March 4, 1952 R. W. WOLF 2,587,947

ARRANGEMENT FOR MAINTAINING A CLOSURE IN ANY OF A PLURALITY OF OPEN POSITIONS

Filed Aug. 18, 1950 3 Sheets-Sheet 1

Fig. 1.

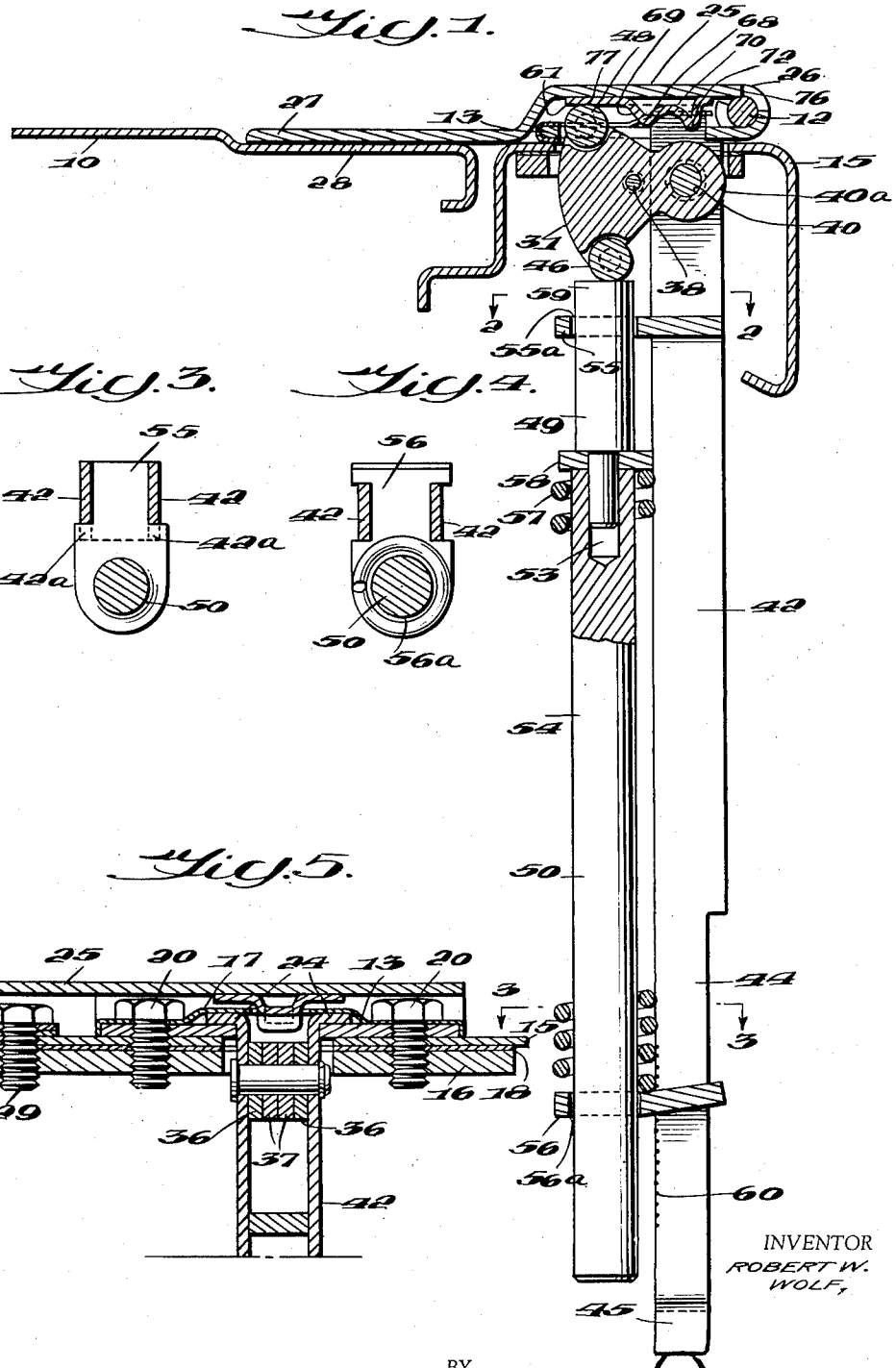


Fig. 3.

Fig. 4.

Fig. 5.

INVENTOR
ROBERT W. WOLF,

BY Robert B Parsons
ATTORNEY

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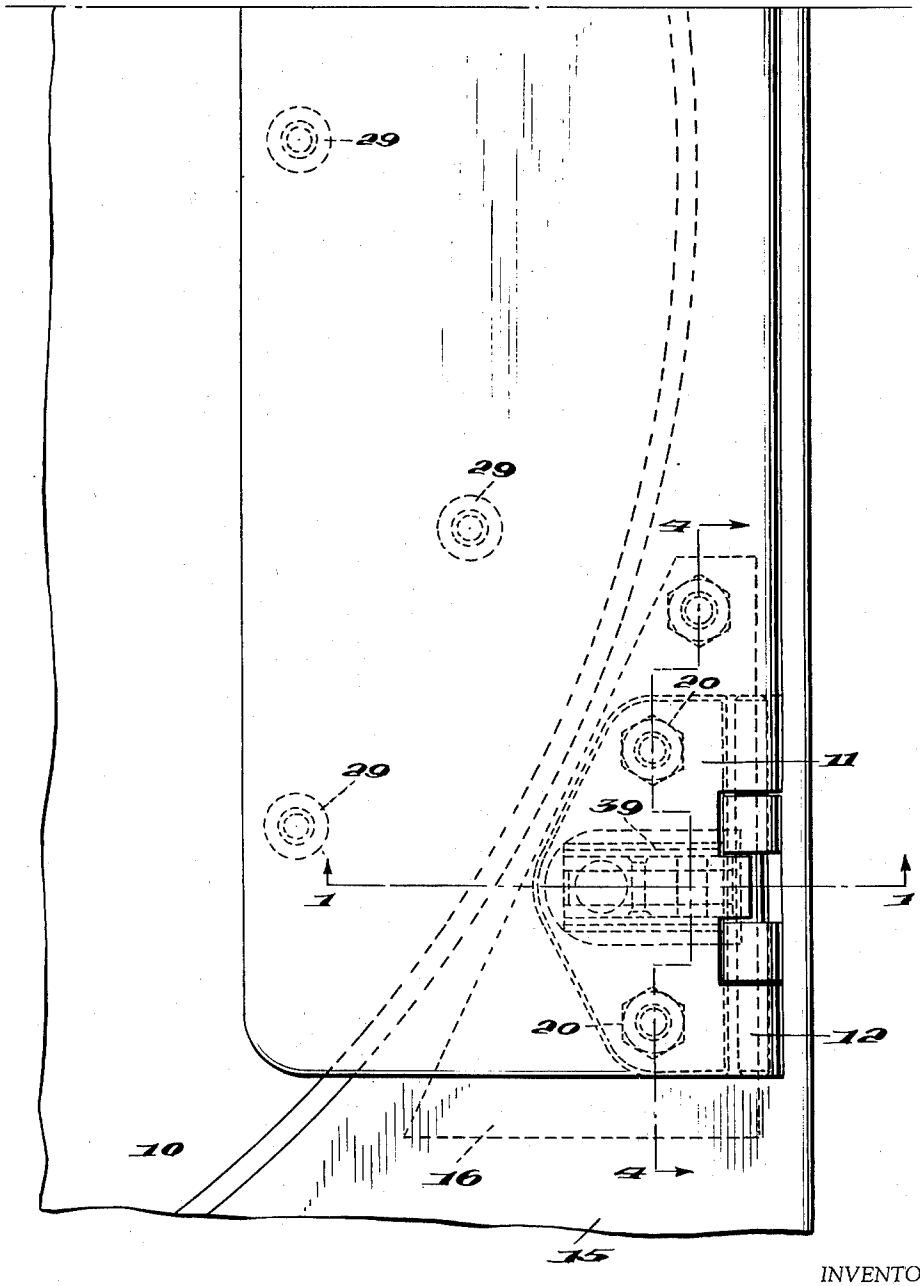


Fig. 2.

INVENTOR
ROBERT W. WOLF,

BY Robert B Pearson
ATTORNEY

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Fig. 8.

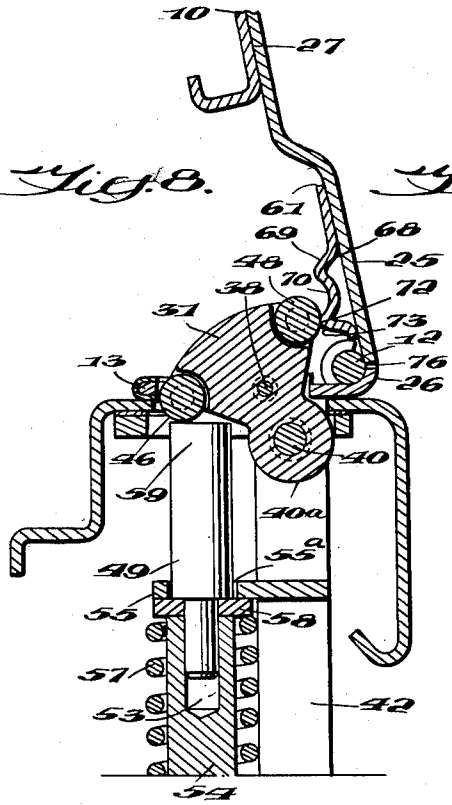
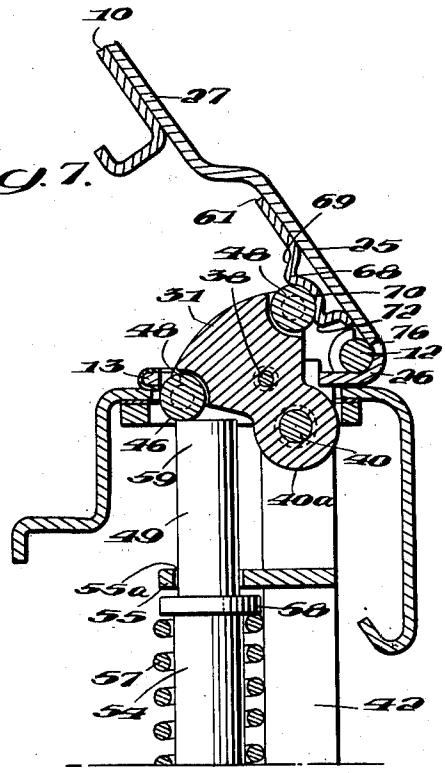


Fig. 7.



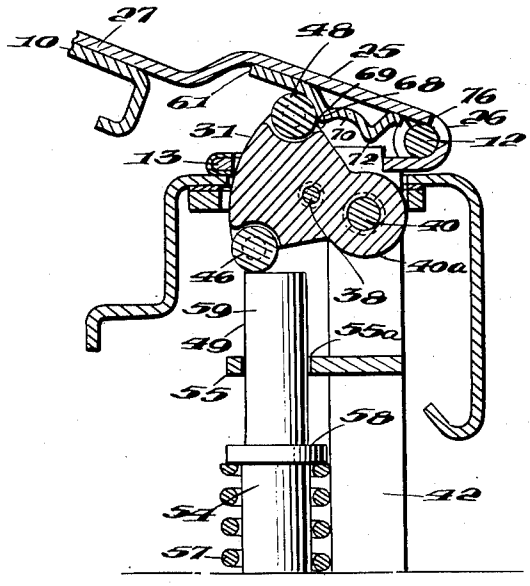


Fig. 6.

INVENTOR
ROBERT W. WOLF,

BY Robert B Pearson

ATTORNEY

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UNITED STATES PATENT OFFICE

2,587,947

ARRANGEMENT FOR MAINTAINING A CLOSURE IN ANY OF A PLURALITY OF OPEN POSITIONS

Robert W. Wolf, Philadelphia, Pa.

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2 Claims. (Cl. 16—1)

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This invention relates to improvements in devices for urging a hinged closure toward an open position and for holding the closure in at least one preselected open position. The invention is particularly useful in, but not limited in application to, automatic electric dishwashers and the like.

It is a primary object of the invention to provide an arrangement for use with a pair of members hinged to each other, one of which members is a closure, said arrangement comprising biasing means carried by one of said members for urging the closure member toward open position, and means carried by the other member for receiving said bias and for defining at least one preselected open position for said closure member.

Another object of the invention is to provide an arrangement as set forth in the preceding object, the means for receiving the bias being cam-like and including portions defining each preselected open position of the closure.

Another object of the invention is to provide an arrangement for use with a pair of members hinged to each other, one of which members is a closure, said arrangement comprising biasing means carried by one of said members for urging the closure member toward open position, a bias transmitting element hinged to the member carrying said biasing means, and bias receiving means carried by the other member for receiving bias through said bias transmitting member, said bias receiving means being cam-like and having surfaces defining, in cooperation with said bias transmitting element, at least one preselected open position.

It is still a further object of this invention to provide an improved device for an automatic electric dishwasher which will urge a dishwasher lid upwardly and will, upon release of the lid from a locked shut position, move the lid to a first open position from which it is manually movable to one or more dish loading and unloading positions in which the lid is more remote from its closed position. These open positions preferably are arranged so as to allow for installation of a dishwasher machine below an overhead cabinet where the lid cannot be opened completely, the lid being restricted to an open angle of around, say, 50 degrees from horizontal.

The open positions also preferably include a wide open or practically vertical position to which the lid may be moved manually in order to provide even better access to the interior of the dishwasher tub such being useful for an installation of the dishwasher machine where there is no overhead cabinet or other obstruction above the machine.

It is even still a further object of this invention to provide an improved device that is operated automatically to open a dishwasher lid to a drying position, which is also manually adjustable to other selected positions, and which is simple, economical to manufacture, accurate and reliable in operation, and which is inexpensive to maintain.

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To summarize briefly, this invention relates to an improved means for urging a hinged lid to open position, and including, in a preferred embodiment, camming means cooperative with the urging means for retaining the lid selectively in any one of a number of open positions.

These and other objects are effected by this invention as will be apparent from the following description and claims taken in connection with the accompanying drawings, forming a part of this application, in which:

Fig. 1 is a sectional view, partly in elevation, of a preferred embodiment of the invention and taken on line 1—1 of Fig. 2;

Fig. 2 is a top plan view of a right hinge assembly constructed and arranged in accordance with my invention, and shown mounted on the top of a dishwasher;

Fig. 3 is a horizontal cross sectional view taken along the line 2—2 of Fig. 1 looking downwardly and in the direction of the arrows;

Fig. 4 is a horizontal cross sectional view taken along the line 3—3 of Fig. 1 looking downwardly and in the direction of the arrows;

Fig. 5 is a longitudinal vertical sectional view taken along the line 4—4 of Fig. 2, looking from the front of the dishwasher machine and in the direction of the arrows;

Fig. 6 is a transverse sectional view showing the lid in the first or least open position;

Fig. 7 is a transverse sectional view showing the lid in the second or intermediate position; and

Fig. 8 is a transverse sectional view showing the lid in the third or practically vertical position.

Referring now to Fig. 2, reference character 10 refers to a closure or lid supported at the upper rear surface of a dishwasher machine by two hinges, one of which is shown generally at 11, for movement about horizontal pivot hinge pins 12. Since the operation and structure of the hinging apparatus is identical for both hinges 11, only one will be described hereafter. A lower hinge plate 13, shown in Fig. 5, is mounted on the upper surface of the casing cover 15. Directly below hinge 11 is a clamping plate 16. A gasket 18 is located between the clamping plate 16 and the casing cover 15. A hinge escutcheon 17 is used to shield the lower hinge plate 13. Lower hinge plate 13, gasket 18, and clamping plate 16 and the hinge escutcheon 17 are retained in position on the casing cover 15 by means of two hexagonal head bolts 20.

Lower hinge plate 13 has a central opening in which hangs a pair of spaced frame members 42, integral flange portions 24 of which lie along

the upper surface of plate 13 on opposite sides of the opening and are welded thereto. These frame members 42 serve to support a biasing arrangement which will be described presently. Escutcheon plate 17, has a raised central portion overlying flanges 24 as shown in Fig. 5, and a central opening extending from the rear edge almost to the front margin of the escutcheon.

Pivot hinge pin 12 provides hinged support for an upper hinge blade 25 which is pivoted at its rear end 26 to lower hinge plate 13. The forward end 27 of the upper hinge blade 25 serves to support the dishwasher lid 10 and it is attached to the upper surface of a depression 28 in the rear portion of the lid 10 by means of bolts 29 shown in Fig. 2. The axis of the hinge pin 12 is located above the upper surface of the casing cover 15.

The upper end portions of frame members 42 support a bias transmitting element 31 positioned in the space between the frame members and pivotable about a pin 40 which passes through the frame members. Element 31 cooperates with a cam-like arrangement 61 to hold the lid in at least one end preferably three preselected open positions as shown in Figs. 6, 7, and 8, and as will be explained in detail presently.

The pivoted element 31, which is generally triangular or segmental in shape, is made up of sheet metal stampings for convenience and includes two end plates 36 which are separated by two spacers 37, all, in turn, being pinned together at 38 so as to move as one integral piece. Pivoted element 31 extends through a slot 39 cut in casing cover 15 and clamping plate 16 for movement about a horizontal pivot pin 40 carried by vertical frame members 42 and passing through enlarged hubs 40a in plates 36, 37. The hub 40a is located at what would be one vertex of the triangular or segmental element 31 and a pair of rollers 46 and 48 are located at its other vertices. The lower roller 46 is in engagement with a stud 49, of an adjustable biasing device which will be described presently, and upper roller 48 cooperates with the cam-like arrangement 61.

The biasing device is best shown in Fig. 1, and is carried by the spaced frame members 42. These members carry just below pivot pin 40 a guide 55 which extends forwardly of the members 42 and has an opening 55a. As shown in Fig. 3, members 42 have shallow slots 42a in their front edges into which winged side portions of guide 55 fit in order to anchor the guide 55 in place against upward or downward movement. Welding completes the attachment of guide 55 to members 42.

Members 42 are bent inwardly toward each other at their lower ends 45 and are welded together.

Near the lower ends of members 42, they are roughened or notched along their front edges at 60 and the lowermost part of each member is of reduced width from front to rear as shown in the portion 44. This portion 44 supports a lower guide 56 which is shaped as shown in Figs. 1 and 4. Guide 56 has notches in its sides receiving frame member portions 44, and these notches are sufficiently longer from front to rear than the frame members that they permit the rear portion to be disposed at an angle to the horizontal so as to be urged into engagement with notches 60 to hold the guide 56 in place. By raising the forward end of guide 56 and thus moving it through a slight arc, it can be disengaged from notches 60 to adjust its position. Guide 56 has a circular opening 56a in its forward portion. Notches 60 are not essential and may be eliminated.

A drive transmitting element 50 in the form of a cylinder having a hole 53 in its upper end is slidable in opening 56a. The hole 53 receives by a press fit an upper portion or stud 49 which holds a collar 58 between it and the upper end of element 54. For purposes of simplicity, the assembly, 49, 50, 58, will be referred to as a spring pressed rod 54.

Rod 54 is mounted for movement upwardly or downwardly and is retained in proper vertical position by means of guides 55 and 56. A coil spring 57 is positioned about rod 54 between the guide or spring adjuster 56 and washer 58.

Spring 57 urges rod 54 upwardly so that rod end 59 and its large, flat end surface are always in contact with lower roller 46. At the same time, coil spring 57 prevents rod 54 from slipping downwardly and out of proper operating position. The spring pressed movement of the rod 54 upwardly urges the lower roller 46 upwardly and, at the same time, tends to cause pivotal movement of the pivoted member 31 about its horizontal pivot pin 40 in a clockwise direction as viewed in Fig. 1.

The upper surface of upper hinge plate 25 carries a cam-like member 61 on its under surface. Plate member 61 is welded at each of its four corners to the upper hinge blade 25.

Cam-like member 61 has two raised portions and is conveniently stamped from sheet metal. Of the two teeth like portions 68 and 72, forward tooth portion 68 is smaller in depth than tooth portion 72. Both tooth portions have smooth convex-concave surfaces of different curvatures for line contact or engagement with the surface of upper roller 48. The teeth portions are joined by a concave portion 70 having a curvature matching that of upper roller 48. The open positions of the lid 10 are defined by contact of upper roller 48 with the front surface 69 of the forwardmost tooth portion 68, or the surface 70 between the two teeth-like portions 68 and 72, or the forwardmost surface 73 of the rearmost tooth portion 72, the three portions just named giving wider open positions of the lid 10 as shown in Figs. 6, 7, and 8, in the order named.

The holding of the lid 10 in the various positions is not a positive holding, since slight additional manual pressure on the lid 10 will force it to a more open or more closed position, depending upon the preselected position to which it is desired to move the lid.

In operation, of the various positions of the lid 10, there is the first and least open position shown in Fig. 6 to which lid 10 is initially urged by spring 57 when a catch member (not shown) holding the lid shut is released during the automatic cycle of operation of the dishwashing machine. In this position, the lid 10 forms an angle of approximately 15 to 20 degrees with the upper surface of the casing cover 15. The lid 10 occupies this position normally, and also during the drying operation.

The automatic movement of the lid to this first open position is accomplished, upon release of the latch (not shown), by upward pressure of spring 57 on roller 46, causing clockwise movement of bias transmitting element 31 about pivot 40 resulting in upward movement of the lid as roller 48 exerts pressure on portion 77 of piece 61. This movement continues until the roller 48 contacts the forward sloping surface 69 of cam tooth 68 which halts the movement and thus defines the first open position.

In order to load dishes into or remove them from the machine, the lid may be opened manually to a next position shown in Fig. 7, where roller 48 contacts curve 70, the rear surface of which prevents further automatic opening. This position has been selected and provided for an installation where the machine is used below an overhead cabinet, or where it is not desirable to open the lid to a substantially wider position.

Where there is no overhead cabinet above the machine, the lid 10 can be opened manually to the third position, illustrated in Fig. 8, which is approximately at an angle of 85 degrees with the upper surface of the casing cover 15. In this position, better access can be had to a tub of the dishwasher machine. In this third position, the tip of the rearmost tooth portion 72 is in engagement with the upper roller 48 and the lid is supported thereby. The uppermost limit of movement of rod 54 is here defined by the contact of the upper surface of collar 58 with guide 55.

Lid 10 can also be raised manually to a vertical position. However, in this position the upper roller 48 is not in engagement with the plate member 61. A stop 76, prevents lid 10 from being opened more than 90 degrees from the upper surface of casing cover 15.

Closing of the lid from any position is readily accomplished merely by pushing the lid shut with enough pressure to overcome spring 57.

While this invention has been illustrated in a preferred one of its forms, it is to be understood that this invention is capable of many embodiments and is not limited by the specific form shown, but only the scope of the appended claims.

I claim:

1. A biasing arrangement in combination with a pair of hinged members, one of which members is a closure, for urging the closure member to open position and for defining three predetermined open positions for the closure member and between which positions said closure member is movable manually, said arrangement comprising frame structure attached to the other of said members, biasing means carried by said other member for urging the closure member away from said other member, said biasing means including a driving element carried by said frame structure, said driving element extending transversely of the closed position of said closure, a lower guide for said driving element, said guide being adjustably mounted on said frame member, a projection on the upper portion of said driving element, and a coil spring about said driving element and compressed between said projection and said lower guide so as to urge said driving element toward said closure, bias transmitting means receiving bias from said biasing means, said bias transmitting means comprising a bias transmitting element pivoted to said frame structure about a hinge axis spaced from the hinge axis of said closure member, a lower roller carried by said bias transmitting element, in engagement with the upper end of said driving element for receiving bias therefrom, bias receiving means carried by the closure member, and an upper roller carried by said bias transmitting means in engagement with said bias receiving means, said bias receiving means including a cam-like member having two teeth-like portions joined by a concave portion, said concave portion having a surface configuration complementary to that of said upper roller, the first of said teeth-like portions being more remote from the hinge axis of said closure member than the second of said teeth-like portions, said teeth-like portions cooperating with said upper roller to define predetermined open positions for said closure in which said closure is located at progressively greater angles with regard to said other member, the least open position being defined by engagement of said upper roller with the forwardmost surface of said first tooth-like portion, the next position being defined by engagement of said upper roller with the concave portion located between said teeth-like portions, and the third and most open position being defined by engagement of said upper roller with the tip part of the rearmost tooth-like portion.

2. A biasing arrangement in combination with a pair of hinged members, one of which members is a closure, for urging the closure member to open position and for defining a plurality of predetermined open positions for the closure member and between which positions said closure member is movable manually, said arrangement comprising frame structure attached to the other of said members, biasing means carried by said other member for urging the closure member away from said other member, said biasing means including a driving element carried by said frame structure, said driving element extending transversely of the closed position of said closure, a lower guide for said driving element, said guide being adjustably mounted on said frame member, a projection on the upper portion of said driving element, and a coil spring about said driving element and compressed between said projection and said lower guide so as to urge said driving element toward said closure, bias transmitting means receiving bias from said biasing means, said bias transmitting means comprising a bias transmitting element pivoted to said frame structure about a hinge axis spaced from the hinge axis of said closure member, a lower roller carried by said bias transmitting element, in engagement with the upper end of said driving element for receiving bias therefrom, bias receiving means carried by the closure member, and an upper roller carried by said bias transmitting means in engagement with said bias receiving means, said bias receiving means including a cam-like member having at least two teeth-like portions joined by a concave portion, said concave portion having a surface configuration complementary to that of said upper roller, the first of said teeth-like portions being more remote from the hinge axis of said closure member than the second of said teeth-like portions, said teeth-like portions cooperating with said upper roller to define predetermined open positions for said closure in which said closure is located at progressively greater angles with regard to said other member.

ROBERT W. WOLF.

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