Nov. 29, 1932. J. G. STODDARD 1,889,159

DEVICE FOR OPERATING AND CONTROLLING FOLDING DOORS

Filed April 18, 1931 2 Sheets-Sheet 1

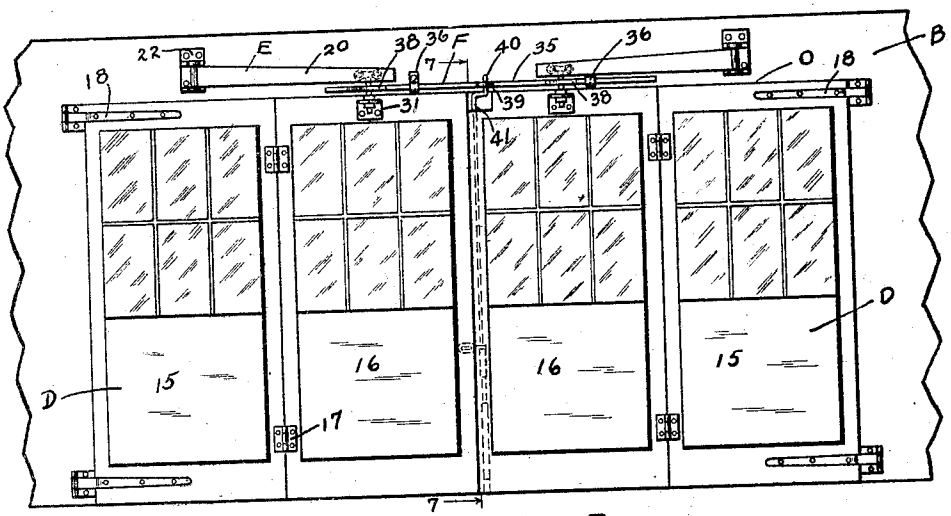


Fig. 1

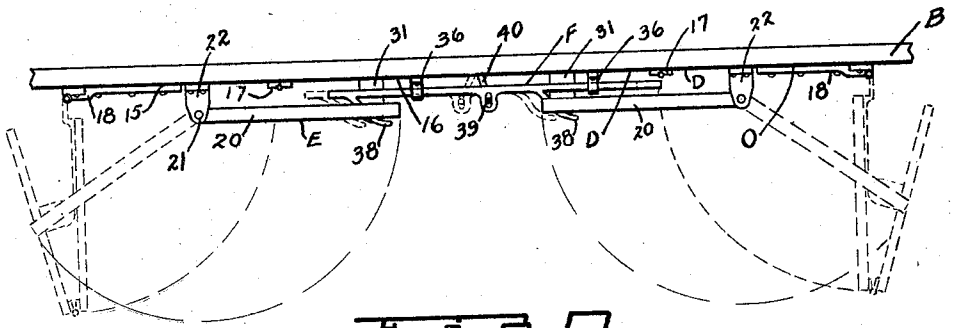


Fig. 2

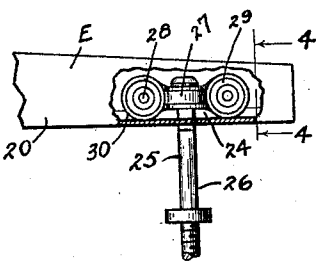


Fig. 3

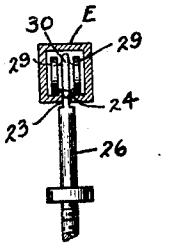


Fig. 4

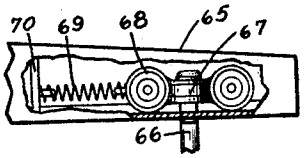


Fig. 5

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DEVICE FOR OPERATING AND CONTROLLING FOLDING DOORS

Filed April 18, 1931 2 Sheets-Sheet 2

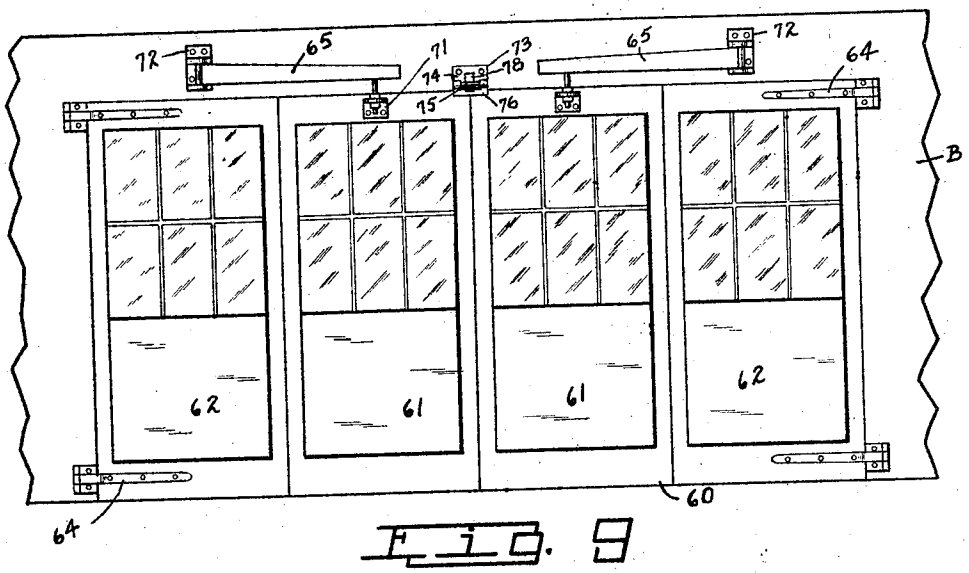


Fig. 9

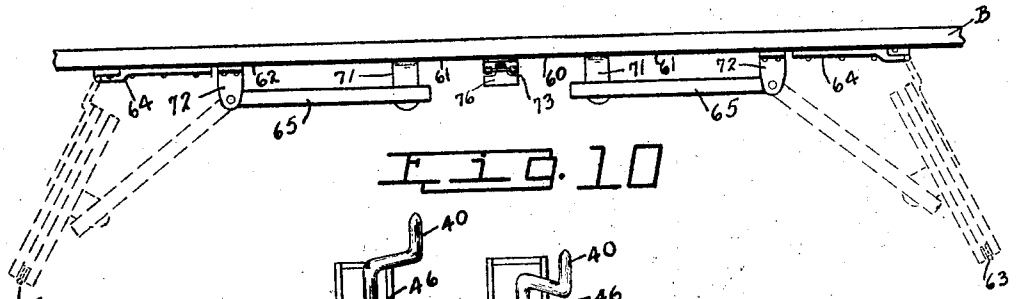


Fig. 10

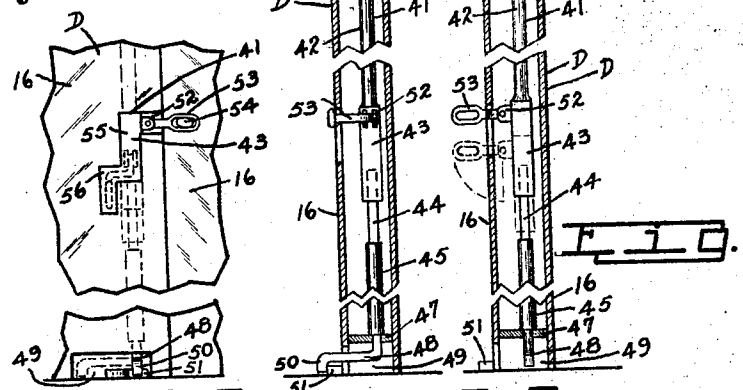


Fig. 6

Fig. 7

Fig. 8

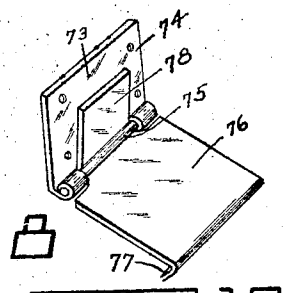


Fig. 12

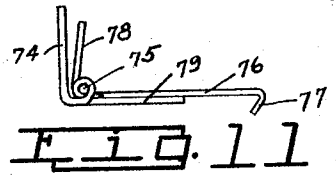


Fig. 11

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1,889,159

UNITED STATES PATENT OFFICE

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DEVICE FOR OPERATING AND CONTROLLING FOLDING DOORS

Application filed April 18, 1931. Serial No. 531,183.

This invention appertains to doors or other closures of the folding type and of the character particularly adapted for use in public or private garages, factories, warehouses, and the like, and so constructed as to permit opening and closing of the doors by manual, mechanical or electrical means.

One of the primary objects of my invention is to provide novel means for operating and controlling doors of the folding type above referred to, whereby the same will be held secured against unauthorized persons and firmly held closed against rattling in wind storms and the like.

Another important object of my invention is the provision of novel means for operating the locking structure, so that the said locking structure can be quickly and easily actuated and with the expenditure of a minimum amount of effort.

A further salient object of my invention is the provision of novel means for guiding the doors during the opening and closing movement, whereby the doors can be quickly and properly swung both to their open and closed position and whereby the doors will have a tendency to be held in both their open and closed positions.

Another important object of my invention is the provision of a novel locking mechanism for cooperating with the guide means for the swinging and folding doors, whereby the guide means will be engaged by said locking mechanism, when the locking mechanism is in its operative position, so as to positively hold the doors in their closed position.

A further object of my invention is the provision of a novel guide track and hanger structure in the guide mechanism for the swinging doors, said guide tracks and hanger structure acting to properly guide and hold the doors during the opening and closing movement.

A still further object of my invention is to provide an improved device of the above character, which will be durable and efficient in use, one that will be simple and easy to manufacture, and one which can be placed upon the market at a reasonable cost.

With these and other objects in view, the invention consists in the novel construction, arrangement and formation of parts, as will be hereinafter more specifically described, claimed, and illustrated in the accompanying drawings, in which drawings;—

Figure 1 is a front elevation showing my improved operating and controlling mechanism applied to a pair of folding and swinging doors.

Figure 2 is a top plan view of my operating and controlling mechanism applied to a pair of folding, swinging doors, the swinging and locking mechanism being shown in full lines in their locked position, and in dotted lines in their unlocked position.

Figure 3 is a fragmentary detail view in side elevation illustrating my improved guide tracks and hanger brackets forming a part of the guiding mechanism for the doors.

Figure 4 is a detail transverse section taken through the guide tracks on the line 4—4 of Figure 3 looking in the direction of the arrows.

Figure 5 is a detail fragmentary view illustrating a slightly modified form of my hanger and track mechanism, which is particularly adapted for use in conjunction with another form of my device.

Figure 6 is a fragmentary elevation looking from the inside of the doors showing a part of my locking mechanism and operating device therefor.

Figure 7 is a vertical section taken on the line 7—7 of Figure 1 looking in the direction of the arrows illustrating a part of my locking mechanism and operating device therefor, the locking mechanism being shown in its locked operative position.

Figure 8 is a similar view showing the locking mechanism in its inoperative position for permitting the opening of the door.

Figure 9 is a front elevation showing a modified form of my device applied to a pair of swinging folding doors.

Figure 10 is a top plan view of the modified form of my device showing the same applied to a pair of swinging and folding doors.

Figure 11 is an enlarged detail side elevation of the latch utilized in conjunction with the modified form of my invention, and

Figure 12 is a detail perspective view of the said latch.

Referring to the drawings in detail, wherein similar reference characters designate corresponding parts throughout the several views, the letter B indicates a building, which can be considered of any character, or type, such as a garage, factory, or the like, having enlarged door opening O which can be closed by a pair of swinging and folding doors D. As shown, each pair of doors D include an outer section 15 and an inner section 16 connected together by means of hinges 17 at their adjacent edges. The inner door sections 16 of the pair of doors D are adapted to abut when the pair of doors are in their closed position. The outer door section 15 of each pair of doors are connected to the building B by means of strap hinges 18.

As heretofore intimated, my invention embodies novel means for facilitating the opening and closing of the doors, which means is generally indicated by the reference character E, and novel locking mechanism which is generally indicated by the reference character F.

My improved guiding mechanism E for facilitating the opening and closing of the doors comprises swinging arms 20, which are connected by means of pivot pins 21, with supporting brackets 22, which are connected with the building B directly above the door opening O thereof. As clearly shown there is a pivoted arm 20 on each side of the transverse center of the door opening, so that a guide arm is provided for each door of the pair of doors.

The arms 20 are of novel construction and are in the nature of guide tracks, as can be readily seen by referring to Figures 3 and 4 of the drawings. Thus, the guide arms 20 are of hollow construction and are provided with a longitudinal guide slot 23 in their lower face and the walls of the guide slots can be struck inwardly to provide flared guide flanges 24, for a purpose which will be now described.

Slidably mounted within the hollow guide arms are the novel hanger brackets 25, each of which comprises a depending shank 26, which extends through the guide slots 23 in the arms. The upper end of the shank 26 is swivelly mounted within a supporting bracket 27, which extends outwardly from the opposite sides of the shank. The ends of the brackets 27 support pivot pins 28, on which are rotatably mounted the side rollers 29. These side rollers 29 engage the inner face of the lower wall of the hollow arm 20 and abut against the guide flanges 24, heretofore referred to. The brackets 27 between the rollers 29 can be provided with a circular head 30 which can fit directly within the guide slots between the flanges 23. The lower end of the shank 26 can be pivotally connected in any desired way to angle door brackets 31 which are bolted or otherwise secured to the inner door sections 16. From the description so far, it can be seen that each inner door section 16 carries a door bracket 31, and that the door bracket is connected to the novel hanger 25 which is in turn mounted on rollers within the hollow guide arms 20.

Thus, when the inner door sections 16 are swung outwardly the same will swing on the hinges 17 and fold against the outer door sections 15 and at the same time the door sections 15 will be swung open. This movement is transmitted to the door sections 15 and 16 through the medium of the hollow swinging guide arms 20 and the hanger brackets 25.

Referring to my improved locking mechanism F, the same embodies a novel locking or shuttle latch bar 35. This bar is mounted for sliding movement in supporting U-shaped guide brackets 36 secured to the building B directly above the door opening O. The outer face of the bar 35 on each side of its transverse center is provided with arcuate latch arms 38, which are adapted to be moved into and out of engagement with the shanks 26 of the hangers 25 and it is obvious that when the arcuate latch arms 38 are in engagement with said shanks 26 that the doors will be prevented from opening movement. Directly at the transverse center of the bar 35 I provide an elongated eye or guide loop 39, which receives the sharpened angular end 40 of the lock operating mechanism 41.

This lock operating mechanism 41 embodies a rotatable and a vertical sliding section 42, which section carries the angular end 40. The lower end of the section 42 is provided with a sleeve 43 having a polygonal bore, which is slidably mounted on a polygonal shank 44 of the lower rod section 45.

The sections 41 and 45 are in direct vertical alignment and are rotatably mounted in upper and lower bearing plates 46 and 47 carried by one inner door section 16, it being understood that the upper rod section 41 also has sliding movement. The extreme lower end of the lower rod section 45 is provided with a crank arm 48 which extends through a slot 49 formed in the inner face of the inner door section 16. The lower end of the crank 48 is provided with a depending latch arm 50, which is adapted to be swung into and out of locking engagement with a combined door stop and keeper plate 51.

The sleeve 43 has formed thereon or secured thereto a pair of pivot ears 52 to which is pivotally connected an operating handle 53, which is in the nature of a hasp for movement over a staple 54 carried by the adjacent inner door section 16 of the other door. The door section 16 carrying the rod sections 41 and 45 is provided with a vertical slot 55 having a lateral offset lower end 56 and the operating handle 53 normally projects through said slot. Normally, when the

pair of doors are in their closed position and the locking mechanism is in its operative locked position the operating handle and hasp 53 is swung over the staple 54 and is secured in place by a padlock. The locking arm 50 at this time is in engagement with the combined door stop and keeper 51 and the shuttle bar 35 is in its locked position when its arms 38 are in engagement with the shank 26 of the hanger. Thus the doors are firmly engaged and locked.

When it is desired to open the doors the padlock (not shown) is removed from the staple and the combined hasp and handle 53 is rotated a quarter of a turn, which rotates the rod sections 41 and 45 in their bearings. This swings the upper crank arm 40 and the lower crank arm 48 a quarter of a turn and moves the latch arm 50 from out of engagement with the combined door stop and keeper 51. The swinging movement of the upper crank or offset pin 40, which is received with the loop or eye 39 of the latch bar 35, slides the latch bar 35 in its guides 36 and moves the arcuate latch arms 38 from out of engagement with the shanks 26 of the hangers 35. The handle 53 is now pushed downward which slides the upper rod section 41 on the polygonal portion 44 of the lower rod section 45 and moves the offset pin or crank 40 from out of engagement with the loops or eye 39 of the latch bar. The pair of doors are now free for swinging opening movement. The combined handle and hasp 53 can be swung on the pivot ears 52 downward so as to lie within the lateral offset portion 56 of the slot 55, so as to be out of the way and against injury.

When it is desired to lock the doors the pair of doors are moved to their closed position which will move the lateral offset pin 40, or crank, under the eye or loop 39 of the latch bar 35 and the combined handle and hasp 53 is pushed upwardly, which will move the said pin or crank 40 within the eye. The crank is now given a quarter of a turn to the right, referring to Figure 6 of the drawings, which will shift the lock bar 35 to the right (see Figure 1 of the drawings). This will move the latch arms 38 into engagement with the shanks 26 of the hanger brackets 25 and the latch arm 50 into engagement with the combined door stop and keeper plate 51.

It is obvious from the foregoing that I have provided an exceptionally simple and durable form of locking mechanism for double swinging folding doors for operating in conjunction with novel guide mechanism for said doors.

My invention is capable of modification and in Figures 9 to 12 inclusive I have shown another form of my invention, in which I eliminate the locking or latching mechanism heretofore referred to.

Referring to Figs. 9 to 12 more specifically, it can be seen that I have provided double swinging doors 60 and that each door of the pair of double doors 60 includes inner sections 61 and outer sections 62. The meeting edges of the inner and outer sections 61 and 62 are connected together by means of suitable hinges 63. The outer sections 62 are connected to the door opening jambs by means of strap hinges 64. The door sections 61 and 62 are guided in their opening and closing movement by means of novel swinging guide arms 65, which are similar in their nature to the guide arms 20. The guide arms 65 are also of hollow construction and can be seen by referring to Figure 5 of the drawings. The lower walls of the hollow arms are provided with longitudinal slots through which extend shanks 66 of hanger brackets 67. The shanks 66 are swivelly mounted within the brackets and the ends of the brackets carry the guide rollers 68, which engage the lower walls of the brackets. I prefer, as shown in Figure 9, to provide compression coil springs 69 within the hollow guide arms 65, which springs engage an abutment plate 70 arranged in the arms and the hanger brackets 67 between the rollers 68. Thus the springs normally urge the hanger brackets toward the outer ends of the arms. The shanks 66 are swivelly connected to brackets 71 connected to the inner door sections 61. The inner ends of the arms are pivotally connected to brackets 72 bolted or otherwise secured to the building above the door opening. In this form the inner door sections 61 are adapted to swing flat against the inner face of the outer door section 62 and are guided in their movement by means of the hanger brackets 67 and the hollow guide arms 65.

I provide a latch 73 to work in conjunction with the power operating door and this latch comprises a vertically disposed attaching plate 74, which is bolted or otherwise secured to the building directly above the doors at the point of the meeting of said double doors. This attaching bracket 74 has connected thereto by means of a pintle 75 the swinging latch plate 76 and the outer edge of the swinging latch plate is bent downwardly and inwardly to provide abutting flange 77. The movement of the doors is such as to slide under and away from the swinging latch plate 76 in the opening movement, but it can be seen that during the closing of the doors if the doors engage the depending flange 77 that the latch plate will be swung upwardly. The latch plate will resist any direct outward thrust of the doors, until outward swing of doors takes place. An ear 78 is formed on the latch plate 76 and limits the upward swing thereof, while an ear 79 on the attaching plate 74 limits the downward swing thereof.

It is obvious that the doors shown in Figures 9 and 10 can be modified so as to permit

the same to swing in a horizontal plane, so that the doors can be arranged in overhead position if desired. In this instance the hollow guide arms 65 are disposed on each side edge of the doors.

Changes in details may be made without departing from the spirit or the scope of my invention, but;

What I claim as new is:

1. The combination with a pair of swinging, folding doors including pivoted guide arms arranged above the doors and hanger brackets secured to the doors slidably mounted within the guide arms, of a locking device for said doors including a latch bar mounted for movement into and out of locking engagement with the hanger brackets.

2. The combination with a pair of folding, swinging doors including swinging guide arms and door carried hanger brackets engaging the arms, of a locking device for said doors including a sliding latch bar, means slidably supporting said latch bar, and means for moving the latch bar into and out of locking engagement with the hanger bracket.

3. The combination with a pair of folding, swinging doors including swinging guide arms mounted above the doors and door carried hanger brackets engaging the arms, the brackets having shanks, of a locking device for said doors including a sliding latch bar, means for slidably supporting the bar above the door, arcuate latch arms formed on the bar, and means for sliding the latch bar for moving the latch arms into and out of locking engagement with the shanks of the hanger brackets.

4. The combination with a pair of folding, swinging doors including swinging guide arms mounted above the doors and door carried hanger brackets engaging the arms having shanks swivelly connected with said doors, of a locking device for said doors including a sliding latch bar, means for slidably supporting the bar, arcuate latch arms formed on the bars, and means for sliding the latch bar to move the latch arms into and out of locking engagement with the shank of the brackets, said last named means embodying a rotatable door carried crank.

5. The combination with a pair of folding, swinging doors including swinging guide arms mounted above the doors and door carried hanger brackets engaging the arms having shanks swivelly connected with said doors, of a locking device for said doors including a sliding latch bar, means for slidably supporting the bar, arcuate latch arms formed on the bar, means for sliding the latch bar to move the latch arms into and out of locking engagement with the shank of the brackets, said last named means embodying a rotatable door carried crank, and means for raising the door carried crank into and out of operative engagement with the sliding latch bar.

6. The combination with a pair of folding, swinging doors including hollow swinging guide arms mounted above the doors and door carried hanger brackets including rollers slidably mounted in the hollow arms and depending swivel shanks connected with the doors, of a locking device for said doors including a sliding latch bar having arcuate latch arms, arranged in the path of the shanks, and means for moving the latch bar to bring the latch arms into and out of locking engagement with the shanks of the brackets.

7. The combination with a pair of folding, swinging doors, of a combined door stop and keeper plate, and a rotatable door carried crank for movement into and out of engagement with the combined door stop and keeper plate.

8. The combination with a pair of folding swinging doors including swinging guide arms mounted above the doors and door carried hanger brackets engaging the arms, a locking device for said doors having a rotatable rod carried by one door including upper and lower sections, one section being slidable relative to the other section, a combined operating handle and hasp connected with the sliding section, a staple carried by the other door section for receiving the hasp, a sliding latch bar mounted above the doors having means for engaging the brackets, a crank formed on the sliding section having operative engagement with the latch bar, whereby upon rotation of the rod said means on the latch bar can be brought into and out of locking engagement with the hangers, the crank being arranged below and out of engagement with the latch bar when in its lowered position on its other section.

9. The combination with a pair of folding, swinging doors including swinging guide arms and door carried hanger brackets engaging the arms, of a locking device for said doors including a sliding latch bar, arcuate latch arms on said bar for engaging the hanger brackets, means for slidably supporting the latch bar above the door, and means for moving the latch bar and its arms into and out of locking engagement with the hanger brackets, said means including a loop on the latch bar, a rod rotatably carried by one door having an upper section and a lower section, the lower section being slidable relative to the upper section and rotatable therewith, a crank on the upper end of the sliding section movable into and out of engagement with the loop, and a handle on the rod for facilitating the rotation thereof for sliding the latch bar in its supporting means.

10. The combination with a pair of folding, swinging doors including swinging guide arms and door carried hanger brackets en-

gaging the arms, of a locking device for said doors including a sliding latch bar, arcuate latch arms on said bar for engaging the hanger brackets, means slidably supporting the latch bar above the door, means for moving the latch bar and its arms into and out of locking engaging with the hanger brackets, said means including a loop on the latch bar, a rod rotatably carried by one door having an upper section and a lower section, the lower section being slidable relative to the upper section and rotatable therewith, a crank on the upper end of the sliding section movable into and out of engagement with the loop, a handle on the rod for facilitating the rotation thereof for sliding the latch bar in its supporting means, said handle being pivoted to the rod and including a hasp, and a staple carried by the other door for receiving the hasp.

11. The combination with a pair of folding, swinging doors including swinging guide arms and door carried hanger brackets engaging the arms, of a locking device for said doors including a sliding latch bar, arcuate latch arms on said bar for engaging the hanger brackets, means slidably supporting the latch bar above the door, means moving the latch bar and its arms into and out of locking engagement with the hanger brackets, said means including a loop on the latch bar, a rod rotatable carried by one door having an upper section and a lower section, the lower section being slidable relative to the upper section, and rotatable therewith, a crank on the upper end of the sliding section movable into and out of engagement with the loop, a handle on the rod for facilitating the rotation thereof for sliding the latch bar in its supporting means, said handle being pivoted to the rod and including a hasp, and a staple carried by the other door for receiving the hasp, a combined door stop and keeper arranged in the path of the doors, and a crank on the lower rod section for movement into and out of engagement with the plate upon the turning of said rod.

12. The combination with a pair of folding, swinging doors including swinging guide arms and door carried hanger brackets engaging the arms, of a locking device for said doors including a sliding latch bar, arcuate latch arms on said bar for engaging the hanger brackets, means slidably supporting the latch bar above the door, means moving the latch bar and its arms into and out of locking engagement with the hanger brackets, said means including a loop on the latch bar, a rod rotatably carried by one door having an upper section and a lower section, the lower section being slidable relative to the upper section, and rotatable therewith, a crank on the upper end of the sliding section movable into and out of engagement with the loop, a handle on the rod for facilitating the rotation thereof for sliding the latch bar in its supporting means, said handle being pivoted to the rod and including a hasp, a staple carried by the other door for receiving the hasp, a combined door stop and keeper arranged in the path of the doors, a crank on the lower rod section for movement into and out of engagement with the plate upon the turning of said rod, the door carrying the rod having a slot therein for receiving the handle when the latch bar is in its inoperative unlocked position.

13. The combination with a pair of folding, swinging doors including an outer door section and an inner door section hingedly connected together, of means for guiding the door sections during their opening and closing movement including a swinging hollow arm mounted above the door sections, a hanger bracket slidably mounted in the hollow arm, a shank forming a part of said hanger bracket swivelly connected with the outer door section and a spring means normally urging the hanger brackets toward one end of the arm.

In testimony whereof, I affix my signature.

JOHN GREGORY STODDARD.