Oct. 19, 1971 R. F. ANDERSON ET AL 3,613,151

HINGE CONSTRUCTION

Filed June 27, 1969 3 Sheets-Sheet 1

Fig. 1.

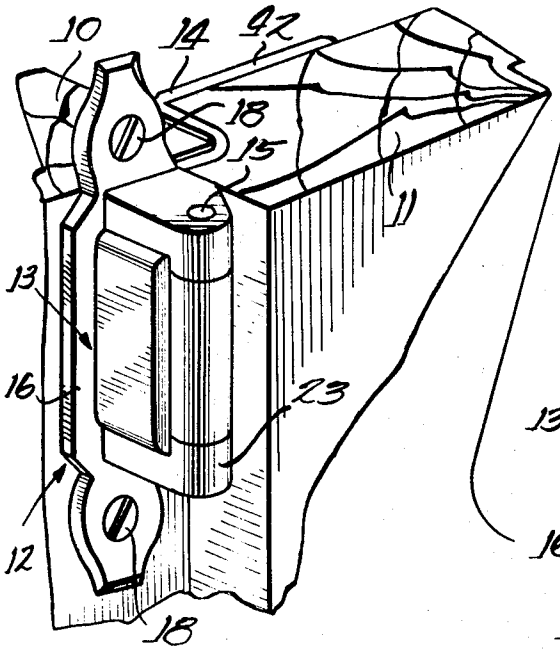


Fig. 2.

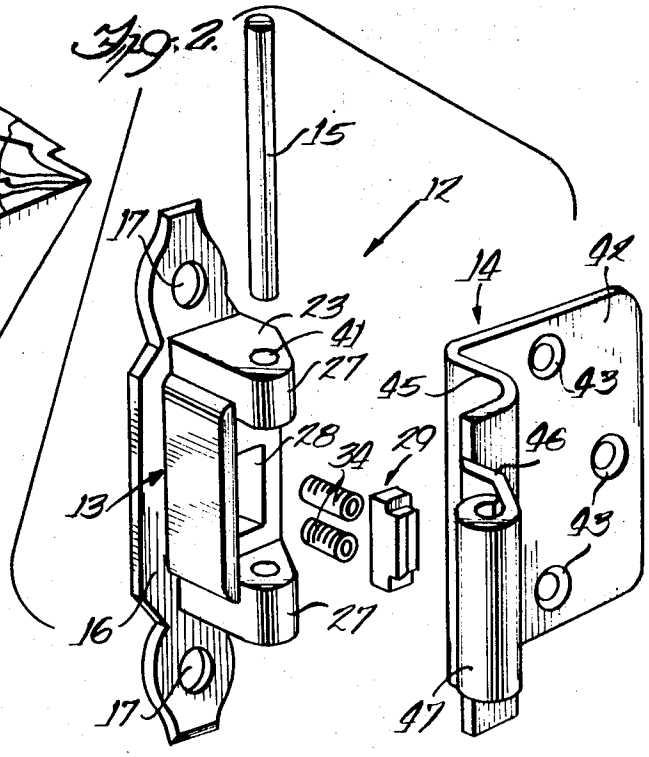


Fig. 3.

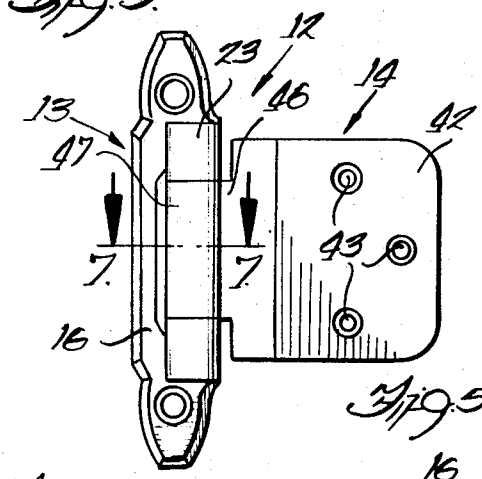


Fig. 4.

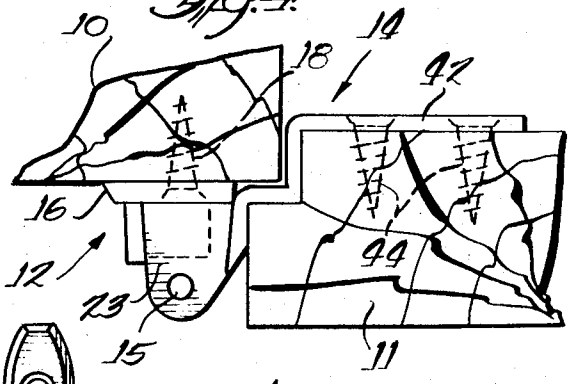


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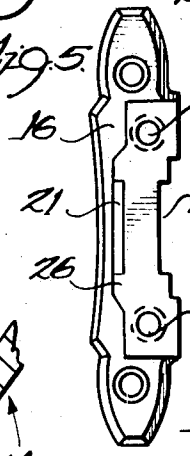


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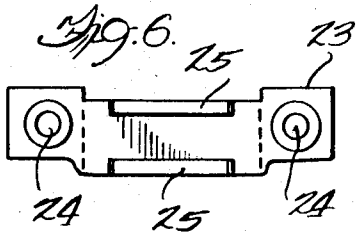
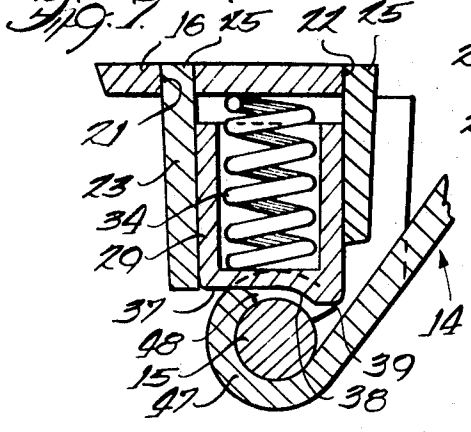


Fig. 7.



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Oct. 19, 1971 R. F. ANDERSON ET AL 3,613,151

HINGE CONSTRUCTION

Filed June 27, 1969 3 Sheets-Sheet 2

Fig. 8.

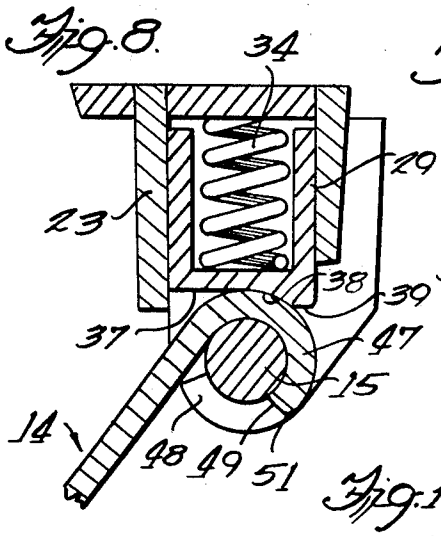


Fig. 9.

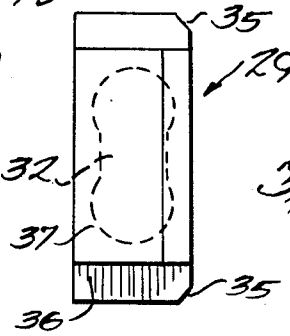


Fig. 10.

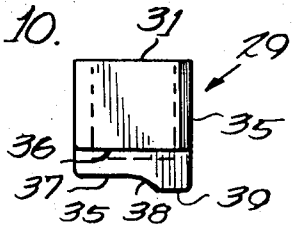


Fig. 11.

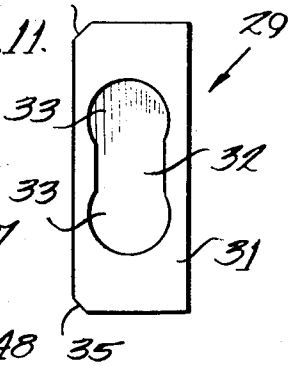


Fig. 12.

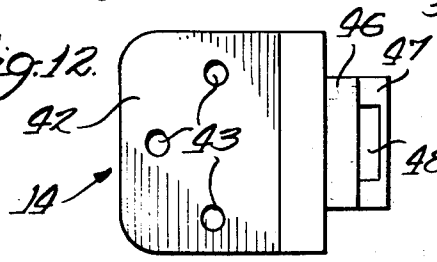


Fig. 13.

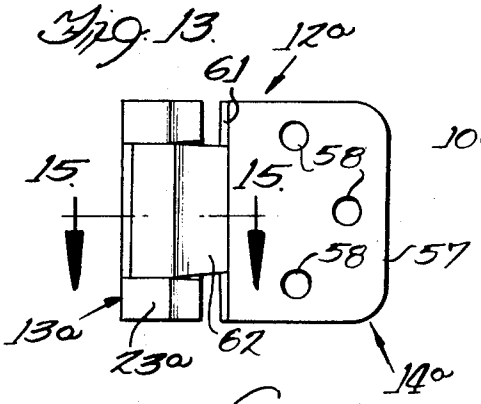


Fig. 14.

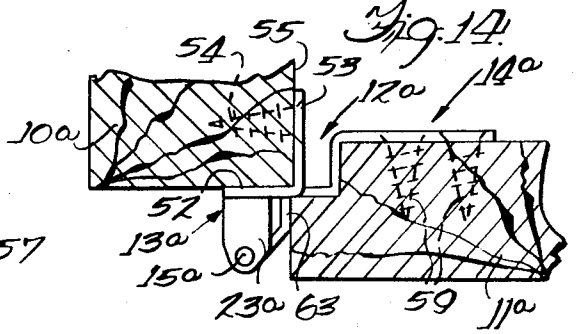


Fig. 15.

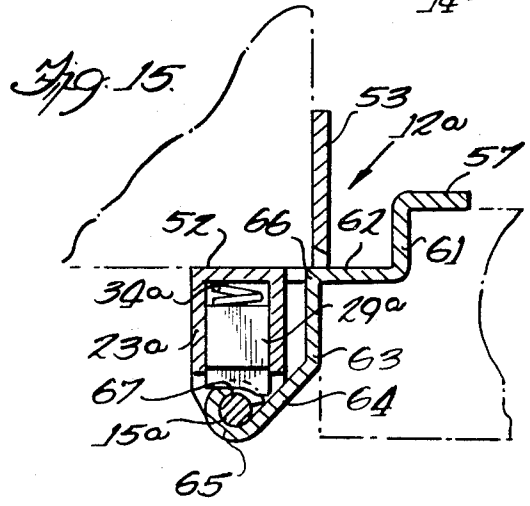
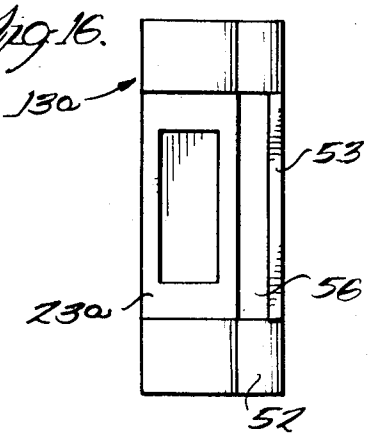


Fig. 16.



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Oct. 19, 1971 R. F. ANDERSON ET AL 3,613,151

HINGE CONSTRUCTION

Filed June 27, 1969 3 Sheets-Sheet 3

Fig. 17

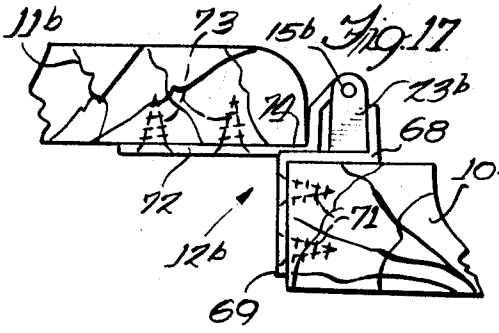


Fig. 18

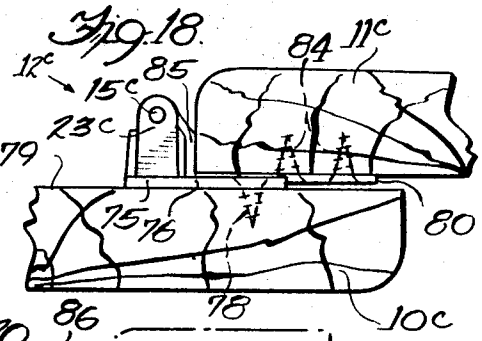


Fig. 20

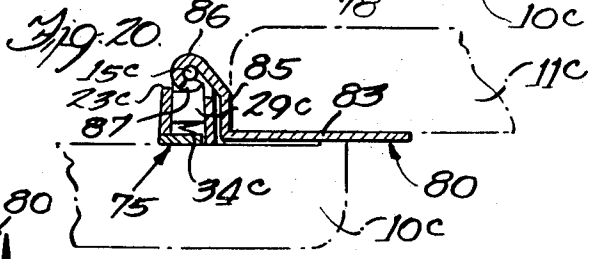


Fig. 19

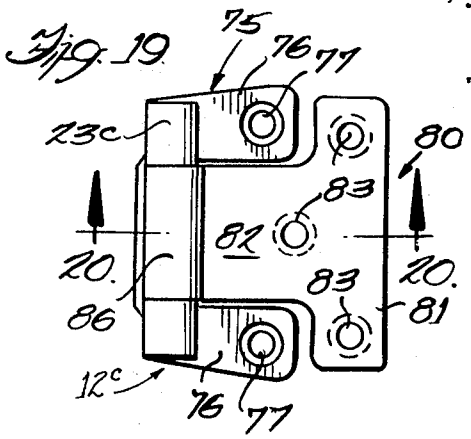


Fig. 21

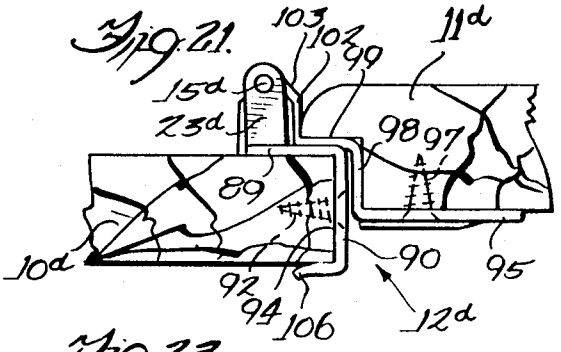


Fig. 22

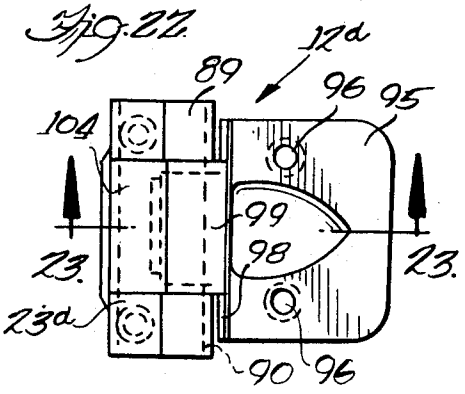


Fig. 23

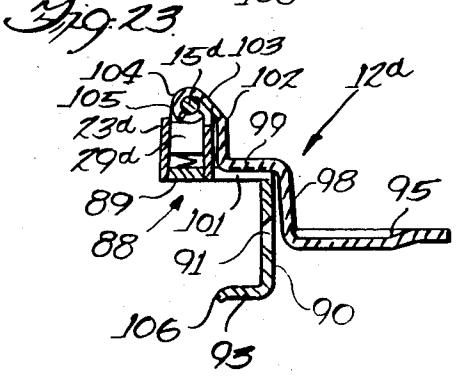
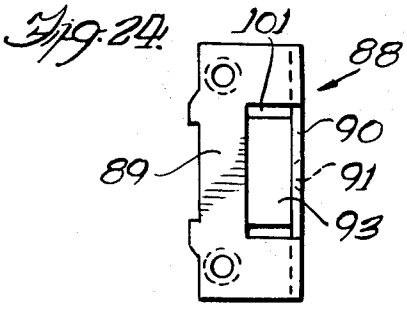


Fig. 24



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Patented Oct. 19, 1971

3,613,151

HINGE CONSTRUCTION

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Filed June 27, 1969, Ser. No. 837,130
Int. Cl. E05d 1/12
U.S. Cl. 16—180 4 Claims

ABSTRACT OF THE DISCLOSURE

Hinge constructions for the doors of cabinets or other enclosures where the door is mounted to swing between open and closed positions, with the hinge having a door wing and a cabinet wing. The door wing is of a configuration for either an inset or an overlay type of door, and the cabinet wing is either exposed or partially concealed. One type of cabinet wing includes a generally U-shaped flange that fits around and clamps onto the edge of the cabinet frame with only a single screw required to secure the wing to the frame. The cabinet and door wings may include a self-closing mechanism having a housing secured to or integral with the cabinet wing, the housing containing a spring-biased cam that is urged outwardly to engage the knuckle of the door wing, and a hinge pin or pintle defining the axis of the door. The door wing knuckle includes a cut-out portion cooperating with the cam to urge the door through the last few degrees of the arc of closing movement and yieldably retain the door closed.

The present invention relates to hinge constructions for the swinging movement of cabinet doors in a cabinet or other enclosure, and more particularly to hinge structures which may include a self-closing mechanism to urge the door to closed position and yieldably retain the door closed.

Among the objects of the present invention is the provision of a hinge construction for use on a latchless type door of a cabinet or enclosure where the hinge is capable of urging the door toward and beyond its closed position. The cabinet wing of the hinge includes a housing secured thereto within which is mounted a movable cam that is resiliently biased outwardly toward a hinge pin or pintle. The door wing includes a knuckle receiving the pintle and having a cutout portion cooperating with the cam to urge the door to closed position.

Another object of the present invention is the provision of a hinge construction having a housing which completely encloses the pressure cam except for the surface engaging the hinge knuckle of the door wing.

A further object of the present invention is the provision of a hinge construction utilizing a housing for the pressure cam which can be interchangeably mounted on various configurations of cabinet hinge wings for various hinge mounting possibilities.

The present invention also comprehends the provision of a hinge construction having a generally U-shaped cabinet frame hinge wing adapted to be mounted on the cabinet frame by the use of a single screw. The U-shaped hinge wing has a portion exposed on the exterior surface of the cabinet frame with the remainer of the hinge wing wrapped around the edge of the cabinet frame so as to be clamped thereonto. A single screw extends through an opening in the base of the U and into the edge of the cabinet frame.

Further objects are to provide a construction of maximum simplicity, efficiency, economy and ease of assembly and operation, and such further objects, advantages and capabilities as will later more fully appear and are inherently possessed thereby.

In the drawings:

FIG. 1 is a perspective view of a self-closing hinge of the present invention mounted on a cabinet and a cabinet door.

FIG. 2 is an exploded perspective view of the self-closing hinge of FIG. 1.

FIG. 3 is a front elevational view of the hinge.

FIG. 4 is an end elevational view of the hinge shown mounted on a cabinet and door.

FIG. 5 is a front elevational view of the cabinet hinge wing base of FIGS. 1–4.

FIG. 6 is a rear elevational view of the cam housing to be secured to the base of FIG. 5.

FIG. 7 is a horizontal cross sectional view taken on the line 7—7 of FIG. 3.

FIG. 8 is a cross sectional view similar to FIG. 7 but showing the open position of the hinge.

FIG. 9 is a front elevational view of the cam.

FIG. 10 is an end elevational view of the cam.

FIG. 11 is a rear elevational view of the cam.

FIG. 12 is a rear elevational view of the door hinge wing showing the cut-out portion in the hinge knuckle.

FIG. 13 is a front elevational view of a second embodiment of self-closing hinge.

FIG. 14 is an end elevational view of the hinge of FIG. 13 shown secured to a cabinet and door.

FIG. 15 is a horizontal cross sectional view taken on the line 15—15 of FIG. 13.

FIG. 16 is an enlarged front elevational view of the cabinet hinge wing of FIG. 13.

FIG. 17 is an end elevational view of a third embodiment of hinge for an overlay door.

FIG. 18 is an end elevational view of a fourth embodiment of hinge having the self-closing mechanism for an overlay door.

FIG. 19 is a front elevational view of the hinge of FIG. 18.

FIG. 20 is a horizontal cross sectional view taken on the line 20—20 of FIG. 19.

FIG. 21 is an end elevational view of a fifth embodiment of hinge utilizing the self-closing mechanism and having a wrap-around cabinet hinge wing.

FIG. 22 is a front elevational view of the hinge of FIG. 21.

FIG. 23 is a horizontal cross sectional view taken on the line 23—23 of FIG. 22.

FIG. 24 is a front elevational view of the wrap-around hinge wing with the self-closing mechanism omitted.

Referring more particularly to the disclosure in the drawings wherein is shown illustrative embodiments of the present invention, FIG. 1 discloses a cabinet or enclosure frame 10 and an inset door 11 mounted on the cabinet for swinging movement by two or more hinges 12, one hinge being shown in the drawings. The hinge 12 includes a cabinet hinge wing 13 and a door hinge wing 14 joined for pivotal movement by a hinge pin or pintle 15.

The cabinet hinge wing 13 includes a mounting flange or base 16 of any suitable configuration and having openings 17, 17 adjacent the ends to receive mounting screws 18, 18 to secure the base to the cabinet 10, a pair of openings 19, 19, an elongated slot 21 and a parallel elongated notch 22. The openings 19, 19, slot 21 and notch 22 are adapted to receive a pair of spaced rivet projections 24, 24 and a pair of spaced parallel elongated positioning ribs 25, 25, respectively, of a cam housing 23. The base 16 may have a recess 26 of the general outline of the housing 23 to aid in positioning and assembling the housing onto the base 16; the rivet projections 24, 24 being swaged or spun to conformably fill the countersunk openings 19, 19 and secure the parts together.

The housing 23 is of a generally rectangular shape having upwardly extending rounded projections 27, 27 at the

opposite ends thereof and separated by a central generally rectangular stepped opening **28** therethrough closed at one end by the base **16**. The opening **28** is generally located between the positioning ribs **25, 25** and receives a generally rectangular cam **29**. The cam **29**, as seen in FIGS. 9–11, has a flat rear surface **31** with a recess **32** therein enlarged at each end **33** to accommodate a pair of compression springs **34, 34**. A pair of adjacent corners are beveled at **35**, and the top surface **36** of the cam has a central raised portion **37** with a rounded concave surface **38** leading to a high point of surface **39** for a purpose to be later described.

When assembled as seen in FIGS. 7 and 8, the springs **34, 34** are received in the enlarged recess ends **33, 33** and abut the cam in the recess and at the opposite ends abut the base **16** to yieldably urge the cam outwardly of the housing. The rounded projections **27, 27** have axially aligned openings **41, 41** to receive the hinge pin or pintle **15** which extends across the opening **28** and the pressure cam **29**. The pintle **15** is knurled at one end so as to provide a friction fit in one of the openings **41**.

The door hinge wing **14** (FIG. 2) includes a mounting flange **42** having openings **43** to receive suitable securing means, such as screws **44**, to mount the hinge wing on the door **11**. The door **11** is shown as of the inset variety and the hinge wing **14** has an offset portion **45** joining the mounting flange **42** with a pivot flange **46** terminating in a generally cylindrical hinge knuckle **47** forming a passage receiving the pintle **15**. The knuckle **47** has a cut-out portion **48** of a longitudinal dimension to receive the raised portion **37** of the cam **29**. The edge **49** of the cut-out portion is rounded at **51** (see FIGS. 7 and 8) to cooperate with the high point or surface **39** and the rounded surface **38** to accomplish the self-closing function of the hinge.

As seen in FIGS. 7 and 8, the high point or surface **39** of the pressure cam **29** is offset from the axis of the pintle **15** and the door hinge wing knuckle **47**, with the round surface **38** and high surface **39** bearing on the outer surface of the hinge knuckle **47**. As shown in FIG. 8, when the door **11** is swung to its open position, the cam **29** is urged against the knuckle **47** and slides on the outer surface thereof; the hinge being formed of metal and the cam being formed preferably of a suitable plastic material, such as Celcon, to enhance relative sliding movement.

As the door **11** is swung to its last approximately 20° arc of movement upon closing, first the high surface **39** and then the rounded surface **38** will engage the rounded portion **51** of the edge **49** of the cut-out **48** under the force of the springs **34, 34**, a turning movement is imparted to the hinge knuckle **47** to urge the hinge wing **14** and the door **11** to its fully closed position. As seen in FIG. 7, the raised surface **37** of the cam **29** is urged against the rounded portion **51** of the knuckle edge **49** to urge the door beyond its closed position, which force retains or holds the door in closed position. In opening movement, the rounded portion **51** of the edge **49** engages the raised surface **37** to force the cam into the housing **23** against the force of the springs **34, 34**.

As seen in FIGS. 2, 7 and 8, the cam **29** is totally enclosed in the housing **23** except for the camming surface **37, 38, 39** which faces and is partially concealed by the hinge knuckle **47**. Although shown as two parts, the housing **23** may be formed integral with the base **16**.

FIGS. 13–16 disclose a second embodiment of hinge **12ª** utilizing the self-closing feature. The hinge **12ª** includes a cabinet hinge wing **13ª** and a door hinge wing **14ª** joined together by a hinge pin or pintle **15ª**. A housing **23ª**, substantially identical to the housing **23**, is secured to the cabinet hinge wing **13ª** and houses the pressure cam **29ª** and the springs **34ª, 34ª**, both identical to the first embodiment. The cabinet hinge wing **13ª** includes an exterior flange **52** and a mounting flange **53** at right angles thereto having suitable openings for mounting screws **54** which project into the edge **55** of the cabinet frame **10ª**. The flanges **52** and **53** have an opening or cut-out **56** therein for a purpose to be later described.

The door hinge wing **14ª** includes a mounting flange **57** having openings **58** to receive the mounting screws **59**, an offset portion **61** for an inset door **11ª**, an intermediate portion **62** of reduced width (see FIG. 13) parallel to the mounting flange **57**, and a portion **63** perpendicular to portion **62** and terminating in an angular end portion **64** having the hinge knuckle **65** at the outer edge. The corner **66** formed by the portions **62** and **63** is received in the cut-out or opening **56** when the door is closed as seen in FIGS. 14 and 15. The knuckle **65** has a cut-out **67** identical to that of the first embodiment and cooperates with the cam **29ª** in like manner.

FIG. 17 shows a third embodiment of hinge **12ᵇ** similar to that shown in FIGS. 13–16, except for an overlay door **11ᵇ**. The hinge includes a cabinet hinge wing **68** having a mounting portion **69** at right angles to the wing **68** with openings to receive screws **71** to mount the hinge wing onto the edge of a cabinet **10ᵇ**. A housing **23ᵇ** is secured to the wing **68** and carries a pintle **15ᵇ**. The door wing **72** is flat and has openings to receive mounting screws **73**. The wing **72** has a narrow portion **74** to be received in an opening (not shown) in the wing **68** and flange **69** in a manner identical to that shown in FIG. 15. The wing **72** terminates in a knuckle also substantially identical to that shown in FIG. 15.

FIGS. 18–20 disclose a fourth embodiment of hinge **12ᶜ** for a cabinet **10ᶜ** with an overlay door **11ᶜ**. The hinge includes a flat generally C-shaped cabinet hinge wing **75** having a central connecting portion upon which the cam housing **23ᶜ** is mounted and a pair of spaced generally parallel arms **76, 76** each having an opening **77** for a mounting screw **78** to secure this wing to the exterior surface **79** of the cabinet **10ᶜ**.

The door hinge wing **80** is a generally T-shaped member having a wide end portion **81** and a narrower central portion **82**, the wing having openings **83** for securing screws **84** to mount the wing on the interior surface of the overlay door **11ᶜ**. The narrow portion **82** is conformably received between the arms **76, 76** and terminates in a right angle flange **85** carrying the hinge knuckle **86** having an opening **87** cooperating with the pressure cam **29ᶜ** mounted within the housing **23ᶜ**. The knuckle **86** is carried on the pintle **15ᶜ** as in the other embodiments. As seen in FIGS. 18 and 20, the door **11ᶜ** overlays and conceals both the door hinge wing **80** and the spaced arms **76, 76** of the cabinet hinge wing **75** from view.

FIGS. 21–24 disclose a fifth embodiment of hinge **12ᵈ** with a unique manner of mounting on the cabinet **10ᵈ** and utilized with an inset door **11ᵈ**. The cabinet hinge wing **88** includes a base portion **89** carrying the cam housing **23ᵈ**, a central mounting portion **90** having a single opening **91** to receive a mounting screw **92** and a clamping portion **93**; the hinge wing having a generally U-shaped design, and the base portion **89** and the clamping portion **93** may slightly converge from the mounting portion **90** to aid in clamping the hinge wing onto the edge **94** of the cabinet **10ᵈ**.

The door hinge wing includes a mounting portion **95** having openings **96** to receive mounting screws **97** for attachment to the interior of the inset door **11ᵈ**, an intermediate portion **98** at right angles to the mounting portion, a narrow portion **99** at right angles to the portion **98** which is received in a notch or opening **101** formed in the base portion **89** of the cabinet hinge wing **88**, and the narrow portion terminates in a narrow flange **102** at right angles to the portion **99**. The narrow flange has an angularly disposed portion **103** terminating in the hinge knuckle **104** which is provided with a cut-out or opening **105**, identical to the opening **48**, cooperating with the spring-biased cam **29ᵈ** in the housing **23ᵈ**.

This hinge **12ᵈ** functions in an identical manner with the other self-closing hinges where the self-closing structure is present. Obviously, this hinge, as well as the other

hinge embodiments do not require the self-closing feature but can operate as ordinary hinges about a hinge pin or pintle. If the housing **23** is not utilized in these embodiments, then the cabinet hinge wing must be formed with spaced curled portions or knuckles (not shown) to carry the pintle and receive the knuckle of the door hinge wing therebetween. Also, where the cam **29** and housing **23** are utilized in the hinge structure, the cam housing can obviously be formed integral with the base portion of the cabinet hinge wing.

The hinge structure **12**[d] having the wrap-around cabinet hinge wing **88** provides the additional advantages of (1) simpler installation and (2) more secure engagement with the cabinet frame. As the wrap-around hinge wing **88** has the function of clamping onto the edge **94** of the cabinet frame **10**[d], only the single screw **92** extending through the mounting portion **90** and into the edge **94** is necessary to retain the hinge wing in operative position. The clamping portion **93** also may have an outturned lip **106** to aid in slipping the hinge wing **88** onto the edge **94** of the cabinet frame.

Having thus disclosed our invention, we claim:

1. A self-closing hinge supporting a door on a cabinet frame for movement about a pivotal axis, comprising first and second hinge wings joined by a pintle forming a pivot axis with one hinge wing being mounted on a door and the other hinge wing being mounted on a cabinet frame, said cabinet hinge wing having a base for mounting on the cabinet, a cam housing affixed to the base and having a forward projection at its upper and lower ends having aligned openings receiving an end of the pintle, a longitudinally extending connecting wall at one side of said housing and a central connecting portion spanning said projections having a rectangular outwardly opening recess closed at its rear, a rectangular spring-biased cam member conformably received and bodily movable in said opening, said cam member being recessed to receive one or more coil springs held under compression and open at one end with one end of said spring abutting the base and the other end abutting the other end of said cam member, said cam member having an exposed cam surface facing and biased toward said pintle, and said other hinge wing having a mounting portion and terminating at one edge in a generally cylindrical knuckle forming a passage receiving said pintle, said knuckle having a central cut-out at the inner edge thereof cooperating with said cam member and a wrap-around mounting flange on said base adapted to receive and to clamp onto an edge of the frame of the cabinet and having a cut-out receiving a portion of a mounting flange on the door hinge wing.

2. A hinge construction as set forth in claim **1**, in which the hounting portion of the cabinet hinge wing is of generally U-shaped to conformably receive and clamp over an edge of the cabinet frame.

3. A hinge construction as set forth in claim **2**, in which one side of said mounting portion provides a clamping flange with an outturned lip directing the flange over the edge of the cabinet frame.

4. A hinge construction as set forth in claim **1**, in which the mounting portion of the cabinet hinge wing has a central opening at a corner thereof and the door hinge wing has a mounting portion with a part received within said opening when the door is closed.

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