Oct. 5, 1948. W. T. HORMES 2,450,593

DISAPPEARING DOOR STRUCTURE

Filed Aug. 25, 1944

FIG. 1.

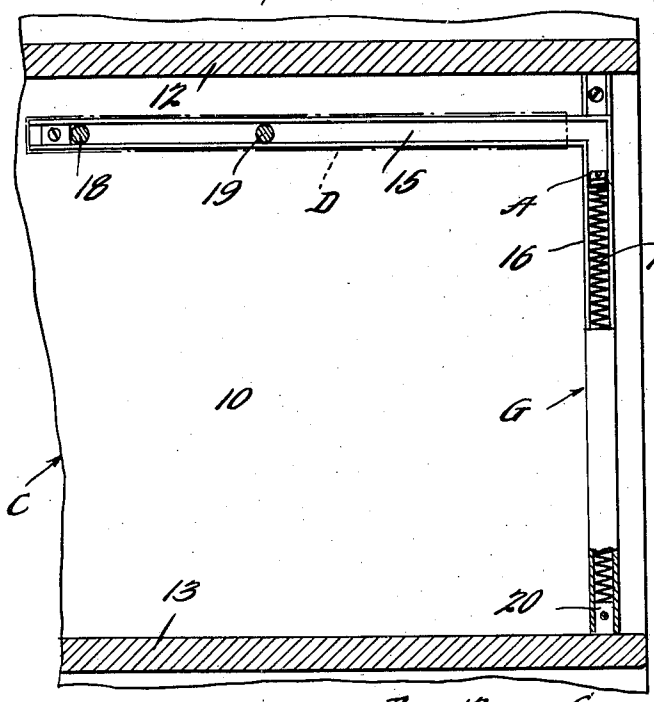
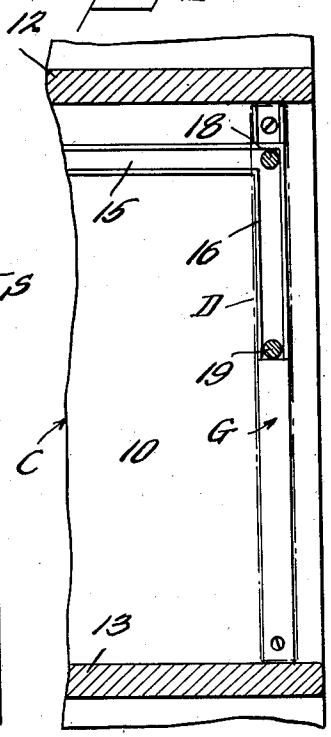


FIG. 2.



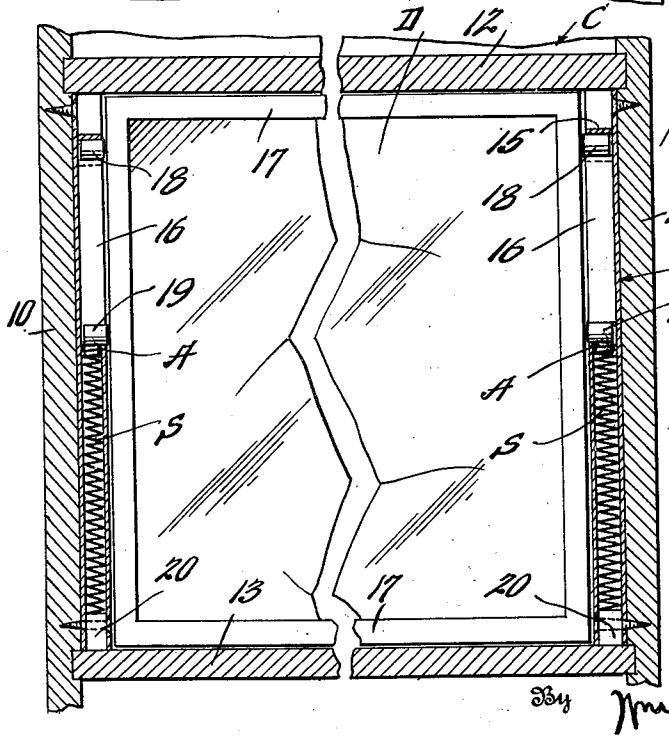


FIG. 3.

FIG. 4.

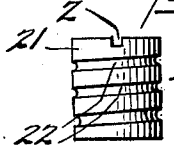
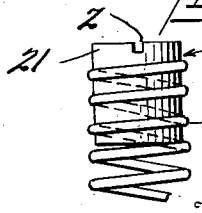


FIG. 5.



Inventor

William T. Hormes,

By Wm. S. Hodges

Attorney

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DISAPPEARING DOOR STRUCTURE

William T. Hormes, Catonsville, Md.

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4 Claims. (Cl. 20—19)

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This invention pertains to door structures of the type commonly employed to close an opening in the front of a store furniture unit.

One of the objects of the invention is to provide a disappearing door structure, i. e. one that is opened by lifting it and moving it inwardly into the top of the space which it normally covers, and means constructed and arranged to counterbalance the door during its opening and closing movements. An important object is to provide such a door structure with means for equalizing the inherent differences in the resiliency of any two springs which may be selected for counterbalancing purposes.

The invention will be hereinafter fully set forth and particularly pointed out in the claims.

In the accompanying drawing—

Figure 1 is a vertical sectional view of a conventional type of store furniture unit, with the door in open position, and looking toward an end wall of the unit, parts being broken away.

Figure 2 is a view similar to Figure 1, showing the door in closed position.

Figure 3 is a vertical sectional view taken at right angles to Figure 2.

Figure 4 is a side elevation of the adjustable equalizer member for a counterbalance spring.

Figure 5 is a detail view illlustrating the manner of connecting the adjustable abutment with its counterbalancing spring.

Referring to the drawings, C designates an open front store furniture cabinet provided with end walls 10, which support vertically spaced shelves 12 and 13. It is to be understood that the invention is not limited to this particular type of cabinet, because it is equally adaptable to other types of store furniture units now in common use and which employ disappearing doors. The form shown has accordingly been selected merely for the purposes of illustration.

Secured to the end walls of the cabinet, on opposite sides of the open front and in any desired manner, are two door guides G, one on each end wall. Each of said guides consists of a horizontal track channel 15, located near the top of the space normally to be covered by a door, and a vertical track channel 16. These channels are arranged at right angles, and communicate with each other at their intersecting ends. The door D for closing the open front of the cabinet, preferably consists of a glass sheet enclosed within a suitable frame 17, and is mounted on sets of rollers 18 and 19, which project laterally from the respective side edges of the door and are arranged to travel in the tracks of the respective

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door guides G. Located in each vertical channel 16 is a helical-coil counterbalance spring S, with both ends free, the lower end of which rests upon a fixed bottom abutment 20, located at the bottom of the channel 16. The upper end of each of said springs is provided with an adjustment member A positioned to engage a roller 19 on an adjacent side of the door frame as the door is closed, and so that the spring member is compressed by the weight of the closed door. In this manner the spring will assist upward movement of the door while the latter is being lifted by the operator.

It is well known that normally no two helical springs have precisely the same resiliency. Because of this factor there is a tendency of the door D to bind at its ends during its opening and closing movements, due to inequality of the spring pressures on its two ends. To overcome this tendency to bind, the adjustment member A of each of the springs S is constructed in the form of a cylindrical body 21, provided with a peripheral helical groove 22, the pitch of which corresponds to the pitch of the convolutions of its spring S. Said equalizer member is rotatively engaged by the end convolutions of the spring, so that it is anchored against free axial movement with respect to the spring, and yet may be moved inwardly or outwardly by rotative movement imparted thereto. The direction of such movement, of course, depends upon the direction of rotation. Rotation of equalizer member A within its coil may be effected in any suitable manner, but for purposes of illustration a slot Z to receive a screw driver is shown. The gripping tension of the spring coils is sufficient to normally prevent rotation of the equalizer member A with respect to its coil, until positive rotative force is applied thereto.

The advantages of the invention will be readily understood by those skilled in the art to which it belongs. For instance, an important advantage is smoothness of movement of the door in either direction, due to the provision of simple means for overcoming the effect of the inherent differences in resiliency of the two counterbalancing springs. A very important advantage is that by means of the adjustment members mounted in the upper free ends of the respective counterbalance springs, the effective extent of reactive compressibility of either spring for counterbalancing purposes may be independently adjusted with respect to that of the other spring, so that any inherent difference in the counterbalancing resiliency of the two springs may be

accurately equalized. Another advantage is that any desired resiliency adjustment of the spring may be quickly and easily accomplished without disengaging the door from its guiding tracks.

Having thus explained the nature of the invention and described an operative manner of constructing and using the same, although without attempting to set forth all of the forms in which it may be made, or all of the forms of its use, what is claimed is:

1. In a door structure for a cabinet having an open front, a door for covering said front, guide tracks supported one at each side of said cabinet, spaced upper and lower guide members projecting laterally from each of the side edges of said door and normally engaging the guide tracks, a fixed abutment adjacent to each guide track, a helical counterbalancing spring located one on each side of said open front, the lower end of each spring resting upon its respective fixed abutment with the upper end of each spring located in the path of movement of a laterally projecting guide member as the door is moved to closed position so that when contacted by the lower guide members as the door is moved to closed position the weight of the door will compress the springs, and a body at said upper end of each spring, means whereby said bodies may be adjusted axially with respect to said springs, said bodies adapted to be engaged by the lower laterally projecting guide members for varying the extent of reactive compressibility of the springs for counter-balancing purposes, so that any inherent difference in the counterbalancing resiliency of the respective springs may be equalized.

2. In a door structure for a cabinet having an open front, a door for covering said front, door guides located one at each side of said open front, each of said guides consisting of a vertical track and a horizontal track arranged in right angular relationship and communicating with each other, a door for covering said open front, spaced upper and lower guide members projecting laterally from each side edge of said door and engaging said tracks, a fixed abutment member adjacent to each vertical track, a helical counterbalancing spring located within each of said vertical tracks, the lower end of each spring resting upon its respective fixed abutment, the upper end of each spring disposed in the path of movement of its respective lower guide member, an adjustment member supported by the upper end of each spring at a position to be engaged by a lower laterally projecting guide member as the door is moved to closed position so that when contacted by said lower guide members as the door is moved to closed position the weight of the door will compress the springs, said adjustment member comprising means whereby it is adjustable axially with respect to the spring.

3. In a door structure for a cabinet having an open front, a door for covering said front, door guides located at opposite sides of said open front, each of said guides consisting of a vertical track and a horizontal track arranged in right angular relationship and communicating with each other, a door for covering said open front, said door having relatively spaced guide members projecting laterally from each side edge thereof and movably engaging said tracks, a fixed abutment located adjacent to the lower end of each vertical track, a helical counterbalancing spring located within each vertical track, the lower end of each spring resting upon said fixed abutment with the upper end thereof located in the path of movement of said laterally projecting guide members on the adjacent side edge of the door so that the weight of the door will compress the spring as the latter is moved to closed position, and a cylindrical adjustment member mounted in the upper free end of each spring in a position to be engaged by the cooperating laterally projecting guide member, each of said adjustment members being rotatively and axially adjustable with respect to its respective spring for varying the extent of reactive compressibility of the latter for counterbalancing purposes, so that any inherent difference in the counterbalancing resiliency of the respective springs may be equalized, said adjustment members normally being held against casual rotative movement by the gripping tension of the convolutions of the springs.

4. In a door structure for a cabinet having an open front, a door for covering said front, door guides located on opposite sides of said open front, each of said guides consisting of a vertical track and a horizontal track arranged in right angular relationship and communicating with each other, a door for covering said open front, said door having relatively spaced guide members projecting laterally from each side edge thereof and movably engaging said tracks, a fixed abutment adjacent to the lower end of each vertical track, a helical counterbalancing spring located within each vertical track, the lower end of each spring resting upon its respective fixed abutment with the upper end thereof located in the path of movement of a lower laterally projecting guide member on the adjacent side edge of the door so that the weight of the door as the latter is moved to closed position will compress the springs, and a cylindrical adjustment member mounted in the upper free end of each spring in a position to be engaged by said laterally projecting guide members, each adjustment member having an external helical groove the pitch of which corresponds to the pitch of the convolutions of its cooperating spring, said groove being rotatably engaged with the adjacent convolutions of the spring for varying the extent of reactive compressibility of the latter for counterbalancing purposes, so that any inherent difference in the counterbalancing resiliency of the respective springs may be equalized.

WILLIAM T. HORMES.

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