United States Patent [19]

Maertin et al.

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[45] **Sept. 3, 1974**

[54] **DOOR HINGES**

[76] Inventors: **Klaus Paul Maertin,** 10 Weeroona Ave., Elanora Heights, Australia 2101; **Stewart Cecil Combs,** Forestville, New South Wales, both of Australia 2087

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Aug. 26, 1971	Australia	6057/71
Oct. 26, 1971	Australia	6791/71

[52] **U.S. Cl.** **16/156,** 16/134, 16/136, 16/168

[51] **Int. Cl.** **E05f 1/06,** E05d 5/12

[58] **Field of Search** 16/152, 168, 134, 136, 16/153, 154, 155, 156

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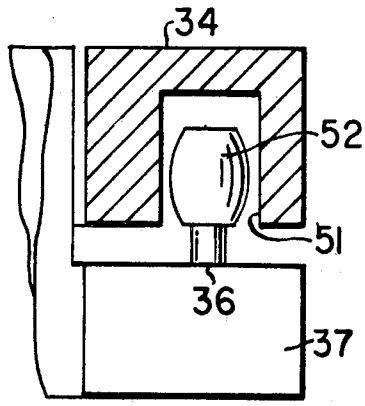
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Primary Examiner—Bobby R. Gay
Assistant Examiner—Kenneth J. Dorner
Attorney, Agent, or Firm—Biebel, French & Bugg

[57] **ABSTRACT**

This invention relates to apparatus for pivotally mounting a door, window or like closure in a frame, comprising at least a top and a bottom hinge construction, each having the appearance of a conventional hinge, but at least the top and the bottom constructions having substantially different pivotal means permitting adaption thereof for a number of relatively different functions. Each said pivotal means includes means defining at least a pin and a complementary recess adapted to locate relative to each other in such a manner as to permit relative departure of the recess from a position coaxial with said pin and relative rotation about a predetermined axis.

26 Claims, 28 Drawing Figures



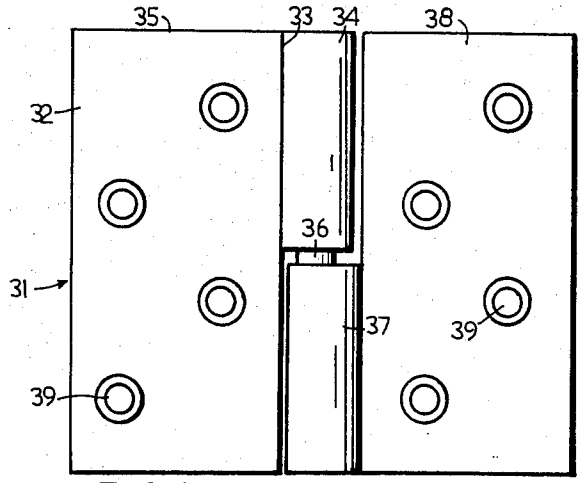


FIG. 1

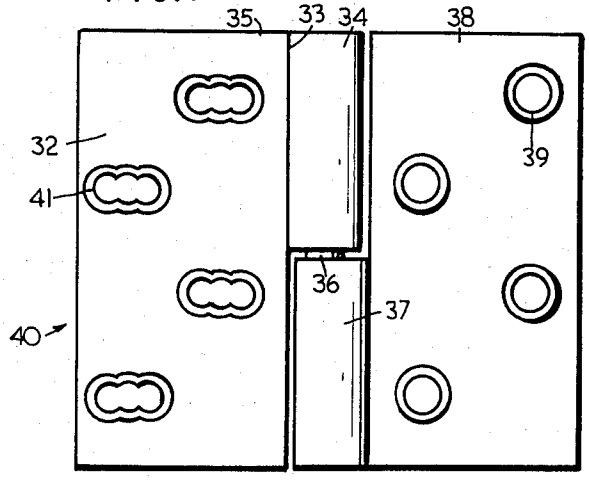


FIG. 2

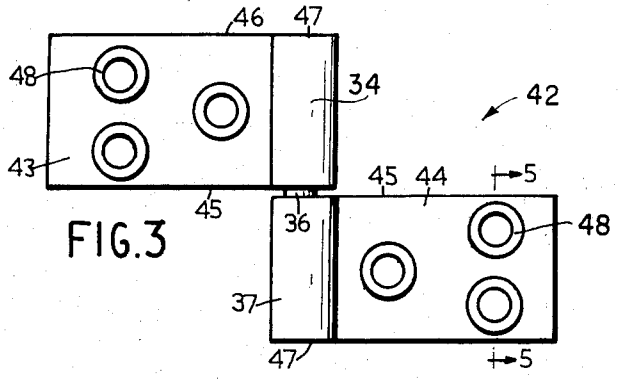


FIG. 3

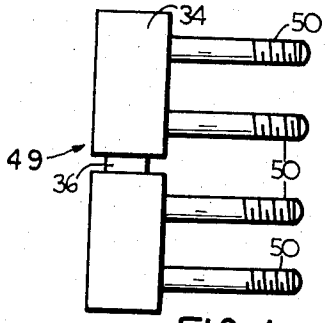


FIG.4

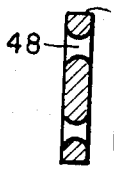


FIG.5

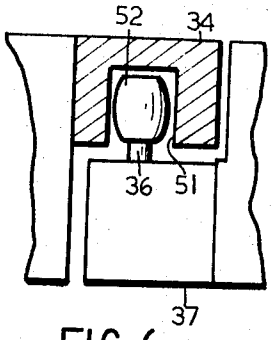


FIG.6

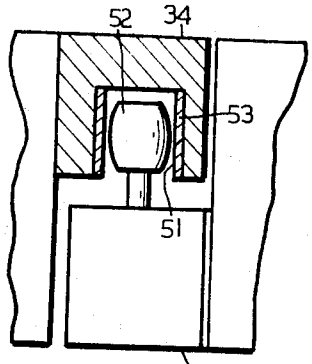


FIG.7

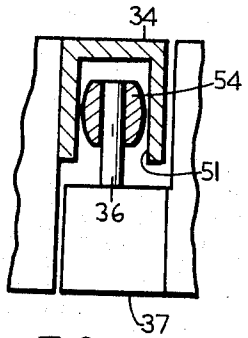


FIG.8

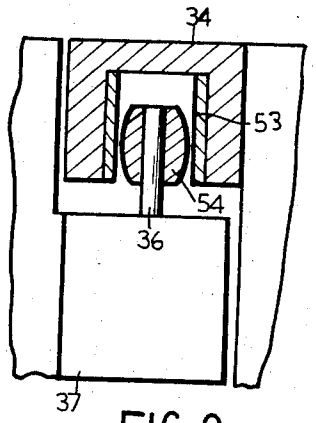


FIG.9

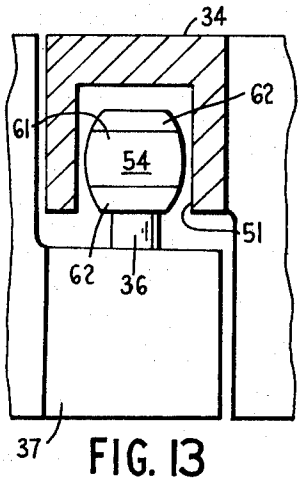


FIG. 13

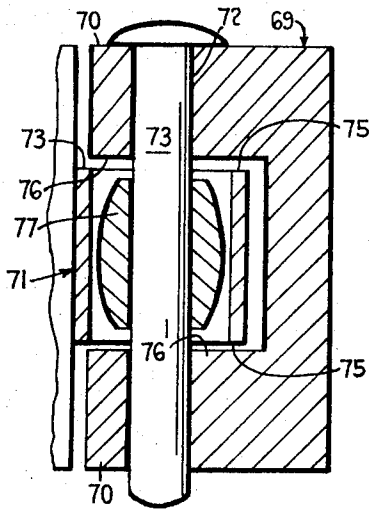


FIG. 20

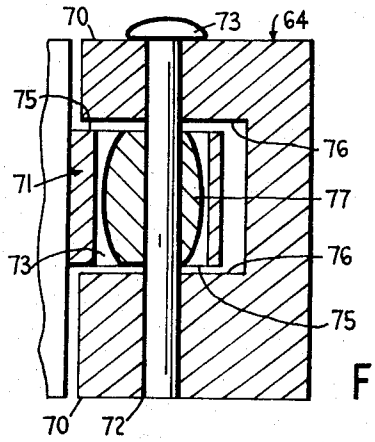


FIG. 21

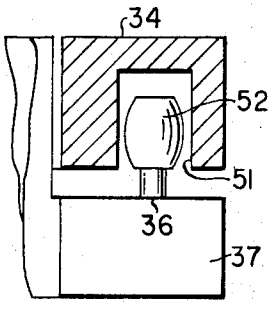


FIG. 10

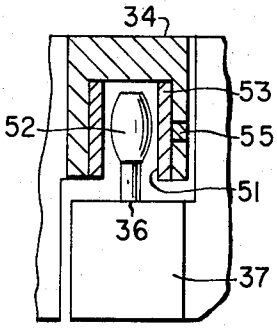


FIG. 11

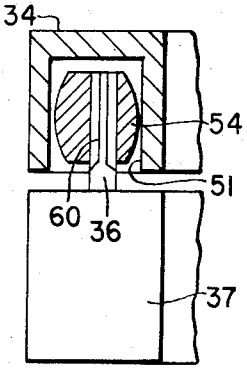


FIG. 12

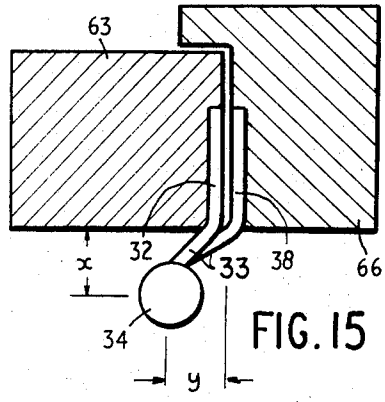


FIG. 15

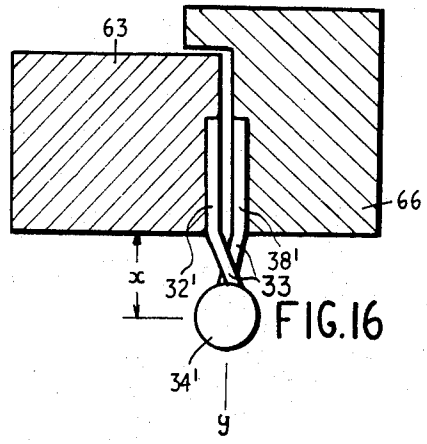


FIG. 16

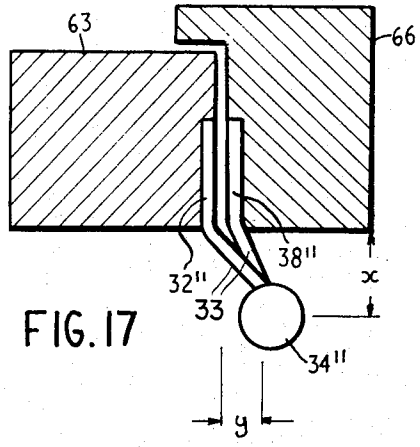


FIG. 17

FIG. 14

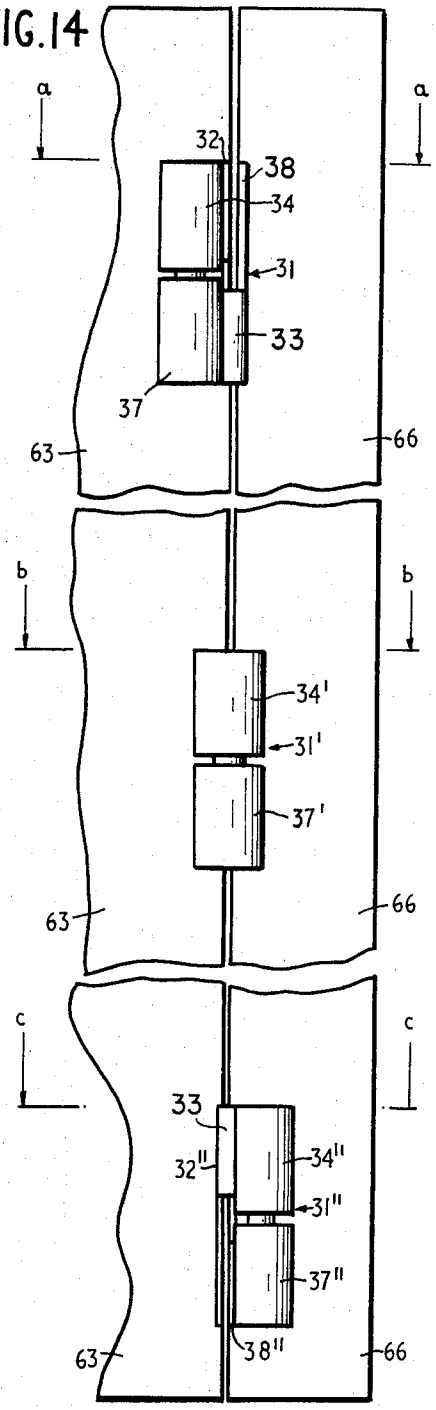


FIG. 19

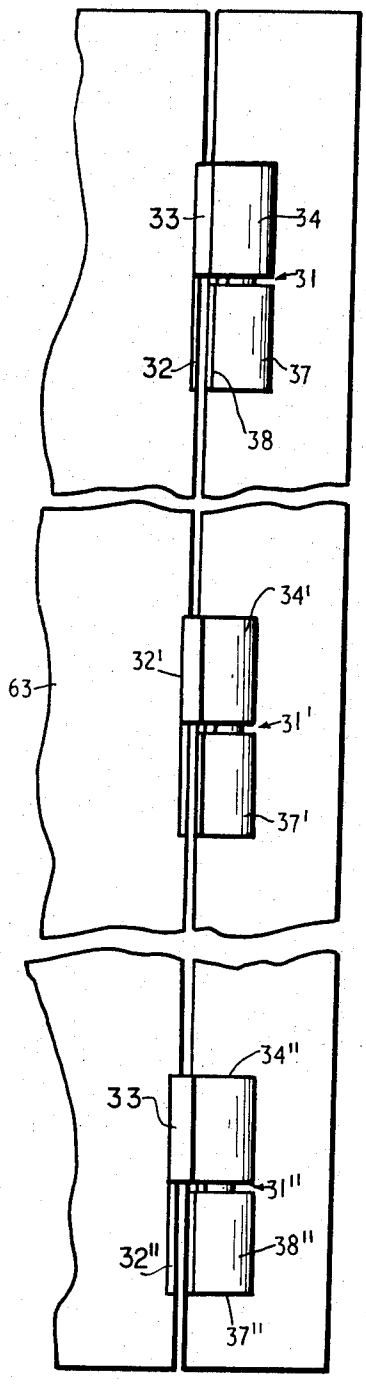
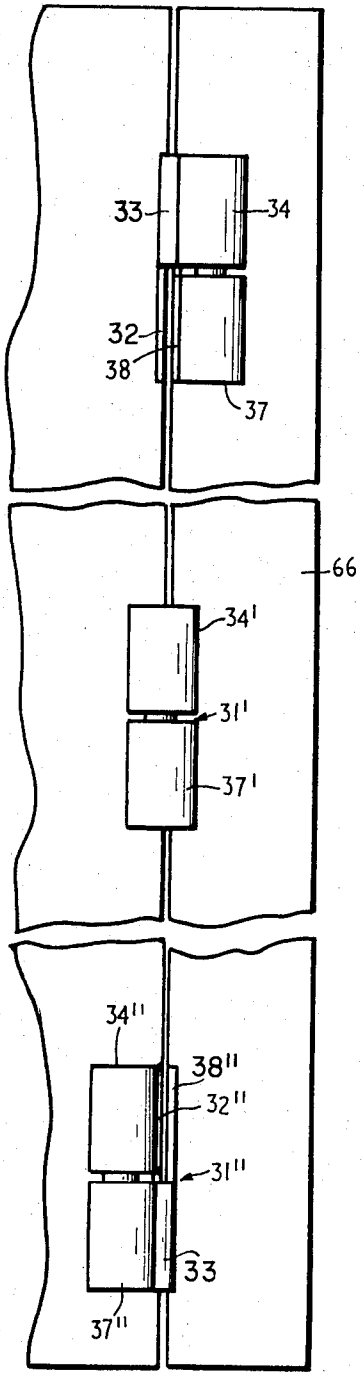

33
34
31
32
37
38
34'
32'
63
31'
37'
34''
33
31''
32''
38''
37''

FIG. 18


33
34
32
38
37
66
34'
31'
37'
34''
38''
32''
31''
33
37''

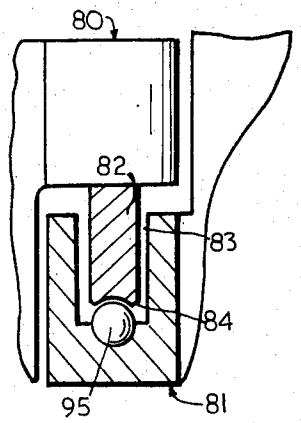


FIG. 22

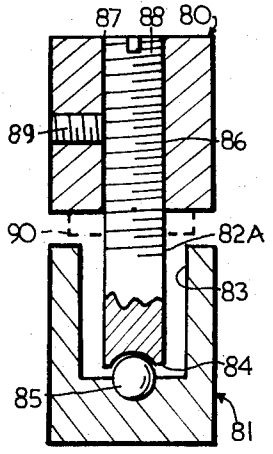


FIG. 23

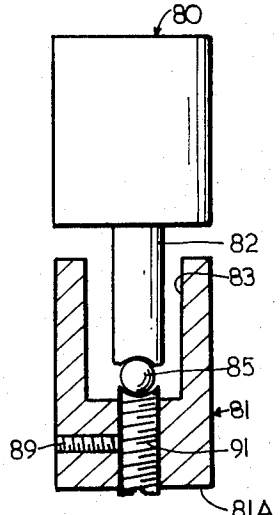


FIG. 24

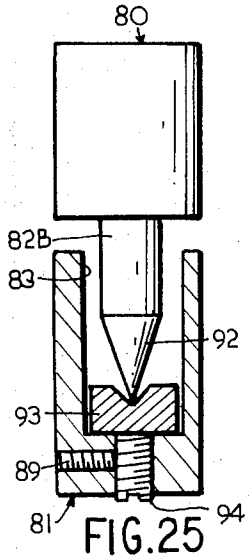


FIG. 25

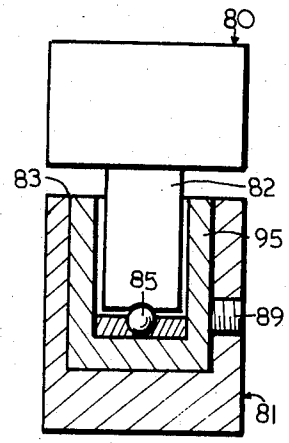


FIG. 26

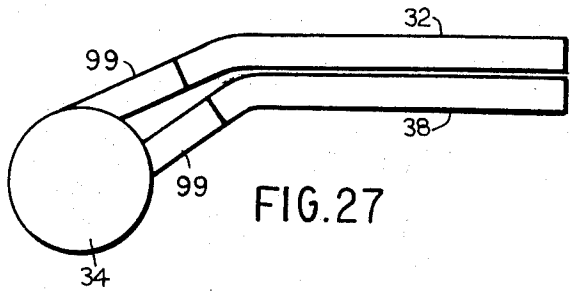
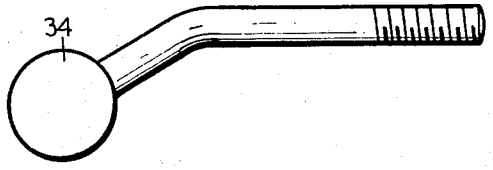


FIG. 27

FIG. 28



DOOR HINGES

Cross reference made to our copending U.S. application Ser. No. 271,677 filed of even date herewith.

This invention relates to improvements in hinges. Present known types of hinges are varied and generally comprise two metal plates each of which has one or more tongues extending from one longitudinal edge. These tongues are curved inwardly to form series of spaced tubular elements adapted to be interlocked with each other by a pin.

These types of hinges generally suffer from various defects in as much as they have a tendency, when supporting a door, for the curved tongues to open and cause the door to rattle. They are also defective in that they require frequent lubrication.

With these types of hinges it is necessary to incorporate a separate component between the door and the door frame when a self-closing door is required. This type of construction generally involves extra cost and the use of unsightly devices.

There are of course several types of hinges presently available that have self-closing characteristics. However, with these hinges it is generally necessary for the peripheral clearance between the door and the door frame to be excessively large, thus making these types of hinges unsuitable for use in special environmental installations.

It is an object of the present invention to provide a hinge that is substantially free from these defects.

Another object is to provide a hinge incorporating a pivotal element that is suitable for use on self-closing, self-opening or normal doors in rabbeted door frames.

It is another object to provide a hinge which substantially eliminates the high degree of horizontal friction commonly found in present known types of hinges.

Throughout the specification, the term "barrel shaped" is intended to mean a conventional barrel shape having sections at right angles to the barrel axis which are closed curves increasing in area, for some distance at least, from the barrel ends towards its centre.

Notwithstanding any other forms that may fall within its scope, the invention will hereinafter be described with reference to the accompanying drawings of which:

FIGS. 1 to 4 are elevations of hinges in accordance with the invention provided with four different forms of mounting means,

FIG. 5 is a view through line 5—5 of FIG. 3 showing double countersunk mounting screw holes,

FIGS. 6 to 13 are sectional elevations illustrating alternative forms of the external barrel-shaped pivot used in the hinges of FIGS. 1 – 4,

FIG. 14 is a fragmented elevation of a door mounted in a doorway illustrating the relative locations of the hinges for a self closing door,

FIG. 15 is a cross section on line *a—a* of FIG. 14,

FIG. 16 is a cross section on line *b—b* of FIG. 14,

FIG. 17 is a cross section on line *c—c* of FIG. 14,

FIG. 18 is a view similar to FIG. 14 but illustrating the locations of the hinges in a self opening installation,

FIG. 19 is a view similar to FIG. 14 but illustrating the locations of the hinges in a normal installation,

FIGS. 20 and 21 are sectional elevations of another form of the pivot.

FIGS. 22 to 26 are sectional elevations showing alternative forms of the pivot of another form of hinge in accordance with the invention, used in combination with the hinge of FIG. 1,

FIG. 27 is a plan view of the hinge of FIG. 1,

FIG. 28 is a plan view of the hinge of FIG. 4.

Referring first to FIG. 1, the hinge 31 comprises a mounting leaf or plate 32 which is generally rectangular in shape. Attached to the longitudinal edge of the plate 32, by a web portion 33, is a body or knuckle member 34 which extends from one end 35 of the plate 32 along the web 33 to approximately the mid point of the plate 32. The body 34 is connected by a pivot member 36 to a second body or knuckle member 37 which is attached to a second plate 38 in a manner similar to 32 and 34. The plates 32 and 38 have holes 39 adapted to accept screws or bolts for attaching the hinge between a door and a door frame. The members 34, 36 and 37 constitute a pivotal connection which will be described in detail later in the specification, and at this point it need only be noted that each of the knuckle members 34 has a longitudinal axis of symmetry which is substantially vertical in the mounted position of the hinge.

The hinge 40 of FIG. 2 is similar to the hinge 31 of FIG. 1 except that the mounting screw holes 41 in one of the plates 32, 38 are elongated transversely of the plate to provide adjustment to compensate for malaligned or warped doors.

The hinge 42 of FIG. 3 comprises a pivotal connection similar to that in FIG. 1. The mounting plates 43 and 44, however, are so proportioned and attached to the members 34 and 37 that one transverse edge 45 of each plate does not overlap the corresponding edge 45 of the other plate but lies on only one side of plane normal to the inner end of the associated knuckle member 34 or 37. This construction will permit the hinge to interleaf, making it unnecessary to recess it into the door or the door frame. If required, the edge 46 of each plate 43, 44 may extend beyond the outer end 47 of the associated knuckle member 34 and 37 respectively.

Both of the plates 43, 44 have holes 48 through them which are adapted to accept mounting screws or bolts for attaching them to a door or door frame (not shown).

FIG. 5 is a view on line 5—5 of FIG. 3 and shows the holes 48 countersunk on both sides of the plates 43 or 44 to permit the hinge 42 to be used in both lefthand and righthand installations.

FIG. 4 illustrates a hinge 49 having pivotal members 34, 36 and 37 similar to those of the hinge of FIGS. 1 to 3. The main difference in the construction of the hinge 49 is that mounting plates are replaced by studs 50 which project at right angles from the side of each member. These studs are spaced axially along the longitudinal surface of each member 34, 37, which enables the hinge to be mounted between a door and a frame.

FIG. 6 is a sectional elevation of the pivotal members 34, 36 and 37 of FIGS. 1 to 4 and shows the construction of the pivot assembly which connects the bodies 34 and 37. The body 34 has a recess 51 drilled coaxially into it from one end. The knuckle member 37 has a pin 36, extending coaxially from one end and having a barrel shaped surface 52 which is received inside the re-

cess 51 and is adapted to rotate at least 180° about the common axis of the members 34, 36, 37. The shape of the pivot 52 will permit member 34 to depart relatively from a position coaxial with the member 37.

FIG. 7 illustrates a pivot assembly similar to that of FIG. 6, the main difference being that a self-lubricating bushing 53 is inserted into the recess 51 in which the barrel-shaped pivot 52 is positioned.

FIG. 8 is a pivot assembly similar to that of FIG. 6 and comprises members 34 and 37 and a pin 36 projecting axially from member 37. Mounted on the pin 36 is a barrel-shaped bushing 54, which may be formed from a suitable self-lubricating material.

The forms illustrated in FIGS. 7, 8 permit the hinge to be manufactured from any suitable material regardless of its bearing capabilities.

FIG. 9 illustrates a pivot assembly similar to that of FIGS. 6 and 7 in which the barrel-shaped pivot assembly comprises a pin 36 projecting axially from member 37 and having a barrel-shaped bush 54 mounted thereon.

FIG. 10 is a pivot assembly similar to that of FIG. 6 and illustrates the manner in which the axis of the member 52 and recess 51 can be offset to one side of the axis of symmetry of the members 34 and 37. This offset will, when the hinge is installed between a door and a door frame, place the axis in a position different from the position occupied by the axis of the pivot of FIGS. 6 to 8 when the hinge is installed between a door and door frame. Thus if the hinge 31, 40 or 42 is used in combination with another hinge (to be described later) having its axis in a position different from that of the members 34, 37 the door may be caused, when in the open position, to gravitate to the closed position, or when in the closed position (not latched), to gravitate to the open position.

It will be seen that in the manufacture of the hinge 31, 40 or 42 incorporating the pivot of FIG. 10 the offset may be varied according to the type of installation to which the hinge is intended to be applied.

FIG. 11 illustrates a pivot assembly similar to that of FIG. 9 except that the bushing 53 has the axis of its internal dimension parallel to and laterally offset from the axis of its external dimension. Thus it will be seen that by simply locking the bushing 53 in position with a set screw 55 located through the wall of the member 34, the offset of the axis of the pivot assembly may be adjusted to a suitable position after the hinge has been installed between a door and a door frame.

FIG. 12 shows an alternative pivot assembly to that of FIG. 11. In this construction, the axis of the internal diameter of the bushing 54 is offset to an eccentric position parallel to and spaced from the axis of its external diameter. The bushing may have splines on its internal surface adapted to engage with corresponding splines 60 on the external surface of the pin 36. Thus the bushing may be locked in its selected position by the splines. Adjustment would be made by merely disengaging the bushing from the splines, moving it to its selected position, and reengaging it on the splines 60.

FIG. 13 illustrates a pivot construction similar to that of FIG. 8 except that the external surface of the bushing 54 is tapered from its ends towards a curved portion 61 at its centre. It is desirable in this construction to form the curved portion 61 with its axial length greater than the axial length of either of the tapered (frustoconical) portions 62 to permit relative angular displacement of the member 34 about the barrel shaped bushing 54.

FIG. 14 illustrates a typical hinge configuration providing the door 63 with a self-closing characteristic. In this configuration the knuckle members 34 and 37 of the top hinge are offset towards the centre of gravity of the door 63, which is effected by the web portions 33 connecting each mounting plate 32 or 38 with its associated knuckle member, each web 33 being extended at an angle to its associated mounting plate to provide the desired offset. The knuckle members 34'' and 37'' of the bottom hinge 31'' are offset towards the door frame 66. The knuckles 34' and 37' of the centre hinge 31', however, lie in a null position midway between the top and bottom hinge knuckles 34, 37 and 34'', 37'' respectively. This situation will cause the door to gravitate from a 90° open position to the closed position.

The time taken for most doors to gravitate from the 90° open position to the closed position should preferably be from 3 – 7 seconds. Accordingly therefore, a very heavy door would require a lesser degree of offset than a light door to achieve a closure speed within that range.

Where the door 63 (FIGS. 15–17) ranges in size from 2 to 10 in height and 1 to 4 in width and ranges in weight from 2lbs. to 500lbs. with a closure time of 3 – 7 seconds from the 90° open position, dimension y for the top hinge 31 (FIG. 15) and the bottom hinge 31'' (FIG. 17) would be from 0.625 to 0.750 inch and 0 for the centre hinge.

FIG. 18 illustrates a hinge configuration that provides the door 63 with a self-opening characteristic. This is achieved by offsetting the top hinge knuckles 31 and 37 towards the door frame 66 and the bottom hinge knuckles 31'' and 37'' towards the centre of gravity of the door 63. The degree of the offset would be the same as for FIGS. 15 – 17.

FIG. 19 shows a typical three hinge configuration for use in normal situations, i.e., neither self-closing or self-opening, which is achieved by inverting either the top or the bottom hinge and replacing the centre hinge with a hinge having an identical construction to the top hinge. In this type of installation the knuckle members of each hinge may be offset toward either the frame 66 or the centre of gravity of the door 63 according to the particular requirements of the user.

FIGS. 14, 18 and 19 also illustrate that all of the hinges employed in mounting a door are of substantially the same external dimensions and differ among themselves only in the extent to which the knuckle members are offset with respect to the mounting plates, a difference which is not particularly noticeable in use when the hinges are mounted several feet away from each other as on a room sized door.

Where very heavy doors are used the degree of offset of the knuckle members 34, 37 is relatively small. This situation permits the radius of the barrel shaped surface to be increased. In some instances that radius may be as great as 3 ft. With very light doors the radius of the barrel may be minimal but at the very least it must be equal to the maximum transverse diameter of the barrel shaped portion to provide a suitable contact surface area.

The length of the barrel shaped portion is not as important as the radius, in some cases for example, it may be as short as 0.125 inch or as long as 1.00 inch.

The radius of the barrel shaped portions is also controlled to some extent by the spacing of the hinges. In most installations, the top and bottom hinges are generally mounted approximately 7 inches from the top and the bottom of the door respectively. By moving the hinges closer together or further apart the closure speed of the door would be increased or decreased accordingly. Thus it will be seen that the barrel shaped pivot should have a radius sufficient to provide a substantial tolerance in the spacing of the hinges.

FIG. **20** illustrates another form of pivot assembly which may be used in connection with some types of doors. This assembly comprises a knuckle member **69** having spaced flanges **70,** the space between them being adapted to accept knuckle member **71** of the other hinge part. In this construction, a hole **72** formed axially through the member **71** is adapted to accept a pivot pin **73** mounted in the flanges **70** and carrying a barrel shaped bushing **77** received in the hole in the member **71.** The member **71** must have an axial length sufficient to provide clearance between its ends **75** and the inner faces **76** of the flanges **70.** This clearance will permit the member **71** to be displaced angularly from a position coaxial with pin **73.**

FIG. **21** illustrates a construction similar to that of FIG. **20** except that the barrel-shaped bushing **77** is eccentrically mounted on the pin **73.**

The hinge of FIGS. **1** to **4** is, due to its structural form, capable of bearing only the horizontal or angular weight of the door and thus would necessarily have to be installed in combination with another type of hinge that is capable of bearing the vertical load. This second hinge would have an outward appearance similar to that of the previously described hinge. Internal components of the pivot assembly, however, are slightly different.

FIG. **22** illustrates one form of pivot suitable for the second hinge. This comprises two knuckle members **80** and **81** which are attached to the hinge mounting plates as previously described. The member **80** has a pin **82** projecting axially from one end thereof which is adapted to be received in a recess **83** in member **81.** To improve the wearing characteristics of this pivot the end of the pin **82** has a concave hemispherical surface **84** which is engaged on the outer surface of the ball **85** located in the bottom of the recess **83** in the member **81.** The pin **82** may be a slide fit in a recess in the knuckle member **80** or they may be integrally formed, but it should have substantial radial clearance in the recess **83,** of the order shown in FIG. **22.**

An alternative form of the pivot of FIG. **22** is shown in FIG. **23.** In this form of pivot, the pin **82A** has a threaded portion **86** at one end which is adapted to engage an internally threaded hole **87** in the member **80.** A hole **88** in the opposite end of the member **80** provides access to the pin **82A** for axial adjustment purposes. The pin **82A** may be locked in its selected position by a set screw **89** passing through the wall of the member **80.** Alternatively the pin **82A** may be locked in position by a lock nut **90** located on the threaded portion of the pin and adapted to be locked against the end of the member **80.** This arrangement permits vertical adjustment of the door when installed in a door frame.

FIG. **24** illustrates an alternative form of the pivot of FIG. **22.** In this form, the ball **85** may be axially adjusted by a set screw **91** passing through the end wall of the member **81.** The screw **91** may be locked in its selected position with a lock screw **89** or by a lock nut acting on the end **81A** of the member **81.**

FIG. **25** shows an alternative form of pivot for the second hinge. This pivot comprises members **80** and **81** which are generally similar to the members **80, 81** of FIG. **22** except that the end of the pin **82B** has a cone shaped portion **92** adapted to engage internally cone shaped seat **93** located in the recess **83.** The pin **82B** may also be axially adjustable similarly to the pin of FIG. **23,** or the seat **93** may be axially adjusted with a screw **94** and locked in its selected position with a set screw **89.**

FIG. **26** shows a variation of the pivot of FIGS. **22** to **26.** In this form, an eccentric bushing **95** is located in the recess **83,** and the ball **85** or the cone shaped lower pivot point **93** (FIG. **25**) is located in the bottom of the bushing **95,** thus providing an adjustable offset on the second hinge. The bushing **95** may be locked in its selected position by a set screw **89.** The pin **82** may be axially adjustable similarly to FIG. **23,** or the bushing **95** may be provided with axial adjustment means.

FIG. **27** is a plan view of the hinge **31, 40** or **42** of FIGS. **1, 2** or **3** and illustrates an alternative method of achieving the offset of the pivot for a self-closing hinge. The degree of offset in the lateral plane at right angles to the transverse plane is achieved bending the mounting plates **32, 38** at positions adjacent pivot **34.** The degree of the offset may be adjusted by increasing or decreasing the angle of this bend. Thus when the hinge is installed between the door and the door frame, the bent portions of the plates **32, 38** cause the pivot axis to be offset towards the vertical axis of the door, or away from it according to the type of installation.

The previously described offset would offset the pivotal axes of the first and second hinges in one plane, thereby providing the door with an efficient self-closing action. In some types of installations it may be desirable to effect a slight acceleration of the closing speed of the door from the 25° – 40° open position. This may be achieved by providing an extension **99** (FIG. **27**) between the edge of the mounting plate and the members **31, 34** and **37, 38** thus providing the hinges with a second offset in a horizontal plane at right angles to the first offset. For example, dimension X for the bottom hinge (FIG. **17**) may be 1.0625 to 2.0 inches and for the top hinge (FIG. **15**) dimension *X* may be from 1.00 inch depending of course on the weight of the door. Thus it will be seen that a hinge providing an efficient self-closing action can be designed and manufactured for any particular type of installation according to the user's requirements.

The hinge of FIG. **4** may be provided with the offset in both planes as previously described by making studs **50** longer and providing a bend at a position adjacent members **34** and **37** as shown in FIG. **28.**

By combining the offset fixing means and the adjustable bushes as previously described it is possible to adjust the closure speed of the door after installation, thus allowing a substantial variation in the spacing of the hinges.

In an installation using the hinge of this invention by interchanging the degree of offset between the upper and lower hinges, the door may be caused to gravitate to the open position. By utilising upper and lower hinges which are offset to the same degree in a direction away from the axis of the door, the door may be

caused to open out from the frame and thus provide a greater amount of the width of the door to be utilised although this configuration of the hinges would not have self-closing characteristics as previously described.

It will be appreciated by those skilled in the art that by careful selection of the components and the shape and configuration of these components, a wide variety of types of special installations may be provided for.

In the forms of the hinge described in relation to FIGS. 6 – 13 and FIGS. 22 – 26 the door, when opened to a position from 90° onwards to the plane of the doorway, may be lifted off the pivots to enable a greater access to the doorway. In a situation where a non-lift-off door is required, the top or centre hinge may be replaced with a hinge of the opposite hand.

With a hinge configuration (FIGS. 14 – 19) in which the centre hinge has no offset, it would merely be necessary to invert the centre hinge to achieve a non-lift-off situation.

It has been found that the hinge in its various forms may be used for mounting doors having a weight of between 2 lbs. and 800 lbs., and dependent of course on the sheer strength of the material from which the hinge is made, it is envisaged that it may be used with doors of much greater weight.

With most types of present known hinges a substantial amount of precision is required during installation and the slightest malalignment will, at the very least, make the door difficult to close. With the present invention, due to the construction of the pivots, it requires no great degree of skill to effect installation thereof.

In an alternative form of the pivot assembly shown in FIG. 20, the pin 73 has an integrally formed barrel shaped surface. This is achieved by providing the pin 73 with spaced circumferential grooves and forming the barrel shaped portion therebetween. The grooves should have sufficient depth and width to permit the angular displacement of the knuckle member 71 with respect to the axis of the pin 73.

This type of construction may also be applied to the form shown in FIG. 21. In this configuration however the pin 73 is larger in diameter than the maximum diameter of the barrel shaped portion to permit relative eccentricity of that portion with respect to the axis of the pin 73.

What we claim is:

1. Apparatus for pivotally mounting a door, window or like closure to a frame, comprising at least a top and a bottom hinge construction each comprising:

a. a first part adapted for mounting on said closure,

b. a second part adapted for mounting on said frame,

c. pivot means connecting said parts for relative rotation about a predetermined axis and for relative angular displacement from the direction of said axis,

d. each said pivot means comprising a first knuckle member on one said part having therein a cylindrical recess,

e. a second knuckle member on the other part having a pin thereon including a portion projecting onto said recess,

f. all of said four knuckles being of substantially the same external dimension,

g. the projecting portion of the pin of one of said second knuckles having means defining a vertical load bearing surface and its corresponding recess having means defining a complementary vertical load bearing surface,

h. the projecting portion of the pin of the other second knuckle having means defining a barrel shaped surface having a maximum diameter substantially greater than the remainder of the pin and constituting a lateral load bearing surface in load bearing relation with the peripheral wall of said cylindrical recess wherein it is received, and

i. the maximum diameter of each of said pins being sufficiently smaller than the diameter of said recess wherein it is received to provide for angular displacement of all of said pins from the axes of the respective said recesses.

2. Apparatus as in claim 1 wherein the means defining the barrel shaped surface is the outer surface of a barrel shaped bushing mounted on said pin.

3. Apparatus as in claim 2 wherein the outer surface of said bushing is curved in an axial plane throughout its length with the radius of curvature being at least equal to the maximum transverse diameter of the bushing.

4. Apparatus as in claim 1 wherein the complementary load bearing surfaces are spherically curved.

5. Apparatus as in claim 3 wherein said complementary load bearing surfaces comprise a concave hemispherically curved seat on the end of said pin engaging with a ball received in the corresponding recess.

6. Apparatus as in claim 2 wherein the barrel shaped surface is curved in an axial plane, the radius of curvature being greater at the centre of the surface than at the ends thereof.

7. Apparatus for pivotally mounting a door, window or like closure in a frame, comprising at least a top hinge and a bottom hinge, each hinge comprising:

a. a first mounting plate adapted for mounting on said frame,

b. a second mounting plate adapted for mounting on said closure,

c. pivot means connecting said first and second plates for relative rotation about a predetermined axis; the pivot means of one of said hinges being defined by:

d. a first knuckle member on said first mounting plate and a second knuckle member on said second mounting plate,

e. a first pin projecting vertically from said first knuckle member,

f. means defining a barrel shaped surface on said pin having a maximum diameter substantially greater than said pin,

g. a cylindrical recess in said second knuckle member receiving said barrel shaped surface therein and forming a cylindrical lateral load bearing surface; the pivot means of the other of said hinges being defined by:

h. a third knuckle member on said first mounting plate and a fourth knuckle member on said second mounting plate,

i. a second pin projecting vertically from said fourth knuckle member,

j. a cylindrical recess in said third knuckle member receiving said pin therein,

k. means on said pin and in said recess defining complementary vertical load bearing surfaces,
l. all of said four knuckles being of substantially the same external dimensions, and
m. said second pin and said surface on said first pin each having a maximum diameter sufficiently smaller than the diameter of its respective recess to provide for relative angular displacement of each said pin within a predetermined range from a position coaxial with its respective recess.

8. Apparatus as in claim **1** wherein said projecting portion of said pin having said barrel-shaped surface is received in a recessed bushing received in said recess.

9. Apparatus as in claim **8** wherein the recess in said bushing is eccentrically disposed with relation to its outer surface.

10. Apparatus as in claim **2** wherein said barrel shaped bushing is eccentrically mounted on said pin.

11. Apparatus as in claim **1** wherein each of said parts includes a plate having holes therethrough for receiving mounting screws.

12. Apparatus as in claim **11** wherein said holes in at least one of said plates are transversely elongated to provide for adjustment of said plate relative to said closure or frame.

13. Apparatus as in claim **7** including means for effecting vertical adjustment of said load bearing surfaces.

14. Apparatus as in claim **13** wherein said vertical adjustment means comprises a screw threaded into one of said knuckles.

15. Apparatus as in claim **14** wherein said screw is provided with a concave seat defining one of said load bearing surfaces.

16. Apparatus as in claim **1** comprising at least one stud projecting from each said part at substantially right angles to the axis of the associated pivot means providing for mounting said parts on the closure or frame.

17. Apparatus as in claim **16** wherein each stud includes angularly disposed portions such that the longitudinal axis of a major portion of each of said studs lies substantially parallel to but spaced from a plane extending through the major maxis of the associated pivot means.

18. Apparatus as in claim **7** wherein each of said knuckles has a longitudinal substantially vertical axis of symmetry, and the axis of the associated pivot means is substantially parallel to but spaced from said longitudinal axis.

19. Apparatus for pivotally mounting a door, window or like closure to a frame, said apparatus comprising at least a top and a bottom hinge construction each comprising:

a. a first part adapted for mounting on said closure and connected by pivot means to a second part adapted for mounting on said frame,
b. said pivot means comprising means on one said part having a bore extending at least partway therethrough and pin means on the other said part at least partly received in said bore,
c. the pivot means of one of said hinge constructions further including means defining a vertical load bearing surface on said pin means and a complementary vertical load bearing surface in said bore,
d. the pivot means of the other of said constructions including means defining a lateral load bearing barrel shaped surface on said pin means received in said bore and engaging with complementary lateral load bearing means therein,
e. said pin means and said barrel shaped surface each having a maximum diameter sufficiently smaller than its respective bore to permit relative rotation thereof about a predetermined axis and relative angular displacement of one of said hinge parts with respect to said axis.

20. Apparatus as in claim **19,** wherein said barrel shaped surface is integrally formed with said pin.

21. Apparatus as in claim **19,** wherein the radius of curvature of said barrel shaped surface is greater than its maximum transverse diameter.

22. Apparatus as in claim **1,** wherein said complementary load bearing surfaces are defined by means on the end of said pin engaging with cooperating means on an end wall in said recess.

23. Apparatus as in claim **1** wherein said means defining the vertical load bearing surfaces comprise cone shaped pivot means on a projecting portion of said pin and complementary cone shaped pivot means in said recess.

24. Apparatus as defined in claim **20** wherein each said hinge part includes a mounting plate and a web connecting said plate with the associated said knuckle member and extending at an angle to said plate to offset said knuckle member from said plate.

25. Apparatus as defined in claim **24** wherein each said mounting plate is proportioned to lie on only one side of a plane normal to the inner end of the associated said knuckle member to provide for interleaving of said mounting plates.

26. Apparatus as defined in claim **25** wherein each said mounting plate has holes therethrough for receiving mounting screws, said holes being countersunk on both sides of said plate to promote mounting of said plate with either side adjacent the closure or frame.

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