Sept. 15, 1959 M. SCHNEIDER 2,903,735

DOOR HINGE STRUCTURE

Filed June 19, 1957 2 Sheets-Sheet 1

Fig. 1.

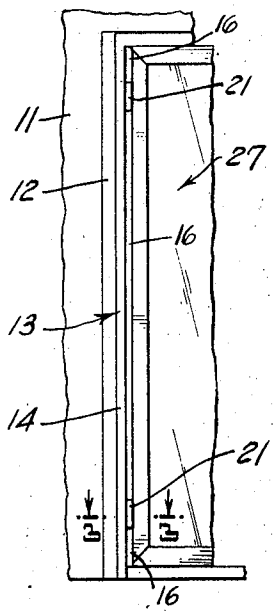


Fig. 2.

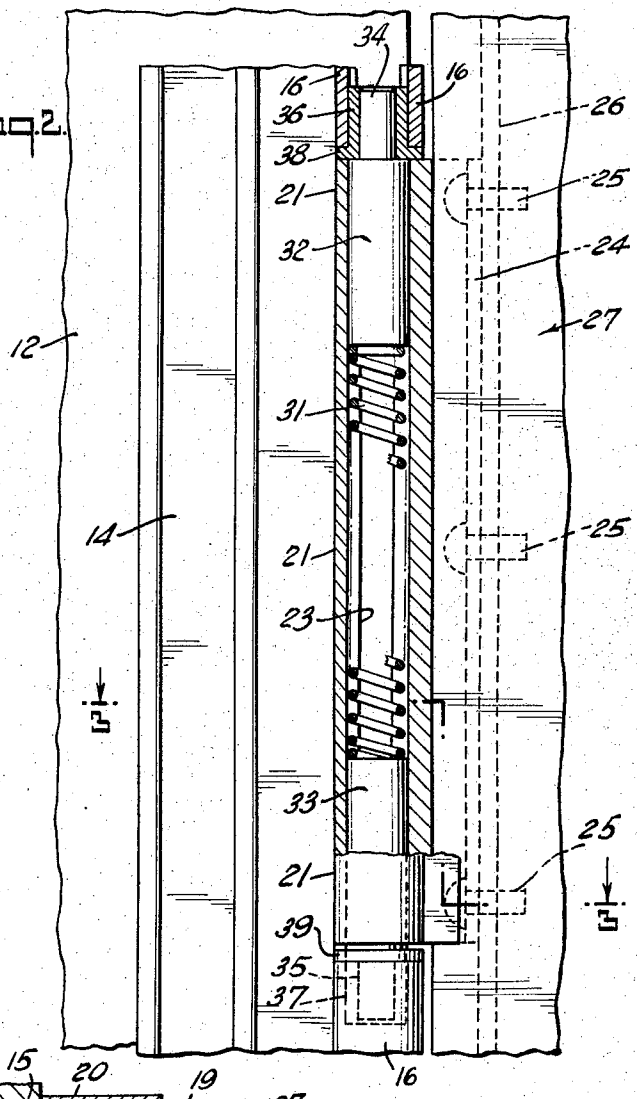
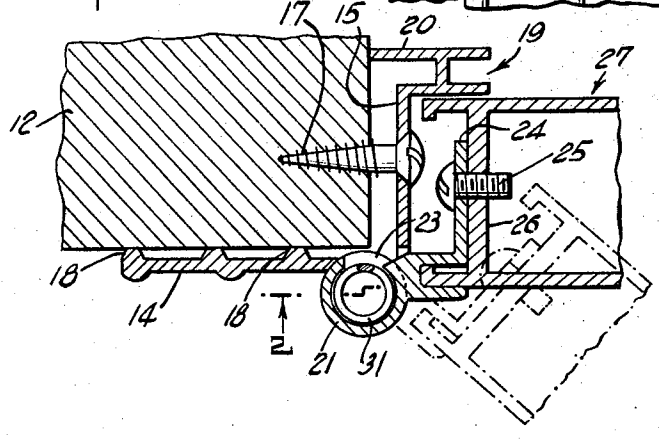


Fig. 3.



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Sept. 15, 1959 M. SCHNEIDER 2,903,735

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Filed June 19, 1957 2 Sheets-Sheet 2

Fig. 5.

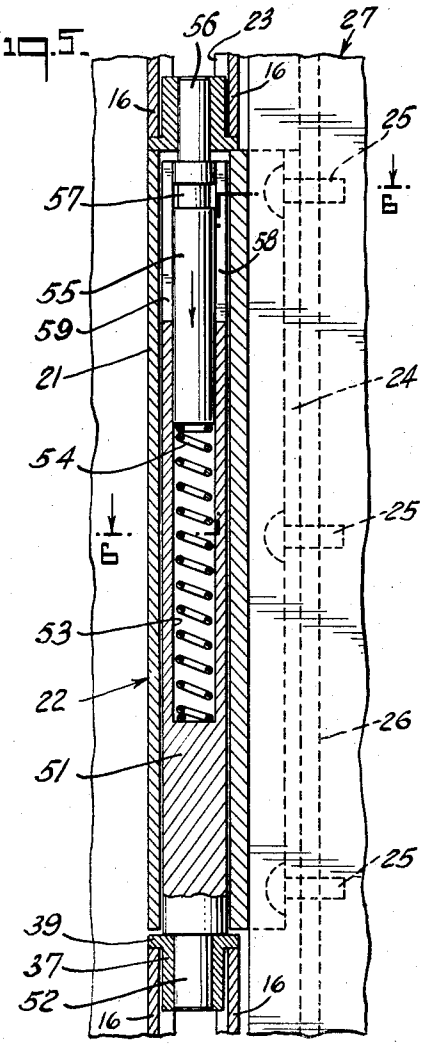


Fig. 6.

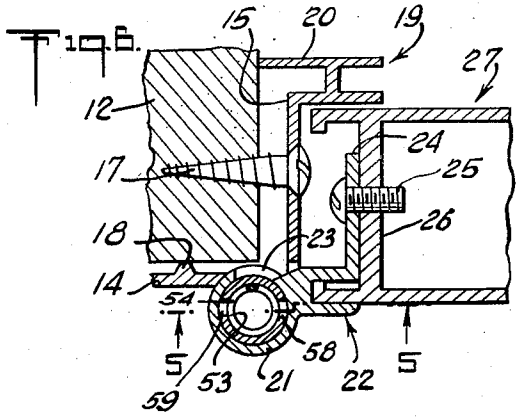


Fig. 4.

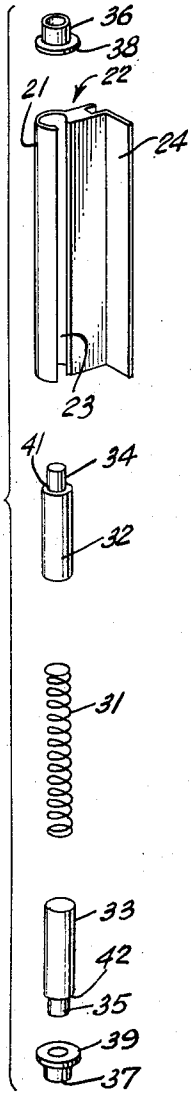
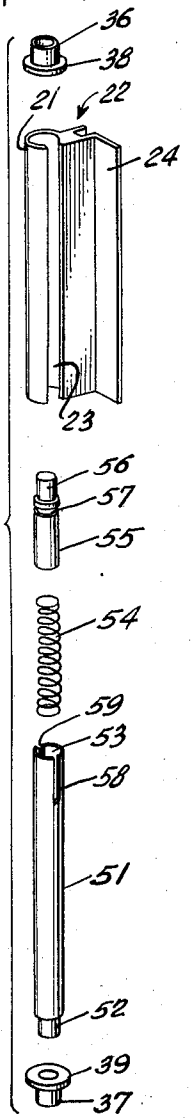


Fig. 7.



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DOOR HINGE STRUCTURE

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Application June 19, 1957, Serial No. 666,729

9 Claims. (Cl. 16—176)

This invention relates generally to door supports and particularly to an improved door hinge structure.

The improved hinge structure herein comprises a door hinge plate having an arcuate knuckle which interfits with the knuckle joint of a door jamb support strip, said knuckles being secured to each other by means of a pair of pintles in said hinge knuckle being urged in opposite directions by spring means or the like to engage the knuckle joint of the support strip. By providing separate securing means for each of the hinge plates of the door, the latter may be mounted and unmounted with greater facility than has been afforded by previous mounting means. Additionally, the pintle-spring elements are readily manipulated by simple tools to cause their engagement and disengagement with the support strip knuckle members.

Still other objects and advantages of my invention will be apparent from the specification.

The features of novelty which I believe to be characteristic of my invention are set forth herein and will best be understood, both as to their fundamental principles and as to their particular embodiments, by reference to the specification and accompanying drawings, in which:

Figure 1 is a fragmentary elevation of a door mounted within a frame by means of the hinge structure of the present invention;

Fig. 2 is a greatly enlarged partial vertical cross section of one of the hinge structures securing the door to the frame, taken on line 2—2 of Fig. 3, some parts being shown in phantom outline;

Fig. 3 is a section view taken on line 3—3 of Fig. 2, some parts being shown in phantom outline;

Fig. 4 is a rear exploded view of the hinge structure shown in Fig. 2;

Fig. 5 is a view similar to Fig. 2, showing an alternative embodiment of the hinge structure, shown in cross-section on line 5—5 of Fig. 6;

Fig. 6 is a section taken on line 6—6 of Fig. 5; and

Fig. 7 is a rear exploded view of the hinge structure shown in Fig. 5.

Referring now to the drawings in detail, there is shown in Figs. 1 and 3, a fragmentary portion of a building wall 11 having a rectangular aperture along one vertical edge of which is mounted a door jamb 12 to which is attached a substantially rigid elongated support member, generally designated 13. Said support member 13 comprises a front facing panel 14 and a perpendicular lateral panel 15, said panels being joined integrally with each other by an elongated arcuate knuckle 16. Panels 14 and 15 and curved knuckle 16 are formed of extruded aluminum or the like. Front panel 14 abuts the outer surface of jamb 12 while lateral panel 15 is aligned substantially parallel to the inner face of said jamb. Lateral panel 15 has a plurality of apertures, each of which accommodate a screw 17 by means of which support member 13 is secured to jamb 12.

In one embodiment, as shown in Fig. 2, the inner surface of panel 14 has a plurality of longitudinally extending bosses 18 with space panel 14 slightly apart from the front face of jamb 12. Also the inner edge of lateral panel 15 may have an integrally formed H-shaped extension, generally designated 19, one elongated leg 20 of which abuts the inner face of jamb 12 whereby said panel 15 is maintained in a spaced apart position from said inner face (Fig. 3).

At suitable spaced apart intervals, portions of knuckle 16 are cut out to form apertures each of which accommodates arcuate knuckle 21 of a door hinge, generally designated 22. Both knuckles 16 and 21 have substantially the same cross-sectional dimensions and curvature. Knuckle 21 has a longitudinal slot 23, the purpose of which will be explained hereinbelow. Hinge 22 has an elongated lateral support plate 24 having a plurality of apertures accommodating screws 25 by which the edge panel 26 of a door, generally designated 27, is attached.

Hinge 22, knuckle 21 and support plate 24 are formed integrally of extruded aluminum, or the like.

Positioned in the interior of knuckle 21 is a coiled spring 31 whose upper and lower ends bear against the ends of circular rods 32 and 33 that are positioned within the interior of said knuckle and are slidable longitudinally therein. See Figs. 2 and 4. Rod 32 has an upwardly extending pintle 34 of reduced diameter and rod 33 has a downwardly extending pintle 35 of reduced diameter, said pintles extending slidably into the interior of bushings 36 and 37, respectively. Bushings 36 and 37, which may be made of stainless steel or the like, have radially extending annular flanges 38 and 39, respectively, which provide bearing surfaces for the respective opposing edges of knuckle 16 and knuckle 21, as well as for the shoulders 41 and 42 of rods 32 and 33, respectively, which are urged against said respective flanges by spring 31. Bushings 36 and 37 extend into the interior of knuckle 16 and together with pintles 34 and 35 they form a pivot structure by which door 27 swings open and shut.

In some embodiments, bushings 36 and 37 may be omitted, in which case pintle rods 32 and 33 would not be reduced in diameter at their outer ends and would directly engage those portions of support member knuckle 16 which bound the cut out section which receives knuckle 21 of hinge plate 22.

In order to remove door 27 from the door frame, the end of a pin, screw driver or the like, is inserted between shoulder 41 and flange 38, and rod 32 is urged downward against the action of spring 31 until pintle 34 draws clear of bushing 36 and flange 38, the insertion and downward movement of the tool being permitted by slot 23. In some embodiments, the periphery of rod 32 on shoulder 41 may curve inwardly to facilitate the insertion of a tool for this purpose. A slight twist of the door frame will cause the upper end of pintle 34 to rest against a portion of the lower surface of flange 38, and a tool may then be inserted between the shoulder 42 of rod 33 and flange 39, and said rod is caused to move upward against the action of spring 31 until pintle 35 is retracted completely from bushing 37 and flange 39 at which time knuckle 21 may be drawn free from the aperture of knuckle 16.

In some cases a single action tool may be provided having two spaced apart tongues that may be simultaneously inserted between the shoulders of rods 32, 33 and flanges 38, 39, respectively, whereby rods 32 and 33 may be retracted simultaneously against the action of spring 31 to facilitate the withdrawal of hinge 22 from knuckle 16.

In hanging the door, the foregoing procedure is reversed, whereby rods 32 and 33 are maintained retracted within knuckle 21 against the action of spring 31 by a suitable tool until knuckle 21 is aligned with knuckle 16 at which time rods 32 and 33 are released to cause pintles

34 and 35, respectively, to enter into the central apertures of bushings 36 and 37, respectively, which have been perviously placed in position.

Figs. 5 and 7 show another embodiment of the hinge securing means of the present invention, wherein lower rod 33 is replaced by an elongated rod 51 which is almost, but not quite, coextensive in length with knuckle 21. The outer diameter of rod 51 is slightly less than the inner diameter of knuckle 21, whereby said rod is readily slidable longitudinally within said knuckle. At its lower end, rod 51 has a pintle 52 of reduced diameter which is insertable into the the central aperture of bushing 37.

The upper portion of rod 51 has a central longitudinal aperture 53 which accommodates a spring 54. Upper rod 55 has an outer diameter which permits its longitudinal retraction into aperture 53 against the action of spring 54. Rod 55 has an upwardly extending pintle 56 of reduced diameter. which is adapted slidably to enter the central aperture of bushing 36.

It will be noted from the illustrations in Figs. 5 and 7 that the shoulders formed between rods 51 and 55 and their respective pintles 52 and 56 cooperate with flanges 39 and 38 of bushings 37 and 36 in the same manner as described and illustrated hereinabove in connection with Figs. 2 and 4.

Spaced apart a short distance from pintle 56 of rod 55 is an annular recess 57 which accommodates the end of a pin, screw driver, or other suitable tool, for retracting rod 55 into aperture 53 of rod 51 against the action of spring 54. The retraction of rod 55 by the tool inserted into annular recess 57 is permitted by the provision of a longitudinal slot 58 communicating with aperture 53 in rod 51, said slot 58 being aligned with slot 23 of knuckle 21, so that the tool may be readily manipulated. An additional slot 59 similar to slot 58 and spaced approximately 180° apart therefrom, may be provided so that the alignment of a slot in rod 51 may conveniently be coordinated with the position of slot 23 in knuckle 21.

In Figs. 4 and 7, hinge 22 is illustrated as having a unitary slot 23 throughout its whole length. In some embodiments hinge 22 may be extruded with knuckle 21 being in the form of a completely closed cylinder after which slots may be cut from either or both ends of knuckle 21 for a suitable distance to permit the insertion of tools for retracting rods 32, 33 and 35, respectively, as described hereinabove.

In the specification, I have explained the principles of my invention, and the best mode in which I have contemplated applying those principles, so as to distinguish my invention from other inventions; and I have particularly pointed out and distinctly claimed the part, mode or combination which I claim as my invention or discovery.

While I have shown and described certain preferred embodiments of my invention, it will be understood that modifications and changes may be made without departing from the function and scope thereof, as will be clear to those skilled in the art.

I claim:

1. A structure for mounting a door in a doorway comprising an elongated support member secured to the jamb of said doorway, an elongated arcuate knuckle on said support member, a plurality of cut away sections in said knuckle, a hinge plate for each of said cutout sections, each hinge plate being adapted to be secured to the edge of a door, an elongated arcuate knuckle on said hinge plate of substantially the same cross sectional dimension and curvature as said first mentioned knuckle, said hinge plate knuckle being adapted to be positioned within the cutout section of the support member knuckle, a flanged bushing removably inserted into each end of the support member knuckle bounding each cutout section, a pair of pintles movable longitudinally within each hinge plate knuckle, an annular shoulder near the outer end of each pintle, and a spring positioned between said pintles, said

pintles being urged outwardly by said spring from opposite ends of their respective hinge plate knuckle to cause the outer ends of said pintles to engage the interiors of their adjacent respective bushings positioned in the support member knuckle and to cause each pintle shoulder to bear against the flange of its respective adjacent bushing.

2. A structure for mounting a door in a doorway comprising an elongated support member secured to the jamb of said doorway, an elongated arcuate knuckle on said support member, at least one cutout section in said knuckle, a hinge plate adapted to be secured to the edge of a door, an elongated arcuate knuckle on said hinge plate of substantially the same cross sectional dimension and curvature as said first mentioned knuckle, said hinge plate knuckle interfitting the cutout section of the support member knuckle, a pair of rods movable longitudinally within the hinge plate knuckle, a longitudinal pintle of reduced diameter at the outer end of each rod, a shoulder at the junction between each rod and its respective pintle, a removable bushing positioned within each end of the support member knuckle bounding said cutout section, an annular flange on each bushing abutting the respective arcuate edge of said support member knuckle, a spring positioned between said rods, said rods being urged outwardly from said hinge plate knuckle to cause said pintles to enter and engage adjacent respective bushings to the extent limited by their respective shoulders bearing against the respective bushing flanges, said flanges serving as bearings between the opposing respective ends of said support member knuckle and said hinge plate knuckle.

3. A structure according to claim 2, and further comprising a longitudinal slot in said hinge plate knuckle through which a tool may be inserted to engage at least one of said shoulders to retract its respective rod against the action of said spring for the removal of said hinge plate knuckle from said support member knuckle.

4. A structure for mounting a door in a doorway, comprising an elongated support member secured to the jamb of said doorway, an elongated arcuate knuckle on said support member, at least one cutout section in said knuckle, a hinge plate adapted to be secured to the edge of a door, an elongated arcuate knuckle on said hinge plate, said hinge plate knuckle being adapted to be positioned within the cutout section of the support member knuckle, a removable bushing positioned within each end of the support member knuckle bounding said cutout section, an annular flange on each bushing abutting the respective arcuate edge of said support member knuckle, a first elongated pintle movable longitudinally within the hinge plate knuckle, a longitudinal axial recess in said first pintle, a spring positioned within said recess, a second pintle movable longitudinally within said recess and normally urged outwardly therefrom by said spring, an annular shoulder near the outer end of each pintle, said spring causing the outer ends of said pintles to enter into and engage respective bushings to the extent limited by said shoulders bearing against the respective flanges of said bushings.

5. A structure according to claim 4, and further comprising an annular recess in the surface of said second pintle, a longitudinal slot in said first pintle in the region of the position of said second pintle, the combination of said slot and said recess permitting the insertion of a tool to cause the retraction of said second pintle into the axial recess in said first pintle against the action of said spring.

6. A structure according to claim 5, and further comprising a longitudinal slot in said hinge plate knuckle with which said longitudinal slot in said first pintle may be aligned to permit the insertion of a tool for the retraction of said second pintle.

7. A hinge structure comprising a support member, an elongated arcuate knuckle on said support member, a cutout section in said knuckle, a hinge plate, an elon-

gated arcuate knuckle on said hinge plate of substantially the same cross sectional dimension and curvature as said first mentioned knuckle, said hinge plate knuckle being positionable within said cutout section of said support member knuckle and aligned therewith, a bushing removably inserted into the interior of each portion of the support member knuckle bounding said cutout section, an annular flange on each of said bushings forming a bearing between adjacent respective edges of both of said knuckles, a pair of pintles movable longitudinally in said hinge plate knuckle, a spring positioned between said pintles and normally urging the latter into engagement with the respective interiors of adjacent bushings, an annular shoulder on each of said pintles adapted to abut against the flange of its respective adjacent bushing to limit the outward movement of said respective pintles.

8. A hinge structure comprising a support member, an elongated arcuate knuckle on said support member, a cutout section in said knuckle, a hinge plate, an elongated arcuate knuckle on said hinge plate of substantially the same cross sectional dimension and curvature as said first mentioned knuckle and positionable within said cutout section, a bushing removably inserted into the interior of each portion of the support member knuckle bounding said cutout section, an annular flange on each of said

bushings forming a bearing between adjacent respective edges of both of said knuckles, a pair of pintles movable longitudinally in said hinge plate knuckle, means yieldably urging each of said pintles into engagement with the respective interiors of adjacent bushings, and an annular shoulder on each of said pintles urging against the flanges of their respective bushings and retaining them in place within the support member knuckle while limiting the outward movement of said pintles.

9. A hinge structure according to claim 8, and further comprising a slot in said hinge plate knuckle to permit the retraction of at least one of said pintles from its respective bushing in order to release said hinge plate from said support.

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