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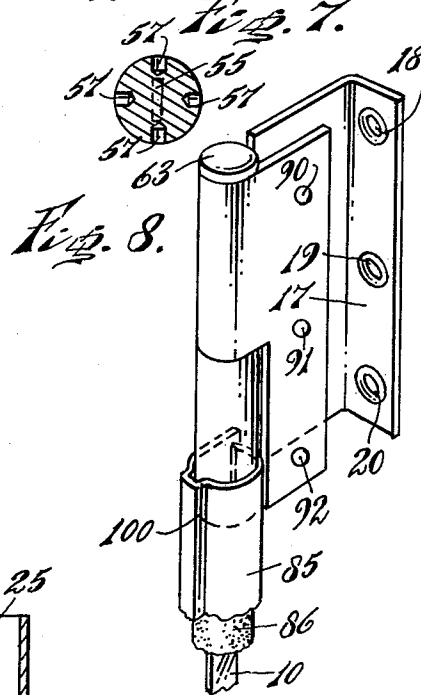
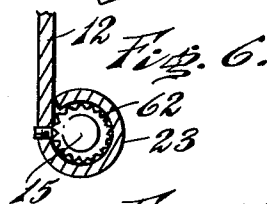
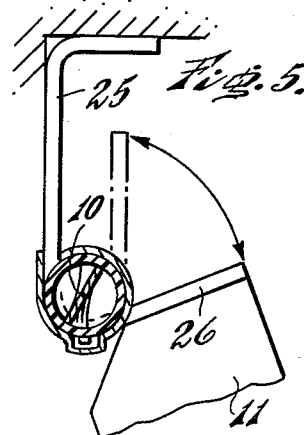
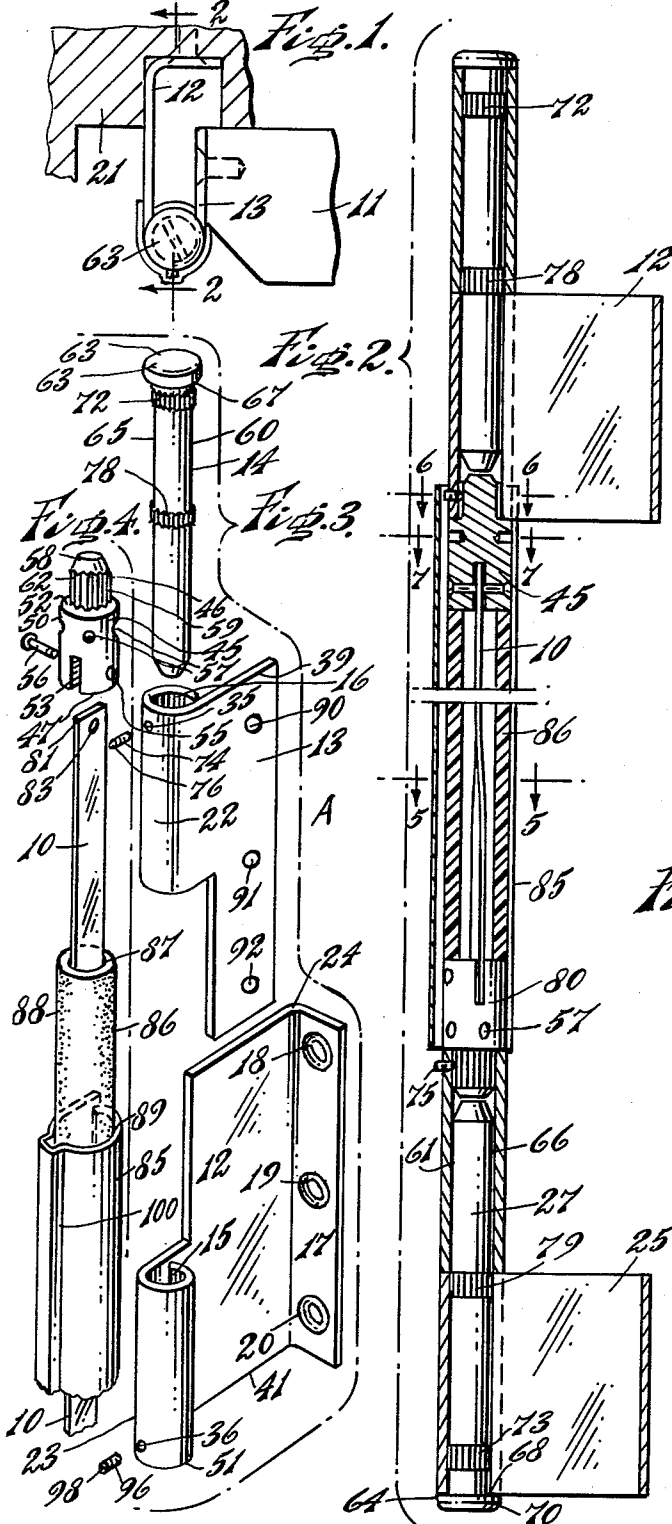
D. J. MANGINI

3,209,391

DOOR CLOSER

Filed July 20, 1962

2 Sheets-Sheet 1



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2 Sheets-Sheet 2



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DOOR CLOSER

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This invention relates generally to door closing devices and more particularly to the adjustable, spring operated type for use with relatively heavy doors.

In the commercial refrigerator and freezer field, upright boxes having horizontal, swinging doors have been in great demand both for public use in supermarkets and for private use by operating personnel behind the counters. It has been common practice to both display and dispense food products in such boxes through the use of heavy glass doors whereby the products to be sold may be kept refrigerated and at the same time be readily seen. Inasmuch as the doors are designed to be opened by the purchaser as well as by employees, it has been found necessary to employ self closing devices in order to assure that the doors are always closed after use to prevent undue loss of refrigerated air and to prevent possible spoilage.

Prior art devices have consisted of springs of various design, conventional door closers, levers, pulleys and weights and other well known appliances. Common shortcomings have proved to be difficulty in adjustment, the requirement for extraordinary maintenance, excessive breakage and ungainly appearance. Keeping in mind that pleasant design features must go hand in hand with competent technical arrangement in order to market a successful commercial box, prior art workers have sought to conceal springs within the hinges and thereby solve the problem. However, experience has proved that the great weight of the door coupled with the relatively short spring length usually resulted in extremely brief spring life thereby making the maintenance problem quite burdensome. The instant invention seeks to overcome all previously known difficulties through the arrangement and combination of parts as more fully described below.

It is therefore an object of this invention to provide a door closer of pleasing outer configuration.

It is a further object of this invention to provide a door closer incorporating hidden operating features.

It is a further object of this invention to provide a door closer having an operating spring of relatively great length.

It is a further object of this invention to provide a door closer with easy adjustment means included to vary spring force.

It is a further object of this invention to provide a door closer having unique spring connecting members.

It is another object of this invention to provide a door closer incorporating means for varying time period of door operation.

It is another object of this invention to provide a door closer designed for smooth operation with relatively heavy doors.

It is another object of this invention to provide a door closer designed to conform with and blend into refrigerator construction.

It is a further object of this invention to provide a door closer of unique torsion spring design.

It is a further object of this invention to provide a door closer of extraordinary strength incorporating relatively few operating parts.

It is another object of my invention to provide a door closer that is simple in construction, inexpensive in manufacture and trouble-free in operation.

Other objects and a fuller understanding of the invention will be had by referring to the following description and claims of a preferred embodiment thereof, taken in conjunction with the accompanying drawings wherein like reference characters refer to similar parts throughout the several views and in which:

FIG. 1 is a top view of the invention in place with partial representation of door and jamb.

FIG. 2 is a cross section partly broken away taken along line 2-2 of FIG. 1.

FIG. 3 is an exploded perspective view of top hinge.

FIG. 4 is an exploded perspective view of top connection of spring.

FIG. 5 is a cross section taken along line 5-5 of FIG. 2.

FIG. 6 is a cross section taken along line 6-6 of FIG. 2.

FIG. 7 is a cross section taken along line 7-7 of FIG. 2.

FIG. 8 is an assembled perspective view of the upper hinge and spring connection.

FIG. 9 is an exploded perspective view of bottom hinge and spring connection.

FIG. 10 is a perspective view of torsion spring and connectors.

Although specific terms are used in the following description for the sake of clarity, these terms are intended to refer only to the particular structure of my invention selected for illustration in the drawings and are not intended to define or limit the scope of the invention.

The invention consists generally of an upper hinge assembly A interconnected with a lower hinge assembly B through the action of elongated torsion spring 10. The hinge assemblies support a refrigerator door 11 or similar heavy door and at the same time provide means for automatic closure utilizing the torsional energy stored in spring 10 when the door is in open position.

As shown in FIG. 3, the upper hinge assembly A consists of a stationary blade 12, a rotatable blade 13 and hinge pin 14 inserted through vertical, cylindrical openings 15, 16 of respective hinge members 12, 13 from top to bottom. Stationary member 12 is equipped along one edge 24 with a longitudinal flange 17 provided with three mounting holes 18, 19, 20 to secure blade 12 to refrigerator construction 21 as shown in FIG. 1. Movable blade 13 cooperates with blade 12 and is installed with hinge pin holding element 22 mounted above hinge pin holding element 23 of blade 12. Rotatable blade 13 is drilled with three spaced mounting holes 90, 91, 92 for securing to door 11.

As shown in FIG. 9, the lower hinge assembly B comprises a stationary blade 25, a rotatable blade 26 and hinge pin 27 inserted through vertical, cylindrical openings 48, 49 of respective hinge members 25, 26 from bottom to top. Stationary member 25 is equipped along one edge 28 with a longitudinal flange 29 provided with three mounting holes 30, 31, 32 to secure blade 25 to refrigerator construction as shown in FIG. 1. Movable blade 26 cooperates with blade 25 and is installed with hinge pin holding element 33 mounted above hinge pin holding element 34 of blade 25. Blade 26 is provided with three spaced mounting holes 93, 94, 95 for securing to door 11. Assemblies A and B are equipped with small, through-extending, upper and lower drilled and tapped holes 35, 36, 37, 38 near respective upper edges 39, 40 and lower edges 41, 42 along barrels of hinge pin encircling edges 22, 23, 43, 44 forming place of attachment for various set screws hereinafter more fully described.

In FIG. 4 I show an upper spring connector 45 comprising a cylindrical metal rod of two diameters, consisting of a smaller, locking, upper component 46 and a larger, spring engaging, lower component 47 defining

a shoulder 52 therebetween. Lower component 47 is approximately twice as long as upper component 46 and has an outer diameter 50 equal to outer diameter 51 of hinge pin containing edge 23 of hinge member 12 in the interests of uniformity and in presenting a finished appearance. A deep, vertical slot 53 is cut into bottom 54 of component 47, extends upwardly and stops before reaching shoulder 52. A bottom, horizontal hole 55 is drilled entirely through component 47 near bottom edge 54 at right angles to and completely through slot 53 whereby a pin 56 may be inserted as hereinafter set forth. A series of adjusting holes 57 are provided in the exterior of component 47 adjacent to and below shoulder 52 to permit rapid adjustment of spring torsion upon installation. I have found that four such holes spaced at 90 degree intervals around the periphery of component 47 are suitable for this purpose. Top edge 58 of upper component 46 is bevelled for easy installation and diameter 59 is fabricated the same as diameters 60, 61 of hinge pins 14, 27 for insertion into vertical hole 15 of stationary hinge member 12 and cylindrical opening 49 of movable blade 26. Shallow longitudinal V-grooves 62 are provided continuously about upper component 46 and extend the entire length thereof. A lower spring connector 80, exactly similar in construction to upper spring connector is provided for lower hinge in 180 degree reversed position as shown in FIG. 10.

Upper and lower spring connectors 45, 80 are installed by inserting smaller component 46 into respective vertical holes 15, 49 of hinge assemblies A and B and are secured in place by means of set screws 96, 97 are provided with hexagonal recesses 98, 99 to permit use of a conventional Allen wrench in the usual way.

The hinge pins 14, 27 are identical in appearance, configuration and operation except that upper pin 14 is drifted into hinge member openings 15, 16 from the top while lower pin 27 is inserted into hinge member openings 48, 49 from the bottoms. Diameters 60, 61 of pins are slightly smaller than diameters of openings 15, 16, 48, 49 to permit ready insertion and easy operation. Heads 63, 64 of greater diameter than body portions 65, 66 are provided to positively seat pin in operating position by resting shoulder 67, 68 upon respective top and bottom edges 39, 42 of hinge members 13, 25. The outer diameters 69, 70 are equal to respective outer diameters 51, 71 of hinge pin containing edges 23, 34 in the interest of uniformity and in presenting a finished appearance. As shown in FIGS. 3 and 9, hinge pins 14, 27 are tooled with a short band 72, 73 of circumferential V-groove indentations extending peripherally about the pin body 65, 66 immediate-adjacent the head 63, 64. The bands 72, 73 are provided to enable hinge pins 14, 27 to be securely locked in position after installation by means of the operation of set screws 74, 75. Set screws 74, 75 are equipped with hexagonal recesses 76, 77 to permit tightening using an Allen wrench in the usual manner. Hinge pins 14, 27 are tooled with a short band 78, 79 of circumferential ridges and indentations extending peripherally about pin body 65, 66 at the approximate respective midpoint thereof thereby creating an area slightly raised above the surface of the pin body. The band 78, 79 is provided for ease in installation whereby the ridges will bind against the sides of vertical hole 16, 48 thereby holding pin 14, 27 in position until the set screws 74, 75 are provided with body portions 65, 66 of such length as to fit entirely through openings 15, 16, 48, 49 leaving sufficient clear distance to permit complete insertion of locking component 46 of spring connectors 45, 80 into openings 15, 49.

Torsion spring 10 extends between and connects hinge assembly A and hinge assembly B and is constructed of high grade spring steel preferably one-half inch in width and one-sixteenth inch in thickness. Of course, the strength of the spring can be varied as necessary to ac-

commodate doors of varying weights. Upper terminus 81 of spring 10 is inserted into and rests within slot 53 of upper spring connector 45. Lower terminus 82 of spring 10 is inserted into and rests within slot 53 of lower spring connector 80. Upper and lower securing holes 83, 84 are drilled near upper and lower termini 81, 82 in aligned relation with horizontal holes 55. Pins 56 may be drifted through holes 55, 83 and 55, 84 to secure spring termini 81, 82 within respective slots 53 of upper and lower spring connectors 45, 80. The pins 56 should be equal in length to the diameter of larger component 47 of connectors 45, 80 and are inserted completely into holes 55 so that ends fill the holes 55 and terminate substantially flush with external surface of connectors.

A decorative shield 85 constructed of a length of generally circular extruded aluminum completely covers spring 10 and is of length approximately two inches greater than the distance between hinge assembly A and hinge assembly B in order to cover both spring and respective innermost portions of pin enclosures of hinge assemblies. A length of tubular polyethylene or other plastic insert 86 covers spring 10 and is drawn through inside of extruded shield 85 throughout the entire free length of spring. Insert should be of interior diameter 87 sufficient to fit over spring 10 and of exterior diameter 88 substantially equal to interior diameter 89 of shield 85 so as to form a continuous, circular contact between insert and shield, thereby providing a unique, simple, sound deadening construction.

In order to use my invention, hinge assemblies A and B should be secured to the refrigerator construction 21 and door 11 in the usual manner and set screws 74, 75 tightened using an Allen wrench (not shown) thereby securing hinge pins 14, 27 in position. Upper spring connector 45 may then be inserted into bottom of opening 15 and tightened in place through action of set screw 96. Similarly, lower spring connector 80 may be inserted into top of opening 49 and tightened in place through action of set screw 97 making sure that respective slots 53 lie in the same vertical plane. The plastic insert 86 is then drawn over torsional spring 10 and both are inserted into extruded shield 85 leaving upper hole 83 exposed. Upper terminus 81 is introduced into slot 53 and secured in place by pin 56. The upper end 100 of shield 85 is then urged upward and over pin containing edge 23 of hinge member 12 a sufficient distance to expose lower hole 84 of spring 10. Lower terminus 82 is introduced into lower slot 53 and secured in place by pin 56. Initial torsion may then be placed in the spring as desired by rotating lower spring connector 80. This torsion may be conveniently applied using a spanner wrench (not shown) in conjunction with adjusting holes 57. The desired position of lower connector 80 may then be secured using set screw 97. Shield 85 should then be centered between hinge assemblies A and B by lowering and urging bottom end of shield 101 over hinge pin holder 33 of member 26. In such a way, both set screws 96, 97 will be covered and hidden from view thereby enhancing the appearance of the device. As may be appreciated, ready adjustment of spring torsion may be made at any time simply by raising or lowering shield to expose spring connector 45 or 80, loosening set screw by Allen wrench and then securing in the new position by the set screw.

Although I have described my invention with a certain degree of particularity, it is understood that the present disclosure has been made only by way of example and that numerous changes in the details of construction and combination and arrangement of parts may be resorted to without departing from the spirit and scope of the invention as hereinafter claimed.

What is claimed is:

1. In a hinge and door closer unit arranged to close heavy doors the combination of an upper hinge assem-

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bly connecting the upper portion of a door to a stationary construction, said assembly having a lower fixed blade bolted to the stationary construction, an upper rotatable blade bolted to the door and a cylindrical hinge pin pivotally joining said blades, said pin driven into position from top to bottom in a vertical cylindrical opening formed in said blades and said pin being of a length less than the height of said upper hinge assembly; a lower hinge assembly connecting the lower portion of the door to the stationary construction, said assembly having a lower fixed blade bolted to the stationary construction, an upper rotatable blade bolted to the door and a cylindrical hinge pin pivotally joining said blades, said pin driven into position from bottom to top in the vertical cylindrical openings formed in said blades and said pin being of a length less than the height of said lower hinge assembly; an upper spring connector and a lower spring connector each comprising a cylindrical locking body and a concentric cylindrical spring holding body defining a shoulder therebetween, said spring holding body being of a diameter equal to the outside diameter of said cylindrical opening of said blades, said diameter of the locking body equal to the diameter of said hinge pin, said locking body of the upper spring connector inserted into the bottom of said cylindrical opening of the upper hinge assembly blades up to said shoulder, said locking body of the lower spring connector inserted into the top of said cylindrical opening of the lower hinge assembly blades up to said shoulder, said upper and lower locking bodies contacting said respective upper and lower

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er hinge pins, and each of said spring holding bodies provided with deep, vertical spring receiving slots and spring fastening means; a long, flat, vertical torsion spring extending between said upper and lower hinge assemblies and secured within said spring receiving slots; a hollow, generally cylindrical shield, said shield containing said torsion spring and covering said upper and lower spring connectors and said shield extending between and covering a portion of said upper and lower hinge assemblies; and torsion spring adjusting means provided in said upper and lower spring connectors, said means covered by said shield.

2. The invention of claim 1 wherein said shield is vertically slidable upon a portion of said upper and lower hinge assemblies.

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