Aug. 12, 1969 R. D. MacDONALD 3,460,190

DOOR HINGE WITH MEANS FOR URGING TOWARD A PREDETERMINED POSITION

Filed Dec. 20, 1965

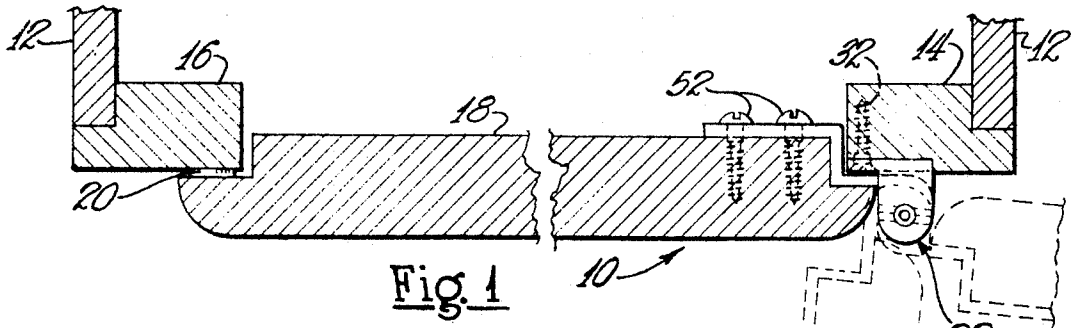


Fig. 1

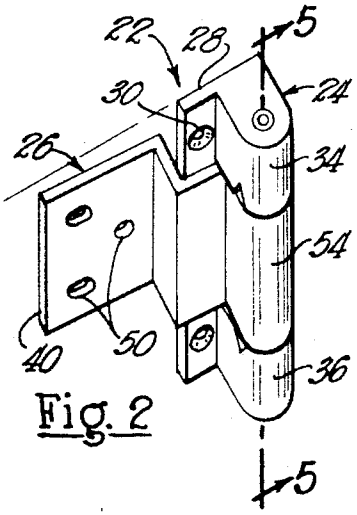


Fig. 2

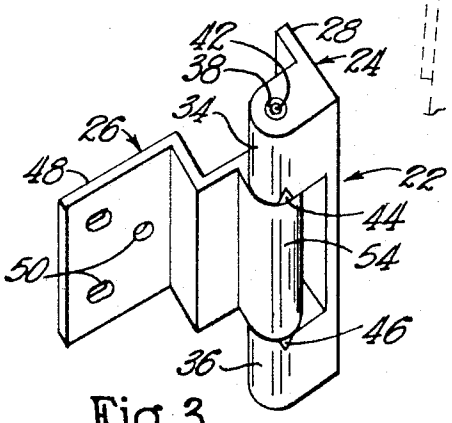


Fig. 3

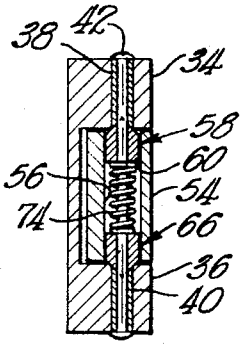


Fig. 5

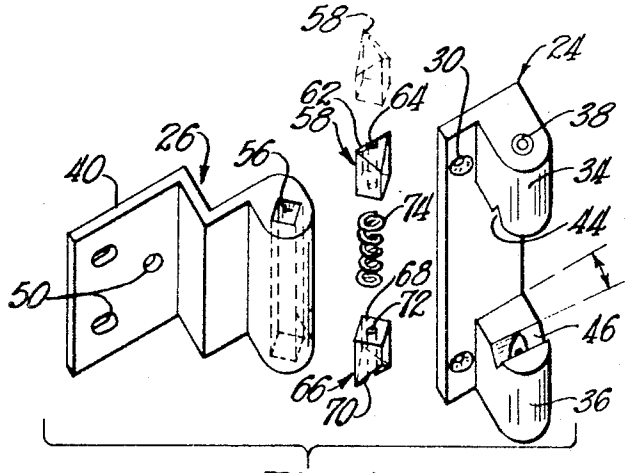


Fig. 4

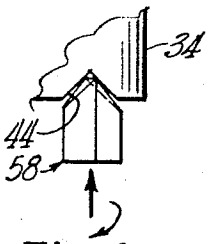


Fig. 6

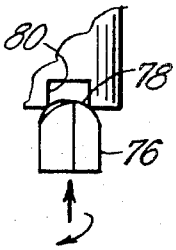


Fig. 7

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3,460,190

DOOR HINGE WITH MEANS FOR URGING TOWARD A PREDETERMINED POSITION

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U.S. Cl. 16—189 1 Claim

ABSTRACT OF THE DISCLOSURE

A door hinge has compact and concealed components which urge the door toward a closed position and beyond the closed position when the door is closed. Consequently, there is no need for a latch of any sort which is expensive to install and subject to misalignment. Firm closing of the door also is assured. The concealed components result in an attractive hinge and reduce the chance for dirt to collect in the hinge and impair the operation.

This invention relates to a door hinge for urging a door or the like toward a predetermined position and particularly to a door hinge capable of urging a door toward a position beyond its closed position to eliminate the need for a latch.

With hinges of the type with which the present invention is concerned, when the door is closed, it is continuously urged beyond the closed position and against the frame or door stop. This eliminates the need for any latch for the door, eliminating the cost of the latch and the cost of installation. In addition, without a latch, there are not latch components which otherwise are subject to misalignment during changes in the weather, including temperature and humidity. Also, with a hinge of this type, the door has little tendency to bounce, even if slammed. In contrast, with many latches, the door will not catch at all if shut too hard.

The new door hinge has a number of advantages over hinges of this type heretofore known. The new hinge has substantially no protruding components, all components being located in the knuckle portion of the hinge. This reduces the chance for dirt to catch in the hinge and also conceals the operating components of the hinge, even when a door with which the hinge is used is completely open. The new hinge also has a unique spring action which enables substantial torque to be applied to the door with which the hinge is used.

It is, therefore, a principal object of the invention to provide a door hinge by means of which a door can be more effectively urged toward a predetermined position.

Another object of the invention is to provide a hinge of the above-discussed type having more completely concealed components.

Many other objects and advantages of the invention will be apparent from the following detailed description of preferred embodiments thereof, reference being made to the accompanying drawings, in which:

FIG. 1 is a fragmentary view in horizontal cross section taken through a cabinet and door attached by a hinge embodying the invention;

FIG. 2 is an enlarged view of perspective of the hinge shown in FIG. 1, in a closed position;

FIG. 3 is a view similar to FIG. 2, with the hinge in an open position;

FIG. 4 is an exploded view in perspective of the hinge shown in FIGS. 1–3;

FIG. 5 is a view in longitudinal cross section taken along the line 5—5 of FIG. 2;

FIG. 6 is a fragmentary view of an engaging member and an enggageable means of the hinge when the door is in a closed position; and

FIG. 7 is a view similar to FIG. 6 but showing a slightly modified hinge.

Referring to the drawing, and more particularly to FIG. 1, a cabinet **10** can be typical of those found in kitchens and includes side walls **12**, a hinge frame member **14**, and a door stop frame member **16**. The frame members define a cabinet opening closed off by a door **18**. The door **18**, as shown, is of the offset type, but any type of door can be used when the hinge plates are suitably modified, as is well known. A door bumper or stop **20** is attached to the frame member **16** or the door **18** to prevent contact between the two and space the door slightly from the frame member.

A hinge **22**, two or more of which are employed with the door **18**, includes a first portion **24** which, in this instance, is attached to the frame member **14**, and a second portion **26** which, in this instance, is attached to an edge portion of the door **18**. The first hinge portion **24** includes a back plate or flange **28** having openings **30** to receive screws **32** which are turned into the frame member **14** to affix the first hinge portion **24** thereto. Spaced knuckles **34** and **36** extend outwardly from the plate **28** and have bushings **38** and **40** receiving a hinge pin **42**. A lower and surface of the upper knuckle **34** has a pair of diametrically-opposed notches or engageable means **44** located on opposite sides of the pin **42** and an upper end surface of the lower knuckle **36** has a pair of diametrically-opposed notches or engageable means **46** facing the notches **44**. In a preferred form, the notches **44** and **46** lie in a common plane at a small angle to the back plate **28**, as shown by the dotted lines and arrows in FIG. 4, this angle being 5°, by way of example.

The second hinge portion **26** includes a back plate or flange **48** having openings **50** to receive screws **52** for attaching the hinge portion **26** to an inner edge portion of the door. With the particular offset door shown, the plate **48** is of Z-shape configuration to conform with the edge of the door. An intermediate knuckle **54** extends from the plate **48** and has a relatively large noncircular opening or passage **56** therethrough, which, as shown, is square in transverse cross section, and surrounds an intermediate part of the hinge pin **42**. An upper engaging member **58** is slidably held in the upper end of the passage **56**. The member **58** has a blunt lower end **60** and a tapered upper end **62** which is designed to extend into the upper engageable notches **44** when the hinge **22** is in a closed position, which it assumes when the door **18** is closed. The member **58** has a square cross section similar to that of the passage **56** and has a central opening **64** through which the hinge pin **42** extends, in this instance, so that the member **58** also serves as a bearing for the intermediate knuckle **54**.

A lower engaging member **66** is located at the lower portion of the opening **56** and is similar but oppositely disposed to the upper engaging member **58**. The lower member **66** also has a blunt end **68** which faces the blunt end **60** of the member **58**, and a tapered end **70** which is received in the notch **46** when the hinge is in the closed position. The engaging member **66** also is of square cross-sectional shape and has a central opening **72** to receive a portion of the hinge pin **42** and also act as a bearing member for the intermediate knuckle **54**. Resilient means in the form of a coil spring **74** is located between the engaging members **58** and **66** and urges them outwardly, the spring **74** being retained by the hinge pin **42**, in this instance.

The apex of the pointed ends **64** and **70** of the engaging members **58** and **66** lie in a plane parallel to the hinge

plates **48** and also parallel to the plate **28** when the hinge is in the closed position. In this manner, while the engaging members will be received in the engagable means or notches **44** and **46**, they will not extend completely to the apexes of the notches but will bear against the sides thereof, as shown in FIG. 6. The force of the spring **56** urging the members **58** and **66** outwardly will produce torque tending to move the door **18** beyond the closed position and, in this instance, tend to move the door to a position 5° beyond the closed position since this is the angle at which the notches **44** and **46** lie relative to the hinge plate **28**.

With this arrangement, the door **18** will continually be urged toward the door stop member **16** against the door stops **20** by the torque achieved through the spring force. Consequently, it is not necessary to employ a latch with the door since it will be held tightly closed when in the closed position anyway. Further, if the door is slammed, it will not bounce to any extent. Also, the door will tend to be held in any position to which it is opened due to the slight pressure or drag produced by the engaging members **58** and **66** bearing against the adjacent end surfaces of the knuckles **34** and **36**. This prevents the door from accidentally closing or opening if the cabinet frame is out of plumb or from swinging excessively if the door should be bumped or blown.

If desired, one of the engaging members **58** and **66** can be turned 90°, the upper member **58** being shown turned 90° to the dotted position in FIG. 4, in which instance the upper member **58** will be received in the notches **44** only when the door **18** has been swung open to approximately a 90° position, and specifically 85° when the notches **44** are located at an angle of 5° with respect to the hinge plate **28**. Thus, the door can be prevented from accidentally swinging beyond the 90° position, if desired. This is particularly advantageous if the cabinet **10** is located with the hinge frame member **14** adjacent an outwardly-extending wall or at the corner of mutually perpendicular rows of cabinets, in which case the door will be prevented from accidentally hitting the wall or other cabinets when opened wide.

The specific shape of the engaging members **58** and **66** and the engageable notches **44** and **46** can vary substantially. As shown in FIG. 7, an engageable member **76** has a rounded end **78** while an engageable means or notch **80** is shown as square. In this instance, with the notch disposed at an angle similar to the notches **44**, the rounded end **78** will contact the opposite edges of the notch when the door is closed and again produce a torque tending to move the door beyond the closed position. Of course, the engaging members can be disposed at the slight angle to the back plate rather than the notches, if desired.

In the form of hinge shown, no components appear outside of the basic components of the hinge portions themselves, namely the hinge plates and knuckles. Even when the door **18** is opened completely, no springs or

engageable means are exposed and, further, there are no protruding elements which can collect dirt and dust more readily or be subjected to possible damage. Further, the positions of the engaging members and spring provide an effective torque-producing arrangement for the hinge which is also compact and relatively trouble-free. The potential variation of the position of one of the engaging members **58** and **66** or one of the notches **44** and **46** also provides another advantage.

Numerous variations in the above design will be apparent to those skilled in the art, and it is to be understood that such modifications can be made without departing from the scope of the invention.

I claim:

1. A hinge to pivotally connect a door to a frame, said hinge comprising a first portion and a second portion, one of said hinge portions including a pair of spaced knuckles and the other of said hinge portions including an intermediate knuckle located between said spaced knuckles, means pivotally connecting said spaced knuckles and said intermediate knuckle and comprising a hinge pin extending through all three of said knuckles and being closely rotatably held by said spaced knuckles, said intermediate knuckle having a non-circular passage extending therethrough larger than said hinge pin, a coil spring located in said non-circular passage around said hinge pin, a pair of engaging members each having a cross-sectional size and shape which is slightly smaller than the cross-sectional size and shape of said non-circular passage with said engaging members slidable in said passage, said engaging members being located at each end of said spring and oppositely disposed with protruding opposite ends urged beyond the ends of said intermediate knuckle by said coil spring, said spaced knuckles having engageable means comprising notches formed in the ends of each of said spaced knuckles facing toward said intermediate knuckle and on diametrically opposite sides of said hinge pin, said notches and engaging members being positioned for said notches to receive said engaging members when said hinge portions are in positions corresponding approximately to a closed position of the hinge, but with said engaging members not extending fully to the apexes of said notches when the door is closed, thereby producing torque urging the door beyond the closed position.

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PO-1050
(5/69)

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,460,190 Dated August 12, 1969

Inventor(s) Robert D. MacDonald

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In Column 1, line 35, "not" should read -- no --; line 65, "of" (first occurrence) should read -- in --.
In Column 2, line 2, correct the spelling of "engageable"; line 27, "and" should read -- end --.

SIGNED AND
SEALED

DEC 23 1969

(SEAL)
Attest:

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Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents