting. Rather, the greater the impact force the more the rubber stop element is forced against the wall of the rail for stability.

It is another object of this invention to provide a resilient drawer rail stop employing a metallic mounting clip for securement of a resilient bumper to the wall of the rail, yet not requiring any spot welding or bolting for attachment of the clip to the rail.

It is another object of this invention to provide a rail support assembly employing a cushioned resilient stop assembly, but which, in even case of failure of the resilient stops, will not allow over-extension of the drawer to cause an accident.

Still another object of this invention is to provide a drawer support resilient stop assembly that not only has cushioned stop advantages, but also is simple in construction, relatively inexpensive to manufacture and assemble, and rapid and easy to assemble.

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

FIG. 1 is a side elevational view of the novel drawer support assembly with the rails extended;

FIG. 2 is a side elevational view of the drawer support assembly with the rails in closed position;

FIG. 3 is a sectional elevational view taken on plane III—III of the support assembly in FIG. 2;

FIG. 4 is a perspective enlarged view of the resilient bumper element of the novel stop assembly;

FIG. 5 is a perspective enlarged view of the metallic mounting clip for the resilient bumper illustrated in FIG. 4, to form a bumper stop;

FIG. 6 is an enlarged, fragmentary sectional view of a portion of the rail wall and stop assembly taken on plane III—III of FIG. 2;

FIG. 7 is a fragmentary enlarged plan view of cooperative stop elements in the abutment on opposite sides of a ball;

FIG. 8 is an end elevational view of the rail assembly illustrated in FIG. 2, taken on plane VIII—VIII;

FIG. 9 is a sectional view of the rail assembly illustrated in FIG. 2 taken on plane IX—IX.

Referring now specifically to the drawings, the drawer suspension support assembly **10** includes a drawer rail **12**, a suspension rail **14**, and a case rail **16**.

A pair of these suspension assemblies is used to support a drawer on the drawer rail, in a cabinet case. The forward end of the case rail **16** is secured to the case frame by interfitting rivets with key hole shaped slots or the like. On back end of each case rail, is an L-shaped plate **20** having a rear flange and bottom flange. It attaches the rear of the case rail to the wall of the case. On the back flange of this bracket or plate is a pair of resilient pads **22** and **24** for cushioned abutment of the drawer and suspension rail respectively when the drawer is closed.

Preferably, all three rails are formed of a plurality of identical channel sections. More specifically, referring to FIG. 8, drawer rail **12** is formed of one channel, case rail **14** is formed of an upper channel **14'** positioned inversely to and secured to a lower like channel **14"** by weldment, and case rail **16** is formed of one channel inverted with respect to drawer rail **12**.

Each of the channels is generally C-shaped, having a pair of parallel arms **26** and **28** (see channel **16**, FIG. 3) connected by a web **30**. At the end of the arms **26** and **28**, remote from web **30**, is a pair of flanges **32** and **34**. Flange **32** extends outwardly of the channel, while flange **34** extends inwardly of the channel, with outwardly extending flange **32** being slightly offset from inturned flange **34** whereby it is closer to web **26**.

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

This telescopic interfitting defines six ball raceways between the rails, three raceways **40**, **42**, **44** (FIG. 9) being between the upper drawer rail and the upper half of the suspension rail, and three additional raceways **46**, **48**, and **50** being between the lower half of the suspension rail and the case rail. In the four outermost raceways **40**, **42**, **48**, and **50**, two balls are used in each to separate the rails and allow frictionless movement there between. Thus, referring to FIG. 2, raceway **40** includes balls **54** and **56**, raceway **42** includes balls **58** and **60**, raceway **48** includes balls **62** and **64**, and raceway **50** includes balls **66** and **68**.

The two centrally located raceways **44** and **46** each include only one ball; ball **74** at the forward end of upper central raceway **44**, and ball **76** at the rear end of the lower central raceway **46**. Supplying the additional rolling contacting and spacing means in the central raceways is a disk-shaped propulsion roller **80**. This propulsion roller **80** is positioned in a narrow elongated vertical opening extending through the connecting arms

of the two channels forming the suspension rail. It is rotatably and irremovably mounted in this position to the suspension rail by an elongated horizontal axle **82** positioned in an elongated horizontal opening drilled crosswise through the connecting arms of the two channels. The propulsion roller cannot become dislodged out of its position or become misaligned even when the drawer rail is extended to the position illustrated in FIG. 1 where the drawer rail is out of contact with the roller and then is pushed back into contact over the roller upon closing the drawing. The upper portion of the roller normally contacts and bears against the lower leg of the drawer rail, while the lower portion of the roller contacts and bears against the upper leg of the case rail.

Movement of the rails with respect to each other during rail extension occurring with opening of the drawer, is limited by a plurality of unique cooperative cushion stops **90**, **92**, **94**, and **96**. Stop assembly **90** is mounted to the drawer rail, stop assembly **92** to the upper channel of the suspension rail, stop assembly **94** to the case rail, and stop assembly **96** to the lower channel of the suspension rail.

Stop assemblies **90** and **92** cooperate with each other astraddle roller ball **60** in a manner to be described hereinafter. Likewise stop assemblies **94** and **96** cooperate with each other astraddle roller ball **64**, when the drawer rail is extended as in FIG. 1. Stop assembly **90** is located approximately in the central section of the drawer rail, stop assembly **92** being located at the front end of the case rail upper portion, stop assembly **96** being located in the centeral portion of the lower channel of the suspension rail, and stop assembly **94** being located at the forward end of the case rail.

Each of the stop assemblies includes two main components, a resilient bumper **100** and a metallic clip **102** (FIGS. 4, 5, and 6). The resilient bumper element **100** is preferably of rubber or rubber-like material, i.e., an elastomer of useful, self-supporting characteristics. It has a generally wedge-shaped nose which tapers diagonally toward the wall of the rail on which it is mounted (see for example the drawer rail wall **104** shown in FIG. 6). The tapered face **106** is at an angle of about 45 degrees, more or less, with respect to the face of wall **104**. The resilient bumper has a transverse slot **108** (FIG. 4) and an elevated rear portion **110** to interfit with a generally C-shaped portion of clip **102**, with leg **112** of the C-shaped portion being foreshortened. The rearwardly protruding tail or leg **114** of the clip extends into a slot formed by severing parallel slits into the rail wall, and deforming a tab **116** inwardly of the rail wall **104**. Insertion of the tail **114** of clip **102** within the slot under this tab causes the C-shaped portion of the clip facing the wall to retain the rubber bumper against the wall. The rubber bumper may also be adhered to the wall with a suitable adhesive.

A force in the direction of the arrow illustrated in FIG. 6 by a ball on the tapered face **106** of the rubber bumper causes the rear face **118** of the slot in the bumper and the back end **120** of the rubber bumper, to bear against the transverse sufaces of the clip, preventing movement of the stop assembly. Movement is also limited by contact of the C-shaped portion with tab **116**. Each of these stops or stop assemblies therefore is within one of the raceways. Preferably these particular raceways **42** and **48** are slightly larger (FIG. 8) and accommodate slightly larger roller balls.

When the drawer is opened to extend the drawer rail assembly, stop assembly **90** moves toward stop assembly **92**, and stop assembly **96** moves toward stop assembly **94**. Referring to FIG. 7, the two cooperative stop assemblies **90** and **92** move to a position straddling the intermediate roller ball **60** (see FIG. 1) so that the ball is pressed between the two diagonal surfaces of the rubber bumper elements. This creates a force perpendicular to the tapered faces of the bumper elements, such that the force applied creates a pressure forcing the rubber bumper elements tightly against the walls of the respective rails. Consequently, instead of a potential shearing action occurring on the stops, a greater force merely increases the resistance of the elements, to thereby effect a unique and dependable stop assembly. The resilient bumpers substantially eliminate all noise normally occurring, and also the jarring vibrations when the suspension rail is suddenly pulled to the limit. While extension of the drawer rail with respect to the case rail is limited by this cooperation between assemblies **90** and **92** over ball **60**, extension of the suspension rail with respect to the case rail is limited by stop assemblies **94** and **96** astraddle ball **64**.

As a safety factor, in case of possible failure of the resilient stop elements, supplemental metallic stop assemblies are employed in a manner such that these do not normally engage, but may in case of slight over-extension of the drawer rails. Thus, referring to FIG. 1, a boss **130** is slit on one edge and deformed from the rear portion of the suspension rail, and a corresponding reversed boss **132** is deformed from the center portion of the case rail. Likewise (referring to FIG. 1) a boss **134** is deformed from the rear of the drawer rail, while a cooperative boss **136** is deformed from the central portion of the upper channel of the suspension rail. The position of these bosses during the closed drawer position of the rails is illustrated in FIG. 2. Each of these stops is basically of a semi-conical configuration (see FIG. 9). Bosses **130** and **132** are on opposite sides of ball **62**, while bosses **134** and **136** straddle ball **58**. Each of the bosses protrude inwardly into the raceway, as shown in FIG. 9, so that with the ball positioned between the bosses, they can abut the ball and prevent further movement. Normally these bosses do not move close enough to abut the intermediate ball (see FIG. 1), and only do so in case of failure of the previously resilient stops abutting to prevent significant accidental over-extension of the support assembly. In FIG. 9 the bosses **136** and **132** are shown in phantom, as well as the balls cooperative therewith, to illustrate the cooperative action therebetween.

This invention provides for the first time, as far as is known, a quietly operating, dependable, stable, safe, cushioned action eliminating jarring of the frame and providing dignity to the operation of the case drawers. The assembly actually achieves, simultaneously, the usually incompatible features of (1) resilient cushioned stop means and (2) safety and structural stability. Various additional advantages will undoubtedly occur to those skilled in this art upon studying the foregoing form of the invention, and the principles applicable thereto. It is conceivable that certain minor modifications could be made in the particular structural arrangement depicted as the exemplary form of the inventive concept, without departing from the principles taught. Consequently, the invention should be accorded reasonable protection not limited to the particular structural form presented, but only by the scope of the appended claims and the reasonably equivalent structures to those defined therein.

We claim:

1. In a drawer suspension support comprising: a case rail, a suspension rail, and a drawer rail; said case rail and said drawer rail each being telescopically received by portions of said suspension rail; anti-friction means separating said drawer rail from said suspension rail including at least one ball, and separating said suspension rail from said case rail including at least one ball; a pair of cooperative resilient stop elements mounted respectively to the walls of said drawer rail and suspension rail on opposite sides of one of said balls, and a second pair of cooperative resilient stop elements mounted respectively to the walls of said suspension rail and case rail on opposite sides of the second one of said balls; said stop ele-

ments being placed in straddling abutment with said balls upon extension of said support; and each of said stop elements having a wedge-shaped nose to cooperate with the adjacent wedge shaped nose of the cooperative stop element and wedge a ball therebetween, thereby pressing the resilient stop elements tightly against the walls of said rails; said rails including metallic safety stops severed and deformed to cooperate and form a pair of cooperative safety stops between said case rail and suspension rail, and a second pair of cooperative safety stops between said suspension rail and drawer rail; said safety stops being spaced to normally be free of operative engagement except upon slight over-extension of said support with failure of said resilient stops.

2. The support in claim 1 wherein each resilient stop elements includes a bumper with a slot engaged with a generally C-shaped portion of a metallic clip, the other end of said clip having a tail slidably secured under a tab severed and deformed from the wall of the respective rail to form a receiving slot.

3. In a drawer suspension support comprising: a case rail, a suspension rail, and a drawer rail; said case rail and said drawer rail each being telescopically received by portions of said suspension rail; anti-friction means separating said drawer rail from said suspension rail including at least one ball, and said suspension rail from said case rail including at least one ball; a pair of resilient stop elements mounted respectively to the walls of said drawer rail and suspension rail on opposite sides of one of said balls, and a second pair of resilient stop elements mounted respectively to the walls of said suspension rail and case rail on opposite sides of the second one of said balls; said stop elements being placed in straddling abutment with said balls with extension of said support; each of said stop elements having a resilient bumper with a ball-contacting surface tapered toward the wall upon which the stop element is mounted, to cause a portion of the abutment force to press the bumper tightly against the wall for stability; said bumpers each having a slot

in its outer portion, spaced from said tapered surface; a generally U-shaped, metallic holding clip elements engaged in said slots of said bumpers, and having a tongue extending therefrom away from said bumper; a tab severed and deformed from the respective rail wall and slidably receiving said tongue to anchor the bumpers against movement with impact.

4. In a drawer suspension support comprising: a case rail, a suspension rail, and a drawer rail; said case rail and said drawer rail being telescopically received by said suspension rail; a first pair of cooperative resilient stop assemblies mounted to said case rail and suspension rail and having cooperative elastomeric bumpers providing cushioned stop action; a second pair of cooperative resilient stop assemblies mounted to said suspension rail and drawer rail and having cooperative elastomeric bumpers providing cushioned stop action; a pair of safety stops between said drawer rail and suspension rail and a second pair of safety stops between said suspension rail and case rail; said safety stops normally being out of operative engagement with extension of said support, except with slight over-extension thereof upon failure of said resilient stops.

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