June 30, 1959 R. E. CONDIT 2,892,209

COMBINED HINGE AND HOLD-OPEN DEVICE FOR CLOSURE MEMBERS

Filed June 2, 1958

FIG. 1

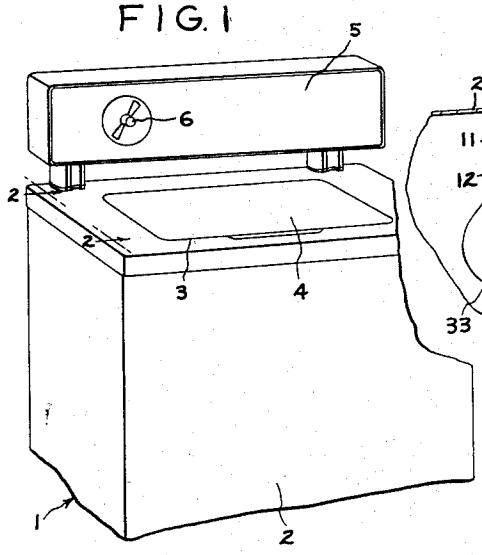


FIG. 2

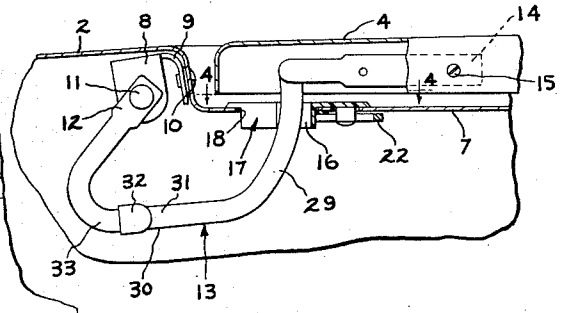


FIG. 4

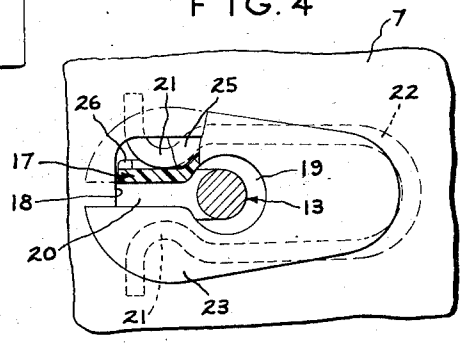


FIG. 3

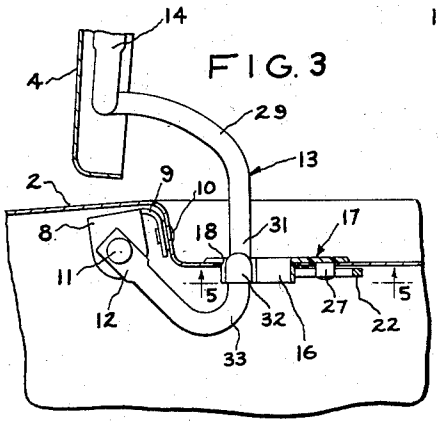
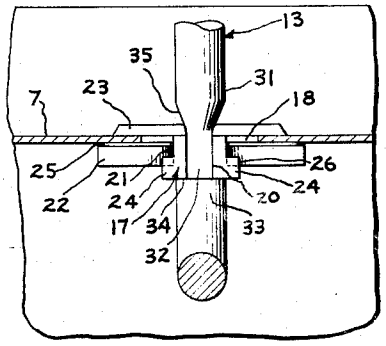


FIG. 6



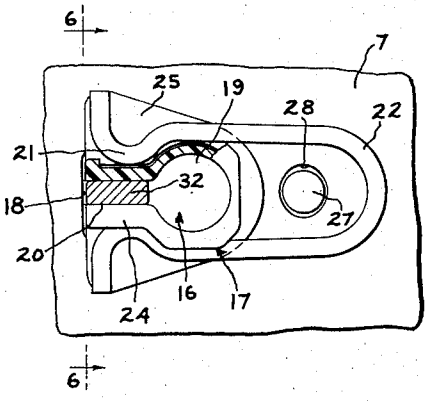


FIG. 5

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COMBINED HINGE AND HOLD-OPEN DEVICE FOR CLOSURE MEMBERS

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Application June 2, 1958, Serial No. 739,419

4 Claims. (Cl. 16—140)

This invention relates to hinging arrangements, and more particularly to an improved combination hinging and hold-open arrangement of simplified yet effective design.

It is an object of this invention to provide an improved hinging arrangement which readily provides for movement of a closure member without necessitating an exposed pivot point therefor.

A further object of the invention is to provide such a hinging arrangement wherein the hinging device automatically operates as a hold-open device when the closure member reaches a predetermined position.

Yet a further object of the invention is to provide an arrangement of the type set forth above wherein the hinging member, by relatively minor modifications thereto, provides the necessary cooperation with stationary parts to effect yieldable holding open of the closure member.

In one aspect of the invention, I provide a combined closure member hinging and holding device where a hinge leaf member has a first end intended to be rigidly secured to a closure member. Bracket means are provided to be secured to the supporting structure for the closure member, and the other end of the hinge leaf is pivotally connected to this bracket so as to pivot about a point. Also intended to be rigidly secured to the supporting structure are means forming an opening which is at a predetermined distance from the point about which the hinge leaf pivots.

A first length of the hinge leaf adjacent the first end thereof is formed to pivot about the point at a distance different from the predetermined distance from the point to the opening. A second length of the hinge leaf, provided adjacent the first length, has at least a portion which is at the predetermined distance from the point and aligned with the opening so that as the hinge leaf pivots about the point the second length portion passes through the opening. There are three separate parts to the second length portion: a relatively wide first part; a relatively narrow second part at the end of the first part which is remote from the first length of the hinge leaf; and a relatively wide third part on the end of the second part which is remote from the first length of the hinge leaf. The opening is formed of a flexible material, and means are provided to bias the opening to a width which is substantially less than that of the first and third parts, so that when the hinge leaf is pivoted to cause the second length portion to pass through the opening the biasing means causes the opening in effect to shrink when the second part is passing through. The opening closes between the first and the third parts to an extent which retains the hinge leaf with the second part seated in the opening. The second part is approximately positioned on the hinge leaf so that when it is thus retained in the opening the closure member is open to the desired position. The yielding nature of the opening permits the hold-open arrangement to be overcome by the exercise of a relatively small force to cause the first part of the

second length portion to pass through the opening, forcing the opening to a larger dimension and releasing the closure from its hold-open position.

An instance of a suitable closure member to which the invention may be applied is the lid which closes the loading opening of a washing machine. The use of the improved arrangement of my invention provides a concealed hinge for the lid member together with suitable means for holding the lid open so that no attention is required from the operator of the machine at the time when she is likely to need both hands for loading clothes into or unloading clothes from the machine.

The features of the invention which are believed to be novel are set forth with particularity in the appended claims. The invention itself, however, both as to organization and method of operation together with further objects and advantages thereof, may best be understood by reference to the following detailed description taken in conjunction with the accompanying drawing.

In the drawing,

Fig. 1 is a fragmentary view in perspective of a typical clothes washing machine which may include a closure member hinged by means of my improved arrangement;

Fig. 2 is a fragmentary view, partly in cross section, along line 2—2 in Fig. 1;

Fig. 3 is a view similar to that of Fig. 2, with the closure member being held in its open position by my improved hold-open arrangement;

Fig. 4 is a view, partly in cross section, along line 4—4 in Fig. 2;

Fig. 5 is a view, partly in cross section, along line 5—5 in Fig. 3; and

Fig. 6 is a view along line 6—6 in Fig. 5.

Referring first to Fig. 1, there is shown a typical clothes washing machine 1 of the type having a cabinet 2 which encloses clothes washing apparatus (not shown) which is accessible through an opening 3 having a closure member 4 which normally blocks off the opening except when the operator wishes to load or unload the machine. A typical backsplasher 5 including a control member 6 may be provided in the usual manner to provide effective operator control of the sequence of operations being performed by the apparatus contained within cabinet 2. It will readily be apparent that the operator will wish the closure member 4 to remain in an open position without any assistance since, when the closure member is in its open position, she will normally be engaged either in depositing clothes to be washed in the machine or taking clothes out of the machine; in either event, she will wish to have the use of both hands. Also, of course, it is desirable that the closure member or lid 4 remain in its open position without resting against backsplasher 5 since this would eventually mar the finish either on the backsplasher or on the lid or on both.

Referring now to Fig. 3 it will be seen that lid 4 is provided with a seat 7 formed in cabinet 2. According to my invention I provide a bracket member 8 including a flange 9 which is secured by suitable means such as a screw 10 to the cabinet structure. Bracket 8 includes a pin 11 on which is pivotally mounted the end 12 of a hinge leaf generally indicated at 13. The other end 14 of the hinge leaf 13 is secured to lid 4 by any suitable means such as members 15. The intermediate portion of the hinge leaf 13 passes through an opening 16 formed in a flexible member 17 (which may, for instance, be formed of plastic) which is secured within an opening 18 provided in seat 7.

Referring now to Figs. 2 through 6 of the drawing, the plastic member 17 is formed, as stated, to provide an opening 16 therethrough. Opening 16 in turn includes a first section 19 which is relatively large by com-

parison to the cross-sectional dimensions of hinge leaf 13 (Fig. 4), and a second section 20 which is substantially narrower than the width of hinge leaf member 13 as viewed in Fig. 4. The plastic member 17 is engaged on each side of opening section 20 by sections 21 of a spring 22. Spring sections 21 serve to bias the plastic member 17 to the position shown wherein opening section 20 is substantially narrower than the hinge leaf member 13.

In order to maintain the assembly of the plastic member 17 and the spring 22 in position, the plastic member is formed on its upper part with a flange portion 23 which extends substantially entirely over the opening 18 in seat 7 so that the opening is entirely covered except where it coincides with the opening 16 in the plastic part 17. At the underside thereof, plastic member 17 is provided with lips 24 which extend under the spring 22 and act to support it against the seat 7. Where so desired, a thin shim member 25 may be provided between spring 22 and seat 7 in order to prevent damage to the finish of seat 7 from the spring 22. The plastic member 17 may further be provided with bosses 26 (Figs. 4 and 6) which position portions 21 of spring 22 and prevent the spring from slipping out of position. The assembly may be completed by providing the plastic member 17 with a projection 27 which registers with an opening 28 provided in the seat 7, as best shown in Figs. 3 and 5.

It will thus be seen that the engagement of the flange 23 against seat 7 prevents downward movement of the plastic member 17 as viewed in Fig. 6, and engagement of the lips 24 with the spring 22 prevents upward movement of the plastic member 17, so that it is rigidly positioned in a vertical direction. With respect to back and forth movement, the provision of the projection 27 through opening 28 locks the plastic member 17 in position. These features, together with the bosses 26 to prevent movement of the spring 22 relative to the plastic member 17, serve to provide a complete assembly which is rigidly secured to the seat 7.

Plastic member 17 is formed of a material such that, together with selection of an appropriate strength for spring 22, the opening section 20 may be forced open to the extent necessary to receive the full width of hinge leaf member 13 as it appears in Fig. 4, with the portions 21 of spring 22 returning the member 17 to the formation shown upon the removal of the object forcing the opening section 20 to a larger dimension. However, it will be understood (particularly from the following description) that the important feature is that the opening section 20 be resiliently biased to the formation shown, and it is readily conceivable that an appropriate material may be used for part 17 which may preclude the requirement for a separate spring 22, the bias necessary being built directly into the member 17. However, the arrangement shown represents the presently known most practical embodiment of my invention.

The hinge leaf member 13 has a first length 29 thereof adjacent the end 14 formed so that it does not pass through opening section 20. In the present embodiment, this has been effected by providing length 29 of the hinge leaf 13 in the shape of an arc of a circle formed about the pivot pin 11 with a radius about equal to the distance from the pivot pin to opening section 19. Thus, when hinge leaf section length 29 passes through opening 16 of member 17, as shown in Fig. 2, it passes through section 19 which is wide enough to accommodate the hinge leaf without any interference, as shown in Fig. 4.

Adjacent the first length 29 of hinge leaf member 13 there is a second length 30 on the side of the length 29 which is remote from end 14. Length 30 of the hinge leaf member 13 is formed with at least a portion thereof which includes three parts 31, 32 and 33 which are aligned with the opening section 20 and which are at the same distance from the pivot pin 11 as opening section 20. Thus, when the closure member 4 has been opened to the point where the second length 30 of the hinge leaf member 13 is passing through opening 16, parts 31 and 32, being aligned with opening section 20 at the same distance from the pivot pin as that opening section, pass therethrough. Parts 31 and 33 have the same relatively large dimensions as part 29 (shown in Figs. 4 and 6). However, part 32 is relatively narrow compared to the other two parts 31 and 33, which are substantially greater in size than the formation to which opening section 20 is biased. As closure member 4 is opened to a point where length 30 of the hinge leaf member is passing through opening 16, part 31 will first force the opening section 20 to a relatively enlarged position as it passes therethrough. Then, as part 32 passes through opening section 20, spring portions 21 will return the member 17 to its previous shape so that it has the appearance set forth in Figs. 5 and 6. This shrinking, as it might be called, of the opening section 20 between hinge leaf parts 31 and 33 in effect locks the hinge leaf in the position shown in Figs. 5 and 6 so that the closure member 4 will remain in the position it finds itself in at the time that part 32 moved into registry with the opening section 20. As shown in Fig. 6, this effect may be further assured by making the junction between parts 32 and 33 relatively flat one in the form of a shoulder 34. This has the additional effect of substantially preventing any possibility of opening the closure member or lid 4 to a greater extent than that desired as determined by the position of part 32.

It will readily be seen that lid 4 will remain in the desired position as long as no force is exerted to unlock the hinge leaf member 13 from the position it has assumed. When it is desired to close the lid 4, it is merely necessary to pull it gently toward its closed position. When this occurs the sloping cam face 35 which forms the junction between part 31 and part 32 forces the opening section 20 to its enlarged position against the action of spring 22, and the hinge leaf slides through the opening 16, first with part 31 passing through the opening section 20, and finally with length 29 passing through opening section 19 until the lid 4 reassumes its closed position as shown in Fig. 4.

It will be seen from the foregoing that the invention provides a hinge leaf and hold-open arrangement where, by appropriate formation of the hinge leaf, it can be made to cooperate with different parts of the opening through which it passes to provide ready opening and closing of the lid member without the pivot point being exposed, and also a locked position where it will remain as long as desired and which requires only a relatively small force in order to return it to its closed position. It will readily be seen that while this invention has been applied to the lid of a washing machine, it will find ready application to other closure members, and of course to closure members which pivot about other axes than a horizontal one (as in the case here, with pivot pin 11 being formed along a substantially horizontal line in order to provide the horizontal closure member 4).

While in accordance with the patent statutes I have described what at present is considered to be the preferred embodiment of my invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the invention, and I therefore aim in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of this invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A combined closure member hinging and holding device comprising a hinge leaf member having a first end adapted to be rigidly secured to a closure member, bracket means adapted to be rigidly secured to the supporting structure for said closure member, said hinge leaf hav-

ing a second end pivotally connected to said bracket so as to pivot about a point, yieldable means adapted to be rigidly secured to the supporting structure forming an opening at a predetermined distance from said point, said hinge leaf having a first length adjacent said first end thereof formed to pivot about said point at a distance different from said predetermined distance, said hinge leaf having a second length adjacent said first length, at least a portion of said second length pivoting about said point at said predetermined distance therefrom in alignment with said opening, said second length portion including a relatively wide first part, a relatively narrow second part on the end of said first part which is remote from said first length, and a relatively wide third part on the end of said second part which is remote from said first length, and means biasing said yieldable opening-forming means to cause said opening to tend to have a width substantially less than that of said first and third parts, whereby when said hinge leaf is pivoted to cause said second part to pass through said opening, said biasing means causes said opening to shrink between said first and third parts thereby to retain said hinge leaf with said second part in said opening.

2. A combined closure member hinging and holding device comprising a hinge leaf member having a first end adapted to be rigidly secured to a closure member, bracket means adapted to be rigidly secured to the supporting structure for said closure member, said hinge leaf having a second end pivotally connected to said bracket so as to pivot about a point, yieldable means adapted to be rigidly secured to the supporting structure forming an opening having two sections, the first of said opening sections being larger than the second of said opening sections, said opening sections being radially displaced from each other relative to the pivot point, said hinge leaf having a first length adjacent said first end thereof formed as an arc of a circle having a center at said pivot point and a radius equal to the distance from said pivot point to the larger of said opening sections, said hinge leaf having a second length adjacent said first length, at least a portion of said second length pivoting about said point at the same distance therefrom as said second opening section, said second length portion including a first part wider than said second opening section, a second part relatively narrow with respect to said first part and positioned on the end of said first part which is remote from said first length, and a third part which is wider than said second opening section on the end of said second part which is remote from said first length, and means biasing said yieldable opening-forming means to cause said opening to tend to have a width substantially less than that of said first and third parts, whereby when said hinge leaf is pivoted to cause said second part to pass through said opening said biasing means causes said opening to shrink between said first and third parts thereby to retain said hinge leaf with said second part in said opening.

3. The device defined in claim 1 wherein the junction between said second and third parts is formed as a shoulder thereby to preclude passage of said third part through said opening, and the junction between said first and second parts is formed as a sloping surface to permit said first part to be passed through said opening when it is no longer desired to retain said hinge leaf with said second part in said opening.

4. A combined closure member hinging and holding device comprising a hinge leaf member having a first end adapted to be rigidly secured to a closure member, bracket means adapted to be rigidly secured to the supporting structure for said closure member, said hinge leaf having a second end pivotally connected to said bracket so as to pivot about a point, a member of flexible material adapted to be rigidly secured to the supporting structure forming an opening having two sections radially displaced from each other relative to the pivot point, the first of said opening sections being larger than the second of said opening sections, said hinge leaf having a first length adjacent said first end thereof formed as an arc of a circle having its center at the pivot point and having a radius equal to the distance from the pivot point to the first of said opening sections, said hinge leaf having a second length adjacent said first length, at least a portion of said second length pivoting about said point at the same distance therefrom as said second opening section, said second length portion including first, second and third parts respectively increasingly remote from said first length, said first length and said first and third parts of said second length having a width substantially in excess of the normal width of said second opening section said second part having a width substantially less than that of the remainder of said hinge leaf, and spring means engaging said opening forming means adjacent said second opening section thereof and biasing said second opening section to its normal width and opposing any increase in the width thereof, whereby when said hinge leaf is pivoted to cause said second part to pass through said opening said spring means causes said opening to shrink between said first and third parts to its normal position thereby to retain said hinge leaf with said second part in said opening.

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