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DOOR HINGE AND ASSEMBLY THEREFOR

Filed Aug. 18, 1966

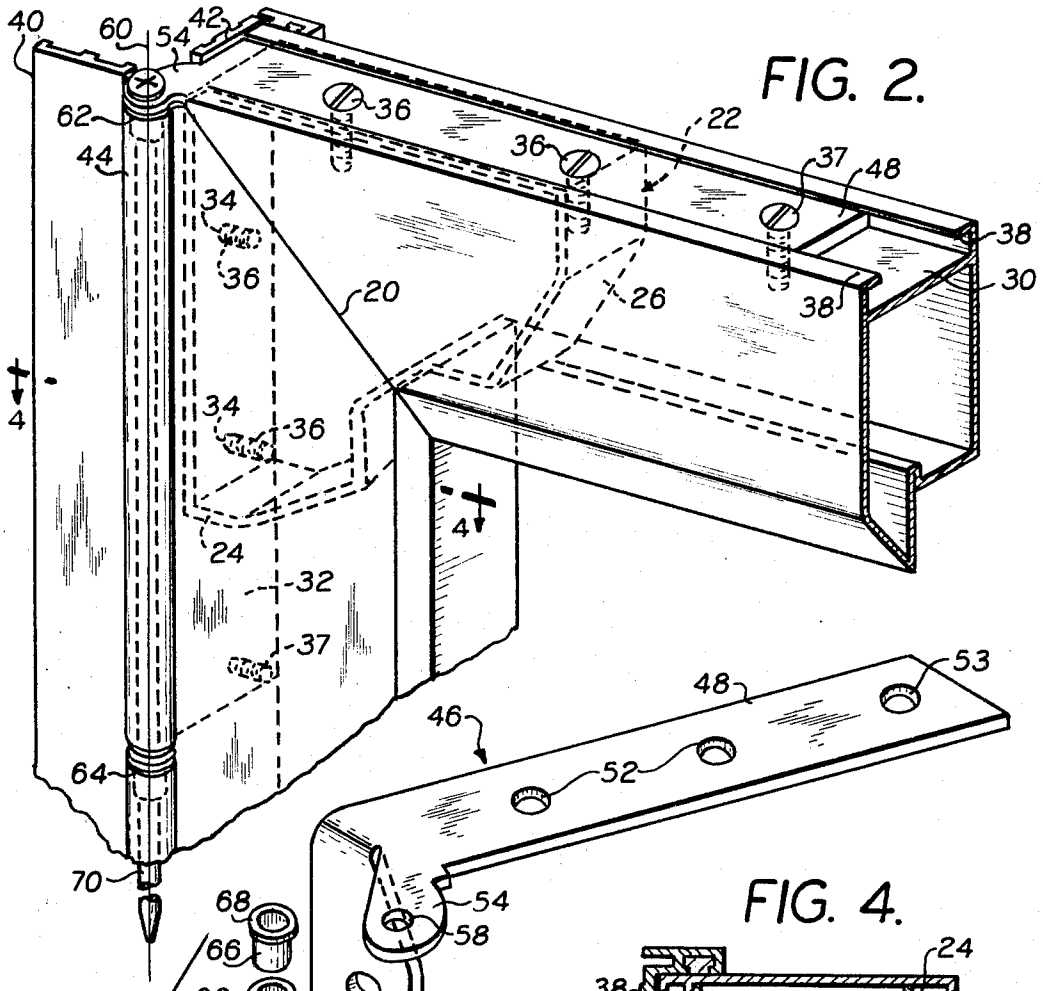


FIG. 2.

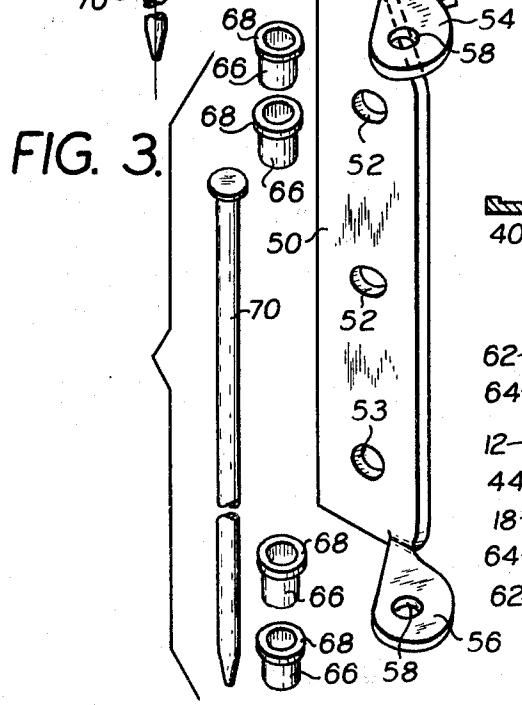


FIG. 3.

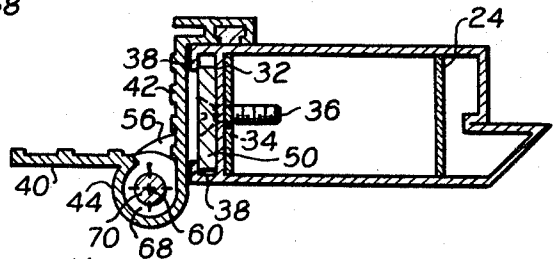


FIG. 4.

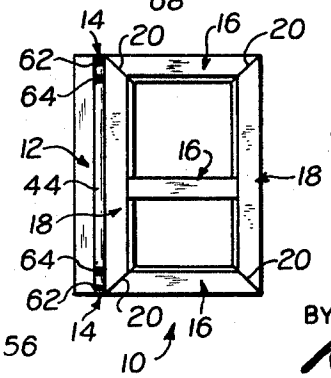


FIG. 1

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DOOR HINGE AND ASSEMBLY THEREFOR

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ABSTRACT OF THE DISCLOSURE

A door hinge and hinge assembly having unitarily formed vertically and horizontally extending hinge arms with means extending from the door hinge for engagement by a hinge pin to secure the hinge in assembly between the door and the door buck.

This invention relates to a door construction and, more particularly, to a door hinge and hinge assembly therefor.

One of the problems most frequently encountered in the hinge mountings of doors is the tendency of the door to sag after a period of use so that it no longer closes the door opening evenly and scrapes along the threshold of the door becoming increasingly difficult to close and open because it is no longer properly in alignment with the door frame and rubs against parts thereof. Such door sagging is, of course, a direct result of yielding at the hinges with consequent shifting of the door in its door frame. Although many attempts have been made over the years to provide door hinge assemblies which will reliably prevent sagging of a door, this problem has not yet been satisfactorily solved. The sagging of doors is encountered with relatively high frequency in the case of relatively heavy doors such as metal doors which, even if they are made of aluminum nevertheless are quite heavy and put a considerable strain on the hinges resulting in sagging of the doors with the disadvantages referred to above.

Accordingly, the desideratum of the invention is to provide a door hinge and assembly therefor that obviates the possibility of sagging by proper distribution of the forces that are applied to the door.

A further object of the invention is to provide a hinge member that is adaptable for use with doors in general and with storm doors in particular and which, when utilized with such doors, enables the retention of sufficient metallic surface on the buck of the door as to enable it to overcome the stressing forces normally applied to the door.

Yet another object of the present invention is to provide a hinge assembly which, while rugged and reliable in operation, is of relatively small inexpensive unitary construction so that the hinge assembly of the invention is of low cost and easy to manufacture.

It is also an object of the present invention to provide a hinge assembly capable of being assembled together with a metal door buck in a quick simple manner requiring very low labor costs while at the same time necessitating removal of only a small part of the door buck so that the strength of the latter is retained while the assembly costs are reduced to a minimum.

The invention is illustrated by way of example in the accompanying drawings which form part of this application and in which:

FIG. 1 schematically illustrates a door together with a door buck and hinge assemblies of the invention;

FIG. 2 is a fragmentary perspective illustration showing the details of the structure of the invention at an upper inside corner section of the door;

FIG. 3 is an exploded perspective illustration of the components of the hinge assembly of the invention and

FIG. 4 is a transverse sectional plan view taken along lines 4—4 of FIG. 2 in the direction of the arrows.

Referring now to FIG. 1 of the drawing there is disclosed a door generally identified by the numeral **10**. The door **10** is connected to a buck generally identified by the numeral **12** by upper and lower hinge assemblies generally identified by the numeral **14**. The door **10** may be constructed in the usual manner whereby its outline is framed by horizontally disposed but longitudinally spaced members generally identified by the numeral **16** which are conveniently extruded to the shape as shown in FIGS. 2 and 4. The horizontal frame members **16** are connected with vertically disposed framing members generally identified by the numeral **18** and which are conveniently extruded to have the same shape as the members **16**.

The ends of the extruded members **16** and **18** are mitered at **20** to abut each other and form a corner of the door **10**. The mitered ends are secured together in any convenient manner, however, as is the practice in the manufacture of aluminum doors a mullion generally identified by the numeral **22** is placed in each mitered end of the corner forming members. The mullion or corner gusset **22** is substantially L-shaped as seen in FIG. 2 with its vertical leg **24** extending down into the ends of the frame extrusion **18** and its horizontal leg **26** extending into the mitered end of frame **16**. When the mitered ends of the members **16** and **18** abut each other at the mitered joint **20** they are held in this position by the mullion **22**.

To assure relative securement of the framing members **16** and **18** the outer facing wall **30** and **32** of these members respectively are provided with holes (not shown) that align with similar holes **34** in the legs of the mullion **22**. Self-tapping screws **36** are then inserted into the holes of both the frame member walls **30** and **32** and the holes **34** of the mullion legs to secure the same together. This manner of securement is quite common and is described herein to form a basis for understanding the invention. As is also the practice, the framing members **16** and **18** are extruded with T-shaped tracks adjacent their respective outer facing walls **30** and **32** and which tracks extend outward beyond each wall. These tracks are illustrated more clearly in FIGS. 2 and 4 and are defined by the inwardly turned legs **38**.

In the usual support of a door **10** to a door frame it is the practice to hingedly mount the door to a buck **12**. The buck **12** is conveniently extruded with a front flange **40** and a side flange **42** which are unitarily connected together by a channel **44** that is arcaute in cross-section. The channel **44** forms an incomplete circle and has approximately a ¾ length arc as can be seen in FIG. 4. The buck **12** is adapted to be securely fastened to the walls of the opening in which the door **10** is to swing. This is done along the length of the front and side flanges **40** and **42**.

In the usual practice in the past, hinges (not shown) were used to connect the door **10** to the buck **12**. These hinges were of substantial length. Hence, to accommodate them in the buck **12** it was necessary to move or cut out large sections of the length of the channel **44** at different portions spaced therealong. When this was done in the past, the channel **44**, that connected the flanges **40** and **42** together became weakened, and would easily twist out of its original shape when subjected to stresses and forces resulting from the operation of the door. The present invention eliminates this problem because it obviates the need to remove the large sections from the channel, no less the large saving in time, labor and equipment that was necessary to remove such large sections.

It will be seen that the novel hinge assembly **14** previously referred to in FIG. 1 is disclosed in greater de-

tail in FIG. 3. Both assemblies 14 of FIG. 1 being identical in structure will easily be understood by a description of one of the assemblies. The assembly 14 comprises a substantially L-shaped angle hinge member generally identified by the numeral 46 that has a pair of perpendicularly disposed arms 48 and 50 which are integrally connected and unitarily formed at their point of jointure or intersection. Thus, the arms 48 and 50 form a single unitary bar that is flat and rectangular in cross-section.

The member 46 is of rigid material and is provided with a set of preformed openings 52 on each arm. Each arm 48 and 50 have additional openings 53 that can be used, if desired, as will be described. Also formed integral and unitarily with the vertical arm 50 are a plurality of ears 54 and 56 that are relatively spaced along the length of the arm 50. The ear 54 defines an extension of the arm 48 and is situated in the same plane while the lower ear 56 extends perpendicularly from the arm 50 at the lower end thereof. Ears 54 and 56 are parallel to each other and each has coaxially aligned openings 58 that are adapted to receive a bushing and hinge pin therethrough.

In the practice of the present invention as compared to that of the past, the hinge member 46 will form a hinge and non-sag support between the door 10 and its buck 12. The horizontal arm 48 of the hinge member 46 is placed within the confines of the T-shaped track 38 of the member 16 and the screws 36 are inserted through the holes 52 for securing engagement with the leg 26 of the mullion 22. If desired, a further screw 37 may be inserted through the extra hole 53 to add further securement to the wall 30. When the arm 40 is thus secured the vertical arm 50 will automatically be positioned for similar securement to the wall 32 of the frame extrusion 18 and leg 24 of mullion 22 by the screws 36 and 37.

Because the ears 54 and 56 extend laterally and perpendicularly from the arm 50 they must be accommodated within the channel 44 of the buck 12 since the longitudinal swinging axis of the door passes through the center of the arcuate channel 44 as shown at 60. To provide for the accommodation of the upper ear 54 the channel 44 is recessed at its uppermost end at 62. To accommodate the lower ear 56, the channel 44 is again slotted but intermediate its ends as at 64. Clearly, the reverse recess 62 and slot 64 will be formed in the channel 44 at its lower end as shown in FIG. 1 to accommodate the lower hinge assembly 14 therein.

The opening 58 in each ear is of such diameter as to receive therein the shanks 66 of an upper hollow bushing which has an enlarged head 68. Two bushings or bearings are used with each ear. Thus, with the upper ear 54 the shanks 66 of the upper one of the bushings is inserted down into the opening 58 as deep as its head 68 will allow. The adjacent lower bushing has the upper surface of its head in bearing engagement with the adjacent under surface of the ear. This same arrangement is made with a pair of bushings shown in FIG. 3 positioned adjacent the ear 56.

Now it can be seen that with the bushings positioned adjacent the ears 54 and 56 the recess 62 and slot 64 must be of sufficient length formed along the channel 44 as to closely accept and receive the same therein. In practice the shank of the lower bushing adjacent each ear is inserted into the arcuate interior of the channel 44 through the recess or slot so that its head provides a bearing seat on which its ear will seat. The shank 66 of the upper bushing that fits into the ear opening 58 is equal to or less in height than the height of the ear. Therefore, the ear with its bushing is easily slid into position in its respective recess 62 or slot 64.

In practice, the extent of the recess or slot is only in the order of ¼ to ⅜ inch in height as compared to the height of between 2 to 3 inches previously required to be removed from the channel 44 to accommodate hinges of the prior art. It can be realized now how quickly and easily the recess 62 and slot 64 can be formed with a single cut of a saw blade and without weakening the strength of the channel or its buck 12. When the ears and bushings are positioned in the channel a single hinge pin 70 is inserted through the coaxially aligned bushings in the ears 54 and 56 to enable them to function as spaced hinges.

During the swinging operation of the door 10 about the axis 60 it is supported at its very top by the arm 48 that is strapped to its topmost frame member 18. The ear 54 forming an extension of the arm 48, and being bearingly supported at 66 in the channel 44 of the buck 12, and held therein by the hinge pin 70, takes up and absorbs all downward sagging forces that may be applied to the door 10. The second, lower spaced ear 56, being similarly locked into the channel 44 absorbs all forces acting on the door that would normally tend to force the door inward toward the buck 12.

The relative location of the ears 54 and 56 and their securement to the topmost and bottommost frame members 16 provide for a unique support for forces that may be applied to the door 10. For example, a downward force applied to the door 10 produces a turning movement directed away from the channel 44, about the ear 54, and which is resisted by the ear and its connection with the channel. At the same time, the same force produces a turning movement about the other ear 56 that is directed back inward toward the channel, about the ear 56 and which is resisted by the ear and its connection with the channel. From the above it will be clear to those skilled in the art that any deleterious upward or downward force exerted on the door 10 will act on the ears 54 and will produce a simultaneous equal and opposite force on the ears 56. Because of this unique arrangement of hinge assemblies 14 and their attendant structures the door 10 will remain properly supported.

While there have been shown and described and pointed out the fundamental features of the invention as applied to a preferred embodiment thereof, it will be understood that various omissions and substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled in the art, without departing from the spirit of the invention. It is the intention, therefore, to be limited only as indicated by the scope of the claims appended hereto.

What is claimed is:

1. In a hinge member for use in a door hinge assembly which is adapted to form at least part of a hinge mounting for a door which has upper and lower horizontal edges and an inner side edge and which is adapted to be mounted for turning movement about an axis of a door buck that is parallel and adjacent to its inner side edge,

said member being substantially L-shaped and having a pair of substantially perpendicular arms one of which is adapted to extend along one of said horizontal door edges and to be fixed to the door at said one horizontal edge thereof and the other of which is adapted to extend along the inner side edge of the door and to be fixed to the door at said inner side edge thereof parallel to the axis of turning movement of the door,

a pair of ears, one of which projects laterally as a horizontal extension and as a unitary continuation and horizontal extension of and beyond the horizontal one of said arms of said L-shaped member and the other ear extends horizontally from the arm which is adapted to extend along the inner side edge of the door,

said ears each being flat and formed with coaxially aligned openings aligned with the axis of a door buck to receive a hinge pin simultaneously there-

through and whose centers are situated in the turning axis of the door,

said arms and ears being unitary with each other.

2. In a door assembly,

an elongated one-piece extrusion forming a door buck and adapted to be fixed to an upright door frame at the exterior thereof,

said extrusion having a front flange and a side flange which is substantially perpendicular to said front flange and said extrusion having an elongated channel extending between and integrally joined to said flanges thereof,

said elongated channel of said extrusion extending around an axis situated within said channel and forming the axis about which a door is adapted to swing during opening and closing thereof,

said channel being formed with at least one notch passing therethrough spaced from but adjacent an end of said channel,

a door hinge member having a pair of flat arms forming a substantially L-shaped configuration having a pair of flat ears one of which ears is located adjacent said end of said channel and the other of which ears extends into said notch of said channel spaced from the adjacent end of said channel,

said hinge member arms being fixed with said ears and one of which arms extends along said side flange of said extrusion and the other of which arms extends perpendicularly from an end of said one arm and from said side flange,

said arms being adapted to be fixed to a door at a corner thereof,

said ears bing respectively formed with openings situated in said channel and through which said channel axis passes,

a hinge pin extending along said channel and through said openings of said ears and having an axis coinciding with the axis of said channel and the swinging axis of the door,

and bushing means situated in said channel and surrounding and engaging said hinge pin to form bearings therefor,

said bushing means respectively having ends engaging said ears and also having at said ends, respectively, flanges which engage said channel of said extrusion at said end and said notch thereof,

so that the part of said channel of said extrusion which extends between said end and said notch thereof forms an outer hinge member which receives said hinge pin and which is pivotally connected with said ears of said L-shaped hinge member which is adapted to be fixed directly to a door.

3. The combination of claim 2 and wherein said assembly further includes a pair of bearing rings respectively situated at and engaging those surfaces of said ears which are directed away from said bushings,

said bearing rings also surrounding and participating in the support of said hinge pin,

one of said rings being situated in said notch and the other of said rings being situated in the region of said end of said channel,

each of said ears being sandwiched between a bushing and a bearing ring.

4. The combination of claim 3 and wherein said hinge pin has at one end a head engaging that one of said bearing rings which is situated at said end of said channel,

the end of said pin distant from its head being tapered.

References Cited

UNITED STATES PATENTS

2,853,747	9/1958	Anderson	49—399
2,989,772	6/1961	Parsons	16—135 XR
3,075,255	1/1963	Taubman	49—411

KENNETH DOWNEY, *Primary Examiner.*