June 24, 1958 C. W. HAAG 2,839,779

ADJUSTABLE DOOR STOP HINGE ASSEMBLIES

Filed Sept. 13, 1956 2 Sheets-Sheet 1

Fig. 1.

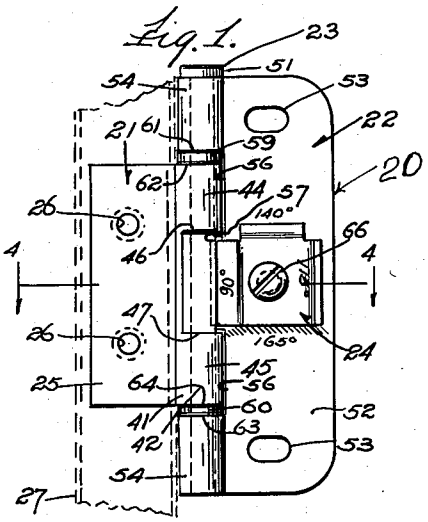


Fig. 2.

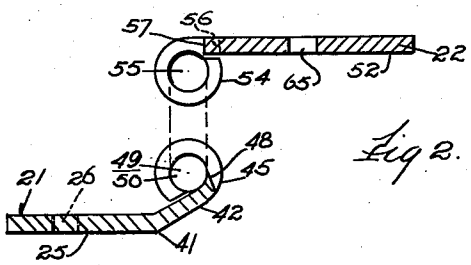


Fig. 3.

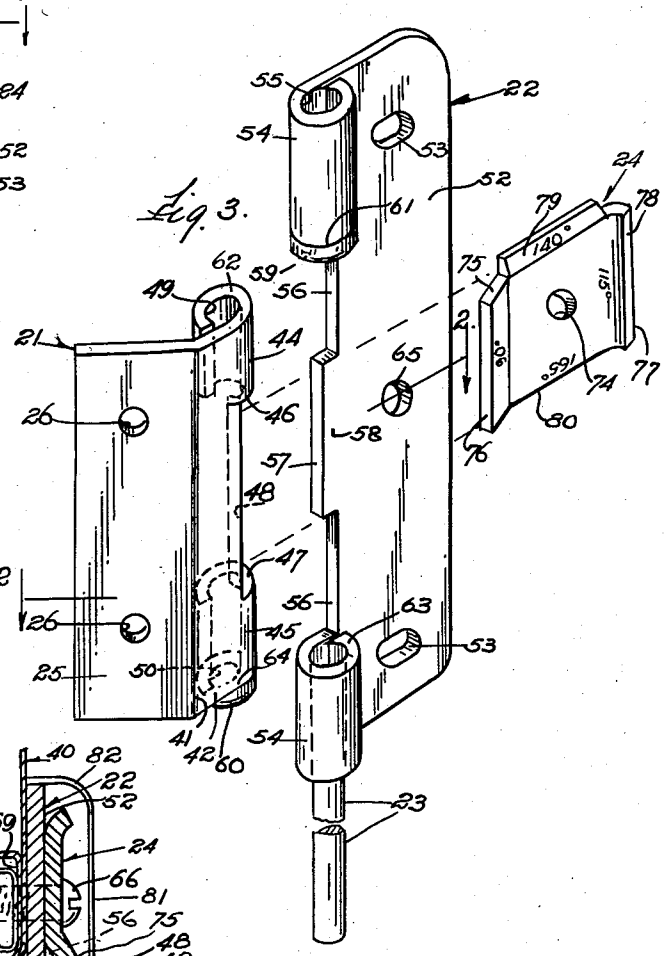


Fig. 4.

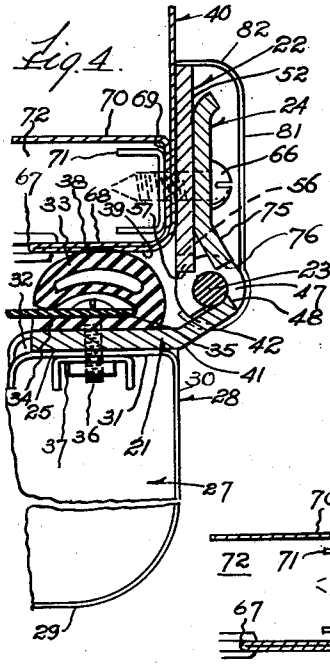
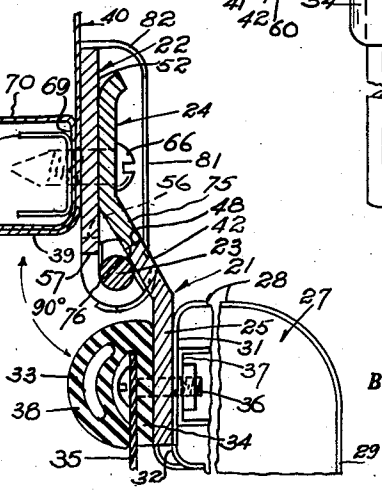


Fig. 5.



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ADJUSTABLE DOOR STOP HINGE ASSEMBLIES

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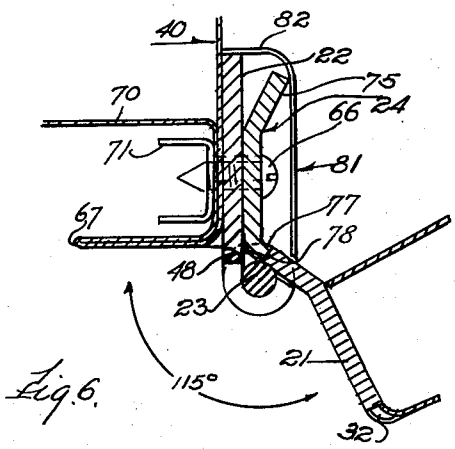

Fig. 6.

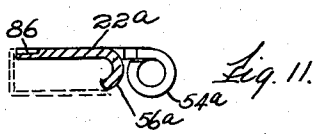

Fig. 11.

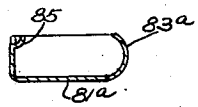

Fig. 12.

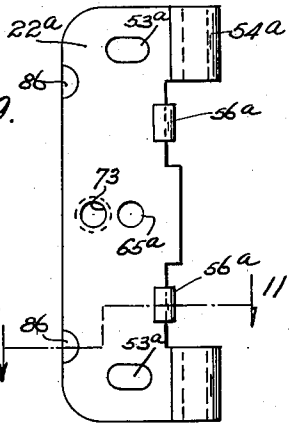

Fig. 9.

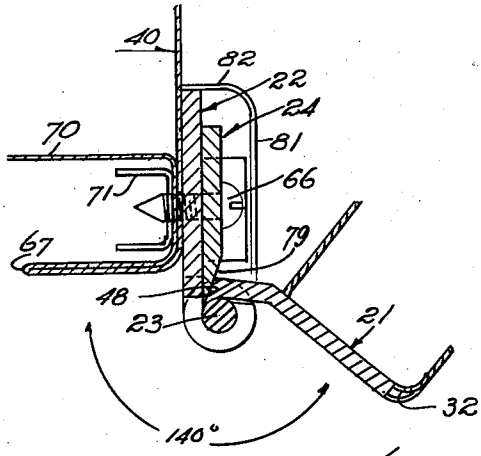

Fig. 7

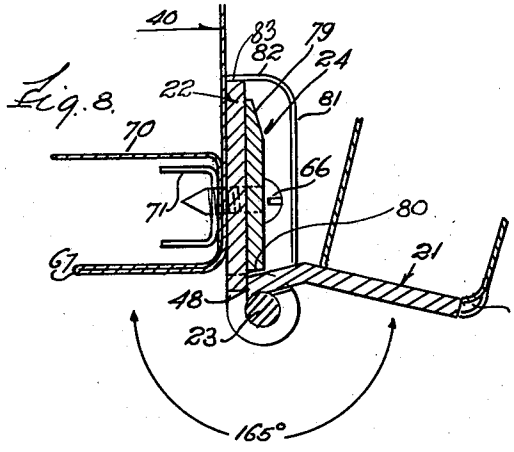

Fig. 8.

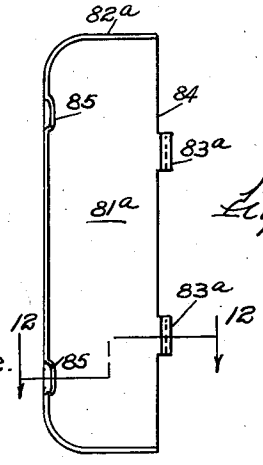

Fig 10.

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ADJUSTABLE DOOR STOP HINGE ASSEMBLIES

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Application September 13, 1956, Serial No. 609,737

2 Claims. (Cl. 16—191)

The present invention relates to adjustable door stop hinge assemblies and is particularly concerned with hinge assemblies for household refrigerator doors.

One of the objects of the invention is the provision of an improved hinge assembly for refrigerator doors by means of which the refrigerator door may be pivotally mounted on the cabinet and arranged to have a stop which will stop the door at any of a plurality of chosen open positions.

Another object of the invention is the provision of an improved door stop hinge assembly including a stop plate which has a plurality of different positions for stopping the motion of the refrigerator door at a position of 90° open, a position of fully open, or any of a plurality of other intermediate positions.

Another object of the invention is the provision of an improved door stop hinge assembly in which the hinge not only provides a pivotal mounting for the door, but the hinge may also be so adjusted as to provide a door stop limiting the opening movement of the door, and eliminating the necessity for any other door stop.

Another object of the invention is the provision of an improved hinge door stop assembly having provision for adjusting the position of the door on the cabinet so that the door seal may engage the face of the cabinet tightly all around the door opening.

Another object of the invention is the provision of an improved door stop hinge assembly including a cover which snaps on one of the hinge plates covering up all the securing screws and the mechanism of the adjustable door stop.

Another object of the invention is the provision of an improved door stop hinge assembly which is provided with antifriction means on the pintle and between the hinge plates so that the hinge will operate with a minimum amount of friction and without any noise.

Another object of the invention is the provision of an improved door stop hinge assembly which may be manufactured economically, which includes a minimum amount of parts, which may be used for a long period of time without necessity for repair and which is adapted to replace not only the hinges of the prior art, but also the door stops of the prior art.

Other objects and advantages of the invention will be apparent from the following disclosure and description, in which similar characters of reference indicate similar parts throughout the several views.

Referring to the two sheets of drawings,

Fig. 1 is a fragmentary elevational view of a door stop hinge assembly applied to a household refrigerator and embodying the invention;

Fig. 2 is a sectional view taken on the plane of the line 2—2 of Fig. 3, looking in the direction of the arrows, showing the two hinge plates;

Fig. 3 is an expanded view in perspective showing the parts of the door stop hinge assembly;

Fig. 4 is a fragmentary horizontal sectional view taken

on the plane of the line 4—4 of Fig. 1, looking in the direction of the arrows, and also including fragments of the cabinet and door, in the closed position;

Fig. 5 is a view similar to Fig. 4 with the door open at a position of substantially 90°;

Fig. 6 is a view similar to Fig. 5 omitting the door and door seal but showing the parts in the position which they assume when the door is opened to substantially 115°;

Fig. 7 is a similar view with the door open to a position of substantially 140°;

Fig. 8 is a similar view with the door open to a position of substantially 165°;

Fig. 9 is an elevational view of a modified form of hinge plate with provision for securing a cover;

Fig. 10 is an inside elevational view of the cover plate that fits upon the hinge plate of Fig. 9;

Fig. 11 is a sectional view on the plane of the line 11—11 of Fig. 9, looking in the direction of the arrows, showing the formations on the hinge plate for engagement with the cover;

Fig. 12 is a sectional view taken on the plane of the line 12—12 of Fig. 10, looking in the direction of the arrows, showing the parts of the cover that are formed to hold it on the hinge plate.

Referring to Figs. 1 to 3, 20 indicates in its entirety the present door stop hinge assembly which preferably includes a hinge plate 21 for attachment to the door, a hinge plate 22 for attachment to the cabinet, a pintle 23 and a stop plate 24.

The hinge plate 21 for the door comprises a substantially rectangular metal member having a flat attaching flange 25 which is provided with a pair of apertures 26 for receiving the screw bolts which secure this hinge plate to the door.

The door 27 comprises a hollow metal member having an outer shell 28 formed with a face 29 and an edge flange 30 which is turned inwardly at 31.

The inwardly turned flange 31 is provided with a pressed depression 32 for receiving the hinge plates 21 of which there are usually two.

The hinge plate 21 is arranged in the depression 32 so that its inner surface is flush with the inner surface of the flange 31 and a door seal 33 has its attaching flange 34 engaging the door flange 31 and covering the hinge plate 21.

An inner panel 35 of suitable plastic engages the outside of the attaching flange 34 of the door seal 33 and screw bolts 36 pass through the inner panel 35, door seal attaching flange 34, hinge plate 21, flange 31 and are threaded into a reinforcing member 37. The door seal 33 has the resilient portion 38 engaging the face flange 39 of the cabinet shell 40 and covering the screw bolts 36.

The hinge plate 21 is bent backward in a diagonal direction at 41 and the diagonal portion 42 locates the pintle 23 midway between the door flange 31 and the face flange 39 of the cabinet.

Hinge plate 21 has its outer edge formed with the cylindrical bearing portions 44, 45 and these bearing portions are located at each end of the plate which is cut away at 46, 47, the inner ends of the bearing portions leaving an edge 48 to serve as a stop surface. This is the edge of the diagonal portion 42, Fig. 4.

The size of the bearing portions 44, 45 is such that they have aligned cylindrical bores 49, 50, adapted to receive a common cylindrical pintle 23 having a flat head 51 which limits the motion of the pintle into the bore, the head engaging the upper end of the plate 22.

The hinge plate 22 comprises a rectangular metal mem-

ber and all of the parts of the assembly may be made of steel.

Hinge plate **22** has a rectangular attachment flange portion **52** which is elongated and provided with oval apertures **53** adjacent each end. Hinge plate **22** has its left edge, Fig. 3, formed with the cylindrical bearing portions **54**. These cylindrical bearing portions are located at each end of the body flange **52**, so that they are spaced to receive the bearing portions **44**, **45** of the other hinge plate.

The bearing portions **54** have cylindrical bores **55**. These are also adapted to receive the pintle **23** which extends from end to end of the longer hinge plate **22**.

Attaching flange **52** of hinge plate **22** is cut away between the bearing portions **54** and terminates at a straight edge **56** adjacent each bearing portion but extends to the edge **57** at its central portion.

The stop surface **48** is also adapted to engage the outer surface **58** of the hinge plate **22** adjacent edge **57** when the hinge opens to 165°.

The bearing portions **54** are separated from each other sufficiently so that they may not only receive the bearings **44**, **45** between them, but there is also space for a pair of anti-friction washers **59**, **60**, Fig. 1. These washers comprise flat rings of a non-metallic material and are preferably molded out of plastic, such as nylon, which has a self lubricating characteristic.

The washers have an inner bore of the same size as the bore **50** in the bearing portions and the outer surface of the washers is flush with the outer surface of the bearing portions. Thus the upper washer **59** engages the end **61** of the upper bearing portion **54** on plate **22** and it engages the end **62** of the upper bearing portion **44** on hinge plate **21**.

The lower nylon washer **60** engages the upper end **63** of lower bearing portion **54** on plate **22** and also engages the lower end **64** of the lower bearing portion **45** on plate **21**. The weight of the door is borne by the lower nylon washer **60**, but the upper nylon washer prevents end play in the hinge plates with a minimum amount of friction.

The hinge plate **22** has a centrally located cylindrical aperture **65** which is used to pass screw **66** that finally secures the hinge plate **22** in its adjusted position, but in some embodiments of the invention, such as Fig. 9, there may be a second aperture **73** for this purpose.

The hinge plate **22** is secured to the cabinet shell **40** adjacent the door opening which is defined by the edge **67**, Fig. 4, and the shell is customarily formed with a double layer, including the face flange **39** and a rear flange **68** extending from the door opening **67** which is a hair pin bend.

Shell **40** has an inner flange **69** engaging the inside of the shell **40** and an inwardly extending flange **70** which may house the edge of a breaker strip, all of which reinforces the shell at the door opening.

A channelled member **71** is preferably located against the flange **69** in the groove **72** and has a threaded aperture for receiving the threaded end of the screw **66** which secures the hinge plate **22** to the shell.

Screw bolts like bolt **66** pass through the oval apertures **53** into the shell **40** being secured by being threaded into the same or similar channelled members **71**, but due to the length of the oval apertures **53**, this permits some adjustment of the door toward or away from the face flange **39** to secure a good contact between the door seal **33** and the face flange **39**, compressing the door seal and making an air-tight connection. Such an adjustment could not be maintained against movement because the hinge plate **22** might still slide on the screw bolts which pass through the oval aperatures **53**, and become loose at the door seal.

For this purpose the bolts are first tightened in the oval apertures **53** and then a hole is drilled through the shell **40** in alignment with the hole **65** to receive the screw bolt **66** which permits no further sliding of the hinge plate **22** on the oval apertures and secures the door in adjustment with a tight seal.

In the embodiment of Fig. 9, the aperture **73** is used for this screw bolt and is counter-sunk at **73** to receive a flat head screw flush with the surface of the hinge plate.

The present assembly is preferably provided with a separate stop plate **24**, Fig. 1, which is substantially rectangular and has a central aperture **74**, used in Figs. 1 and 4 to receive the same screw bolt **66**. The stop plate **24** has its four edges located and shaped in a particular manner to serve as a stop for limiting the opening motion of the door by means of the hinge parts.

For example, in Figs. 4 and 5, the diagonally, outwardly turned edge portion **75**, is so located that it engages the edge **48** of hinge plate **21** with its edge **76** when the door has reached the 90° open position as shown in Fig. 5. When it is desired to have the door open only to 90°, the stop plate **24** is oriented in this position. The various edges of the stop plate **24** are labelled with angular positions of the door, in Fig. 3, such as, 60°, 115°, 140°, and 165°.

I desire it understood that these specific angles are merely exemplary and any desired angles may be employed.

The 115° position of the door is illustrated in Fig. 6 and for this purpose the stop plate **24** is rotated 180° until its outwardly turned shorter edge portion **77** has its edge **78** located to engage the stop surface **48** when the door reaches the 115° position.

Referring to Fig. 7, this illustrates the 140° position and for this purpose the stop plate **24** is bevelled at **79**, Fig. 3, and the plate is rotated from the position of Fig. 3 through 90° counter-clockwise to the position of Fig. 7 where it is secured by screw bolt **66**.

The stop surface **48** then engages the bevelled surface **79** and stops the door at the 140° position.

A fourth position is illustrated in Fig. 8 in which the stop plate **24** has its edge **80** cut away until the stop plates does not interfere with the stop surface **48** on hinge plate **22**. Hinge plate **21** may then rotate until the stop surface **48** engages the hinge plate **22** at the surface **58** and the door is then opened to about 165°.

Thus the stop plate **24** may be adjusted to any of four positions for varying the opening limits of the door.

The assembly including hinge plate **22**, screw bolts **66** and stop plate **24** is covered by means of a cover plate **81**, Fig. 4, which comprises a stamped sheet metal member formed with an inwardly turned border flange **82** on its top, bottom and rear edge.

The border flange is sprung inwardly at **85** to engage the edge **83** of the hinge plate **22** and the opposite edge of the cover **81** may be formed with a pair of curved retaining flanges **83***a* which engage only about the bearing portions **44** of the plate **21**.

In the preferred form of the invention shown in Figs. 9 to 11, the hinge plate **22***a* is similar in every respect except it has extending from the edges **56**, a pair of outwardly curved retaining lugs **56***a* which retaining lugs cooperate with curved flanges **83***a* on the improved cover **81***a* which extends only to the side **54***a* of the bearing portions terminating at straight edge **84**.

In this case the cover plate **81***a* has the same border flange **82***a* on its top, bottom and rear side but the border flange **82***a* is pressed inward at **85** along the rear edge of the border flange at two points where the hinge plate **22***a*, Fig. 11, has a depressed portion **86**.

Thus the cover plate **81***a* has its retaining portions **85** which snap into the depressed portions **86** on the edge of hinge plate **22***a*. In this case hinge plate **22***a* may also be provided with a separate aperture **65***a* for receiving a

separate screw bolt that rotatably supports the stop plate **24**.

Aperture **73** is used for securing the hinge in its adjusted position but aperture **65** may be threaded to receive a screw bolt permitting adjustment of the stop plate at any later date.

It will thus be observed that I have invented an improved hinge and door stop assembly in which the door is automatically stopped at an open position that is dependent on the adjustment of the stop plate.

Where a cabinet is arranged in a right hand corner with a right hand hinge, it may be desired to limit the door opening to 90° so that the door will not strike the right hand wall. Various other positions of the door stop may be convenient depending on the location of other kitchen furniture, such as, stoves and cabinets, to prevent the door from hitting them but permitting the desired amount of opening.

The door hinge assembly is simple, it assures a tight door seal adjustment and it permits the ready adjustment of the amount of door opening.

While I have illustrated a preferred embodiment of my invention, many modifications may be made without departing from the spirit of the invention, and I do not wish to be limited to the precise details of construction set forth, but desire to avail myself of all changes within the scope of the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States, is:

1. A refrigerator door stop hinge assembly, comprising a first hinge plate to be secured to a refrigerator door having a door seal thereon engaging a cabinet shell, said plate having a flat body with apertures for screw bolts to secure the body to the door, said body having a first pair of spaced pintle bearings, and being provided with a diagonal portion supporting said first bearings with their axis midway of the seal, and being cut away between said first bearings to provide a stop edge, a pintle in said first bearings, said stop edge terminating adjacent the outer surface of said pintle, a second hinge plate having a flat body with a pair of second bearings at one edge thereof and mounted on said pintle outwardly of the

first bearings, said pintle supporting a nylon washer between each second bearing and each first bearing, said second plate body being cut away between its second bearings and terminating at an edge, which clears the first bearings, and which has a stop lug projecting between the first bearings, said second plate body having horizontal, elongated, oval apertures for securing screws, permitting horizontal sliding only of the second plate on said securing screws to adjust the tightness of the door seal, and said second plate body having a third aperture for a self tapping screw to be inserted in said third aperture and driven into a hole drilled in the cabinet shell, when the door hinge is adjusted for seal tightness, said second plate body having a fourth aperture located adjacent its stop lug, a screw bolt for said fourth aperture, and a substantially rectangular apertured stop plate rotatable and securable on said latter screw bolt, said stop plate having one edge clearing the first body stop edge, and permitting the first body stop edge to engage the face of the second plate to stop the door at wide open position, said stop plate having its three other edges formed to engage the stop edge on the first plate at any one of three different door open positions, between right angle and wide open position.

2. A refrigerator door stop hinge assembly according to claim 1, in which said second plate body has a pair of outwardly projecting cover supporting lugs located at its edges, which clear the first plate bearings, and said second plate having its opposite edge provided with depressions on its back side, forming recesses opposite the cover supporting lugs for retaining a hinge cover having complementary securing formations thereon.

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