June 27, 1961 J. S. PARSONS 2,989,772

HINGE ASSEMBLY

Filed Oct. 8, 1959

FIG. 1

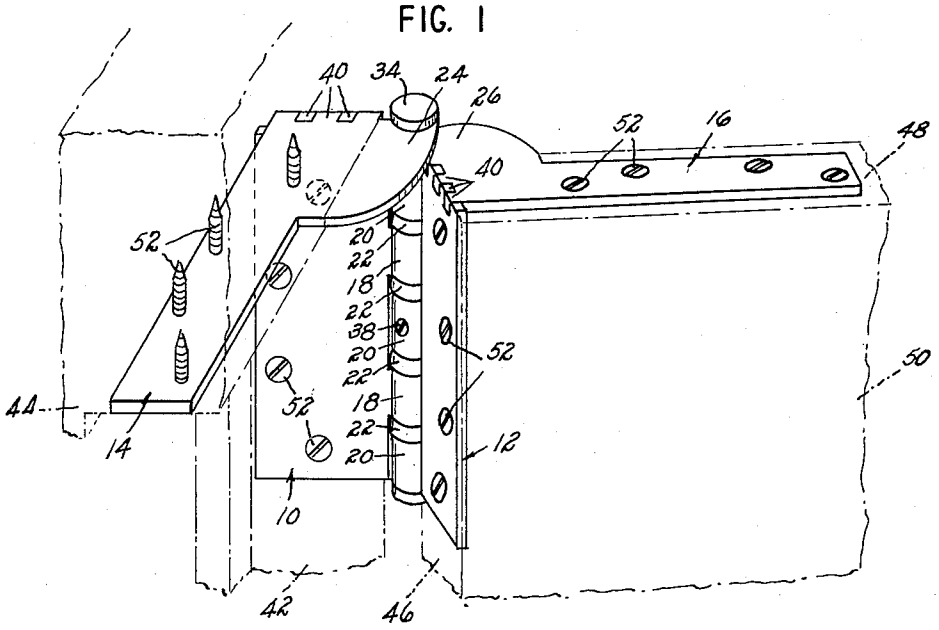


FIG. 2

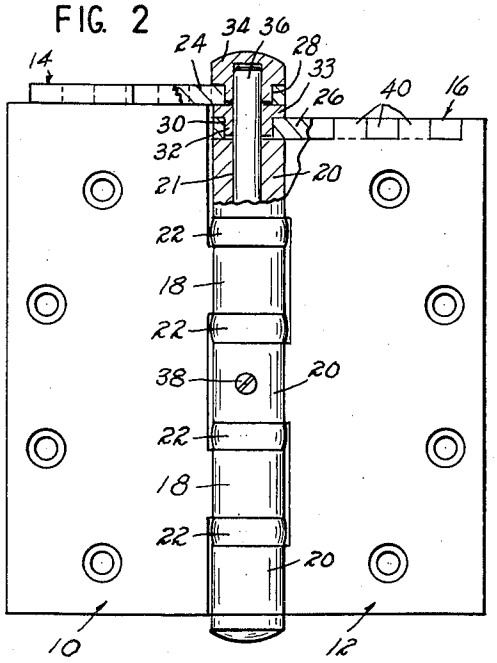


FIG. 3

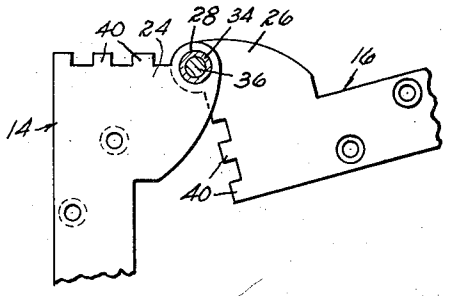
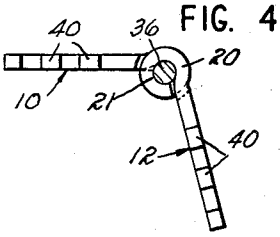


FIG. 4



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HINGE ASSEMBLY

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The present invention relates to hinges for pivotally mounting a door in a door frame and is concerned more particularly with an improved hinge assembly for mounting doors which are subjected to severe forces or stresses.

In many cases a pivotally mounted door will be subjected to extreme and even violent forces and strains which may occur in a direction parallel or transverse to the door or door frame or a combination of both. This may be the result of abuse, for example, or may result because the door is provided with a door closer or a door holder or a similar device which sets up severe stresses in the door during normal use. Under such circumstances, with conventionally mounted doors, it is not unusual for the door or jamb to split, or for the knuckles of the hinge to bend or unwrap, or for the hinge to become loose or detached from the door or jamb or both, thus necessitating frequent and costly repair or replacement.

An object of the invention is to provide an improved hinge assembly particularly adapted to be used for pivotally mounting doors which may be subjected to severe forces and which will overcome the disadvantages referred to so as to provide a long service life and avoid costly maintenance.

A further object of the invention is to provide such a hinge assembly which is easy and convenient to mount on the door and door frame with a minimum of instruction and which will permit the installer to hang the door using standard tools and techniques.

A further object of the invention is to provide such a hinge assembly which is of rugged design and yet simple and economical to fabricate and assemble so that it may be manufactured at reasonable cost.

Other objects will be in part obvious and in part pointed out more in detail hereinafter.

The invention accordingly consists in the features of construction, combination of elements and arrangement of parts which will be exemplified in the construction hereafter set forth and the scope of the application of which will be indicated in the appended claims.

In the drawings:

FIG. 1 is a perspective view of a hinge assembly embodying the invention as applied to a door and door frame which are shown in phantom;

FIG. 2 is a side view partially in cross section of the hinge assembly of FIG. 1 with the hinge assembly in open position;

FIG. 3 is a fragmentary top plan view of the head plates or leaves of the hinge assembly of FIG. 1 with the hinge pin and bushing in cross section; and

FIG. 4 is a top view of the butt hinge plates or leaves with the pin in cross section.

Referring in detail to the drawings, a novel hinge assembly embodying the invention comprises a pair of generally rectangular butt plates or leaves **10** and **12** and a pair of generally rectangular head plates or leaves **14** and **16**. The butt plates **10** and **12** are formed with interfitting knuckles **18** and **20** having aligned bores **21**, and in the preferred embodiment, the knuckles are spaced apart by ballbearing inserts **22** to minimize friction. The head plates **14** and **16** are formed at one end with projections **24** and **26** which, when the hinge is assembled, are disposed in overlapping relationship with their apertures **28**, **30** in alignment with the bores **21** of the knuckles

18, **20**. As best shown in FIG. 2 of the drawings, the aperture **30** of the lowermost head plate **16** is provided with a centrally apertured bushing **32** having a lip **33** which is positioned between the projections **24**, **26** and a headed bushing **34** disposed in the aperture **28** of the projection of the head plate **14**. There is only a single pintle **36** for the hinge assembly which is inserted upwardly through the bores of knuckles and extends into the bushings **32**, **34**. The pintle is retained in seated position by the set screw **38** in the center knuckle **20**.

The butt plates **10** and **12** and the head plates **14** and **16** are formed as separate and individual plates, but provision is made for lateral interlocking of the head plates with the butt plates when the hinge is assembled. In the embodiment shown in the drawings, the upper ends of the butt plates and the inner ends of the head plates are notched in a complementary manner to form interlocking teeth **40** which provide lateral shoulders preventing lateral movement of the head plates and the butt plates relative to each other but will permit adjustment longitudinally of the butt plates.

As shown in FIG. 1 of the drawings, the butt plate **10** and head plate **14** are adapted to be secured to the jamb and lintel respectively of a door frame, the jamb being denoted in phantom at **42** and the lintel being denoted in phantom at **44**. The butt plate **12** and head plate **16** are secured to the side edge **46** and top edge **48** respectively of a door **50** also shown in phantom in the drawings. The butt plates are dimensioned so that the upper edge of the butt plate **10** extends upwardly beyond the upper edge of the butt plate **12** in order to allow for the normal clearance between the upper edge of the door and the lintel. The head plates are dimensioned so that the notched end of the head plate **14** extends laterally beyond the notched end of head plate **16** in order to allow for normal clearance between the edge of door **46** and side jamb **42** when the door is closed.

In order to mount the hinge assembly on the door and door frame, it is preferable to mortise the corners of the frame and door as illustrated in FIG. 1 of the drawings using conventional techniques. Inasmuch as the butt plates and head plates are individual parts, no extra clearance is required to permit the installer to seat the plates in the mortises provided. Each plate is set in place individually and is secured by means of fastening screws **52**, the butt plates and head plates being interlocked by the teeth **40** which interfit when the plates are properly butted together at the corners of the door and door frame. Although the butt plates and head plates are individual parts, nonetheless when they are installed, the interlocking teeth **40** insure that the butt plates and head plates cannot shift laterally. Adjustment longitudinally of the butt plates is permitted, however, which is particularly important when the hinge assembly is used with metal doors and frames to permit the installer to accommodate for slight inaccuracies in hole alignment due to manufacturing tolerances.

After the head plates and butt plates are secured to the door and jamb, the door may be hung in the usual manner by moving the door in a lateral direction to intermesh the knuckles **18**, **20** following which the pintle **36** is inserted and secured in place by the set screw **38**. Since a single pintle is used, it is assured that the pivot of the head plates and butt plates will be in alignment. While only a single hinge assembly mounted at the top corner of the door has been illustrated, it will be appreciated that a similar hinge assembly may also be used at the bottom of the door, or conventional butt hinges may be used at the bottom and also at the center of the door if desired. While optimum strength and operating characteristics are obtained by using the full hinge assembly as illustrated, it is possible to omit one of the head plates **14**, **16** if this

is found to be necessary or desirable in a particular installation.

The improved hinge assembly of the present invention successfully overcomes the disadvantages of conventional hinges when applied to doors which are subjected to severe or unusual forces. Although the butt plates and head plates are formed of individual pieces, nonetheless when the hinge is assembled, they are securely interlocked to prevent lateral displacement. As a result, any force applied transversely of the plane of the door or door frame which would tend to cause splitting of these members will be shared by all of the fastening screws **52** and will thus be sufficiently distributed to avoid this kind of damage, particularly since the screw holes in the head plates can be located well back from the corner or edge of the door and lintel. If the force applied to the door is parallel to the plane of the door in a lateral direction, this force will be absorbed by the head plates **14** and **16** and will be applied to the fastening screws thereof in shear, thus avoiding loosening or detachment of the butt plates or bending or unwrapping of the hinge knuckles. On the other hand, if the force or component thereof is parallel to the plane of the door in a vertical direction, this will be absorbed by the butt plates and their interlocking knuckles and the load on the fastening screws thereof will be in shear. The use of a common pintle for pivotally connecting together all of the hinge plates assures proper assembly of the parts in alignment and also prevents shifting of the parts except as a unit.

For simplicity of presentation, the door illustrated in phantom in the drawings has been provided with an edge or stile **46** which is at right angles to the front face of the door. It will be understood that in the event the hinge assembly of the present invention is to be used with a door edge or stile which is beveled or cut at an angle to the face of the door, then, of course, the interlocking edge portions of head plate **16** and butt plate will be cut or milled at a corresponding angle.

Inasmuch as the butt plates and head plates are formed as individual parts, manufacture is facilitated and is economical. Finishing operations such as polishing and buffing are more readily accomplished and the hinge in disassembled form is convenient to package compactly for storage or shipping. Furthermore, mounting of the hinge assembly is rendered easier and more convenient and at the same time, improper assembly or misalignment of the parts during installation is effectively avoided.

Variations and modifications within the skill of the art are intended to be included within the scope of the invention.

I claim:

1. A hinge assembly comprising a pair of butt plates having interfitting integral knuckles along one side thereof provided with aligned bores, the adjacent edges at one end of the butt plates being spaced apart in a direction axially of the bores, a pair of separable head plates extending from the said edges of the butt plates in a plane normal thereto and having projecting portions overlying the knuckles with apertures therein aligned with the bores of the knuckles, means laterally interlocking the head plates and butt plates, and a common pintle seated in the apertures of the head plates and the bores of the knuckles.

2. A hinge assembly comprising a pair of butt plates having interfitting integral knuckles along one side thereof provided with aligned bores, the adjacent edges at one end of the butt plates being spaced apart in a direction axially of the bores, a pair of separable head plates, each extending from the said one end of one of the butt plates in a plane normal thereto, the ends of the head plates and butt plates being complementarily notched to form laterally interlocking teeth, projecting portions at the side of the head plates overlying the knuckles and having apertures aligned with the bores of the knuckles, and a common removable pintle seated in the said apertures and the bores of the knuckles.

3. A hinge assembly comprising a pair of butt plates having interfitting integral knuckles along one side thereof provided with aligned bores, and at least one separable head plate having its end engaging the end of one of the butt plates and extending in a plane at right angles to the butt plate, said head plate and said one of the butt plates having means forming a lateral interlock therebetween, said head plate having a projecting portion overlying the knuckles and having an aperture aligned with the bores of the knuckles, and a common pintle seated in the aperture and the bores of the knuckles.

4. In combination with a door and door frame, a pair of butt plates mounted on the vertical surfaces of the door edge and jamb of the door frame having interfitting integral knuckles along one side thereof provided with aligned bores, a pair of head plates mounted on the top edge of the door and the lintel, said head plates and butt plates having notched ends laterally interengaging at the corners of the door and door frame, said head plates having projections at the sides thereof overlying the knuckles provided with apertures aligned with the bores of the knuckles, and a common pintle seated in the said apertures and the bores of the knuckles.

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