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HINGE ARRANGEMENT FOR PIVOTAL CLOSURES

Filed Nov. 2, 1962

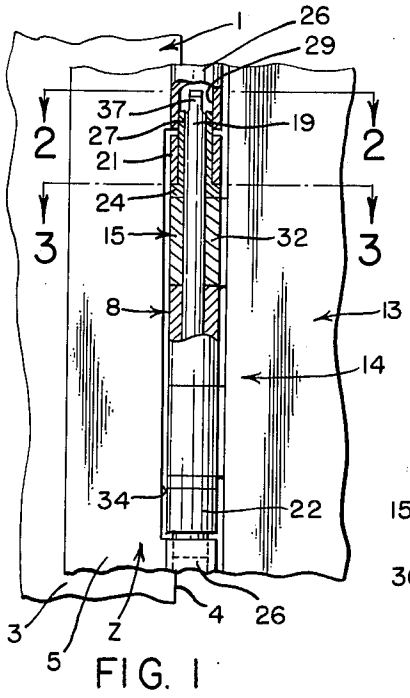
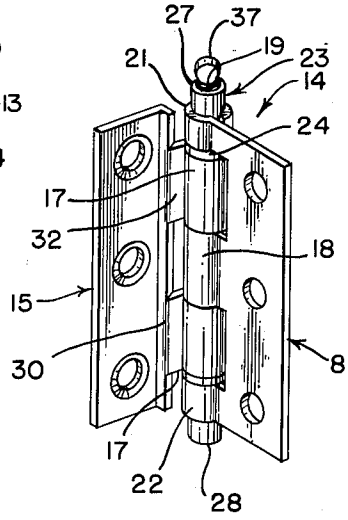


FIG. 1

FIG. 4



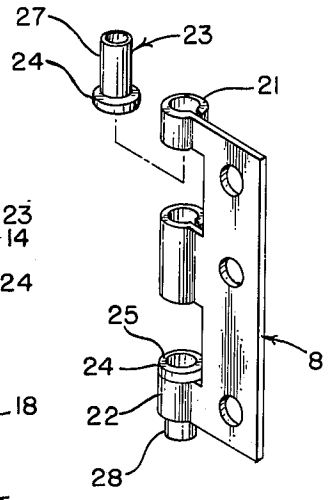


FIG. 5

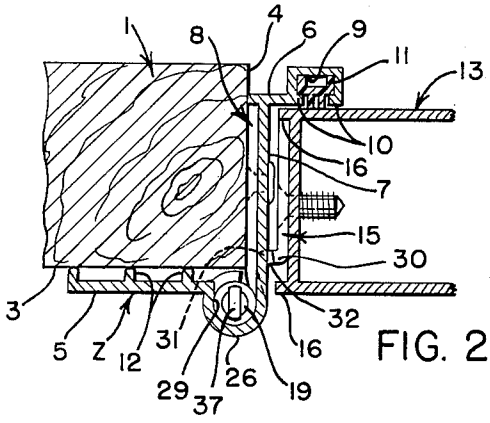


FIG. 2

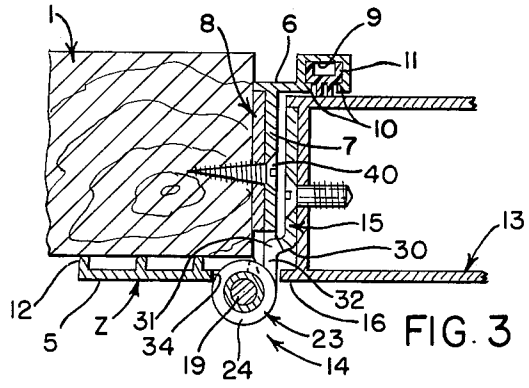
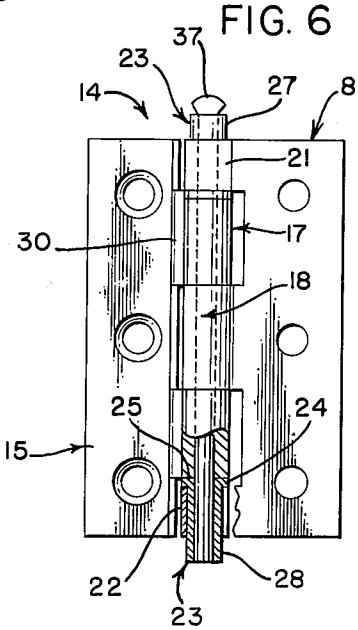


FIG. 3

FIG. 6



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HINGE ARRANGEMENT FOR PIVOTAL CLOSURES

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1 Claim. (Cl. 16—135)

In recent years light weight metal closures and frames have found wide acceptance in the building and remodeling industry. Frame and closure members, as such, being manufactured of metals which are costly, have been reduced in thickness so only a minimum amount of metal is required. The reduction in thickness gives rise to a less rigid connection at the hinge. Attempts at solving this problem have resulted in solutions of questionable nature.

One solution entailed the use of a piano or extended hinge which ran the length of the closure and frame. This was not completely satisfactory from the cost standpoint since it required additional material for the hinge, obviously more than if plural spaced hinges were used.

A more recent solution was the utilization of a pin which extended beyond the ends of the hinge, the extended ends being deformed by swedging or the like. The deformed ends were intended to approximate the size of the arcuate portion of the Z-frame member or bead, so that under severe loading conditions, part of the load would be distributed through the pin ends. Several disadvantages of such a solution present themselves when viewed in the light of the present invention. Firstly, such practice dictates that the hinge be fully assembled when manufactured, and secondly, the tolerance of the deformed pin end portions are more difficult to control than would be the case in a turned or similarly manufactured part. Obviously, if the deformed pin is oversized, a proper fit in the Z-member channel or bead cannot be had. If undersized, a substantial movement of the leaf carried by the frame member is required, before the extended deformed ends of the pin become loaded, thus subjecting the frame and fastening members to an unusual load initially with resultant weakening of the joint. Lastly, the pin does not contact the arcuate portion through the full 180° of the bead, thus the force is not spread over the maximum area.

The invention herein disclosed contemplates the use of a turned or cast part to cooperate with the arcuate portion or bead of the Z-frame so that the two parts are in close fitting engagement over approximately 180° at the time of installation. The turned or cast part serves the dual function of providing a bearing surface to the pin and also a load carrying member.

It is therefore an object of this invention to provide a hinge that will be economical and easy to manufacture, but strong enough to support the cantilevered weight of the closure over prolonged periods of rugged use.

It is a further object of this invention to provide a hinge with an extended bushing which cooperates with a Z-section frame, the assembled parts closely fitting the framing of the opening without additional trim or modification.

It is a further object of the invention to provide a novel reversible hinge construction which may be used on either right or left swinging closures, and can be easily and conveniently installed by labor of minimal skills.

Further novel features will become apparent when reference is made to the accompanying drawings wherein:

FIG. 1 is a fragmentary front view of a frame and side stile of a closure, with portions of the knuckle and pin assembly of the hinge in section;

FIG. 2 is an enlarged cross section taken along the line 2—2 of FIG. 1;

FIG. 3 is an enlarged cross section taken along the lines 3—3 of FIG. 1;

FIG. 4 is a perspective view of the hinge in the assembled position;

FIG. 5 is a fragmentary exploded perspective view of the three-knuckle leaf of the hinge, showing the upper bushing removed alongside the upper knuckle; and

FIG. 6 is a plan view of the hinge assembly with the lower portion cut away to illustrate the bushing, knuckle, and pin assembly.

With particular reference to FIGS. 1 and 2, the frame **1** has a Z bar of extruded aluminum or the like overlying the frame surfaces **3** and **4**. The legs of the Z are indicated by the reference characters **5** and **6**, the former having a plurality of ribs **12** extending from the planar portions into contact with the frame member **1**. This serves to enhance the contact between the legs **5** of the Z and the door frame to insure line contact for weathertight labyrinthian sealing with metal frames, and slight deformation of the frame member results when wood frames are utilized. Additionally, the ribs lend rigidity to the structure minimizinng the use of material. The leg **5** merges into a raised portion **26** which is curled to form a smooth arcuate seat **29** integral with the web **7**. As best seen in FIG. 1, an elongated rectangular slot **34** is cut in the raised portion **26** which allows the hinge to be inserted therethrough, the slot extending into the web **7** of the Z.

The legs **5** and **6** of the Z bar are connected by aforementioned web **7**. Interposed between the frame **1** and the web **7** is the three-knuckle leaf **8** of the hinge assembly. A suitable fastener **40** joins the web **7** and leaf **8** to the frame. The leg **6** of the Z bar has a recessed portion **9** extending along its length with ribs **10** extending towards each other across the recess **9**. A gasket **11** of rubber, plastic, or the like, is inserted in the recess **9**, and the ribs **10** serve to hold it in place under normal use while facilitating easy replacement in the event such becomes necessary.

A fragmentary portion of a closure stile **13** is illustrated with the two-knuckle leaf **15** of the hinge **14** juxtaposed and fastened to the stile **13** by a suitable fastener. In the disclosed embodiment, the stile **13** has two ribs **16** extending along its length to lend rigidity to the stile as well as providing a recess for the leaf **15**, said recess serving to trim the hinge. The leaf **15** extends across the stile into contact with the rib **16** to add support to the leaf of the hinge along its length. It is to be understood that the hinge is of general utility and can be used with a wide variety of closures differing from the disclosed embodiment.

With particular reference to FIGS. 2 and 3, it will be noted that the leaf of the two-knuckled portion of the hinge has a sharp bend **30** approximately a right angle and another bend **31** so that the portion of the leaf **32** which merges into the curled knuckle is approximately parellel to but slightly offset from the leaf portion. This permits the stile **13** to be manufactured with the ribs **16**, to insure rigidity of the stile, trim the hinge and yet requiring only a minimum of material. If the stile were to be planar, the bend **30** would be obviously omitted.

Referring to FIG. 4, the assembled hinge **14** is shown with the knuckles **17** and **18** interfitted. A pin **19** with an enlarged end portion **37** connects the knuckles for rotary engagement. The opposite end of the pin **19** may or may not be deformed, depending on the intended use.

The upper and lower knuckles **21** and **22** of the leaf **8** receive a bushing **23** lightly press fitted coaxial with the bore and extending beyond the knuckle. The knuckles **21** and **22** are reduced in thickness by drilling or coining

to allow for the bushing **23** to be lightly press fitted therein.

The bushing **23** is L-shaped in cross section, the base of the L formed by a circumferentially extending radial flange **24** which overlies the knuckles. The flange **24** provides a smooth and true wear surface **25** for the knuckles **17** to rotate with respect to the knuckles **21** and **22**. The preferred embodiment contemplates the use of material for the bushing, such as that sold under the trade name "Oilite," but any suitable plastic or metal may be used.

As best seen in FIGS. 1, 4 and 6, and mentioned above the bushing **23** extends beyond the upper and lower knuckles, as indicated by reference characters **27** and **28**. The outside diameter of the portions **27** and **28** closely approximates that of the inside diameter of the arcuate surface **29** of the Z bar. This serves to add support to the hinge assembly while not increasing the friction thereof, since the bushing is non-rotatably carried by the three-knuckle leaf **8** which, along the Z bar **2**, is attached to the frame. Moreover, the use of the bushing **23** presents a finished bearing surface for the pin which, because of its circular configuration, is machined with greater ease than would be the internal surface of the knuckle. An additional advantage of the separate bushing **23** is that the outside curvature thereof can easily be held to a close tolerance to facilitate a close fit with the curvature **29** of the Z bar, thereby the two being in mutual engagement upon installation. The attendant advantage of having such extension allows a greater load to be supported for a given thickness of metal of the Z bar or frame member. Accordingly, with the use of the novel hinge disclosed, the thickness of the metal can be reduced with the attendant saving in material, when due consideration is given to the thousands of such units that are manufactured daily.

It is readily apparent upon inspection that the above described hinge and associated Z frame are capable of use on either right or left handed closures since the hinge is symmetric as viewed transversely.

The above embodiments are intended only by way of illustration and it is to be understood that the same is capable of modification without departing from the scope of the appended claim.

I claim:

In a closure construction the combination with a frame member and a closure member, a hinge assembly comprising a shaped frame member overlying a first frame member, a first hinge leaf having a plurality of knuckles thereon, said first leaf being interposed between said first frame member and a second frame member, said second frame member having a leg portion merging into a raised arcuate seat portion and smoothly curving into a curved web, said raised portion having an elongated slot therein to facilitate insertion of the hinge assembly, said first hinge leaf having upper and lower knuckles, bushings inserted in said upper and lower knuckles, said bushings extending beyond the uppermost and lowermost extremities respectively of the knuckle portions into close fit with said arcuate seat portion, a second leaf portion attached to said closure member, and second knuckles attached to said second leaf portion, said upper and lower knuckles and said second knuckles being interfitted and joined by a pin having an enlarged head end and extending through said knuckles and bushings with its head end in engagement with the upper surface of said upper bushing for smooth pivotal movement.

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