April 28, 1942. W. J. KEENE 2,281,158

HINGE

Filed June 24, 1940

Fig. 1

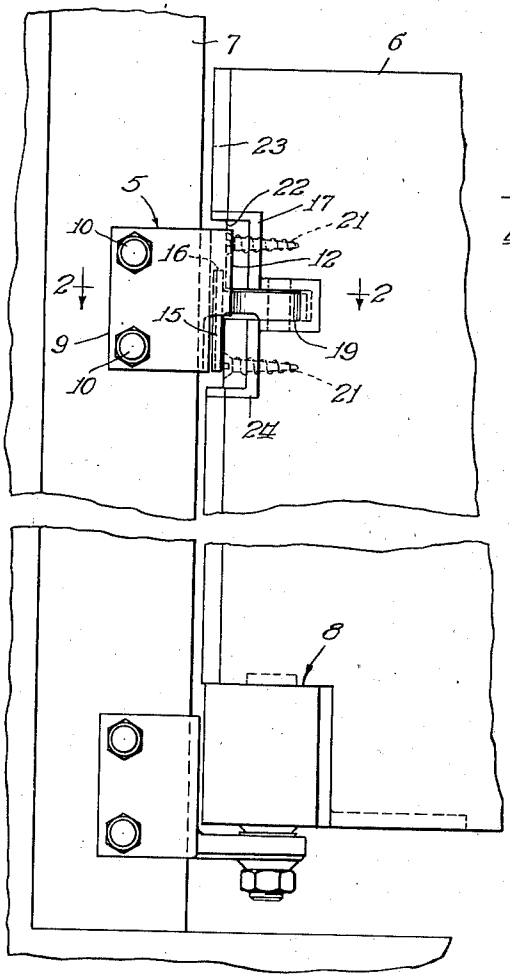


Fig. 2

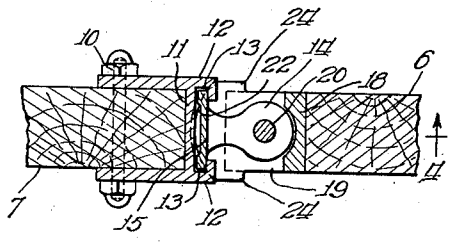


Fig. 3

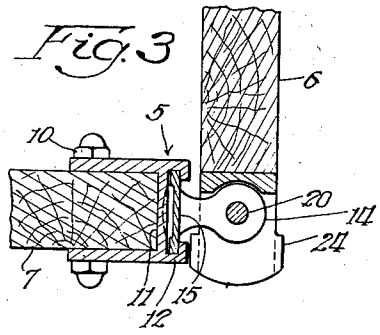


Fig. 4

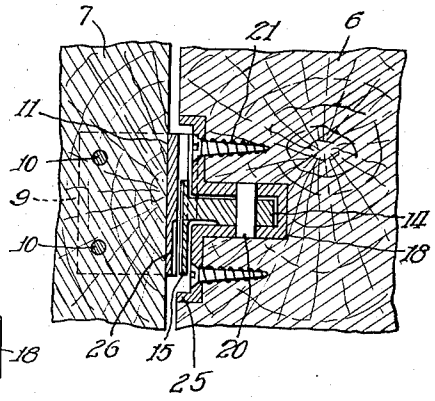


Fig. 5

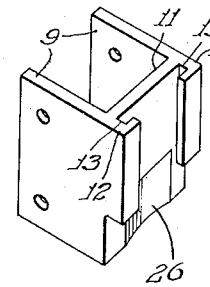


Fig. 6

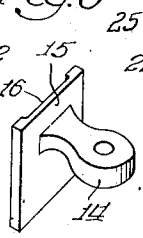
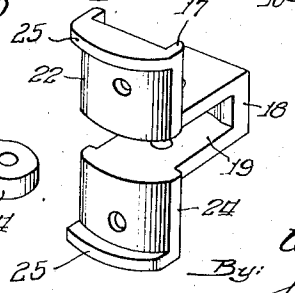


Fig. 7



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UNITED STATES PATENT OFFICE

2,281,158

HINGE

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Application June 24, 1940, Serial No. 342,016

5 Claims. (Cl. 16—179)

This invention relates to an improved hinge construction and has particular reference to a hinge which permits a door or like swinging part to move about its hinge pivot or axis and also to move vertically or edgewise. Such hinges are useful particularly in connection with the mounting of doors which are normally held in a predetermined position by the use of a special kind of hinge wherein the weight of the door itself causes the door to swing automatically to the selected position. Such special gravity-actuated hinges necessitate vertical movement of the door, wherefore all of the supporting hinges for the door must be of such character as to permit the indicated required vertical movement.

There are many instances where doors are mounted in the indicated manner but perhaps the most common one is the mounting of a door in a toilet room stall.

The main objects of the present invention are to provide a hinge designed for use in connection with any of the known types of gravity actuated hinges and which will freely permit both horizontal swinging and vertical movement of the door; to provide such a hinge which may be mounted at any point in the height of the door and particularly at a considerable space from the top edge of the door so as to avoid objectionable cutting, drilling or other objectionable weakening of the door or hanging stile in a location which would tend to facilitate breakage of the door or hanging stile; to provide a hinge construction of the character indicated which will permit mounting of the door with its hinged edge in very close proximity to the adjacent edge of the hanging stile so as to avoid objectionable gaps between the said parts; to provide such a hinge construction which will be neat in appearance, rugged and durable but relatively simple in design and easy to manufacture.

Other objects and advantages of the invention will be understood by reference to the following specification and accompanying drawing wherein there is illustrated a selected embodiment of the improved hinge construction and a typical installation thereof.

In the drawing:

Fig. 1 is a fragmentary front elevation showing the application of a hinge, forming one embodiment of my invention, to a door adapted to swing by gravity to a predetermined position;

Fig. 2 is a fragmentary horizontal sectional view taken on the line 2—2 of Fig. 1;

Fig. 3 is a fragmentary horizontal sectional view similar to Fig. 2 showing the relationship of the hinge parts when the door supported thereby is swung to a position at right angles to its position shown in Fig. 2;

Fig. 4 is a fragmentary vertical sectional view taken on the line 4—4 of Fig. 2; and

Figs. 5, 6 and 7 are perspective views of the different parts of the hinge shown in Figs. 1 to 4, inclusive, which illustrate one embodiment of my invention.

Referring now to the drawing, the improved hinge construction herein contemplated is illustrated in its entirety at 5, the same serving to hingedly connect a door 6 to a partition wall or hanging stile 7 near the upper edge of the door and hanging stile. The door is pivotally connected at its lower edge to the hanging stile through the agency of a suitable form of gravity actuated hinge indicated in its entirety at 8, the construction of which is well known in the art and forms no part of the present invention. Such hinge 8 is adapted, however, to support most of the weight of the door 6 and it includes a cam arrangement whereby the weight of the door causes the door to swing to a predetermined position, for example, a closed position. It will be understood, of course, that when the door is swung from said predetermined or closed position it moves upwardly to the extent required by the cam action of the hinge 8 and that the hinge 5 must accordingly permit such vertical movement of the door in addition to its normal horizontal swinging movement.

The hinge 5 comprises a clamp member 9 which is of U-shaped cross-section, having flanges adapted to embrace the thickness of the hanging stile to which it may be secured by suitable bolts as indicated at 10 or otherwise. In this instance, the mounting clamp 9 is illustrated as being of fixed interior dimension to accommodate a predetermined wall thickness. It will be understood that one of the clamp plates may be made independent of the cross member portion 11, or that it may be adjustably connected thereto in the manner indicated in United States Patent No. 1,808,308, issued June 2, 1931.

The cross member portion 11 of the mounting bracket 9 is provided with edge extensions 12 so formed as to provide guide-ways 13 therein. For purposes which will presently appear, the extensions 12 and guide-ways 13 are preferably provided on only a portion of the length of the clamping member 9 as illustrated. The guide-ways 13 provided in the clamping member 9 are adapted to vertically slidably receive a hinge ear 14 which has a base 15 so formed as to fit slidably

in and between the oppositely disposed guide-ways 13. The base portion 15 of the hinge ear 14 preferably extends upwardly above the top face of the ear 14 a relatively short distance and terminates as indicated at 16 but it extends downwardly below the bottom face of said ear 14 a greater distance, preferably so as to reach substantially to the lower edge of the clamping member 9 when the door is in its normal or lowermost position. By this arrangement the base portion 15 is made of adequate length to be effectively guided and controlled by the guide-ways 13 in the clamping member 9.

For connecting the hinge ear 14 to the door, there is provided a bracket member 17, the same having a centrally disposed, laterally extending portion 18 and being provided with a horizontally directed slot 19 which extends from side to side of the door. The slot 19 receives the hinge ear 14 as illustrated and a pivot pin 20 extends through the top and bottom portions of the extension 18 and through the interposed hinge ear portion 14 to thereby hingedly connect the bracket member 17 to the hinge ear 14.

The bracket member 17 with its extension 18 is mortised into the door 6 and is secured in place by suitable means such as wooden screws indicated at 21.

It will be seen that when the door 6 swings horizontally and moves upwardly, it may swing on its hinge pivot 20 in the hinge ear 14, and, further, that it may move upwardly, moving with it the said hinge ear 14 which then slides upwardly in the ways 13 of the fixed clamping member 9. Thus each movement is effected on its own bearing with consequent simplification and durability.

The vertical sliding connection between the hinge ear 14 and the fixed hinge part 9 is located between the hinged edge of the door and the hanging stile. The space required between the edge of the door and the hanging stile to accommodate the vertical sliding connection is of course somewhat dependent upon the thickness of the parts employed in producing the structure. If it is desired to make the slidably connected parts of fairly heavy thickness as illustrated, the sliding connection may be, in effect, recessed into the bracket part 17, the latter herein being shown as having its outer surface 22 offset inwardly or recessed relative to the hinged edge of the door. The hinged edge of the door is also preferably rounded as indicated at 23 approximately concentric with the axis of the hinge pivot 20, and the surface 22 and its top and bottom flange-like margins 25 are correspondingly rounded. The fixed member 9 is provided with a concaved recess 26 to receive the lower margin 25 when the door moves upwardly.

In one practical embodiment of the described construction, the hinged edge of the door 6 is spaced from the adjacent edge of the hanging stile 7 approximately ⅛". This spacing may be varied considerably, being made either larger or smaller, but the indicated spacing has been found quite satisfactory.

To facilitate installation of the hinge construction, especially mounting of the door part in the door, the vertically extending portion 17 of said door part is preferably formed with flanges such as indicated at 24 which are adapted to overlie the marginal portions of the door at the recess cut therein to receive said bracket portion 17. The extension 18 may be similarly provided with flanges, although the same are of less importance on such extension since the door recess for receiving such extension may be cut to quite accurately receive said extension with relatively little difficulty. By providing flanges 24 on the main bracket portion 17, accurate fitting of the main portion 17 in the door is made relatively unnecessary since the flanges 24 will serve to conceal any roughness in the cutting of the recess. A snug fit is to be preferred, however, and the flanges 24 may serve merely ornamental purposes.

It will be seen that because of the recessed arrangement of the surface portion 22 of the door hinge part 17, the upper and lower end portions of the said part are caused to project over the ends of the clamp member 9. When assembling the structure, or to permit removal of the door, the door is first swung to a position at right angles to the hanging stile 7, whereupon the said overhanging portions of the hinge member 17 will be disposed wholly outwardly of all portions of the clamp member 9, whereupon movement of the base portion 15 of the hinge structure upwardly from the guide-ways 13 may be effected, it being understood that the hinge 8 has been first prepared to permit such separation.

In the normal swinging action of the door, the hinge part 14 moves upwardly with the door to such an extent that the upper end 16 of the base 15 approximately coincides with the upper end of the clamping member 9. Hence no undesirable projection emerges from the clamping member 9 upon swinging of the door. Incident to the upward movement of the door, the lower end portion of the hinge bracket member 17 moves upwardly beneath the guide-way forming extensions 12, 12 in the space normally occupied by the vertically sliding base part 15. Hence, the base part 15 normally serves to close the space required by the lower end portion of the hinge bracket member 17 for upward movement with the door 6.

It will be apparent to those skilled in the art that the structure described may be modified in respect of many details without departing from the spirit of the invention, the scope of which should be determined by reference to the following claims, which should be construed as broadly as possible consistent with the state of the art.

I claim:

1. In a hinge structure of the class described, a normally stationary hinge part, another hinge part movable vertically relative to said normally stationary part, an intermediate member pivotally connected at one end to said movable hinge part and slidably connected adjacent its other end to said stationary hinge part, said sliding connection comprising oppositely disposed guides formed integral with said stationary hinge part and a base part formed integral with said intermediate member and slidable in said guides, said movable hinge part having a portion adapted to move upwardly toward the lower ends of said guides incident to relative vertical movement between said hinge parts, and said intermediate member base part having a portion normally extending below the lower ends of said guides to normally fill the space into which said movable hinge part moves incident to said relative vertical movement between the hinge parts.

2. A hinge structure of the class described comprising a pair of relatively vertically movable parts and an intermediate member pivotally connected to one of said parts, elongated, slidably interfitting elements carried respectively by said

intermediate member and the other of said hinge parts and serving to slidably connect the same, said hinge part to which said intermediate member is pivotally connected having a portion movable toward and from the interfitting element carried by said other hinge part, the interfitting element of said intermediate member being movable vertically in unison with said portion relative to the other hinge part and having one end projecting into the space in which said portion moves toward and from the interfitting element of said other hinge part, whereby said space is normally filled or closed.

3. A hinge structure of the class described comprising a pair of relatively vertically movable parts and an intermediate member pivotally connected to one of said parts, elongated, slidably interfitting elements carried respectively by said intermediate member and the other of said hinge parts and serving to slidably connect the same, said hinge part to which said intermediate member is pivotally connected having a portion movable toward and from the interfitting element carried by said other hinge part, the interfitting element of said intermediate member being movable laterally in unison with said portion and having one end projecting into the space in which said portion moves, whereby said space is normally filled or closed, the other end of the interfitting element of said intermediate member being disposed within the length of the other interfitting element in such relation thereto as to remain within the length thereof for at least the major portion of the relative vertical movement between said interfitting elements.

4. A hinge of the class described comprising a normally stationary part adapted to be secured to a hanging stile and embodying a web portion adapted to extend transversely over the edge of such stile, an intermediate part having a base plate and an arm extending laterally from said base plate, said base plate being disposed in parallel relation to said hinge web and slidably connected thereto, and a second hinge part adapted to be secured to a door and having an outer portion recessed to receive and house said base plate, and an inner portion adapted to be recessed into the door, said inner portion embodying spaced elements for receiving therebetween the arm of said intermediate part, said arm being pivotally connected to said spaced elements.

5. A hinge of the class described comprising a normally stationary part adapted to be secured to a hanging stile and embodying a web portion, an intermediate part having a base plate and an arm extending laterally from said base plate, said base plate being disposed in parallel relation to said web and slidably connected thereto, and a movable hinge part adapted to be secured to a door and having an outer portion recessed to receive and house said base plate and an inner portion adapted to be recessed into the door, the arm of said intermediate part being pivotally connected and anchored to said inner portion so as to cause said intermediate part to move with said movable hinge part.

WILLIAM J. KEENE.