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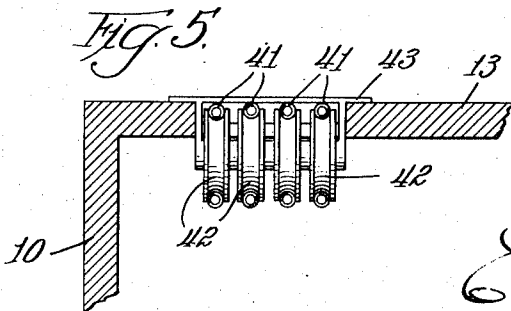
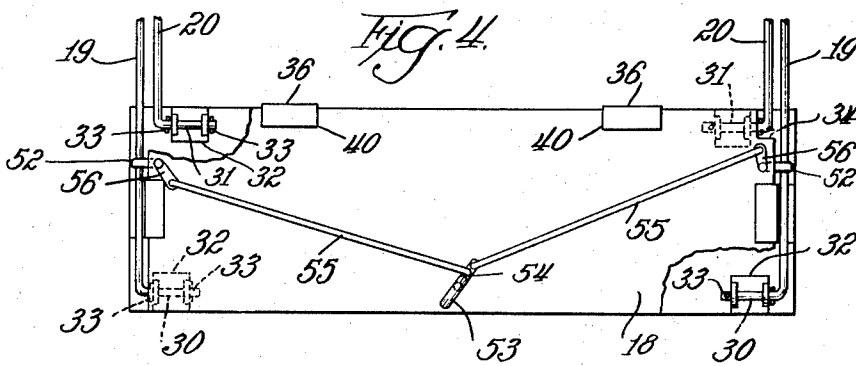
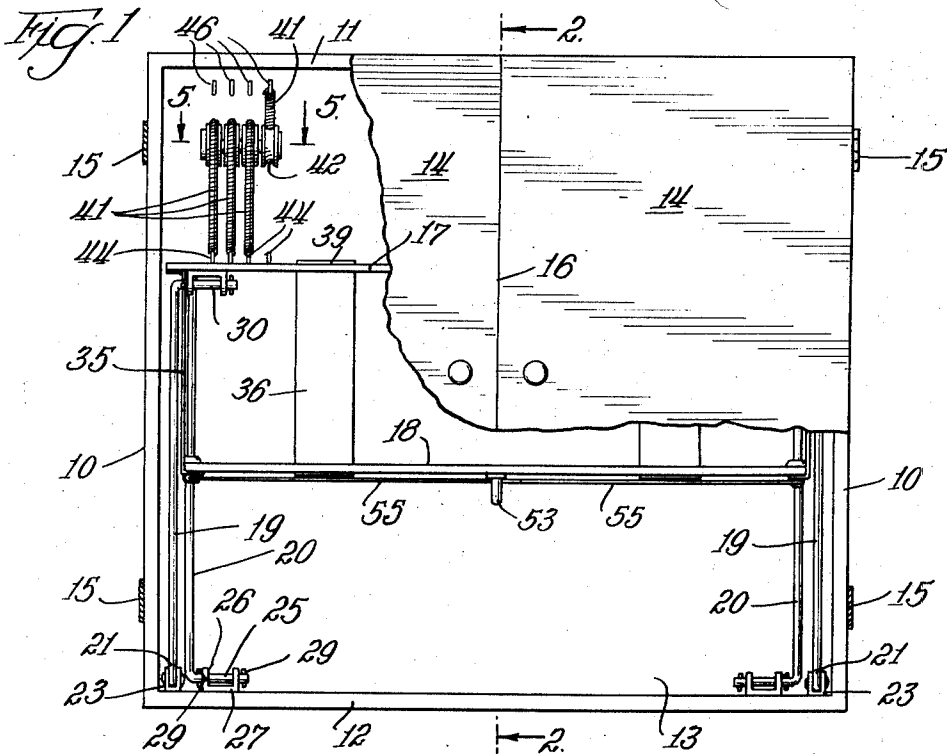
E. BRACK

2,558,416

SWING-DOWN SHELF

Filed March 3, 1947

2 Sheets-Sheet 1



INVENTOR.
Emit Brack
BY
Eugene M. Giles
Atty.

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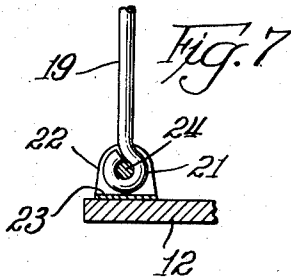
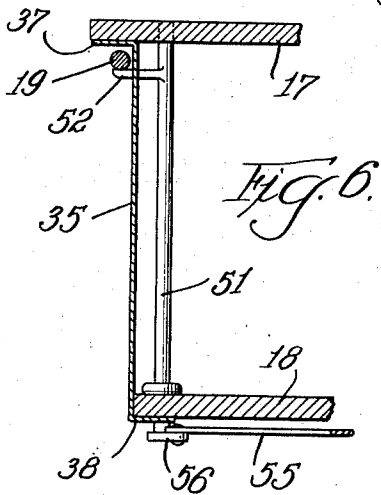
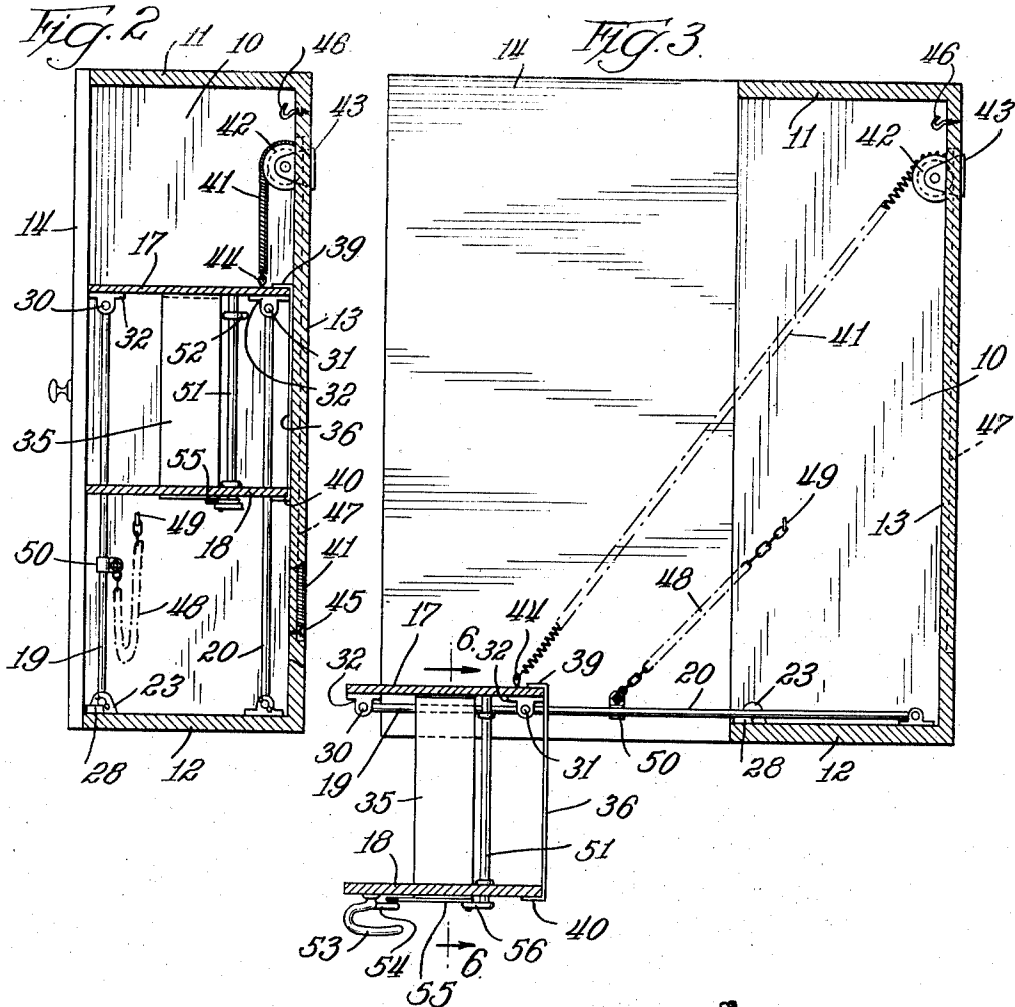
E. BRACK

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SWING-DOWN SHELF

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2 Sheets-Sheet 2



INVENTOR.
Emit Brack
BY
Eugen M. Giles
att'y.

UNITED STATES PATENT OFFICE

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SWING-DOWN SHELF

Emil Brack, Western Springs, Ill.

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2 Claims. (Cl. 312-266)

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My invention relates to a shelf mounting whereby a shelf, which is normally located at an elevation beyond convenient reach, may be readily lowered to a position of convenient access—the invention having reference more particularly to a shelf which is supported at each end on a pair of parallel upwardly extending front and rear arms so that the shelf may be swung forwardly and downwardly and is maintained at all times in a level position.

More than one shelf may be employed with the mounting and arranged to swing together to and from the upraised position, and the shelf structure and mounting are preferably incorporated in a cabinet—the invention being designed primarily to provide a kitchen cabinet which may be mounted on the wall at such an elevation that it would ordinarily be necessary to stand on a step ladder or chair to reach the shelf contents and wherein the shelves swing downwardly to a position where the shelf contents may be readily reached from the floor.

The principal objects of my invention are to provide an improved shelf structure whereby shelves which are normally located at an elevated position out of reach, may be swung downwardly to a position of convenient access; to insure maintenance of the shelves in a level position throughout the swinging thereof to and from the upraised position; to provide convenient means to facilitate the raising and lowering of the shelves; and to provide a simple and inexpensive swinging shelf structure which may be incorporated readily in a cabinet in a neat compact manner, these and other objects being accomplished as pointed out more fully hereinafter and as shown in the accompanying drawing in which:

Fig. 1 is a front view of a cabinet containing a swinging shelf structure constructed in accordance with my invention, the cabinet doors being broken away to disclose details of the swinging shelf structure;

Fig. 2 is a vertical sectional view of the cabinet of Fig. 1 taken on the line 2—2 thereof;

Fig. 3 is a view similar to Fig. 2 but showing the shelves swung down to the lowermost position;

Fig. 4 is a bottom view of the shelf structure of Fig. 3 with portions of the bottom shelf broken away to disclose details of construction;

Fig. 5 is a fragmentary sectional view of the back wall of the cabinet taken on the line 5—5 of Fig. 1 and showing the pulleys for the shelf counterbalancing springs;

Fig. 6 is a fragmentary sectional view of the

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shelf structure taken on the line 6—6 of Fig. 3; and

Fig. 7 is a detail view of the pivoted lower end of one of the front supporting arms of the shelf structure.

In the drawing, in which my invention is illustrated in cabinet type form suitable for kitchen use at an elevation on the kitchen wall, the reference numerals 10, 10 indicate the cabinet ends, 11 and 12 the cabinet top and bottom respectively, and 13 the back wall. The cabinet preferably has a pair of doors 14, 14 hinged respectively to the end walls 10 as indicated at 15 to swing together at the center as indicated at 16 to close the cabinet at the front.

The cabinet bottom 12 serves as the lower shelf of the cabinet and between the top 11 and bottom 12 are two shelves 17 and 18 which are suitably spaced from one another and from the top 11 and bottom 12, and are normally located in the cabinet so that the doors 14, 14 close together at the front thereof.

These shelves 17 and 18, however, are mounted in the cabinet so that when the cabinet doors 14, 14 are open, they may be swung forwardly and downwardly at the front of the cabinet to the position indicated in Fig. 3, so that articles on the shelves 17 and 18 are readily accessible to a person standing on the floor even though the cabinet is at a relatively high elevation in the kitchen.

For mounting these shelves 17 and 18 for the aforesaid swinging movement, a pair of supporting arms 19 and 20 are provided at each end of the cabinet adjacent the respective end wall 10 and pivoted at their lower ends to the cabinet bottom 12 which serves as a base whereon the shelf structure 17, 18 is mounted to swing forwardly, the arm 19 being at the front of the cabinet and close to the respective wall 10 and the arm 20 at the rear of the cabinet and spaced a sufficiently greater distance from the respective end wall 10 so that the arms 19, 20 swing in different close adjoining planes and lie in side by side relation, as indicated in Fig. 4 when they are swung downwardly to horizontal position.

These arms 19 and 20 may be pivoted at their lower ends in any convenient manner which will permit them to swing down to the side by side relation shown in Fig. 4. For example, each front arm 19 may have the lower end thereof bent to form an eye 21, as shown in Fig. 7, which is confined, between the upturned wings 22 of a bracket 23, on a pivot pin 24, which said bracket 23 is se-

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cured to the bottom wall 12 of the cabinet close to the respective side wall 10.

Each rear arm 20 has its lower end bent inwardly toward the center of the cabinet, as indicated at 25, and the inturned end 25 is pivoted in the spaced upwardly extending wings 26 of a bracket 27 which is secured to the bottom wall 12 of the cabinet at such distance from the respective end wall 10 that the arm 20 which is pivoted therein will swing down close beside the bracket 23 of the corresponding front arm 19, a stop 28 being provided on the bottom wall 12 at the side of the bracket 23 against which the arm 20 rests in the down-swung position of the shelves. Preferably, the inturned end 25 of each arm 20 is retained in position in its bracket 27 by a cotter pin 29 engaged through said end 25 at each end of the bracket 27.

The arms 19 and 20 extend upwardly in parallel relation in the cabinet, as shown in Fig. 2, to the elevation of the shelf 17 which is pivoted at each end to the upper ends of a pair of arms 19 and 20 in any convenient manner. This pivoting may be accomplished, in the same manner as the arms 20 are pivoted at their lower ends, by turning the upper ends of the arms 19 and 20 inwardly toward the center of the cabinet as at 30 and 31 respectively and engaging these inturned ends in brackets 32 which are secured to the underside of the shelf 17 with cotter pins engaged through said inturned ends 30 and 31, as indicated at 33.

The upper shelf 17 is of a length to extend at each end nearly to the respective cabinet end wall 10 with sufficient separation, as shown in Fig. 1, to allow free movement of the shelf 17 to and from the normal position in the cabinet, whereas, the bottom shelf 18 is shorter than the upper shelf 17 to afford sufficient space between the ends thereof and the respective cabinet wall 10 for free movement of the front arms 19.

Preferably said lower shelf 18 is longer than the distance between the rear arms 20 and has the rear corners notched as at 34 in Fig. 4 to accommodate said arms 20.

This shelf 18 is suspended from the upper shelf 17 by end hangers 35 and rear hangers 36, the former of which have outturned upper ends 37 secured to the underside of the upper shelf 17 and inturned lower ends 38 secured to the underside of the lower shelf as shown in Fig. 6, whereas, the rear hangers 36 have inturned upper ends 39 extending over and secured to the top of the upper shelf 17 and inturned lower ends 40 extending under and secured to the bottom of the lower shelf 18.

By reason of the above described mounting of the shelves 17, 18, these shelves, while normally located within the cabinet, as shown in Figs. 1 and 2, may be swung down to the position shown in Fig. 3, and it will be noted that by reason of the parallel arm mounting at each end, the shelves 17 and 18 are maintained in horizontal position throughout the range of movement thereof, and thus, any articles on these shelves will not be tipped off therefrom our displaced in the swinging movement of the shelves.

It is desirable to counterbalance the weight of the shelves and their load so that they will swing up and down easily and safely, and I have found that this may be done advantageously by employing one or more long springs which are distended as the shelves swing downwardly.

Preferably a number of such springs are employed at each end, for example, four at each

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end as indicated at 41 and each trained around a separate pulley 42 of a multiple pulley block 43 secured to the back wall 13 of the cabinet near the top as shown in Figs. 1 and 2. One end of each spring 41 is secured to the upper shelf 17 at the respective end thereof and near to the rear of the shelf preferably to one of a series of hooks 44 on the shelf, so that it is detachable, and the other end of the spring is secured to the rear wall 13 of the cabinet near the bottom thereof as indicated at 45 in Fig. 2. A series of hooks 46 are also provided on the back wall of the cabinet, one above each pulley 42 location for a purpose hereafter explained.

The pulley blocks 43 may be secured to the back wall 13 at the inside of the cabinet with the springs 41 extending down along the inner side of the back wall 13, but I prefer to mount the pulley block 43 on the cabinet back wall 13, as shown herein, so that the springs 41 pass through the back wall at the pulley location, and I provide the back wall 13 with channels 47 on the rear side to accommodate the springs 41, the channels 47 having at their lower ends the fasteners 45 which may be in the form of header pins, onto which the lower ends of the springs 41 are fastened.

Thus, when the shelves 17, 18 are swung forwardly and downwardly, the long springs 41 are stretched over their pulleys 42, the tension thereof increasing as the load thereon increases in the downward swinging movement, so that the tension is substantially proportionate to the load at all times, and manual operation of the shelves is thus rendered quite easy.

The load on the shelves 17, 18 may vary, and it is for this purpose of affording tension according to the load that a series of springs 41 are employed at each end of the shelf structure and the hooks 46 above the pulleys 42. Thus, when the shelves 17, 18 are heavily loaded, all of the springs 41 may be employed for counterbalancing the shelf structure, but if the shelf structure has a lighter load, one or more of the springs 41 may be detached from the shelf hooks 44 and engaged with the corresponding hook 46 thereabove so that only such number of springs 41 is employed as the load on the shelves 17, 18 may require.

The rear arms 20, as hereinbefore indicated, rest on their respective stops 28 when the shelf structure is swung down to the lowermost position, and it is also desirable to provide supports which will at the same time limit the downward swinging movement of the front arms 19. To this end, a chain 48 is provided at each end of the cabinet, one end of which is attached to the respective cabinet end wall 10 as indicated at 49, and the other end of which is attached to a clamp 50 on the corresponding front arm 19 at a substantial distance from the pivot 25 thereof. Thus, when the shelf structure 17, 18 is swung downwardly to the Fig. 3 position, the chains 48 are outstretched as shown in said figure so that they limit downward movement of said front arms 19, and when the shelf structure is swung upwardly to the normal position in the cabinet as shown in Fig. 2, said chains are looped at the inner side of their respective end walls 10 as shown in said Fig. 2.

When the shelves 17, 18 are in the lowered position, some forward and rearward tilting of the shelf structure might occur, and to safeguard against any such tilting and also to hold the shelf structure in the lowermost position against any accidental upward movement, I have provided latch means to engage under the arms 19 when

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the shelf structure is in the lowermost position of Fig. 3.

This latching means comprises a vertical shaft 51 at each end of the shelf structure near the rear and journaled in the shelves 17 and 18 to rotate, and each shaft 51 has an arm 52 thereon which, by turning movement of the respective shaft 51, may be swung outwardly, to engage under the respective arm 19, as shown in Fig. 6, when the shelf structure is in the lowered position of Fig. 3.

Thus, when the shelf structure is lowered and the latch arms 52 engaged under the arms 19, the outer end of each arm 19 is confined between the overhanging end of the top shelf 17 and the respective latch arm 52 as shown in Fig. 6, and the shelf structure not only may not then be lifted from the lowered position until the latches 52 are released, but no forward and rearward tilting of the shelf structure may occur.

For operating the latches 52, a handle 53 is provided at the underside of the shelf 18 near the front thereof, which said handle also affords a convenient means whereby the shelf structure may be raised and lowered.

This handle 53 is pivoted to the shelf 18 to rotate on a vertical axis and has an arm 54 extending rearwardly therefrom and connected by a pair of links 55 with crank arms 56 on the lower ends of the shafts 51, directly below the shelf 18, the crank arm 56 of one shaft being extended forwardly from its shaft 51 as indicated at the left end of Fig. 4 and the crank arm 56 of the other shaft 51 being extended rearwardly from its shaft 51 as shown at the right end of Fig. 4 so that when the shafts 51 are rotated by the handle 53 and connecting links 55, one shaft 51 rotates in a clockwise direction while the other shaft 51 rotates in a counter-clockwise direction. The latch arms 52 are located on their shafts 51 so that in the rotation of the handle 53 in one direction, both latch members are swung outwardly to engage under the arms 19, and in the rotation of the handle 53 in the reverse direction, both latches 52 are retracted from underneath the arms 19.

Thus, when the shelf structure 17, 18 is to be lowered, the handle 53 is grasped and the shelf structure pulled downwardly to the position shown in Fig. 3, whereupon a turn of the handle 53 latches the shelf structure in this position in which it is retained until the handle 53 is grasped and turned to release the latches 52, whereupon the shelf structure may be pushed up to the normal position in the cabinet.

While I have shown and described my invention in preferred forms, I am aware that various changes and modifications may be made therein without departing from the principles of the invention, the scope of which is to be limited only by the appended claims.

What is claimed is:

1. In a structure of the class described the combination of a base, a shelf unit comprising an upper shelf and at least one shelf therebelow supported by the upper shelf, said upper shelf having at each end a parallelogrammic connection with the base whereby the shelf unit is supported at an elevation above the base and swings downwardly to a location in front of the base,

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each said connection comprising a pair of parallel arms having their upper ends pivoted to the underside of the upper shelf in spaced relation at the front and rear respectively of the shelf and having their lower ends pivoted to said base in correspondingly spaced apart relation, counterbalancing means which exerts a progressively increasing lifting tension on the shelf as it swings from said elevation above the base to said location in front of the base, latching means on the shelf unit engageable with one of the aforesaid parallel arms at each end of the shelf to hold the shelf in said location in front of the base, and a handle on the underside of the lowermost shelf at the front thereof which is connected with and operable to release said latching means.

2. In a structure of the class described the combination of a cabinet having a back wall, end walls, and a top wall and a bottom wall forming an enclosed shelf space in front of the back wall, a shelf unit in said space comprising an upper shelf and at least one shelf therebelow supported by the upper shelf, said upper shelf having at each end a parallelogrammic connection with said bottom wall whereby the shelf unit is supported at an elevation above said bottom wall and swings outwardly from the cabinet space and downwardly to a location in front of said cabinet bottom wall, each said connection comprising a pair of parallel arms having their upper ends pivoted to the upper shelf in spaced relation at the front and rear respectively of the shelf and having their lower ends pivoted to said cabinet bottom wall in correspondingly spaced apart relation, shelf unit counterbalancing means which exerts a progressively increasing lifting tension on the shelf unit as it swings from said elevation above the cabinet bottom wall to said location in front of the cabinet bottom wall, latching means on the shelf unit engageable with one of the aforesaid parallel arms at each end of the shelf unit to hold the shelf unit in said location in front of the cabinet bottom wall, and a handle on the underside of the lowermost shelf at the front thereof which is connected with and manually operable to release said latching means.

EMIL BRACK.

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