May 13, 1930. C. F. WOLTERS 1,758,550

SUPPORTING MEANS FOR DRAWERS FOR ARTICLES OF FURNITURE

Filed Dec. 5, 1925 4 Sheets-Sheet 1

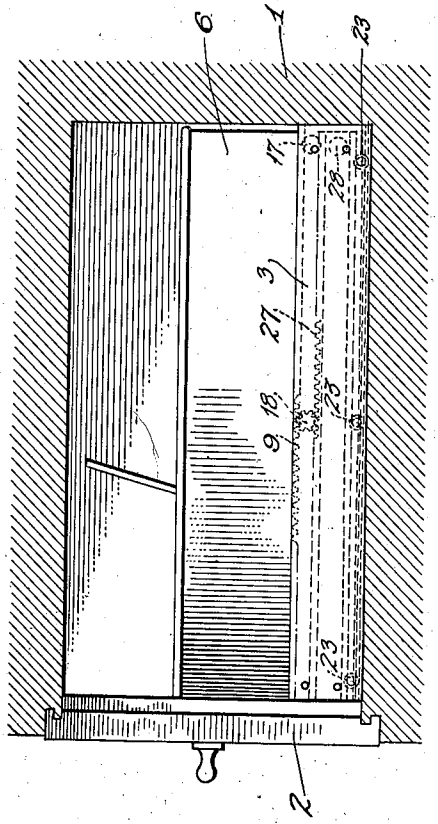


Fig. 1

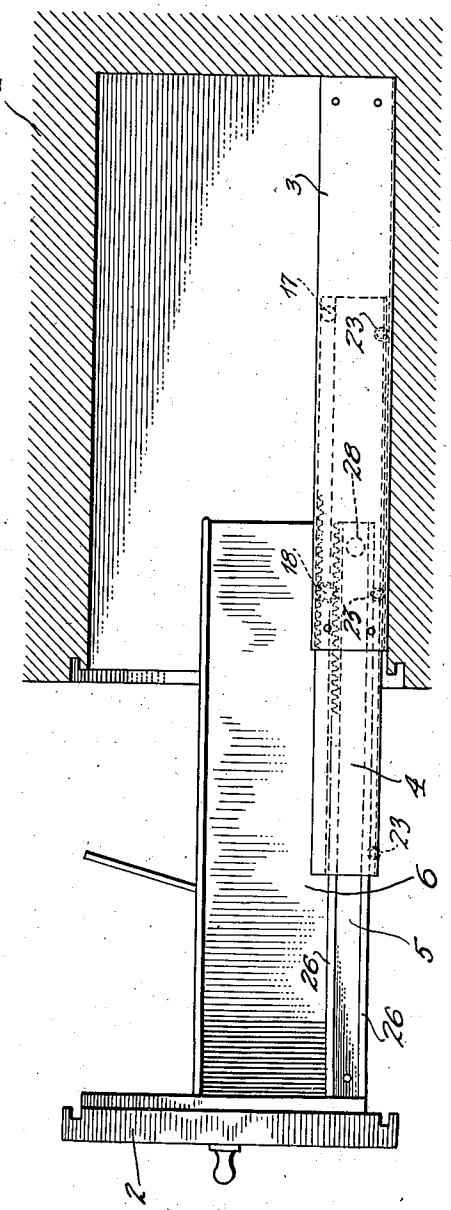


Fig. 2

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SUPPORTING MEANS FOR DRAWERS FOR ARTICLES OF FURNITURE

Filed Dec. 5, 1925 4 Sheets-Sheet 2

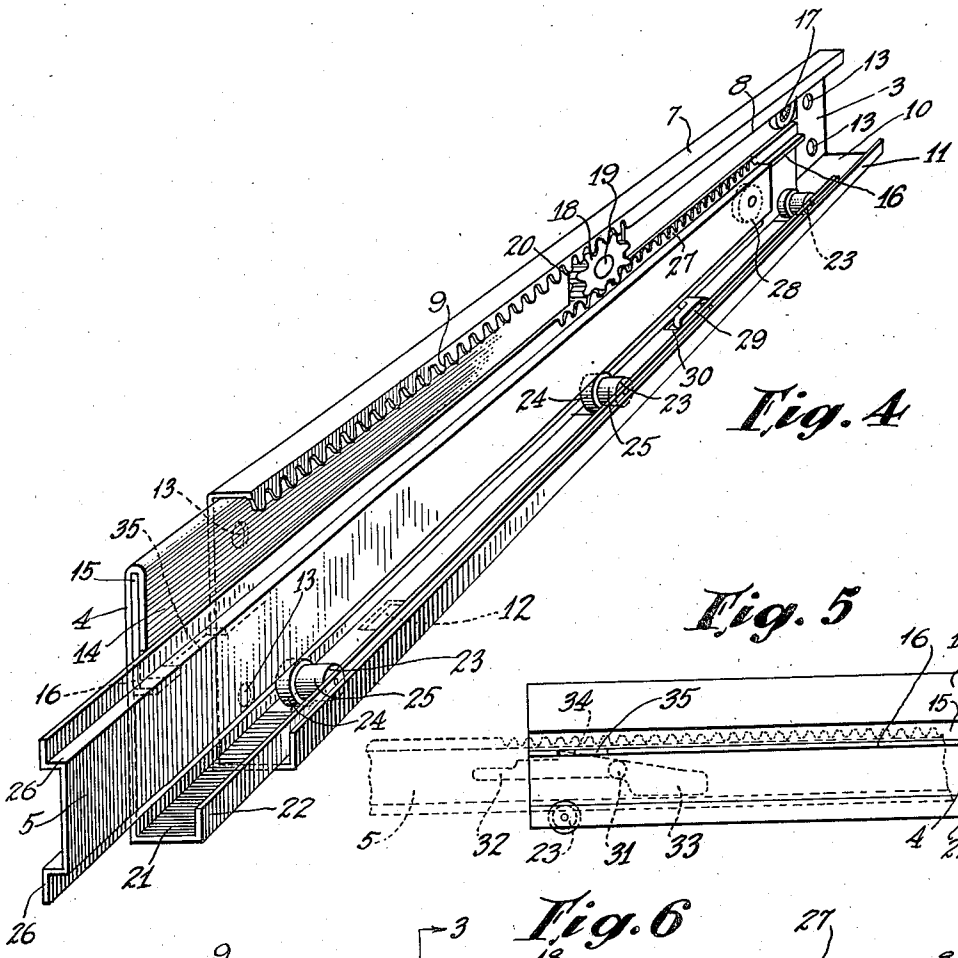


Fig. 4

Fig. 5

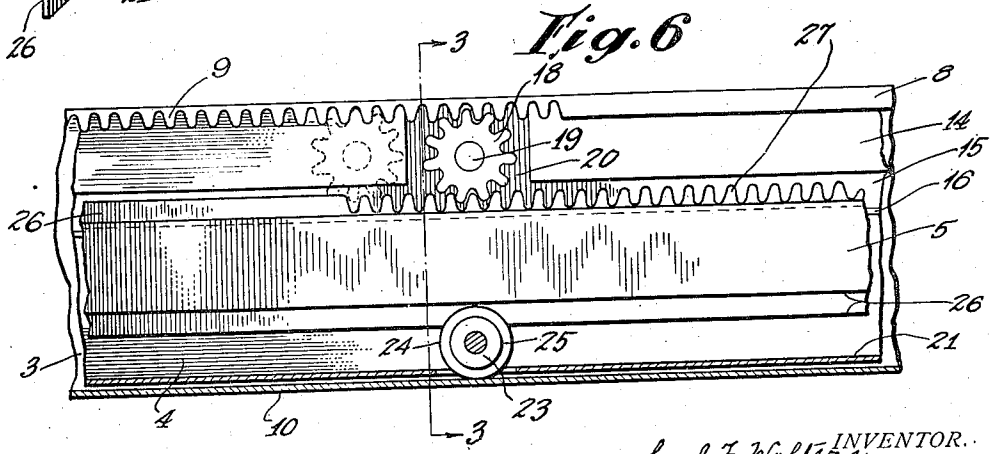


Fig. 6

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SUPPORTING MEANS FOR DRAWERS FOR ARTICLES OF FURNITURE

Filed Dec. 5, 1925 4 Sheets-Sheet 3

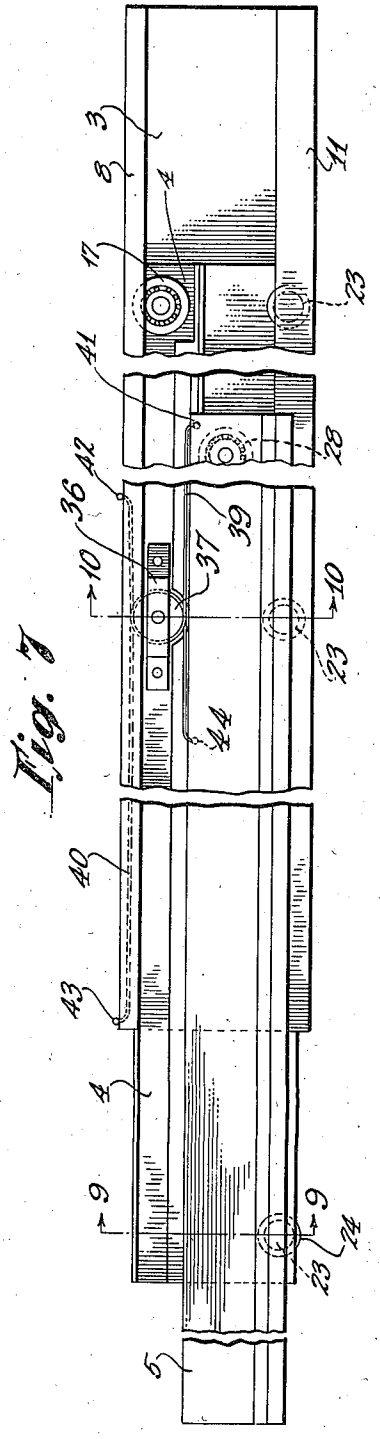


Fig. 7

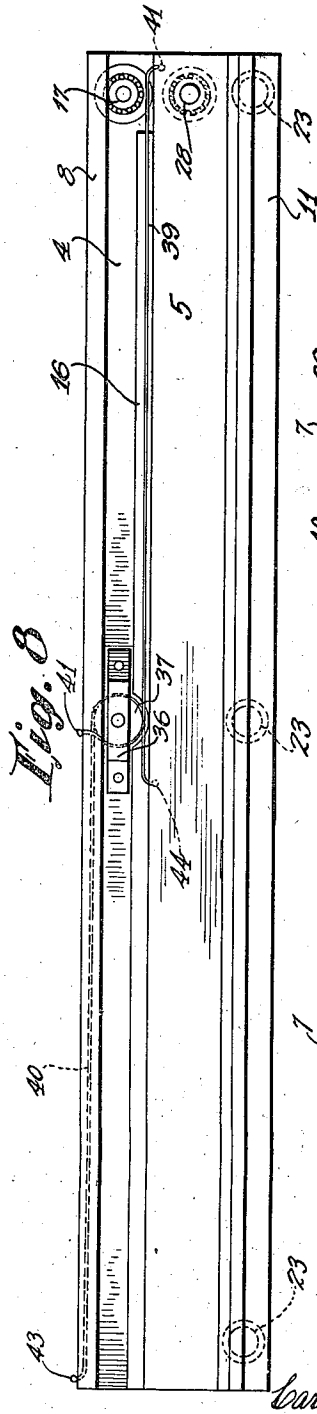


Fig. 8

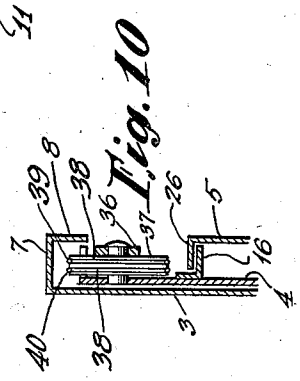


Fig. 10

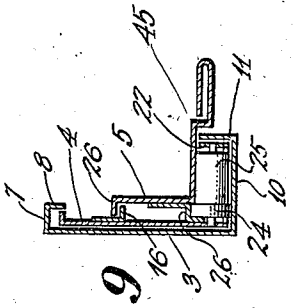


Fig. 9

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SUPPORTING MEANS FOR DRAWERS FOR ARTICLES OF FURNITURE

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Fig. 11.

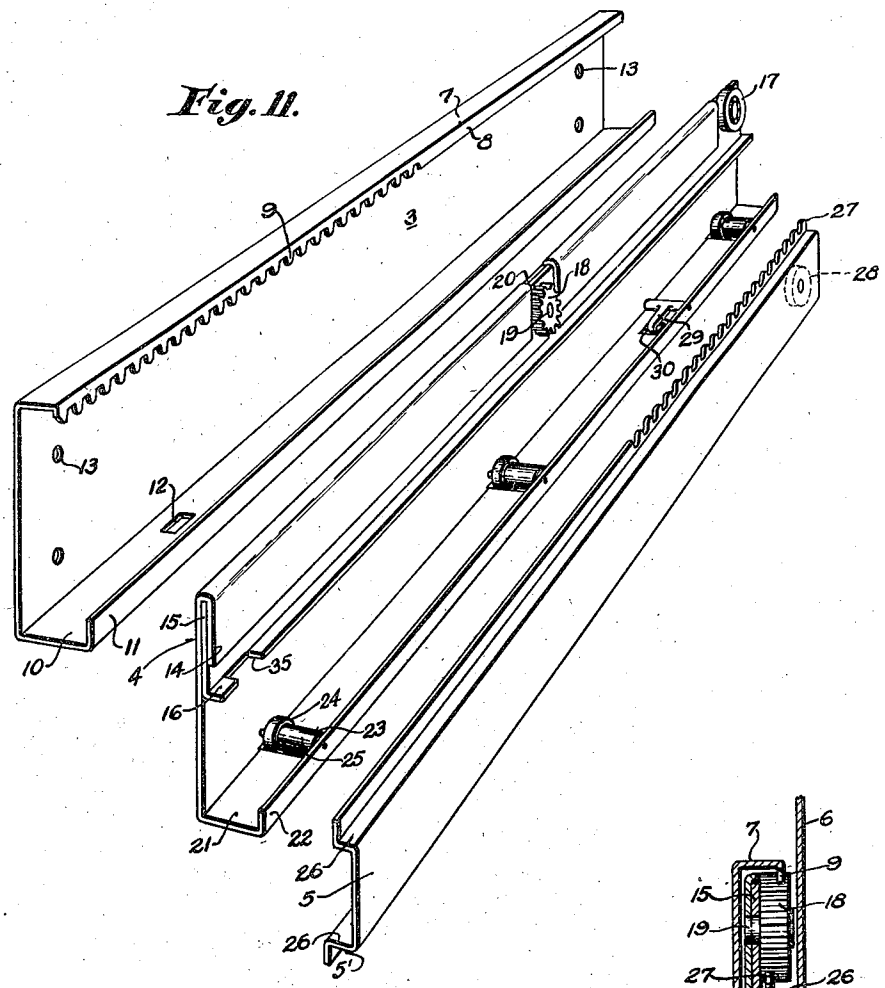
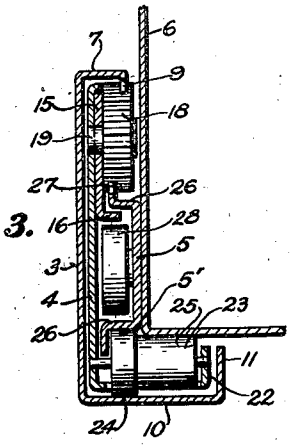


Fig. 3.



INVENTOR

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Patented May 13, 1930

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UNITED STATES PATENT OFFICE

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SUPPORTING MEANS FOR DRAWERS FOR ARTICLES OF FURNITURE

Application filed December 5, 1925. Serial No. 73,325.

This invention relates to what are generally classified as "drawer suspension means" employed in suspending a drawer in a cabinet or other article of furniture in such a way that, even though heavily loaded, the drawer may move freely and easily on suitable bearings, and so adjusted that the drawer may be fully withdrawn from its housing to permit free access to the contents of the drawer.

The invention particularly relates to that class of drawer suspension means wherein supporting elements are secured to the side walls of the container, and corresponding supporting means are secured to the side walls of the drawer, and interposed between the supporting means is a floating element or member so related to the other elements as to cause a differential movement between the elements, by reason of which one movable element moves at twice the speed of the other movable element.

As previously stated, devices of this nature are well known in the art, but, so far as applicant is informed, in all such devices recourse has been had to frictional engagement between the elements composing the structure in order to obtain the necessary traction between such elements so as to cause one to drive the other as the drawer is withdrawn from its casing or returned thereto.

These structures are uniformly made of sheet steel bent into forms to make the combination of parts coacting, as heretofore stated. One of the difficulties involved by reason of such construction is the fact that the sheet metal varies in thickness, and in the bending and constructing of the various parts, it is not possible to so form them as to make perfect registry or alignment between the various elements; and, by reason of the fact that such irregularities exist, the frictional engagements upon which depends the traction have been found to be inadequate; so that rollers or anti-friction devices of any kind which are intended to cooperate fail in such operation because of the irregularities in said alignment and, therefore, the mechanism becomes inoperative and fails to function in the way intended. Numerous compensating devices have been applied, but without an entirely satisfactory result.

One of the objects of this invention is to eliminate the use of frictional contacts for the purpose of establishing tractional engagements. This is accomplished by interposing between the movable elements positive driving means, consisting in this particular instance of a stationary rack, a pinion mounted on a movable element to engage such stationary rack, and a rack mounted on a movable element also adapted to engage such pinion, so that, when the parts are brought into cooperative relation and moved in the manner familiar in such devices, as above indicated, instead of being dependent on any frictional engagement, they will be positively driven by reason of the interposition of a pinion between two racks. Any irregularities in the thickness of the metal, or any imperfection in the alignment due to manufacture under the conditions above recited, will be compensated for by reason of the size and arrangement of the pinion and its cooperative relation to the two racks. Consequently, in this construction, it is possible to mount the various elements between definitely associated friction bearings mounted in predetermined planes having a parallel relation, and yet compensate for the fact that the apparatus may not with precision move in said parallel planes because of the irregularity of the metal or imperfection of workmanship, yet such irregularity or imperfection will be compensated for by the length of the teeth of the pinion operating in conjunction with the said racks between which it is interposed.

My invention, therefore, consists of certain simple, strong and durable parts and combinations thereof, all as will be hereinafter described and claimed.

In order that my invention may be clearly understood, I have provided drawings wherein:

Figure 1 is a view in sectional elevation of a portion of a casing showing a sliding drawer and the supporting and driving means combined therewith, the parts being in closed position;

Figure 2 is a view similar to Figure 1 showing the parts in open position;

Figure 3 is a view showing the parts in section, substantially on the line 3—3 of Figure 6;

Figure 4 is a perspective view of the supporting and driving parts of my invention;

Figure 5 is a view showing in elevation the supporting or floating member of my mechanism;

Figure 6 is a view showing the interaction of the three parts of my mechanism in side elevation, the view being enlarged, and a section only of the parts being shown;

Figure 7 is a view, similar to Figure 6, of another form of my invention, the view being broken in two at several points due to the limitations of the sheet, and the parts being shown in partially extended relation;

Figure 8 is a view similar to Figure 7, the view being unbroken and shown in closed relation;

Figure 9 is a cross-sectional view substantially on the line 9—9 of Figure 7; and

Figure 10 is a sectional view on the line 10—10 of Figure 7, the section extending only part way down.

Figure 11 is a disassembled perspective view of the structure disclosed in Figure 4.

Referring to the drawings, Figures 1 and 2, the numeral 1 indicates the casing, or cabinet, or piece of furniture in a merely conventional manner, in order to show or suggest an application of my invention, and 2 indicates the sliding member, or a container or drawer adapted to slide within the casing upon my supporting and driving mechanism, the latter consisting of the casing member 3 rigidly secured to the casing 1, the supporting, carrying or "floating" member 4, which slides within and is supported on the casing member 3, and which is driven by and, in turn, supports the drawer member 5, the latter being rigidly secured to the side 6 of the drawer. It will be understood that the three principal parts 3, 4 and 5 of my mechanism are provided on opposite sides of the casing 1 and drawer 2, so that the description herein given of one set of parts applies equally to the other set, and similar reference characters are used in both sets. The details of construction of my supporting and driving mechanism are shown in Figures 3 to 6, inclusive.

In Figure 4, the casing member 3 is shown to consist of the main web or body portion having an overturned and rebent flange 7, the depending edge of which is partly plain, as indicated at 8, and partly formed into a rack-bar 9, the latter occupying about one-half the length of the flange and extending from the outer end inwardly to about the middle of the member. The lower or base portion of the member 3 is bent laterally to provide a wide track or support 10, and at its inner edge is upturned to provide a retaining flange 11. Near its inner end, the base portion 10 of the member 3 is provided with an elongated slot 12 for receiving a pivotally mounted latch, presently described. The member 3 is provided at its opposite ends, and at any intermediate points desired, with screw-receiving apertures 13 for securing the member in fixed position within the casing at the bottom of the receptacle.

The carrying or floating member 4 is composed of the web or body portion, the upper portion of which is rebent upon itself, as at 14, to provide a casing within which a plate 15 is fixed, the plate and the portion 14 cooperating to strengthen and reinforce the member 4, and the plate being provided with a laterally extending flange 16 adapted to cooperate with the member 5, as presently described. The floating member, at its extreme inner end, is provided with a ball-bearing, anti-frictional roll 17 journaled near the upper edge of the member in a cut-out or recessed portion thereof, the roller being adapted to operate adjacent the flange 8 of the casing member 3, and to have traction on the overhanging portion 7 thereof. The floating member 4 substantially midway its length, and near its upper edge, is provided with a driving pinion 18, journaled at 19 in a cut-out 20 of the reinforced portion of said member, the pinion meshing with the rack-bar 9 of the casing member, and also with a rack-bar carried by the drawer member, as presently described. The lower edge of the floating member 4 is provided with a laterally extended support 21 terminating in an upturned flange 22 extending the length of the member. Near opposite ends and in the middle of the support 21, apertures are provided through which operate the peripheries of anti-frictional rolls 23 journaled in the flange 22 and in the web portion of member 4. The periphery of rolls 23 is of two different diameters, the larger diameter 24 having traction on the surface 5′ of the drawer member 5, as presently described, and the smaller diameter 25 is only an enlargement of the spindle or shaft of the roller 23 and has no contact with the surface 21 of the member 4. The larger diameter 24 of the roll extends through the apertures in the supporting portion 21 and contacts with the support 10 of the casing member 3, making tractional engagement therewith. Thus, the rolls 17 and 23 operate against the top and bottom portions, respectively, of the casing member 3, while the pinion 18 meshes with the rack 9, the two members being thus adequately supported, the one by the other, antifrictionally. The pinion 18 also bears a driving relation to the casing member 3.

The drawer member 5 is composed of the body portion or web, the opposite edges of which are similarly flanged right-angularly,

as indicated at 26. A portion of the edge of the upper flange 26 is formed into a rack-bar 27 which meshes with the pinion 18 for the purpose of driving the latter, and the horizontal portion of the said upper flange rests and practically rides upon the flange 16 of floating member 4; while the edge of the lower flange reaches below and behind the larger diameter portion 24 of the rolls 23, thus letting the horizontal portion of the lower flange down so as to ride on said portion 24 of the roll. Thus, the member 5 is retained behind the rolls 23, rides upon the rolls 23, rides upon the flange 16 of the member 4, and drives, by medium of its rack-bar 27, the pinion 18, which in turn meshes in the stationary rack-bar 9, thus causing the member 4 to travel relatively to the casing member 3 and the drawer member 5, and at only one-half the speed of the latter. Since the member 5 is rigidly secured to the drawer 2, and the latter is manipulated by the operator, the pinion is positively driven, whenever the drawer is shifted, causing the floating or intermediate member 4 to be positively driven, thus overcoming any tendency of the latter to bind or be retarded in its movements. The member 5, at its extreme inner end, carries, on its inner side, within its longitudinal groove formed between the flanges 26, an anti-frictional ball-bearing roll 28 arranged so as to have traction on the bottom of the flange 16, of the floating member 4, thus preventing the member 5, at its extreme inner end, from unduly rising, or moving transversely to the length of the member 5, and also preventing the teeth of the rack-bar from jamming into the teeth of the pinion. At a point near the middle roll 23, the horizontal portion 21 of the member 4, carries a pivotally mounted latch 29, the forward free end of which passes through an aperture 30 in said horizontal portion 21, the said latch operating automatically to check the travel of the floating member 4 by dropping into the aperture 12 in the horizontal portion 10 of the casing member 3. This operation results from gravity and prevents the member 4 from being shifted too far relatively to the member 3 and, being held in its extreme outer position, member 4 operates as a rigid support for the drawer in its extreme outward position. Approximately midway between its ends, see Figure 5, the member 5 carries a locking latch pivotally mounted at 31, and having a handle portion 32 and a weighted portion 33. At the upper edge of the handle portion, a catch lug 34 is provided, adapted to operate in a slot 35, of flange 16, the forward end wall of which is engaged by the catch lug 34. Normally, the catch lug travels in contact with the under side of the flange 16 of the member 4, the weight 33 maintaining the contact, so that, when the parts reach the position shown in Figure 5, the member 5 is held from further movement, by the lug 34 automatically rising into the slot 35. This occurs in the extreme outer position of the member 5, and of the drawer carrying the latter. However, the drawer may be lifted from its carrying member or support 4 by presing upon the handle member 32, so as to depress the lug 34 from the slot 35.

One of the important features of my invention upon which I desire to lay stress is the provision of a positive driving means between the drawer member 5, and the floating member 4, by which the floating member may be proportionally and positively shifted during the shifting of the drawer member, this mechanism embodying a stationary rack-bar, a shifting rack-bar, and an intermediate, shifting pinion, which, during its shifting movements, is caused to rotate upon its axis and thus actuate or shift the floating member to which it is journaled. Another feature, upon which I desire to lay stress, is the arrangement of the pinion on a shifting member between a stationary rack-bar and a shifting rack-bar, the pinion being of such diameter as to compensate for variations in the form or the surfaces of the several relatively movable members and which variations may result from inequalities in the parts, poor workmanship, inherent characteristics of the metal or of the members due to the mode of manufacture of the parts, or to strains, stresses or wear and tear upon the several parts, having a tendency to cause the several parts to bind or jam during operation; that is to say, by so proportioning the pinion 18 that there may be considerable play between the teeth of the pinion and the teeth of the opposite and cooperating rack-bars, the foregoing compensation is provided for. As an illustration of what is meant by the foregoing, I have shown a pinion, in dotted lines in Figure 6, in a position slightly raised as compared with the pinion shown in full lines. This changed relation of pinion 18 may be brought about by reason of unevenness or inequalities in the supporting portion 10 of the casing member 3, which will cause the floating member to rise relatively to the casing member when the rollers 23 ride over the inequalities. Thus, by allowing play between the pinion and the rack-bars, such inequalities can be compensated for without loss of driving engagement or power and without jamming or binding or retarding the respective members. Such compensation will also result should the horizontal portion of the lower flange 26 of the member 5 develop inequalities resulting in unduly shifting vertically the member 5 with a tendency to more intimately mesh its rack with the pinion. Another important feature of my invention, upon which I desire to lay stress, is the arrangement of anti-frictional rolls on the several members, together with the pinion and

rack-bars which bring about the uniform travel of the parts relatively; that is to say, the drawer is universally carried in a horizontal position, and has not at any time a tilting action relatively to the floating member 4, or the casing member 3. This prevents any tendency to binding, jamming or retardation in the movement of the parts, holds the drawer always in a horizontal position and avoids the necessity for anything other than a perfectly straight pushing or pulling action upon the drawer in a line parallel with the longitudinal walls of the several members of the supporting mechanism.

In the form of my invention shown in Figures 7 to 11, I have shown another means for positively driving the floating member relatively to the drawer member and casing member, and at one-half the speed of the former. In these figures, parts similar to those shown in Figures 1 to 6 are indicated by like reference characters.

In this form of my invention, I have shown the intermediate member 4 provided with a shallow bracket 36 rigidly secured thereto, between which and the floating member a pulley 37 is journaled. The circumference of this pulley is provided with two parallel grooves 38, in which travel, respectively, wires 39 and 40. The wire 39, at its end 41, is removably anchored in the top surface of the extreme inner end of the drawer member 5, and, after passing approximately halfway around the pulley 37, in its outer groove 38, is removably anchored at its end 42 in the top flange of the casing member 3. The other wire 40 has one end 43 anchored in the top flange of the casing member 3 at its forward end, and, after passing approximately halfway around the pulley 37, in the inner groove 38, is anchored at its end 44 approximately midway of the drawer member in the top surface thereof.

In other respects, the features of construction of the several members, in the form of my invention in Figures 7 to 10, are substantially the same as in the construction of Figures 1 to 6. The operation of the second form of my invention is the same as that of the first, and such operation will be understood upon reference to Figures 7 and 8, in which latter figure the parts are shown in closed relation, while in Figure 7 they are shown in partly extended relation, illustrating the difference in speed of travel and in extent of travel of the floating member 4 relatively to the drawer and drawer member. In Figure 9, I have shown how the drawer member 5 may be horizontally extended for the purpose of forming a bottom traction member of considerable rigidity, and may also be flanged, as at 45, and rebent upon itself to provide means for attaching the drawer thereto. Thus, provision is made for detachably securing the drawer to the member 5, and the latter provides a wearing and traction member for the bottom of the drawer.

In all instances, my invention contemplates the employment of automatic stop devices, such as shown in Figures 4 and 5, to prevent the floating member and the drawer from being shifted too far during ordinary operations. Therefore, while such stop devices are not shown in Figures 7 to 10, it is to be understood that their use is contemplated and that they are a part of such structure.

The mode of operation of the structures described is as follows: When the drawer is shifted, the rack-bar 27 on the member 5 will rotate the pinion 18 and its reaction on the rack-bar of the casing member will cause the floating member to be shifted with and in the same direction as the drawer, but at only half the speed and half the distance of the latter. When the floating member is at its outer extreme, the rolls 17 and 23 prevent it from tilting, and, when the drawer and member 5 are at the outer extreme, the pinion 18 and rolls 17 and 23 prevent them from tilting. At its outer extreme, the floating member is checked and held by the latch 29; and, at its outer extreme, the drawer is checked and held by the catch 34. The interaction of the various rolls and rack-bars and pinion hold the members 4 and 5 and the drawer from tilting at all times.

In the form of my invention of Figures 7 to 10, the drawer member is the driving element for the floating member, which is shifted relatively to the casing and its fixed member at half the speed and half the distance of the drawer and its fixed member. Pulley 37 bears the same general relation to the three members as the pinion 18, and the wires 39 and 40 bear the same general relation to the pulley and the drawer and casing members as the two rack-bars. In operation, when the drawer is shifted by the operator, the wires 39 and 40 perform their functions of rotating the pulley, causing the floating member to be bodily shifted in the direction of movement of the drawer, thereby shifting its support afforded the drawer proportionally to the movement of the latter. The wires and pulleys, though subject to slippage, for various obvious reasons, are approximately positive in their action and may be desirable for reasons of economy. However, I prefer the rack-bar and pinion structure because of its literally positive action, its certainty of control, facility in assembling, flexibility in operation and simplicity of construction. In both structures, however, the proportional shift of the floating members affording a shifting support for the drawer, coupled with the cessation of travel of the floating member simultaneously with the cessation of travel of the drawer, and the automatic interruption of movement of the floating member and drawer at the respective terminals of travel

thereof, are important features of my invention. Important, also, are the features of construction which maintain the proper supporting relation of the casing member and floating member at the terminal of travel of the latter, and which maintain the proper supporting relation of the floating member and drawer member at the terminal of travel of the floating member; for, upon such features of construction depend the function of preventing the drawer and floating member from having any tilting action during operation and at the respective terminals of travel.

Claims:

1. A drawer support, having in combination, a casing member, a carrying member entirely supported by said casing member, a drawer member entirely supported by said carrying member, and means between the casing and carrying members engaging the drawer member adapted to compensate for variations in said members, including rolls connected to said carrying member and engaging one side of the drawer member and casing member, and a pinion journalled on said carrying member engaged between the drawer member and casing member, said pinion having means thereon cooperating with said casing and drawer members for positively driving the carrying member in the movement of the drawer member.

2. A drawer support, having in combination, a casing member, a carrying member entirely supported by said casing member, a drawer member entirely supported by said carrying member, and means between the casing and carrying members engaging the drawer member adapted to compensate for variations in said members, including anti-friction means between one side of said drawer member and the carrying and casing members, and means between the drawer member and the carrying and casing members having positive driving cooperation with each for positively operating the carrying member in the operation of the drawer member.

3. A drawer support, having in combination, a casing member, a carrying member within the casing member, a drawer member within the carrying member, and means between the casing and carrying members engaging the drawer member adapted to compensate for variations in said members, including bearing means engaging one edge of the drawer member and said casing member, and a pinion rotatably mounted on the carrying member having teeth loosely intermeshing between teeth on the opposite side of the drawer member and said casing member for positively driving said carrying member in the movement of said drawer member.

4. A drawer support, having in combination, a casing member, a carrying member in and supported by the casing member, a drawer member in said carrying member, and means between the casing and carrying members engaging the drawer member adapted to compensate for variations in said members, including a series of rolls mounted on one side of the carrying member at spaced longitudinal intervals and engaging between the drawer member and the casing member, and a toothed pinion rotatably mounted on the carrying member and having the teeth engaged in opposed rack teeth on the drawer and casing members, said teeth having play therebetween to permit relative lateral movement of the drawer and carrying members on the casing member.

Signed by me at Marietta, Ohio, this 1 day of December, 1925.

CARL F. WOLTERS.