Sept. 4, 1962 A. F. SCHIMEK 3,051,999

DOOR MOUNTING

Filed Oct. 13, 1959 3 Sheets-Sheet 1

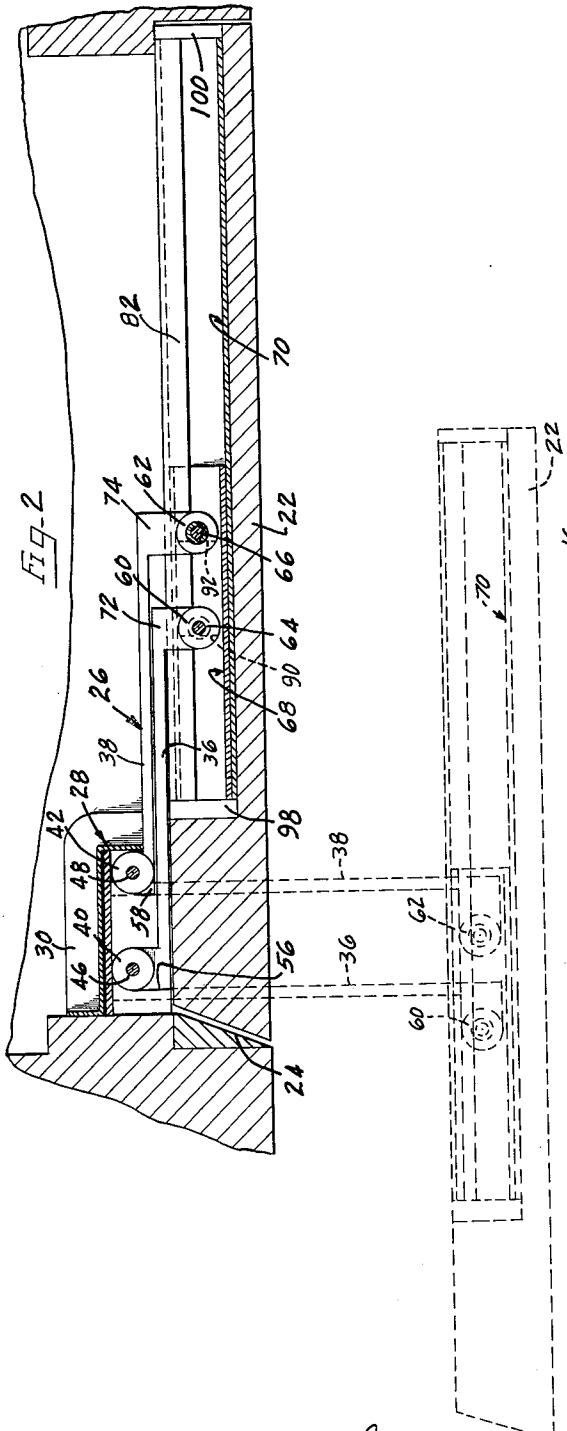

Fig-2

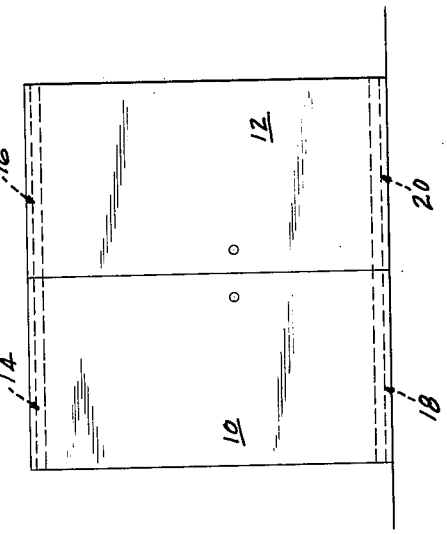

Fig-1

Inventor
Alfred F. Schimek

by Hill, Sherman, Meroni, Gross & Simpson Attys.

Sept. 4, 1962 A. F. SCHIMEK 3,051,999

DOOR MOUNTING

Filed Oct. 13, 1959 3 Sheets-Sheet 2

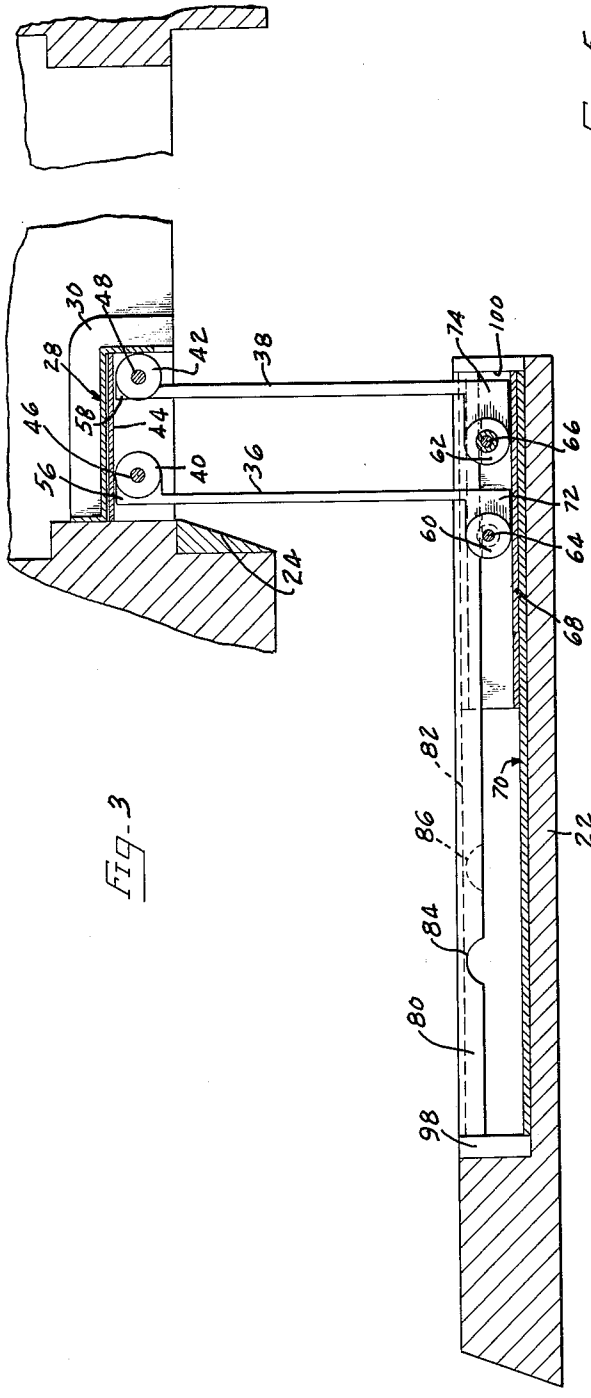

Fig. 3

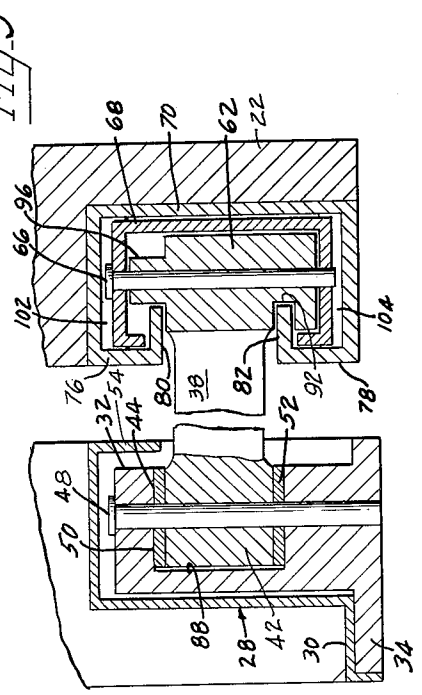

Fig. 5

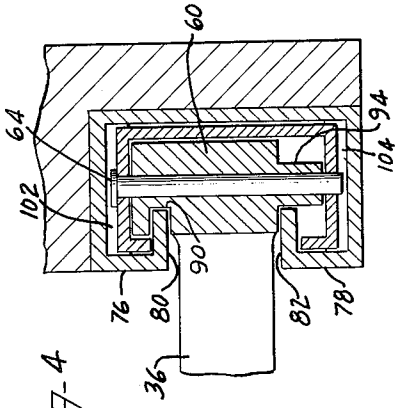

Fig. 4

Inventor
Alfred F. Schimek

By Hill, Sherman, Meroni, Gross & Simpson Attys.

Sept. 4, 1962 A. F. SCHIMEK 3,051,999

DOOR MOUNTING

Filed Oct. 13, 1959 3 Sheets-Sheet 3

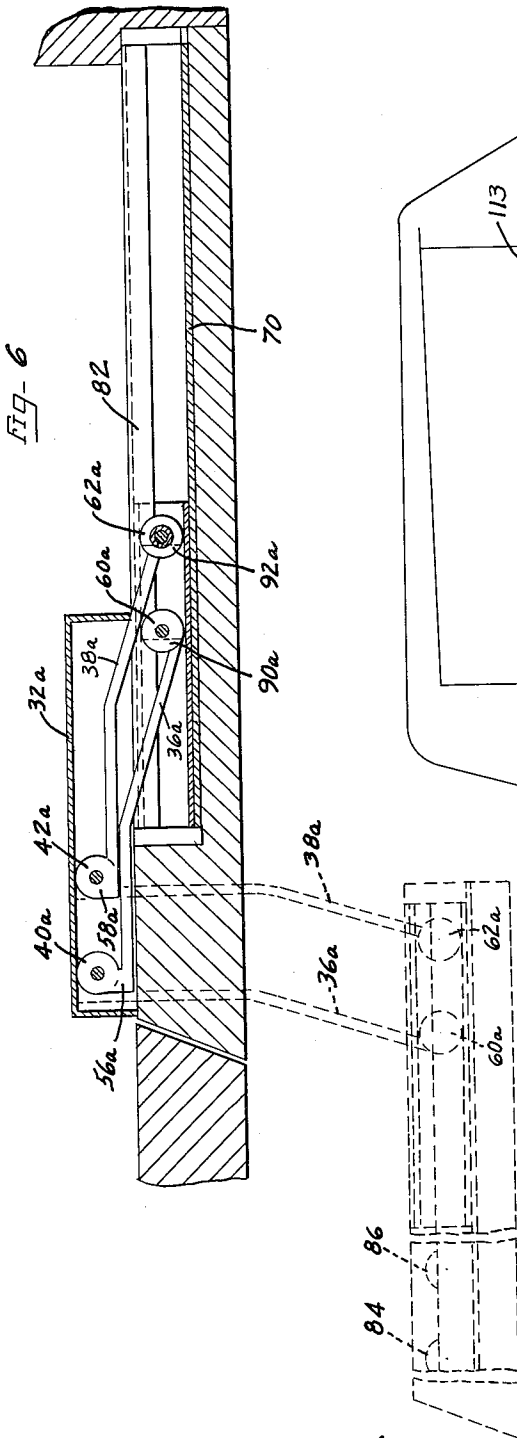

Fig. 6

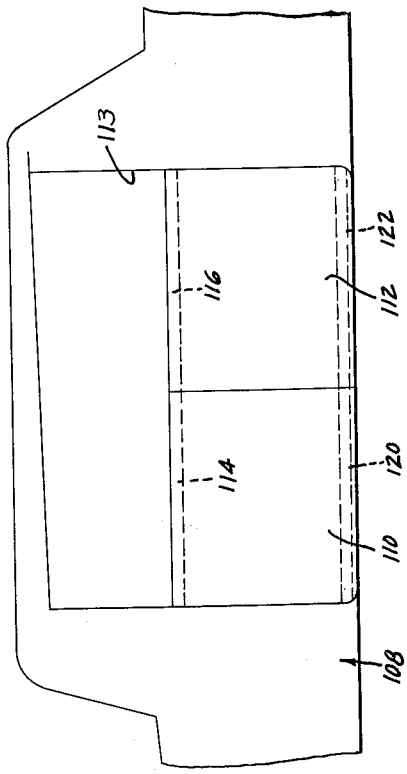

Fig. 7

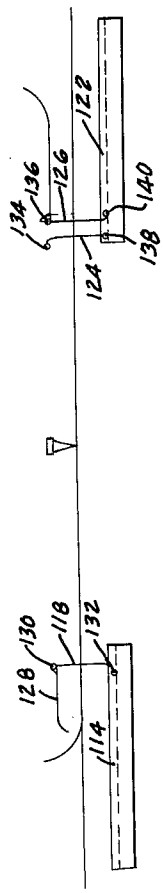

Fig. 8

Inventor
Alfred F. Schimek

by Hill, Sherman, Meroni, Gross & Simpson Attys.

United States Patent Office 3,051,999 Patented Sept. 4, 1962

3,051,999

DOOR MOUNTING

Alfred F. Schimek, 601 N. Spring Ave., La Grange Park, Ill.

Filed Oct. 13, 1959, Ser. No. 846,186
3 Claims. (Cl. 20—16)

This invention relates to door mountings, and more particularly to a door mounting for slidably and pivotally mounting a door or other closure for selective movement between a closed position and an open position which is substantially parallel to the closed position.

The present invention is a continuation-in-part of my copending application, Serial No. 842,781, filed September 28, 1959, now Patent No. 3,019,492, issued February 6, 1962 and similarly provides for opening of a door or closure by pivoting it outwardly of the door opening therefor and then sliding the door in parallel relation to its initial position, closing of the door being accomplished in the reverse manner, whereby full use of the door opening is afforded and very little space is required to accommodate the movement of the door.

In accordance with the invention a pair of arms are pivotally connected to one side of a door frame or jamb in laterally fixed relation thereto, and are pivotally connected at their outer ends to the door for slidable movement along a track secured across the door. This construction eliminates the use of the track across the door frame which was utilized with my said copending application, and further increases the amount of space available at the door opening as a result of the elimination of the arm slidable in the track across the door frame. Thus, in one embodiment of the invention, the door mounting may be used with a car door or doors so that the mounting is positioned at the bottom of the door jamb; and a single arm may be used if desired at the midpoint of the jamb. Thus, where two car doors are used on each side of the car, i.e., in a sedan, the entire door space may be available and the doors in their closed positions may be disposed in abutting relationship at their inner edges.

Accordingly, it is an object of the present invention to provide a door mounting which is exceptionally simple and economical in construction and which may be used in a variety of applications with complete reliability.

Another object of the invention is to provide a door mounting as described which permits the entire door opening to be used, as compared with previous sliding door constructions in which the door occupied at least a portion of the opening even in its open position.

Another object of the invention is to provide a door mounting as described wherein a pair of door mounting arms may be pivotally and fixedly secured at a desired vertical location on a door jamb for giving rugged support to a door slidably connected with the outer ends thereof.

Other objects and advantages of the invention will become apparent as the description proceeds in accordance with the drawings in which:

On the drawings:

FIGURE 1 is a front elevational view of a door structure utilizing the door mounting of the present invention;

FIGURE 2 is a horizontal sectional view of a door mounting shown in operative relation with a single door structure;

FIGURE 3 is a view corresponding to the view of FIGURE 2 but shown in operative relation to a single door structure;

FIGURE 4 is an enlarged fragmentary vertical section of a slidable connection for a door in accordance with the invention;

FIGURE 5 is an enlarged, fragmentary vertical sectional view of a slidable connection for another arm and a pivotal, fixed connection therefor;

FIGURE 6 is a horizontal vertical sectional view of another embodiment of the door mounting of the invention;

FIGURE 7 is a side elevational view in schematic form of a door mounting structure in accordance with the invention in association with the doors of an automotive vehicle; and

FIGURE 8 is a diagrammatic top plan view of the doors of FIGURE 7 in opened position.

As shown on the drawings:

Referring now to the drawings, FIGURE 1 shows a pair of doors **10** and **12**, each having upper and lower door mounting structures **14** and **16** and **18** and **20** formed in accordance with the present invention. However, the invention permits the use of the door mounting means **14** through **20** in any desired location vertically on the doors **10** and **12**, as hereinafter described, and also eliminates the use of door mounting arms on both sides of the doors **10** and **12** so that an increase in available space is afforded.

Referring now to FIGURES 2 through 5, a single door structure **22** is shown pivotally and slidably supported in a door frame **24** by a door mounting **26** according to the invention. Although the door mounting **26** is illustrated as being positioned at the bottom of the door structure **22**, it will be appreciated that it may also be positioned at other vertically spaced positions, as stated, and may be used in conjunction with a similar vertically spaced door mounting, using either a pair of arms or a single arm, as shown in the construction of FIGURE 1.

The door mounting **26** preferably includes a door mounting bracket structure **28** which may have a Z-shaped configuration cross sectionally as shown in FIGURES 2 and 3 and may have a rearwardly and downwardly turned flange structure **30** for engaging a mounting structure **32** at a lower inwardly extending flange portion **34** thereof as best seen in FIGURE 5.

In accordance with the invention, a pair of support arms **36** and **38** are pivotally mounted within the mounting structure **32** by means of inner bosses **40** and **42** received within a groove structure **44** in the mounting element **32**, and hingedly secured therein by pivot pin elements **46** and **48**. Washer means **50** and **52** may be provided within the groove structure **44** and above and below the pivot bosses **40** and **42**, and in order to accommodate pivotal movement of the arms **36** and **38**, the retaining bracket **28** has an upper depending flange **54** terminating in spaced relation to the said arms. It will be appreciated, however, that variations in the mounting structure for the inner, fixedly and pivotally mounted ends of the arms may be provided in accordance with the invention.

The arms **36** and **38** are secured in laterally proximately spaced relation on one side of the frame **24**, depending upon the convenience to the user, and the bosses **40** and **42** have shoulders **56** and **58** formed integrally therewith for engagement with the rear wall of the groove structure **44** so as to limit outward pivotal movement of the arms to the position shown in dot and dash in FIGURE 2 and in solid lines in FIGURE 3. In order to accommodate the arm **38** adjacent the openings for the door **22**, however, the inner arm **36** may have the shoulder portion **56** thereof formed so as to extend outwardly beyond the boss **40** therefor; and may be directly secured to the shoulder portion to overlie the outer arm **38** when the door is closed, as shown. The outer or free ends of the arms **36** and **38** likewise carry bosses **60** and **62** which are pivotally secured by pivot pins **64** and **66** or the like in a carriage **68** having a relatively elongated dimension and slidably received in a track **70** as hereinafter de-

scribed. The arms 36 and 38 are connected to their outer bosses 60 and 62 by shoulders 72 and 74 similar to the shoulders at the inner ends of the arms, but extending outwardly from the bosses in right angular relation to the arms a relatively great distance in order to afford coaction with the track means and to permit the interfitting relation between the respective arms as also seen in FIGURE 2. In this construction, therefore, the shoulder 74 on the arm 38 extends outwardly a greater distance than the shoulder 72 for the arm 36.

The track 70 is formed with a C-shaped configuration in a preferred embodiment thereof, and has upper and lower vertical flanges 76 and 78 and integral inwardly extending lip flanges 80 and 82 spaced vertically so as to accommodate the respective arms 36 and 38 and their shoulder portions 72 and 74. Thus, the track 70 affords means for maintaining the arms 36 and 38 in predetermined outwardly extending angular relation to the track during slidable movement thereof and for preventing such movement until the said predetermined angular position of the arms is obtained, similar to the means in my said copending application.

The upper lip flange 80 of the track 70 has a cutout recess 84 for receiving the boss 60 of the arm 36 in the closed position of the door shown in FIGURE 2, while the lower lip 82 has a cutout recess 86 for receiving the boss 62 of the arm 38 in the said closed position of the door. The recesses 84 and 86 therefore permit pivotal movement of the arms 36 and 38 from the position of FIGURE 2 shown in solid line, to the position shown in dot and dash, until the shoulders 56 and 58 at the inner ends of the arms abut the rear wall 88 of the groove 44. At such time, the door structure 22 is in position for slidable movement parallel to its initial position; and for this purpose, the boss 60 of the arm 36 defines a semicircular recess 90 for receiving the lip 80, at the upper portion of the track 70, while the boss 62 defines a semicircular recess 92 for receiving the lip 82 at the lower portion of the track 70. Consequently, when the arms are in the position of FIGURE 2 shown in dot and dash, the recesses 90 and 92 will permit the arms to move slidably along the lip flanges 80 and 82, and it will be seen that the double lip flange construction prevents interference with the movement of the bosses along the track which might otherwise be afforded if the cutout portions 84 and 86 were formed in a single lip flange. Additionally, an exceptionally high degree of stability is provided also. However, it will be appreciated that single lip flange constructions are within the scope of the invention, since each of the arms is effective to maintain the angular position of the other during travel along the track.

In the construction shown, each of the bosses 60 and 62 has the end thereof opposite the end in which its recess is formed provided with a substantially cylindrical reduced extension, these extensions being designated by reference numeral 94 with respect to the boss 60 and reference numeral 96 with respect to the boss 62 as seen in FIGURES 4 and 5. Accordingly, the reduced cylindrical extensions 94 and 96 can pass freely along the respective flanges 80 and 82 when the arms are in the outward angular position for travel along the track, while the flanges will prevent pivotal movement of the bosses except when the bosses are aligned with the cutout portions 84 and 86. At such time, the extensions 94 and 96 will offer no resistance to pivotal movement of the arms despite the absence of further cutouts in the flanges 80 and 82 which might be in registration with the cutouts 86 and 84 respectively.

Desirably, the track 70 is formed in the door structure 22 substantially as described in my said copending application, to permit movement of the carriage 68 from its initial position as shown in FIGURE 2 substantially to the end of the door structure 22 opposite the end in which the carriage is initially positioned. However, as a result of the elongated construction of the carriage, which preferably extends slightly beyond the boss 60 and substantially beyond the boss 62 to further stabilize the mounting for the door, the track may have a greater length to afford the fullest extent of movement for the carriage. Preferably, end stop portions 98 and 100 are provided at opposite ends of the track, and the track itself coacts with the carriage to afford slidable movement of the carriage by means of sets of rollers 102 and 104 respectively also as set forth in the said copending application.

Thus, it will be seen that the single carriage 68 for the respective arms 36 and 38 is entirely adequate to afford pivotal and slidable movement of the door between open and closed positions thereof without the need for auxiliary support means at the right hand side of the door structure.

Referring now to FIGURE 6, a second embodiment of the invention is shown wherein similar reference numerals refer to similar parts, and the arms 36*a* and 38*a* are angularly formed so as to permit the bosses 60*a* and 62*a* to be suitably received within the track 70 to accommodate closing of the door, as shown in solid line, while permitting the door to be displaced laterally with respect to the door opening as shown in dot and dash to a somewhat greater extent than in the preceding embodiment. Thus, the bosses 60*a* and 62*a* may be formed without shoulders, and the shoulders 56*a* and 58*a* on the bosses 40*a* and 42*a* at the inner ends of the arms will terminate outward angular movement thereof and place the door in readiness for slidable movement, the double connection between the carriage 68 and the door frame 24 serving to hold the door in parallel to its initial position during such slidable movement. Desirably, of course, the bracket structure 28*a* will be elongated in comparison with the structure 28 to accommodate the angular configuration of the arms 36*a* and 38*a*. It will be appreciated that although the shoulders 60 and 62 of the embodiment of FIGURES 1 through 5 might be dispensed with similarly, the linear formation of the arms 36 and 38 makes such shoulders desirable.

The operation of the embodiment of FIGURE 6 is thus substantially the same as that of FIGURES 1 through 5, and when the arms 36*a* and 38*a* are in the position shown in dot and dash in FIGURE 6, the recessed portions 90*a* and 92*a* in the bosses 60*a* and 62*a* will fit in complementary mating relationship with the flange structures 80 and 82 of the track 70 and permit the aforementioned slidable movement of the door structure relative to the frame without interference from the lip flanges, once the bosses have turned in the flange cutouts 84 and 86 from closed position to the predetermined angular position determined for affording such slidable movement.

Referring now to FIGURES 7 and 8, the door mounting of the invention is shown in conjunction with a vehicle 108 having doors 110 and 112 mounted in a door opening 113 so that their inner edges are in abutting relation in the closed position thereof, but which permit the entire opening to be utilized in the opened position thereof as seen in FIGURE 8. Thus, the doors 108 and 110 are desirably provided with upper tracks 114 and 116 respectively adapted for use with single door mounting arms in accordance with the invention, as designated by reference numeral 118 in FIGURE 8; and are provided with a pair of door mounting arms for use with lower tracks 120 and 122 which are designated by reference numerals 124 and 126. The tracks 120 and 122 at the bottom of the doors are substantially as described in the preceding embodiments. The arms 118 for the upper tracks 114 and 116 are fixedly and pivotally connected to the door frame or jamb 128 by a boss 130, while the outer end boss 132 thereof may be pivotally engaged in a suitable carriage structure as described with respect to my said copending application for slidable movement along a lip or flange in the tracks (not shown), which may be cut away to permit pivotal movement of the boss. The inner bosses 134 and 136 on the lower arms 124 and 126 are

suitably mounted for pivotal movement relative to the frame, and the outer bosses 138 and 140 thereof are recessed for cooperative slidable movement with respect to a double lip flange structure (not shown) in the tracks 120 and 122 and are pivotally secured in a relatively elongated carriage therein also as hereinafter set forth.

It will be seen that the door mounting of FIGURES 7 and 8 thus affords unusual ease of entry and exit with respect to a vehicle such as the sedan 108, as well as reducing the amount of space required for opening and closing the doors. Additionally, the fact that the mountings may be positioned in a suitable location at the sides of the door opening permits doors of less than full height to be used; and installation is markedly simpler than with previously available constructions.

The double door structure of FIGURE 1 provides similar advantages in permitting the door opening to be utilized to the fullest extent, as stated, and thus is exceptionally desirable for hospitals and the like, since beds and other equipment can be moved through the opening without interference of the type produced by the traditional sliding doors, or swinging doors.

Although I have herein set forth and described my invention with respect to certain specific principles and details thereof, it will be understood by those skilled in the art that these may be varied without departing from the spirit and scope of the invention as set forth in the hereunto appended claims.

I claim as my invention:

1. In combination with a wall structure having a door opening and a door for closing said door opening and means supporting said door for pivotal and slidable movement parallel to the door opening including a pair of arms, means pivotally securing said arms to said wall structure at one side of said door opening and in laterally proximate relation to one another, a track on said door slidably and pivotally engaging said arms, means on said arms limiting outward pivotal movement thereof to a predetermined extent whereby the door may be pivotally moved from the door opening and slidably moved past the door opening, and means preventing pivotal movement of said arms relative to said track except at a predetermined location of said arms on said track including a boss on the end of each of said arms engaging said track, one of said bosses having an upper recess and the other of said bosses having a lower recess, an upper flange in said track and a lower flange in said track, said recesses receiving said flanges when the arms are in an outward pivotal position determined by said limiting means, said flanges each having a cutout portion for pivotally receiving one of said bosses when the door is in register with said door opening.

2. A door mounting comprising a pair of arms,

a track having upper and lower flanges,

a carriage slidably received in said track,

said upper and lower flanges each having a cut-out portion,

the cut-out portions of the respective flanges being proximately laterally spaced,

and a boss on each of said arms pivotally mounted in the carriage and having a recess for slidable engagement with one of said flanges at a predetermined position angularly of said arms,

said bosses being constructed to pivot within said cut-out portions of said flanges when said arms are located at a predetermined location relative to the track such as to position the bosses within said cut-out portions of said flanges.

3. In combination with a closure structure and a wall structure having an opening closable by said closure structure,

a closure mounting connecting said closure structure to said wall structure in supporting relationship and including,

a track secured horizontally to said closure structure,

a pair of proximately horizontally spaced arms each having one end fixedly and pivotally secured to said wall structure and another end engaged in said track, and

said other ends of said arms and said track together forming means to permit angular movement of the closure structure from closed to open position at a predetermined location of said arms relative to said track while preventing slidable movement of said closure structure on said arms until a predetermined extent of angular movement of said arms outwardly of said wall structure is achieved,

said means including a carriage for said other ends of said arms movable in said track and said other ends of said arms each having a boss in said carriage,

said track having a pair of vertically displaced flanges each with a cut-out portion and said bosses each being configured to cooperate with a single cut-out portion to permit said angular movement of said arms, and having a recess for receiving a flange when the predetermined extent of angular movement of the arms is achieved.

References Cited in the file of this patent

UNITED STATES PATENTS

1,514,115	Whitney	Nov. 4, 1924
1,786,505	Phillips	Dec. 30, 1930
2,067,798	Songer	Jan. 12, 1937
2,956,836	James et al.	Oct. 18, 1960

FOREIGN PATENTS

389,061	Great Britain	May 28, 1931