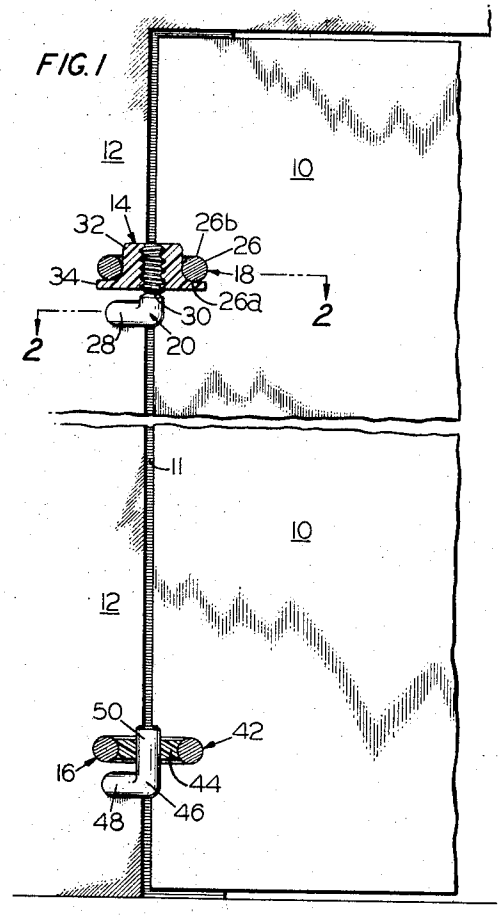
Oct. 31, 1967 C. R. SUSKA 3,349,428

HINGE

Filed Aug. 27, 1965

FIG. 1



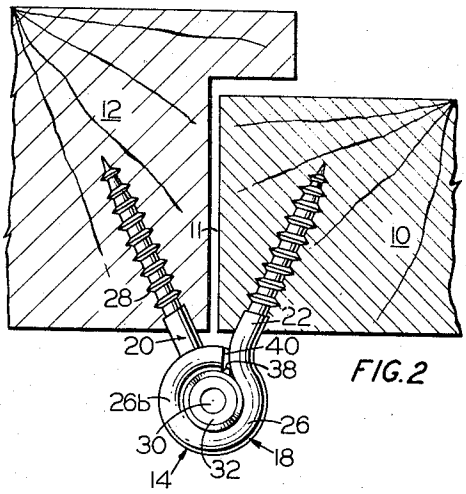


FIG. 2

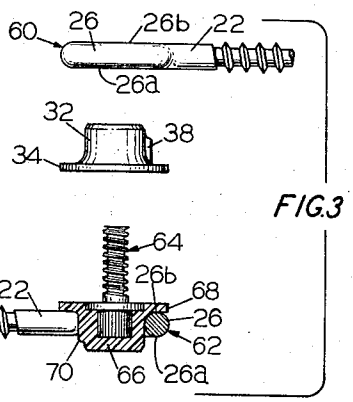


FIG. 3

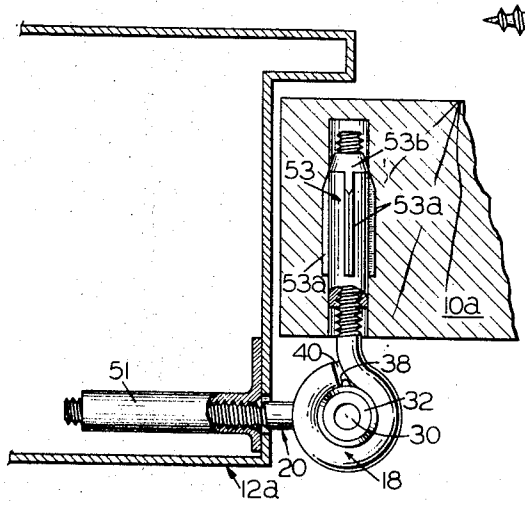


FIG. 4

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HINGE

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ABSTRACT OF THE DISCLOSURE

An improvement in hinges composed of a screw eye and a screw hook, the screw eye containing a low-friction insert having a load-bearing flange engaging one side of the screw eye and the insert and the laterally extending portion of the screw hook having threads therein and thereon providing thrust and radial bearing surfaces and enabling adjustment of the door or other elements supported thereon and providing for self-closing of the hinge, if desired, this hinge cooperating with another screw eye and screw hook hinge, the screw eye containing a low-friction insert and having a smooth central aperture cooperating with a smooth laterally extending portion of the screw hook to resist radial loads, only, on the hinge.

This invention relates to hinge mounted door constructions and the like, and particularly to improved, readily attached and adjustable hinges for facilitating the mounting and positioning of doors and the like in their frames.

Conventional hinges having leaves provided with a plurality of interfitting knuckles joined by a hinge pin or pintle have been used for many years for mounting doors in buildings, cabinets and the like. The butt type of hinge which is widely used requires the mortising of the door frame and the door to conceal the hinge leaves and enable a snug fit of the door in the door frame.

The face mounted hinges do not require mortising but must be located and aligned accurately to center the door in the door frame with proper clearance and hinge pin alignment.

In some types of doors, for example, prehung storm doors, piano-type hinges are used to support the door and maintain its alignment while the door frame is being mounted in a building opening. All of these hinges are satisfactory despite short-comings which have become more apparent as the technology of building has improved and changed. All of these hinges present difficulties for the home craftsman, particularly in their installation and proper alignment and this is especially true of the butt type hinge which requires accurately located and formed mortises for receiving the hinge leaves. Likewise, even in factory assembled doors and door frames, such hinges present problems of alignment and location. In particular, the manufacture and installation of the prior hinges has involved a great deal of labor and time which adds substantially to the cost of the door construction.

Another factor of importance in the hardware industry is the cost of transportation of such hinges, particularly in relation to the competitive sales prices of such hinges. All of the above-described hinges are heavy and bulky and consequently the cost of shipping from one part of the country where the hinges are manufactured to another part of the country for use are high, so that a manufacturer in one part of the country cannot compete with another manufacturer in or supplying another part of the country.

Others have attempted to provide hinges of satisfactory appearance and light weight by forming the hinges of thinner or lighter weight materials but the changes in material and less attractive appearance of the hinges has failed to offset the decreased shipping costs.

Simple hinges formed of inexpensive and readily available parts such as screw eyes have been used, for example, in folding furniture, gate hinges and the like, where appearance and accuracy of fit and positioning of parts are of no moment. However, these hinges have not been made as precision parts or made suitable in appearance for such uses as door hinges, cabinet hinges and the like where an attractive appearance and satisfactory operation are essential.

In accordance with the present invention, hinges are provided which are composed of readily available and inexpensive parts, such as, for example, screw eyes or screws and screw hooks togther with suitable inserts assembled in such relation that a strong, freely movable and precisely aligned and operating hinge assembly is obtained.

Hinges of the type embodying the present invention have many advantages over the prior art leaf type hinge in that ready and precise adjustment of pairs or multiple hinges is possible to bring them into accurate alignment and to locate a door accurately with respect to the door frame by screwing the screw eyes or screw eye and screw hook into the frame and door to greater or lesser extents. By use of a bearing insert having low friction properties, the hinges, according to the present invention, operate silently and easily without lubrication and provide longer trouble-free life under any and all normal service conditions. Moreover, hinges embodying the present invention can be readjusted easily even after installation to maintain proper door alignment if warpage of the door should occur or misalignment results from shifting of the building or other structure in which the hinges are used.

Moreover, the new hinges greatly facilitate the hanging of prehung doors by enabling the door to be packed with the frame and allowing the door to be unhinged readily from the frame to enable the frame to be attached in a building opening without the weight of the door thereon. Also, the new hinges are of such construction that when a door mounted with them is closed, it cannot be unhung or removed as is the case with doors having removable hinge pins or pintles.

Of great commercial significance is the fact that the new hinges are less bulky and much lighter in weight than leaf hinges of equivalent strength and hence can be shipped or transported from place to place and can be stored and handled much more economically. Also, the new hinges can be readily installed by the home craftsman with a minimum of tools and experience and without the problems involved in mortising, aligning and positioning the hinges and the like, which the ordinary home craftsman may be ill-equipped to solve.

In particular, some forms of the new hinges require only the predrilling of two holes which can be accomplished by means of a hand or electric drill and after installation of the hinges precise alignment of the hinge pins of spaced apart hinges and proper positioning of a door in a door opening can be accompjlished by screwing the hinge members into and out of the holes.

For a better understanding of the present invention, reference may be had to the accompanying drawing, in which:

FIGURE 1 is a partial front elevational view of a door installation embodying this invention;

FIGURE 2 is a sectional view taken along line 2—2 of FIGURE 1;

FIGURE 3 is an exploded view, partly in section, of a modified form of the hinge made according to this invention; and

FIGURE 4 is a sectional view similar to FIGURE 2 showing another modified form of the invention as applied to an inset door mounted to a metal frame.

Referring ot the drawings in which like numerals refer to like parts throughout the various figures, FIGURE 1 illustrates a door installation embodying this invention wherein the door **10** is mounted for relative swinging movement in a door frame **12** by a pair of hinges generally indicated by the numerals **14** and **16**.

The hinge **14** comprises a pair of hinge members such as a screw eye **18** and a screw hook **20**, each formed of round rod or wire and having a threaded shank. The shank is preferably of uniform diameter from one end substantially to the other and provided with a gimlet point. Such a construction can be adjusted axially without materially changing the strength of its threaded engagement within an aperture in the door **10**. The other end of the screw eye **18** forms an annular loop or eye **26** which is in horizontal alignment with the shank **22**.

As shown in FIGURE 2, screw hooks **20** is provided with a threaded shank **28** of round cross section. Shank **28** is of uniform diameter from one end substantially to the other and is provided with a gimlet point whereby it may be adjustably threaded within an aperture of the frame member formed by drilling with a suitable hand or electric drill and with the aid of a template.

As illustrated, the threaded shank **28** of the screw hook **20** projects horizontally from the doorway frame member **12** and has its outer end bent substantially at right angles to the plane occupied by the shank **28** to form a hinge pintle **30**. The pintle **30** is threaded to provide a helical bearing surface which operates in a manner hereinafter more fully described.

It is readily apparent from the foregoing that the screw eye **18** and the screw hook **20** can readily and inexpensively be fabricated from lengths of round rod or wire and the threads thereon can be formed in any convenient way, such as by thread rolling.

Seated within the loop or eye **26** of the screw eye **18** is an aperture internally threaded bearing member **32**. The internal threads of bearing member **32** are complementary to those of pintle **30** to provide a helical bearing surface which cooperates with the pintle **30** to transmit all loads therebetween. The bearing member **32** is molded or otherwise formed of a suitable long-wearing bearing material having the properties of low surface friction and the absence of cold flow under normal operation, such as nylon or Delrin. As shown, the threads providing the helical bearing surfaces for pintle **30** and member **32** constitute a plurality of turns of acme threads; it being understood that other thread forms could be utilized. The member **32**, as shown in FIGURE 1, is provided with a circumferential flange **34** which extends beneath the loop **26** of the screw eye **18** to transmit gravity loads therebetween, and the outer periphery of member **32** engages the inner periphery of the loop **26** to transmit radial loads therebetween.

Member **32** is nonrotatably and releasably secured in the loop **26** of the screw eye **18**. As shown in FIGURE 2, a radially extending protuberance or projection **38** formed on the member **32** is positioned in the gap **40** at the terminal portion of the loop **26** to prevent relative rotation.

While a pair of identical hinges **14** can be utilized in mounting the door **10**, it is also within the scope of this invention and as shown in FIGURE 1, to use a second hinge **16** which is effective only in carrying radial loads. As shown, the hinge **16** includes a screw eye **42** which is substantially the same as the screw eye **18** as shown in FIGURE 2 and is provided with an insert **44** comprising a suitable bearing material, such as nylon or Delrin.

The other hinge member **46** of the hinge **16** is similar to the screw hook **20** of hinge **14** and is provided with a shank **48**, which is preferably threaded and of round cross section with uniform diameter and with a gimlet point at its end, and an unthreaded pintle **50** bent at right angles to the shank **48**.

In mounting the door **10** in the frame **12**, the shank portions of each of the hinges **14** and **16** are installed in the desired positions on the door and door frame, respectively, as, for example, in holes which may be readily drilled or formed by the home craftsman or a manufacturer. With the hinge members of the hinges **14** and **16** so mounted and with the pintles **30** and **50** thereof in axial alignment, the member **32** is threaded onto the pintle **30** of the hinge **14** and the door lifted so that the apertures of the hinge members **18** and **42** are positioned concentric with the ends of the pintles, respectively. The lowering of the door so that the loop **26** of the screw eye **18** is positioned around the bearing member **32** and the apertured bearing insert **44** is positioned around the pintle **50** completes the mounting of the door.

If the door **10** is not coplanar with its frame **12**, this condition may be corrected by removing the door and rotating one or more of the hinge members of the hinges **14** and **16** until the desired relationship is obtained. Moreover, if the gap **11** between the door and the door frame is not uniform from one end to the other or suitably balanced with the corresponding gap between the swinging edge of the door and the frame, this may likewise be adjusted in a similar manner. With the use of cyclindrical shanks on the hinge members, these adjustments may be made without substantially affecting the capacity of the hinge to support the door.

With the door so adjusted, it may be opened and closed in the usual manner with the relatively rotatable mating helical bearing surfaces of the pintle **30** and the bearing member **32** serving to transmit the weight of the door from the screw eye **18** to the screw hook **20** with the hinge **16** stabilizing the position of the other end of the door.

If it is desired to raise or lower the door relative to the floor or the door frame **12**, this may be done by lifting the door sufficiently to remove projection **38** from gap **40** so that the bearing member **32** can be rotated one or more turns relative to pintle **30** and then lowering the door so that the projection **38** is repositioned in the gap **40**.

It is readily apparent that if a second hinge **14** were substituted for the hinge **16** and if the projection **38** is replaced on one of the bearing members by a plurality of peripheral serrations or it is nonrotatably secured in adjusted position by a friction fit, the distribution of the weight between the hinges could be adjusted by the relative rotation of the bearing members **32** of the two hinges.

Referring now particularly to FIGURE 3, there is shown a second embodiment of a hinge utilized in this invention wherein the hinge is formed of a pair of substantially identical screw eyes **60**, **62**. In this second embodiment, the upper screw eye **60** has an inserted bearing member **32** like the member **32** shown in FIGURE 1. In this second embodiment, however, the pintle **64** is a member separate from the screw eye **62** and, as shown, comprises an externally threaded stud formed of metal which is molded or otherwise fixed as an insert in a supporting cap member **66** which may be formed of any suitable material such as nylon or Delrin. The cap member **66** is nonrotatably secured relative to the screw eye **62** such as by means of a projection **70** which engages a gap in the loop portion of the screw eye **62**. The cap **66** is also provided with a radial annular flange **68** to support the cap on the screw eye **62**.

In the embodiment of FIGURE 4, the metal door frame **12***a* is provided with an internally threaded tubular mounting insert **51** which is secured to the frame in any suitable manner, such as welding, and the inset wooden door **10***a* is predrilled and an insert **53** formed of a suitable metal or plastic is driven into the predrilled hole so as to be concealed therein. Preferably, the insert **53** is provided with external axial ribs **53***a* to prevent rotation of the insert relative to the door **10***a*. The forward end of the insert may be tapered as shown at **53***b* so as to

center the insert and to facilitate driving it into the predrilled hole of the door **10***a*. If desired, the insert **53** may be secured to the door **10***a* by adhesives or other fastening devices.

Where inserts such as **51** and **53** are used in the practice of the invention, it is preferable to utilize machine screw threads on the shanks of the hinge members to provide a finer adjustability of the axial position of the hinge members due to the finer pitch of such threads, it being understood that the higher shear strength of the material forming the inserts will provide sufficient holding power to maintain the shank of the hinge member threadably engaged with the insert.

From the foregoing, it will be apparent that this invention provides for a door installation incorporating a hinge construction whereby the door may be adjusted in all directions after the hinge members are fixed to the door and door jamb respectively.

As will be apparent to persons skilled in the art, various modifications and adaptations of the structure above described will become readily apparent without departure from the spirit and scope of the invention. For example, hinge members **20** and **46** may be assembled with their respective shanks **28** and **48** positioned above the hinge members **18** and **42**, respectively, so that their pintle portions are directed downwardly through the apertures of hinge members **18** and **42** which are positioned as shown in FIGURE 1. Also, the entire hinge **14** may be inverted and the screw hook **20** be secured to the door **10** and the screw eye **18** secured to the door jamb **12**. Moreover, by proper selection of thread pitch and surface coefficient of friction, the hinges can cause the door to be self-opening or self-closing. Accordingly, the scope and the features of novelty which characterize the invention is defined in the appended claims.

I claim:

1. A hinge mounting a door member and the like for swinging movement, comprising a screw eye having a threaded shank and an annular eye, a low-friction bearing member fitting in said eye and having a load-bearing flange at one end thereof engaging one side of said eye,

said bearing member having a multiple turn threaded aperture therein substantially coaxial with said eye, and an L-shaped hinge member having a threaded shank and a multiple turn externally threaded pintle portion extending substantially perpendicular to the threaded shank of said L-shaped hinge member and threaded into the threaded aperture in said bearing member with said threaded shank opposing said one end of said bearing member.

2. A pair of hinges for mounting a door member and the like comprising a pair of screw eyes, a low-friction bearing member having a central bore fitting in each eye, one of said bearing members having an axial load-bearing flange at one end thereof engaging one side of one of said screw eyes. L-shaped hinge members corresponding to each screw eye and each L-shaped member having a threaded shank and a laterally extending pintle portion, said pintle portions of said L-shaped members engaging in said bores of said bearing members in corresponding screw eyes, the bore of said one of said bearing members having a multiple turn thread therein and the pintle portion engaging in said bore having a multiple turn thread thereon engaging the threads in said bore, and the bore of the other bearing member and the pintle portion of the other L-shaped member being devoid of threads.

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