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DOOR HINGE

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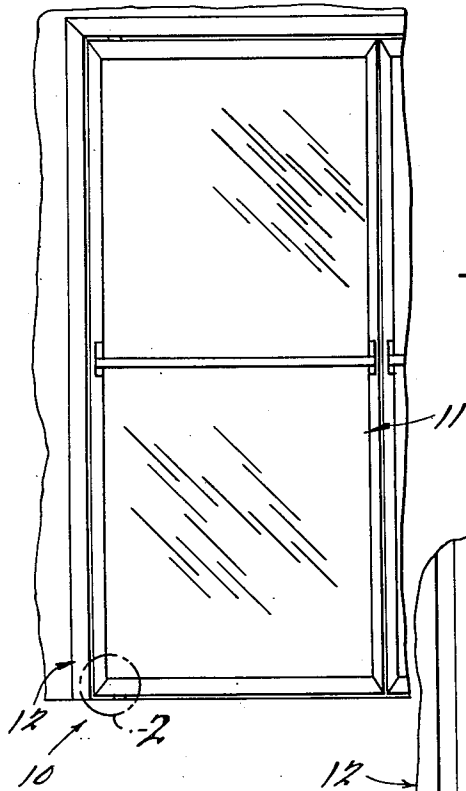


FIG. 1.

FIG. 2.

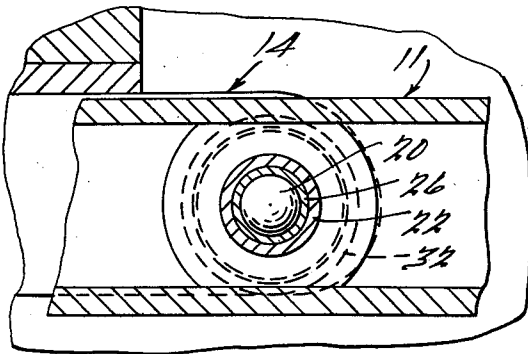
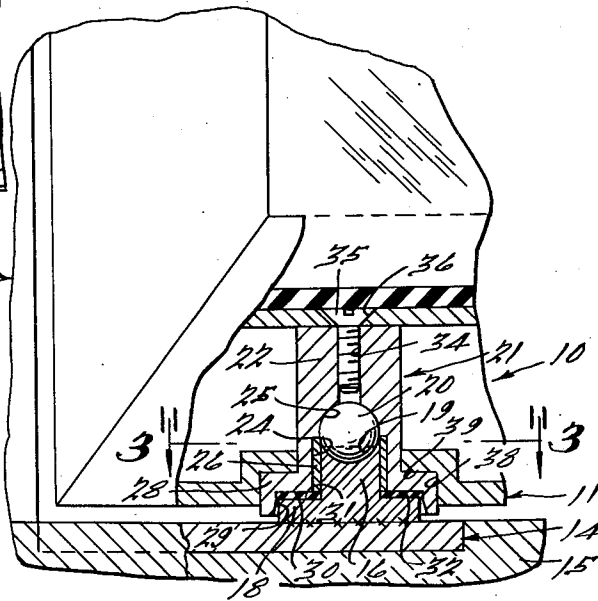


FIG. 3.

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DOOR HINGE

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1 Claim. (Cl. 16-151)

This invention relates generally to hinges, and more particularly to a heavy duty door hinge having a materially longer operating life than hinges heretofore known and used.

One factor that determines the operating life of a door hinge is the ability of the bearing surfaces of the hinge to withstand wear and abrasion. When the bearing surfaces of the hinge become worn or scored the door suspended thereby often sags or becomes difficult to open or close. Replacement of a worn hinge is often a relatively expensive matter due to the cost of a new hinge and in terms of the man-hours required to effect the change and, equally important, usually requires that the door be removed from its frame thus exposing the interior of the building to the outside elements.

Obviously, infiltration of foreign material into the hinge bearings will substantially accelerate the rate of wear of the bearings and to the degree that the hinge can be sealed against such dirt infiltration the operating life of the hinge will be extended.

Relatively heavy doors, for example double glazed glass doors, are often supported for rotation by a hinge placed under the door in order to transmit the weight of the door directly to the base of the door frame. Placement of the hinge under the door, in close proximity to pedestrian traffic and the inherent dirt accumulation associated therewith accentuates the requirement that the hinge be sealed against dirt infiltration. Hinges heretofore known and used are not satisfactorily protected against the infiltration of foreign material and, therefore, are subject to rapid wear of the bearing surfaces and to substantial frictional losses resulting in a relatively short operating life.

The hinge of the present invention presents a material advance in the hinge art in that it employs an improved bearing construction and an improved sealing arrangement that provides for the relatively complete sealing of the bearing surfaces of the hinge against dirt infiltration. In addition, the hinge of this invention provides for the easy replacement of the seal and bearing elements incorporated therein.

The principal object of the present invention is to provide a heavy duty door hinge that is extremely durable and is relatively well protected against the infiltration of foreign material.

Another object of the present invention is to provide a door hinge of the aforementioned type wherein the seal and bearing elements can easily be replaced.

Other objects and advantages of the present invention will be apparent from the following description wherein reference is made to the drawing in which:

FIGURE 1 is a side elevational view of a door supported on a door frame by a hinge of the present invention;

FIG. 2 is an enlarged fragmentary view, partly in section and partly in elevation, taken within the circular area "2" of FIG. 1; and

FIG. 3 is a cross-sectional view taken substantially along the line 3-3 of FIG. 2.

A hinge in accordance with one embodiment of the present invention comprises a base member having an upstanding bearing post secured thereto by any suitable means such as welding. The post has a hemispherical socket at its upper end for the support and retention of a ball bearing and a circular flange at its lower end for engagement with the base member. A cap member hav-

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ing a central bore overlies the post in telescoping or nesting relationship and has a complementary socket at the upper end of its bore for the acceptance of a ball. The cap member has a flange at the lower end thereof with a seal seat on its lower surface and a downwardly extending annular lip at its outer periphery that substantially encloses the flange on the post. The cap member is provided with an upstanding tubular seal in the form of a sleeve of bearing material that surrounds the post in slidable engagement. A sealing gasket is interposed between the flange on the cap member and the flange on the post, thereby substantially sealing the hinge against the infiltration of foreign material. The ball, sleeve and gasket are relatively easily removable to facilitate replacement thereof.

Referring to FIG. 1, a hinge 10 in accordance with the present invention is shown in operative association with a door 11 and door frame 12, although it will be obvious that the hinge 10 is well suited for other applications.

Referring to FIG. 2, the hinge 10 comprises a base member 14 preferably detachably secured to a door sill 15 of the door frame 12 as by screws (not shown). An upstanding bearing post 16 having a flange 18 on the lower end thereof, both of which are of circular cross section, is secured to the base member 14 by any suitable means such as, for example, by welding. The post 16 has a generally hemispherical socket 19 on the upper end thereof for acceptance of a load carrying ball 20.

A cap 21 comprising a housing 22 having a central bore 24 with a hemispherical bearing seat 25 at the end thereof is disposed in overlying coaxial relationship with the post 16. A tubular sleeve 26, preferably of bearing bronze, is removably inserted within the bore 24 with a press fit. The inside diameter of the sleeve 26 is sufficiently large to admit the ball 20. The sleeve 26 is slidably engageable with the post 16 on the base member 14 to restrict the passage of foreign material upwardly through the bore 24 between the post 16 and the inner surface of the sleeve 26. Upon excessive wear of the sleeve 26 the seal between the bore 24 and post 16 can easily be renewed by simply pulling the sleeve 26 outwardly of the bore 24 and inserting a new sleeve.

The cap member 21 is provided with a radially outwardly extending flange 28 having a downwardly extending annular lip 29 at the outer periphery thereof. A seal seat 30 on the lower surface of the flange 28 extends transversely of the bore 24 in generally parallel relation to a transverse seal support surface 31 on the flange 18 of the post 16. A sealing washer 32 is disposed around the post 16 and between the seal seat 30 and the seal support surface 31 to restrict passage of foreign material therebetween. The sealing washer 32 is preferably of resilient material such as fibre or nylon so as to be slightly compressible between the seat 30 on the flange 28 and the support surface 31 on the flange 18 to better seal the cap member 21 with respect to the post 16. It is to be noted that the load of the door 11 is carried substantially entirely by the ball 20 and post 16, the washer 32 being compressed only to effect a seal between the cap member 21 and the post 16. The annular lip 29 extends axially of the cap member 21 so as to substantially enclose the flange 18 of the post 16.

The cap member 21 has a threaded hole 34, axially aligned with the bore 24, for the acceptance of a machine screw 35 that extends through a suitably countersunk aperture 36 in the door frame 12 to rigidly secure the cap member 21 to the door frame 12. The cap member 21 preferably is disposed in a circular recess 38 in the door 11, having an end wall 39 for the engagement of the outer surface of the flange 28 on the cap member 21 in load transmitting relationship. The weight of the door 11 is thus transmitted to the cap member 21, then

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to the base member 14 through the ball 20 and post 16. The ball 20 rotates in the socket 19 about a vertical axis to provide for rotation of the door 11 with respect to the door frame 12.

Because the sleeve 26 and sealing washer 32 are interposed between the cap member 21 and post 16, the passage of foreign material into the bore 24 and onto the bearing surfaces 19 and 25 is virtually precluded.

The sleeve 26, sealing washer 32 and load carrying ball 20 are easily replaced by simply releasing the base member 14 from the sill 15 and swinging the door 11 outwardly from the door frame 12, about a horizontal axis, sufficiently to provide clearance for retraction of the post 16 from within the sleeve 26. Thereafter, the sleeve 26, washer 32 and ball 20 can easily be removed and replaced with new sealing and bearing elements.

What is claimed is:

A hinge comprising a circular post having a ball bearing socket at one end and a radially outwardly extending

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circular flange at the other end, a cap member having a circular bore for the acceptance of said post with a ball bearing socket at the end thereof, a ball in said bearing sockets in load transmitting relationship, said cap member having a circular flange extending transversely of the bore therein generally parallel and equidistant to the flange on said post with an axially extending lip on the outer periphery thereof extending toward and substantially enclosing the flange on said post, and a gasket between said flanges for restricting the infiltration of foreign material into said bore, the lip on the flange of said cap member enclosing and protecting the peripheral surfaces of said gasket.

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