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DOOR.

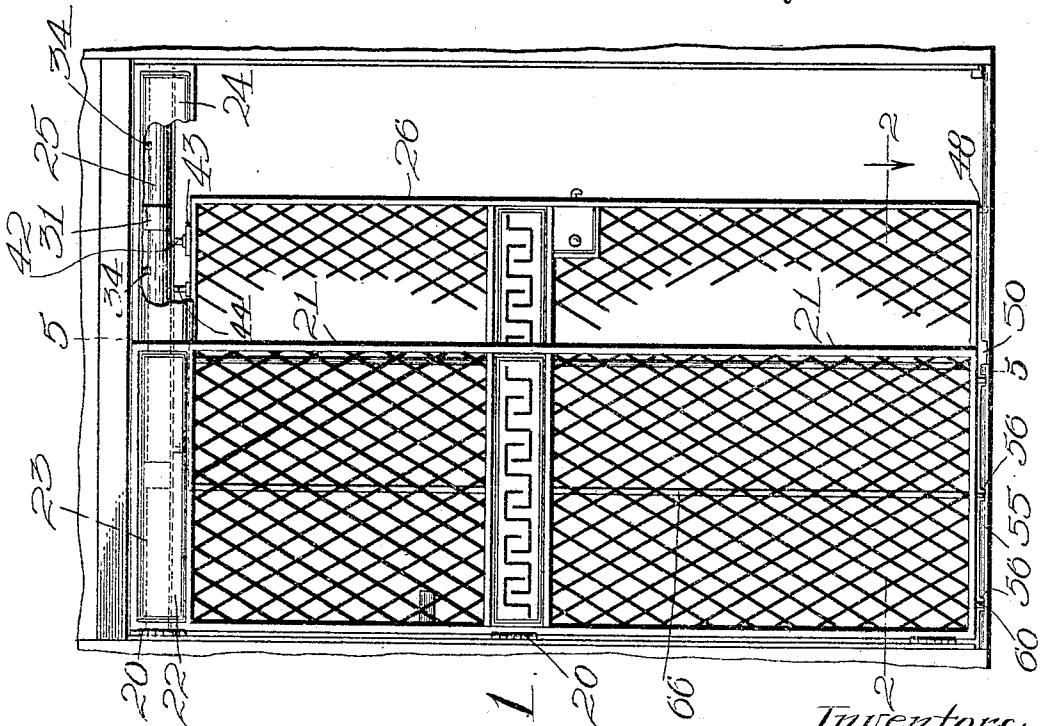
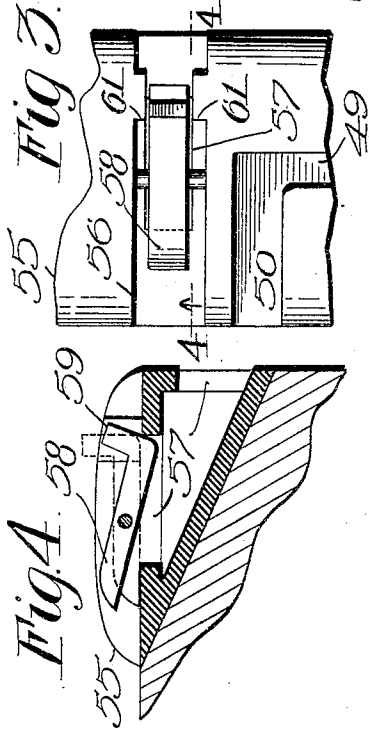
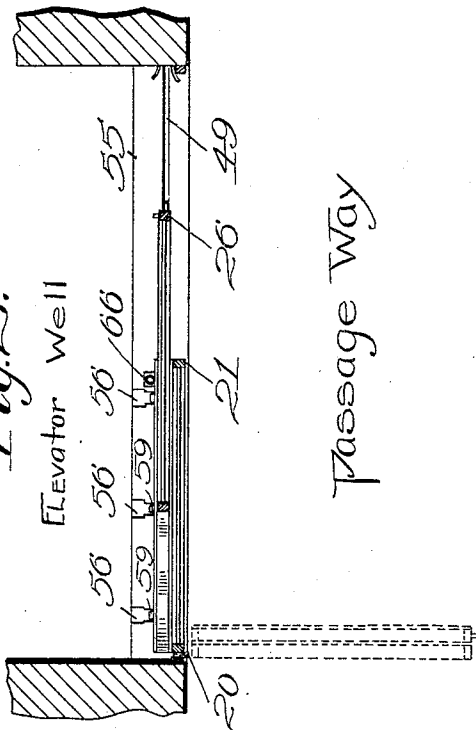
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2 SHEETS—SHEET 1.

940,294.

Fig. 2.



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Fig. 1.

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UNITED STATES PATENT OFFICE.

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DOOR.

940,294.

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To all whom it may concern:

Be it known that we, ALBERT A. WHEELER, MARTIN V. HASKINS, and ALBERT HARRY WHEELER, citizens of the United States, all residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Door, of which the following is a specification.

This invention relates to a multiple door, gate or closure which is capable of general use, but is particularly adapted for elevator wells.

The principal objects of the invention are to provide a simple and inexpensive multiple door of such construction that it can be set up without material modification of the door casing or surrounding grille work, and that it will be possible to open it in such a way as to leave wholly unobstructed the entire width of the opening in a wall or partition normally closed thereby and will leave the door when open in such position as to afford a minimum obstruction of the neighboring passage way even when the floor space in front of the doors is narrower than the width of the space closed by the doors. This is accomplished, broadly speaking, by the provision of a swinging door and one or more sliding doors cooperating therewith, the swinging door having a track thereon and the frame of the door-opening having a fixed track thereon for the sliding door so that the fixed track will register with the swinging track when the swinging door is closed.

Further objects of the invention are to provide for either temporarily or permanently locking the sections of the tracks together, and also for locking the swinging door in closed position so that it will remain closed until the sliding door has been pushed along until supported by the tracks on the swinging door, some of these means being automatic and others manually operated; to provide means whereby adjustment is easily made to secure direct alinement of the sections of track; to provide locking device whereby it will be impossible to accidentally derail the sliding door from the swinging door when the latter is open; to provide an automatic stop for the swinging door of such character that it will not project above the threshold; to provide in combination therewith a convenient passage-way for the dirt from the threshold and floor; to pro-

vide improvements in the construction of means for guiding the sliding doors, for supporting the sliding door from the tracks and in the means for supporting the tracks themselves; and to provide various improvements in the details of construction which will appear hereinafter.

Reference is to be had to the accompanying drawings, in which—

Figure 1 is a front elevation of an elevator well door constructed in accordance with this invention; Fig. 2 is a sectional view of the same on the line 2—2 of Fig. 1; Fig. 3 is a plan of a portion of the threshold showing an automatic stop for the door; Fig. 4 is a sectional view of the same on the line 4—4 of Fig. 3; Fig. 5 is a sectional view on the line 5—5 of Fig. 1 on enlarged scale; Fig. 6 is an elevation partly in longitudinal section of a portion of the mechanism shown in Fig. 1; Fig. 7 is a plan partly in horizontal section on the line 7—7 of Fig. 6, showing a preferred form of carriage for supporting the door; Figs. 8 and 9 are side views of two elements thereof; Fig. 10 is a plan of a wheel thereof; Fig. 11 is a fragmentary side view of part of the sliding door; Fig. 12 is a fragmentary side elevation of part of the doors; Fig. 13 is a plan of the connection between the two track sections; Fig. 14 is a sectional view of the bottom of the door showing the locking device therefor. Fig. 15 is a horizontal section of a modified form of carriage; Fig. 16 is a plan of a locking plate therefor; Fig. 17 is a horizontal section of another modification, and Fig. 18 is a sectional view of a modification of the track.

In order to accomplish the objects elsewhere indicated herein, the casing surrounding the door opening is shown as provided with hinges 20 on which a swinging door 21 is mounted in the ordinary way. On this door is a header 22, at the back of which is a track section 23 which of course swings with the door. Matching the header 22 is a stationary header 24 behind which is a second track section 25 which is fixed in position. Mounted in a manner which will be described hereinafter to move along said track sections is a sliding door 26 the bottom of which is guided by ways 27. In the ordinary use of the door it is intended that the swinging door 21 shall be closed and locked, and that the sliding door shall be used for

ordinary purposes in the same way that sliding doors are used at the present time on many types of elevator wells. But as in most constructions a sliding door can be of only half the width of the available space, by providing a track on the swinging door on which the sliding door can run it will be seen that the size of the available opening can be doubled.

In order to provide for accomplishing this result, these parts are preferably constructed in the following way: While the objects of this invention may be attained by using any form of track commonly used for such purposes and adapted for carrying sliding doors of the nature described, a preferred form of track section having many advantages over other forms in common use is illustrated in the drawings. Both track sections are shown as of a hollow cylindrical or tubular form so constructed that a trolley or other suspending device for the sliding door is carried therein concealed from view. Each track section is provided with a longitudinal bottom opening or slot 29 extending the whole length and provided with integral stiffening ribs 30 extending outwardly and downwardly on both sides thereof and having strengthening collars 31. While the track sections may be fixed in position by the methods commonly employed it is preferred to secure them in such a way that they will readily admit of being laterally adjusted preferably on an arc and each section brought into direct alinement with the other. For this purpose the top part of each track section is provided with a plurality of counter-sunk perforations through which pins or bolts 32 are passed, their heads fitting in the counter-sunk depressions so as to present no obstructions to the passage of a body along the interior of the track. These bolts are suspended from hangers 33, these hangers being mounted on both of the headers above mentioned or in any other convenient place according to circumstances, and constituting supports for the track sections.

In order to provide lateral adjustment for the track sections and to further securely hold them in position one or more pairs of screws 34 are threaded through the hangers so as to come in contact with the track sections on opposite sides of the supporting bolts 32. It will be obvious that the screws and their check nuts assist in holding the tracks and that the angular position of the track sections can be adjusted by loosening those on one side and tightening those on the other.

The meeting ends of the track sections are provided with means for limiting the motion of the swinging sections which is indicated in Fig. 13 in the form of projecting surfaces 280 and the fixed section is pro-

vided also with a fixed stop 28 to limit the motion of the other. In order to prevent the dripping of grease from the slot, the track may have its slot at some other point than the bottom as indicated in Fig. 18 in which the track 230 has a side slot 290.

While the tubular form of track described is adapted for use with various forms of roller supports or trolleys for the sliding doors or the like, preferred forms are illustrated herein. It will be understood that when the sliding door moves from the fixed track section to the movable track section unless the two sections of track are in direct alinement an obstruction will be offered to the movement of the door. In order to provide for automatically centering the two sections with respect to each other by means of the roller support itself this is shown in the form of a carriage 35 provided with wheels 36 which are provided with convex surfaces of such form that when assembled with the carriage they have the general shape of a sphere as is indicated in Figs. 5 and 7 particularly. When moving backward and forward on the inner portion of the tubular track the wheel and carriage always present a convex surface toward any obstacle which may oppose its motion, so that there is always a tendency to throw the obstacle out to one side or the other. It follows from this that when for any reason the two sections of the track are slightly out of alinement with each other the roller when leaving one section and entering the other will tend to bring the two sections into registration with each other so that the swinging door will automatically be moved up to such position as to register the two track sections when the sliding door is moved to or from it. The wheels 36 are shown in two parts separated by a ring 37 preferably of gun metal. The axle 38 on which each wheel rotates is shown as integral with one part of the wheel and extending inwardly through the frame of the carriage and the other section of the wheel, the axle being upset at the end to hold it in position. It is provided with bearing balls 39 inside the ring 37. The carriage is formed of two side members 40 having circular ends flattened at the bottom between which are held the rings 37 which have a spherical surface continuous with each wheel. The carriage and wheel are assembled as follows:—The rings 37 and bearing balls are placed in between the two members 40 and secured by rivets or other fastening devices. Then the wheel halves having the axles thereon are placed in position and the other halves of the wheels are put on. A central locking member 41 is applied to the sides of the carriage and the ends of axles upset to secure them in position.

The door is secured to the carriage by

means of bolts 42, one for each carriage, the bolts being held on the members 41, and being connected with the doors by cleats 43 of a well-known construction. It will be understood that the bolts 42 project down through the slot 29 and serve as guides for the door and carriage, but if additional guides are needed they may be provided in the form of pins 44 projecting upwardly from the door into the slot 29. Both the bolts and pins preferably are provided with loose rollers 45 to engage the walls of the slots 29 with little friction and further assist in registering the two track sections.

For guiding the bottom of the sliding door it has at the bottom a stud 47 having a roller 48 thereon, which is guided in a groove or slot 49 in the threshold. This slot opens outwardly at 50 to permit the sliding door to swing out only when it is in proper position on the swinging door.

In order to provide a check against the motion of the door into the elevator well the following construction is provided. The door has a threshold 55 constructed of any desired material, but preferably in the form of a casting, in which are one or more slots 56 below which are openings 57 communicating with the slots, and located at an angle to the floor on which the same is mounted, so that sweepings or foreign matter falling into the slots pass through and are discharged along the inclined opening into the elevator well. Located within the slots are levers 58 operated by gravity and so hung upon their pivots that when the door is removed from its normal closed position above the rocking levers the ends 59 thereof drop down by gravity into the threshold in such a way that no obstruction is offered above the same for the passage of bodies over the surface of the same, but when the swinging door is moved from open to closed position, projections 60 thereon move into the slots and engage the rounded surfaces of the ends of the levers forcing that end down into the dotted line position in Fig. 4, and forcing the end 59 up so as to lock the door as indicated in Fig. 14, thus preventing the door from moving beyond a certain position. It will be seen that by this construction it is impossible for the rocking lever to move out of its elevated position while the swinging door is in position above it, because the projection rests upon it, but that when the door is opened the projection 59 which has extended beyond the threshold has been withdrawn within the same. It will be understood of course that any sufficient number of these levers may be employed. The projection 60 also engages shoulders 61 in the slots to form a positive check.

In order to provide means whereby the swinging door is prevented from being automatically opened by the operation of the

sliding door and yet is released thereby so that it can be opened by manual means when the sliding door is fully opened, the following mechanism is shown:—

Mounted on the sliding door is a stud or projection 62 which when the sliding door moves to its limiting open position, engages a lever 63 pivoted to move with the swinging door, and moves this lever away from a projection on the casing as for example the end 59 of the lever 58 which in its normal position prevented the opening of the swinging door. The lever 63 normally tends to move back preferably by gravity when the sliding door is closed, so that the lever will lock the swinging door. A similar operation may be performed at any other part of the door.

It would be undesirable to have the swinging door unlocked every time the sliding door was opened to its full extent, because it is not intended to use the swinging door ordinarily, but only when a particularly large opening is desired. Consequently the swinging door is shown as provided with a vertical hollow casing 66 containing two bolts 68 and 69 normally pressed into locked position by springs and operated by handles 70 which are located close together so that they may be grasped and pressed together by one hand and both of the bolts pulled at the same time by a very simple manipulation. To prevent the possibility of unlocking these bolts when the sliding door is not supported solely by the swinging door the former has a plate 71 along it in position to prevent these handles 70 from being pressed together at that time. When the sliding door is in proper position on the swinging door the end of the plate is beyond the handles and they can be operated. In order to prevent the sliding door from becoming disengaged from its track section when the swinging door is opened, means is provided whereby handles 70 will engage lugs 72 on the sliding door except when the swinging door is closed. For this purpose slots 73 through which the handles 70 project are made long enough so that the bolts will separate slightly when they are drawn and the door opened, thus bringing the handles against the ends of the slots 73 through which the handles project, and directly in line with said lugs 72. In this position the door cannot move off the swinging door. But when the swinging door is closed and locked the bolts will be separated enough to carry the handles away from the lugs 72.

In Figs. 15 and 16 a form of carriage or trolley is shown having wheels 75. The axles 77 on which these wheels rotate are shown as in two parts, each one extending inwardly from the frame of the carriage and provided with bearing balls 78. The carriage is provided with curved projections

79 forming a continuous spherical surface with each roller. The carriage and rollers are assembled as follows:—Two rollers are placed in position and one of the carriage sides applied thereto with its bearing balls. A central locking member 80 is applied to the side of the carriage which is thus set up with its T-shaped projection 81 on one side projecting through a slot 82 in the carriage side. Then the other side of the carriage is brought up to position with its bearing balls so that the other T-shaped projection extends through the corresponding slot 82 therein. Then the member 80 is turned 90 degrees which brings the projections 81 into the position shown in Fig. 15. The door is secured to the carriages by means of bolts one for each carriage, the bolts being held on the members 80 by nuts or the like. Fig. 17 shows a modification in which the side pieces 85 are secured together by bolts 86, these side pieces having registering recesses in them for receiving the rollers 87. These rollers are provided with studs 88 thereon projecting therefrom and preferably mounted in ball-bearings. The bolt or other support by which the door is connected with the carriage is held to the carriage by means of a pin 89.

While we have illustrated and described preferred embodiments of the invention, we are aware that many modifications can be made therein by any person skilled in the art without departing from the scope of the invention as expressed in the claims. Therefore, we do not wish to be limited to all the details of construction shown and described, but

What we do claim is:—

1. In a closure for elevators and the like, the combination of a hinged door, a track section thereon, a stationary track section adapted to register with the track section on the hinged door when the latter is closed, means connected with said track sections, whereby the movable one is stopped in registration with the stationary one when the swinging door is swung to closed position, and a sliding door adapted to be moved along said track sections.

2. In a closure, the combination of a swinging door a track section fixed thereon, a stationary track section adapted to register therewith when the swinging door is closed, means on said track sections for causing such registration, a sliding door movable along said track sections, and means on the swinging door for preventing the sliding door from being removed therefrom when the swinging door is open.

3. In a closure, the combination of a swinging door, a track section thereon, a stationary track section adapted to register with the track section on the door when the door is closed, said track sections having

means on their ends for limiting the motion of the movable section in one direction, and a sliding door supported by said track sections and adapted to move from one to the other.

4. In a closure, the combination of a swinging door having a header thereon, a track section mounted on the door behind said header, a fixed header in the door-way, at the same elevation as the first named header, a fixed track section behind the fixed header, whereby both track sections are concealed by the headers, and a sliding door adapted to be supported by said track sections and movable from one to the other.

5. In a closure, the combination of a swinging door having a header thereon, a track section mounted on the door behind said header, a fixed header in the door-way at the same elevation as the first named header, a fixed track section behind the fixed header, whereby both track sections are concealed by the headers, a sliding door adapted to be supported by said track sections and movable from one to the other, and means whereby said swinging door will be locked at all times except when the sliding door is supported entirely by the track on the swinging door.

6. The combination of a swinging door, a track section carried thereby, a stationary track section adapted to register with the track section on the swinging door when the latter is closed, a sliding door adapted to move from one track section to the other, means for locking the swinging door, and means controlled by the sliding door for automatically unlocking the swinging door when the sliding door moves into position to be supported entirely by the track section on the swinging door.

7. In an elevator, the combination of a swinging door, a track section carried thereby, a stationary track section adapted to register with the track sections on the swinging door when the latter is closed, a sliding door adapted to move from one track section to the other, means for locking the swinging door, means controlled by the sliding door for automatically unlocking the swinging door when the sliding door moves into position to be supported entirely by the track section on the swinging door, and independent manually controlled means for locking and unlocking the swinging door whereby the swinging door cannot be opened when the sliding door is partly closed, and is rendered capable of being opened only when the sliding door is fully opened.

8. In a device of the character described, the combination of a swinging door, a sliding door, a support on the swinging door for the sliding door, means for automatically locking the swinging door in closed position, means for automatically unlocking the

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swinging door when the sliding door moves to fully open position, and additional independent manually controlled means for locking and unlocking the swinging door.

5 9. In a device of the character described, the combination of a swinging door, a sliding door, a support on the swinging door for the sliding door, means for automatically locking the swinging door in closed position,
10 means for automatically unlocking the swinging door when the sliding door moves to fully open position, and additional independent manually controlled means for locking and unlocking the swinging door, said
15 automatic locking means comprising a lever adapted to move into locking means by the force of gravity, and said unlocking means comprising a projection on the sliding door for moving the lever.

20 10. In a device of the character described, the combination of a swinging door, a sliding door, a support on the swinging door for the sliding door, means for automatically locking the swinging door in closed position,
25 means for automatically unlocking the swinging door when the sliding door moves to fully open position, and additional independent manually controlled means for locking and unlocking the swinging door, and
30 means for preventing said manually controlled means from being operated to unlock the door except when the sliding door is located entirely on the swinging door.

35 11. In a device of the character described, the combination of a swinging door, a sliding door, a support on the swinging door for the sliding door, manually controlled means for locking and unlocking the swinging door, and means for preventing said manually
40 controlled means from being operated to unlock the door except when the sliding door is located entirely on the swinging door.

45 12. In a device of the character described, the combination of a sliding door, means whereby when it reaches a certain position said door can be moved in a direction transverse to the direction of its sliding motion,
50 means for locking and unlocking the door, and means for preventing the last named door means from being operated to unlock the door except when it is located in one extreme position.

55 13. In a device of the character described, the combination of a swinging door, a sliding door adapted to be supported by the swinging door, a manually controlled locking device for the swinging door, and a bar on the sliding door in position to prevent
60 the operation of the device to unlock the swinging door except when the sliding door reaches its extreme position on the swinging door.

65 14. In a device of the character described, the combination of a swinging door, a sliding door adapted to be moved on and sup-

ported by the swinging door, a locking device carried by the swinging door, and a bar on the sliding door in position to prevent the operation of said locking device to unlock
70 the door at all times except when the sliding door is in its extreme position on the swinging door.

15. In a device of the character described the combination of a swinging door, a sliding door adapted to be moved on and supported by the swinging door, a hollow rod or
75 tube carried thereby and having a slot, a locking device in said tube and projecting through the slot, and a bar mounted on the sliding door in position to engage the projecting portion of the locking device, and
80 prevent its operation to unlock the same except when the sliding door is in its extreme position on the swinging door.

16. In a device of the character described, 85 the combination of a vertical tube having a slot therethrough, a locking device movable in said tube and projecting through said slot, a sliding door, and a bar on the sliding door in position to engage the projecting part of
90 the locking device to prevent its operation in certain positions of the sliding door.

17. In a device of the character described, the combination of a swinging door, a sliding door, a bolt for locking the swinging
95 door, a tube carried by the swinging door, a rod connected with said bolt located in said tube and projecting therefrom, a bar carried by the sliding door in position to engage the projecting portion of said rod,
100 means whereby when the bar on the sliding door moves beyond the locking device the bolt can be withdrawn and will then normally move back to a certain position, and a projection on the sliding door adapted to
105 engage the projecting part of the locking device to prevent the sliding door from being removed from the swinging door, when the latter is unlocked.

18. In a device of the character described, 110 the combination of a swinging door, a sliding door having a longitudinal bar extending along the same and having a projection separated from and adjacent to the bar at one end of said bar, and a locking device on
115 the swinging door having a projection adapted to extend between the bar and projection on the sliding door when the swinging door is locked, and to engage behind said projection on the sliding door when the
120 swinging door is unlocked to prevent the swinging door from being removed from the sliding door.

19. In a device of the character described, 125 the combination of a swinging door, a vertical tube carried thereby having slots there-through two rods carried by said tube, each having a locking bolt connected therewith, one of said rods extending upwardly and the other downwardly from a point on the
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door, each of said rods having a handle thereon projecting through said slot, springs connected with said rods for normally forcing the bolts away from each other, said bolts being capable of moving farther away from each other after the door is unlocked and swung outwardly, a sliding door adapted to move on and be supported by the swinging door, a bar on said sliding door in position to engage both of said projecting handles and prevent their being moved toward each other to unlock the swinging door at all times except when the sliding door is in its limiting position on the swinging door, and a pair of lugs or projections mounted on the sliding door near the end of the bar in registration with the position of said projecting handles after the bolts have been moved to their outermost position by springs, whereby the sliding door is prevented from moving off the swinging door.

20. In a device of the character described, the combination of a swinging door, a vertical tube carried thereby having slots there-through, two rods carried by said tube, each having a locking bolt connected therewith, one of said rods extending upwardly and the other downwardly from a point on the door, each of said rods having a handle thereon projecting through said slot, springs connected with said rods for normally forcing the bolts away from each other, said bolts being capable of moving farther away from each other when the door swings outwardly, a sliding door adapted to move on and be supported by the swinging door, and means on the sliding door cooperating with the bolts in their further position for preventing it from moving off the swinging door when the latter is open.

21. In a device of the character described, the combination of a door, a tube carried thereby, a locking bolt supported by said tube, a spring for normally forcing said bolt away from the door, a socket for receiving the end of said bolt in position to prevent the bolt from moving to its extreme position, a sliding door adapted to move on the swinging door, and a lock on the sliding door in position to engage the locking bolt when the latter is removed from its socket and projected to its utmost position by the spring.

22. In a device of the character described, the combination of a swinging door, a sliding door supported on the swinging door, a

lever for locking the swinging door, and means on the sliding door for moving said lever to unlock the swinging door when the sliding door is moved to its limiting position.

23. In a device of the character described, the combination of a swinging door, a sliding door adapted to move on and be supported by the swinging door, a threshold having a longitudinal slot therein extending from one end thereof to a point near the center of the threshold and then extending outwardly, and a guide on the bottom of the sliding door adapted to move in said slot.

24. In a device of the character described, the combination of a threshold, a door movable toward and from the threshold, said threshold being provided with a slot therein, and a lever pivoted in said slot and having an end adapted to engage the edge of the door, said end being heavier than the opposite end whereby it will normally swing down into the threshold by gravity, and a projection or lug on the door adapted to engage said lever when the door closes, whereby said end will engage the edge of the door and limit its motion.

25. In a device of the character described, the combination of a threshold, a door movable toward and from the threshold, said threshold being provided with a slot therein, and a lever pivoted in said slot and having an end adapted to engage the edge of the door, said end being heavier than the opposite end, whereby it will normally swing down into the threshold by gravity, and a projection or lug on the door adapted to engage said lever when the door closes, whereby said end will engage the edge of the door and limit its motion, said threshold having a passage extending downwardly from the slot, and an opening at the side of the threshold whereby dirt and sweepings entering the slot will be discharged below the threshold.

In testimony whereof we have hereunto set our hands, in the presence of two subscribing witnesses.

ALBERT A. WHEELER.
MARTIN V. HASKINS.
ALBERT HARRY WHEELER.

Witnesses:

O. E. FAY,
C. FORREST WESSON.