Feb. 5, 1957 R. E. TORCHIA 2,779,966

ADJUSTABLE HINGE

Filed April 20, 1953

Fig. 1.

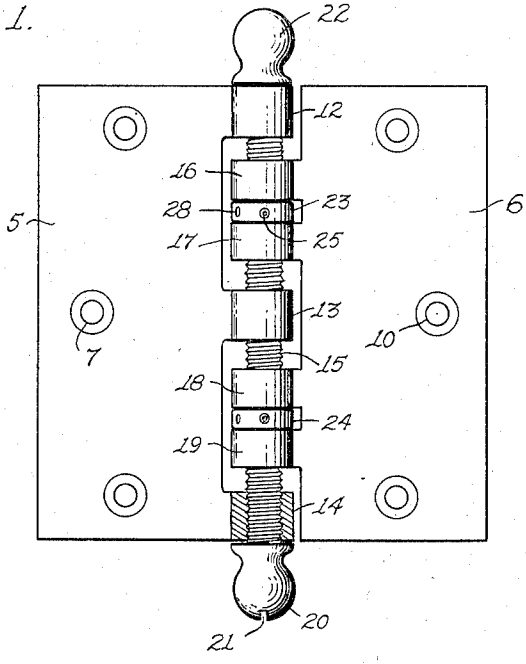
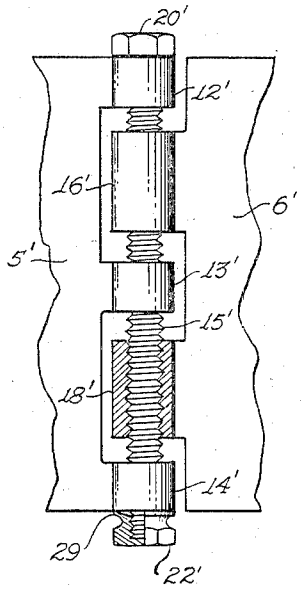


Fig. 4.



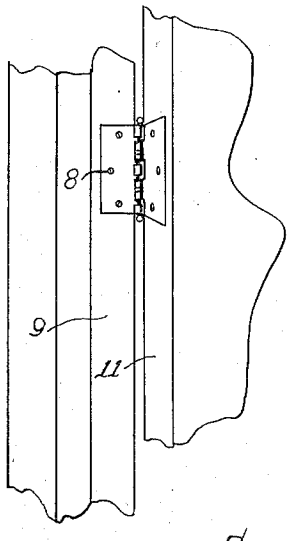


Fig. 2.

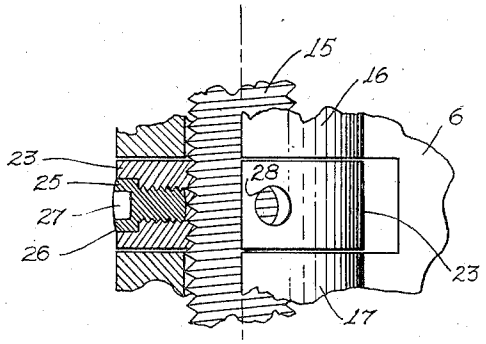


Fig. 3.

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ADJUSTABLE HINGE

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3 Claims. (Cl. 16—133)

This invention relates broadly to an adjustable hinge, and, more specifically, relates to a new and improved adjustable door hinge for raising or lowering a door with respect to a door jamb in order to maintain the door in its proper position relative to a doorway so as to permit unobstructed opening and closing of the door with respect to the doorway without a large clearance, and consequent undesirable results, such as drafts and the like.

Generally speaking, an illustrative embodiment of the present invention comprises hinge plates adapted to be fastened to a door and a door jamb, a threaded bolt in cooperably rotatable relationship with respect to a first hinge plate and in selectively rotatable or non-rotatable relationship with respect to the second hinge plate, and thread means in cooperable relationship with respect to the first of the hinge plates and threaded upon the bolt whereby relative rotation of the bolt and said thread means with respect to each other results in longitudinal movement of that first hinge plate with respect to the bolt and thus also with respect to the second hinge plate.

From the above brief general description of the present invention, it will be obvious that those disadvantages of the prior methods of compensating for decreased or increased vertical clearance between the door and the adjacent members are completely or virtually entirely overcome in and through the use of this invention.

With the above points in mind, it is a general object of this invention to provide a new and improved, easily operated, inexpensive adjustable hinge designed to make possible the raising and lowering of a door without removal of the door from the hinge or from the doorway.

It is another specific object of this invention to provide a hinge with longitudinal clearance between the door hinge plate and the jamb hinge plate whereby said plates may be longitudinally raised or lowered with respect to each other.

Additional and related objects will be clear to those skilled in the art upon a careful examination of the accompanying illustrations, the present specification, and the appended claims.

In order to facilitate understanding of my invention, reference will be made to the following drawings, in which:

Fig. 1 is a front, elevational, partly sectional, view of one preferred embodiment of my invention;

Fig. 2 is a reduced-size perspective view of the device illustrated in Fig. 1, shown in operative position upon a fragmentary door jamb and door;

Fig. 3 is an enlarged, fragmentary, partly sectional view of a portion of the device illustrated in Fig. 1; and

Fig. 4 is a front, elevational, fragmentary, partly sectional, view of a modified version of the present invention.

As seen in Fig. 1, the door hinge is provided with two hinge plates, the left plate 5 hereinafter being called

the jamb plate 5 for the sake of convenience in description, and the right plate 6 hereinafter being called the door plate 6 for the same reason; the hereinafter described uses of the left and right plates as door jamb plate and door plate, respectively, being interchangeable in this preferred embodiment of my invention. The jamb plate 5 has three countersunk holes, such as 7, in vertically staggered relationship with respect to each other, through which wood screws, such as 8 in Fig. 2, may be inserted for fastening the jamb plate 5 to a door jamb 9, in Fig. 2. The door plate 6 has three similar holes, such as 10, for similar fastening of the door plate 6 to a door 11 in Fig. 2. The jamb plate 5 has three lateral projections 12, 13 and 14, having circular shapes and provided with longitudinally common axial bore holes (not shown) adapted to receive an axial bolt 15 therethrough. The door plate 6 has four lateral projections 16, 17, 18 and 19, similar in their circular shapes to the jamb plate's lateral projections 12, 13 and 14, and provided with longitudinally common axial bore holes (not shown) adapted to receive the axial bolt 15 therethrough in pivotal relation thereto. All of the said axial bore holes are so located in their respective lateral projections that there is sufficient clearance for the plates 5 and 6 to pivot with respect to each other about the axial bolt 15, such pivoting taking place when the door 11 is pivoted relative to the jamb 9 in the door's opening and closing operations. The axial bolt 15 is provided with a head 20 having a slot 21 adapted to receive the tip of a screw-driver (not shown) whereby the axial bolt 15 may be turned about its longitudinal axis. A dummy knob 22, similar in appearance to the bolt head 20, is located on the jamb plate's upper projection 12 in symmetrical opposition to the bolt head 20 by partial insertion of a plug (not shown) into the axial bore hole of the projection 12. The axial bolt 15 is provided with spirally advancing grooves or threads along its length. The jamb plate's lower projection 14 is internally grooved or threaded so as to mesh with the threads of the axial bolt 15 and maintain said bolt in its inserted position relative to the jamb plate 5. Two circular internally threaded nuts 23 and 24, hereinafter described as the upper nut 23 and the lower nut 24, are rotatably threaded upon the axial bolt 15; the upper nut 23 being located between the door plate's projections 16 and 17 in abutment against said projections, and the lower nut 24 being located between the door plate's projections 18 and 19 in abutment thereagainst.

Fig. 3 illustrates a preferred construction of the nuts 23 and 24. For convenience, only the upper nut 23 will be described, the lower nut 24 being identical thereto. A locking or set screw 25 (which may be headed or non-headed) is rotatably threaded into internally threaded radial hole 26 in the nut 23 so that the screw 25 may be selectively rotatably driven into locking contact with the axial bolt 15 whereby the nut 23 and the bolt 15 will be relatively immovable with respect to each other. As shown, the set screw 25 is provided with a recessed head or socket 27 having an internal plurality of faces adapted to be abuttingly contacted by a turning wrench for rotation of said screw. The nut 23 has a plurality of circumferentially spaced radial recesses, such as 28, suitable for the reception of the before-mentioned turning wrench or any other lever for rotating the nut 23 relative to the axial bolt 15. The set screw 25 preferably should be made of a material softer than that used for the axial bolt 15, such as brass and steel, respectively, in order to prevent damage to the threads of the bolt 15.

The operation of the above-described preferred embodiment of my invention may be explained as follows:

The function of the door hinge is not only to provide

means for pivoting the door relative to the door jamb but also to maintain the door with a sufficient clearance above the floor so that the door does not touch the floor during said pivoting movement. Hence, the weight of the door is upon its hinges. That is, more specifically, the door plate's projections 16 and 18 exert a downward force upon the upper nut 23 and the lower nut 24, respectively, that force being in turn transmitted by the threads of said nuts to the threads of the axial bolt 15 which transmits the force to the jamb plate 5 by means of the internally threaded lower projection 14. During operation, the adjustable nuts 23 and 24 are locked into position by their set screws, of which screw 25 is the one in the upper nut 23, so that the longitudinal position of the door plate 6 with respect to the jamb plate 5 is fixed. In order to adjust the relative longitudinal position of the door plate with respect to the jamb plate, the set screws must be loosened so that the adjustable nuts are rotatable with respect to the bolt 15, such rotation being either to the right or the left for raising or lowering, respectively, of the door with respect to the door jamb. The same hand tool lever used for insertion into the radial recesses, such as 28, for rotation of the nuts. Upon obtaining the desired position of the door, the set screws may then be tightened, thus fixing the longitudinal position of the door with respect to the door jamb. The opening and closing of the door does not alter that position since the door plate's projections freely slide over the nuts.

Although the above specific description of a preferred embodiment of this invention has referred to the left hinge plate as the jamb plate and the right hinge plate as the door plate, it should be obvious that the functions of the hinge plates may be interchanged without affecting the operation of the hinge in the slightest degree. Instead of the right hinge plate's projections 16 and 18 resting upon the adjustable nuts 23 and 24, respectively, the nuts 23 and 24 will rest upon the right hinge plate's projections 17 and 19, respectively.

Fig. 4 illustrated a modified embodiment of the present invention, similar parts being designated by the same numerals, primed however. The jamb plate 5' has three lateral projections 12', 13' and 14' provided with longitudinally common axial bore holes (not shown) adapted to receive the threaded axial bolt 15' therethrough. The door plate 6' has two lateral projections 16' and 18' similar in their circular shapes to the jamb plate's lateral projections 12', 13' and 14' but their longitudinally common axial bore holes are internally threaded, as seen in the sectioned lateral projection 18', so that relative rotation of the axial bolt 15' and the door plate 6' with respect to each other results in longitudinal movement of said bolt 15' and said door plate 6' with respect to each other. A locking nut 22' is threadably engaged with the axial bolt 15' at the opposite end from the bolt head 20' and is provided with a slanted conical flange 29 so that tightening action of the nut 22' with respect to the bolt 15' causes the flange 29 to elastically deform against the jamb plate projection 14', resulting in the frictional locking of the bolt 15' in immovable relationship with respect to the jamb plate 5'.

The operation of the above-described modification may be explained as follows:

Although the left and right hinge plates are considered as jamb and door hinge plates, resepctively, they are interchangeable in function as in the case of the preferred embodiment previously described. The door plate's projections 16' and 18' exert a downward force by means of their threads upon the threads of the axial bolt 15', that force being in turn transmitted to the jamb plate 5' by the bolt head 20' being in downward abutment against the jamb plate's upper projection 12'. During opening and closing operation of the door, the axial bolt 15' is immovably locked to the jamb plate 5' by the locking nut 22', and the door plate 6' rotates freely upon the axial bolt. Of course, there is a slight raising and lowering of the door as it is rotated back and forth because the door plate 6' is being raised and lowered with respect to the axial bolt due to the spirally threaded relationship between the door plate projections and the bolt. However, the pitch of the threads is so small that the variation in the position of the door between the open and closed positions is negligible; in addition, the door always returns to the exact same relative position when closed as when originally adjusted since the bolt remains stationary with respect to the jamb plate 5'. In order to adjust the relative longitudinal position of the door plate with respect to the jamb plate, the lock nut 22' must be loosened so that the axial bolt 15' may be rotated with respect to the jamb plate 5', such rotation being either to the left or the right for raising or lowering, respectively, of the door with respect to the door jamb. The same hand tool, such as an open end wrench, used for loosening the lock nut 22' may be used on the bolt head 20' for turning the bolt 15'. Upon obtaining the desired position of the door, the lock nut may then be tightened, thus fixing the longitudinal position of the door with respect to the door jamb again.

Although the above specific descriptions of various embodiments of my invention have been confined to the use of a single hinge, it is obvious that most doors will require two hinges in order to provide a stable longitudinal pivotal axis so that the door will swing easily when opened and closed. It should be equally obvious that either the second hinge will have to be longitudinally variable in position itself or else the jamb hinge plate and the door hinge plate will have to be longitudinally movable with respect to each other. An adjustable hinge embodying my invention may be used, in which case the second hinge will provide additional support for the weight of the door as well as pivotal guidance, or else an ordinary hinge having longitudinal clearance between the lateral projections of the two hinge plates may be used, in which latter case only pivotal guidance will be offered by that second hinge since the lateral projections will not rest upon each other unless the door is in its extreme lowest position with respect to the door jamb.

Numerous modifications of my invention within the spirit thereof will be apparent to those skilled in the art. For instance, there are a great many ways of securing the axial bolt in immovable relationship with respect to the jamb plate. The jamb plate projections 12, 13 and 14 in Fig. 1 may be identical with the corresponding members in Fig. 4 (the modified form of the invention) in that none of said projections is internally threaded, and the axial bolt 15 would be inserted from the top instead of from the bottom as shown, the downward force upon the bolt being transmitted to the jamb plate's upper projection 12 by the bolt head 20, such a modification limiting the use of the hinge in that the left hinge plate 5 would always have to be the jamb plate and the bolt would always have to be inserted from the top. Instead of threading the lateral projection 14 as shown in Fig. 1, the dummy head 22 may be internally threaded and the axial bolt 15 extended thereinto, or a locking nut, such as the nut 22' in Fig. 4, could be used. For even greater strength, which may be desired for large heavy doors, all three of the lateral projections 12, 13 and 14 and the head 22 may be internally threaded and the axial bolt threaded therethrough. Obviously, the bolt head 20 need not have a slot 21 for a screw-driver but may be provided with external flat surfaces suitable for gripping by a wrench or other hand tool, as in the modification in Fig. 4.

The preferred embodiment of my invention is not limited to the use of any particular number of jamb plate projections, door plate projections or adjustable nuts, since the principle is the same regardless of variations in numbers thereof. The jamb plate 5 may have only the upper and lower projections 12 and 14, and the

door plate 6 may then have only two lateral projections, such as 16 and 17, which would be desirably enlarged longitudinally, with a large adjustable nut, such as 23, positioned thereinbetween.

Instead of positioning the adjustable nuts between closely adjacent door plate projections, the nuts may be positioned outside those projections, for example, between projections 12 and 16, 17 and 13, 13 and 18, and/or 19 and 14, respectively. It is obvious that there are a great many possible combinations of lateral projections from each plate and adjustable nuts.

The adjustable nuts 23 and 24 may themselves be modified within the scope of this invention. Said nuts may be provided with any sort of set screw 25, either recessed or projecting. The circumferential surface may be a plurality of flat surfaces suitable for gripping by a wrench or other hand tool.

The threaded axial bolt need not be threaded throughout its entire length but may have threads only over those portions over which its threaded counterpart may travel.

I do not intend to limit my invention to those examples, described and illustrated, but use them merely to teach the art, since my invention is broader than any one of the specific embodiments mentioned above. My invention is to be limited only by the appended claims.

I claim:

1. Longitudinally adjustable door hinge apparatus effectively adapted to be attached to a door and a door jamb whereby said door may be selectively adjustably longitudinally positioned with respect to said door jamb comprising: first hinge plate means and second hinge plate means provided with first and second lateral projection means respectively, in longitudinally alignable and longitudinally movable relationship with respect to each other, said lateral projection means being provided with longitudinally common axial hole means; longitudinal axial bolt means provided with bolt thread means and insertable through said longitudinal axial hole means; second thread means cooperably related with respect to said first hinge plate means and threadably engaged with said bolt thread means whereby said bolt means may be selectively lockable in rotatably immovable relationship with respect to said first hinge plate means; and third thread means internally related with respect to said second lateral projection means and threadably engaged with said bolt thread means whereby prior to being selectively rotatably immovably locked, selective relative rotation of said bolt means with respect to said first hinge plate means and with respect to said third thread means causes longitudinal movement of said second hinge plate means with respect to said first hinge plate means.

2. Longitudinally adjustable door hinge apparatus effectively adapted to be attached to a door and a door jamb whereby said door may be selectively adjustably longitudinally positioned with respect to said door jamb, comprising: first hinge plate means and second hinge plate means provided with first and second lateral projection means, respectively, in longitudinally alignable and longitudinally movable relationship with respect to each other, said lateral projection means being provided with longitudinally common axial hole means; longitudinal axial bolt means provided with bolt thread means and insertable through said longitudinal axial hole means, said bolt means being selectively lockable in rotatably immovable relationship with respect to said first hinge plate means; and said second lateral projection means being provided with internal thread means in threadably engaged relationship with respect to said bolt thread means whereby prior to being selectively rotatably immovably locked, selective relative rotation of said bolt means with respect to said internal thread means and with respect to said first hinge plate means causes longitudinal movement of said second hinge plate means with respect to said first hinge plate means.

3. Longitudinally adjustable door hinge apparatus effectively adapted to be attached to a door and a door jamb whereby said door may be selectively adjustably longitudinally positioned with respect to said door jamb, comprising: first hinge plate means provided with first lateral projection means; second hinge plate means provided with second lateral projection means said second lateral projection means including bifurcated portions defining recess means therebetween; said first and second lateral projection means being in longitudinally alignable and longitudinally movable relationship with respect to each other, said lateral projection means being provided with longitudinally common axial hole means; longitudinal axial bolt means provided with bolt thread means and insertable through said longitudinal axial hole means in axial pivot relationship with respect to said second hinge plate means; second thread means carried by said first lateral projection means and threadably engaged with said bolt thread means in selectively rotatably immovable relationship with respect thereto; and third thread means consisting of threaded nut means carried within the recess means in the bifurcated portions of said second projection means and threadably engaged in selectively lockable relationship with respect to said bolt thread means whereby selective relative rotation of said third thread means with respect to said immovable bolt means causes longitudinal movement of said second hinge plate means with respect to said first hinge plate means.

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