

June 30, 1964

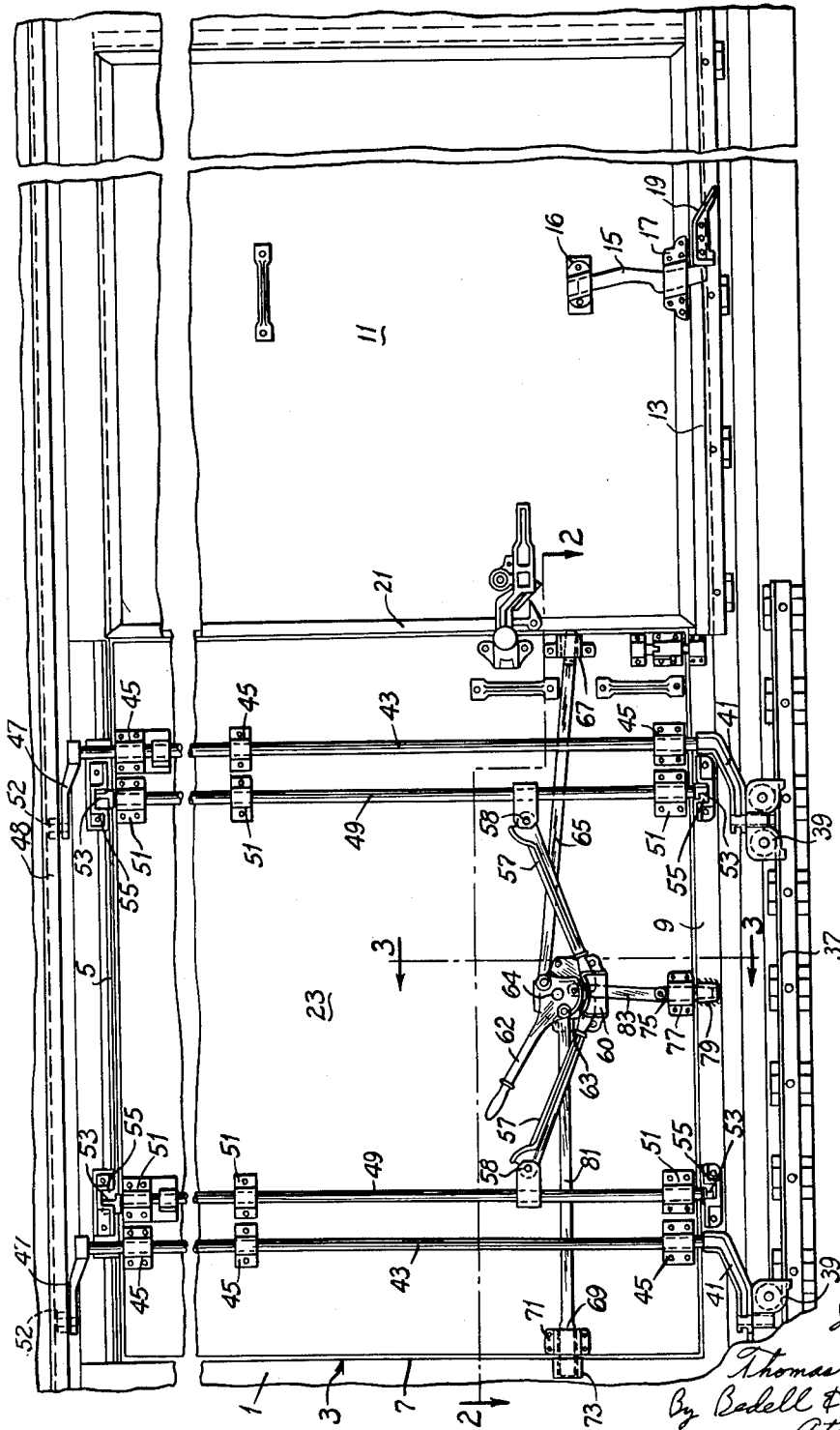
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3,138,831

LATCHING ARRANGEMENTS FOR SLIDING FLUSH DOORS

Filed June 26, 1961

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

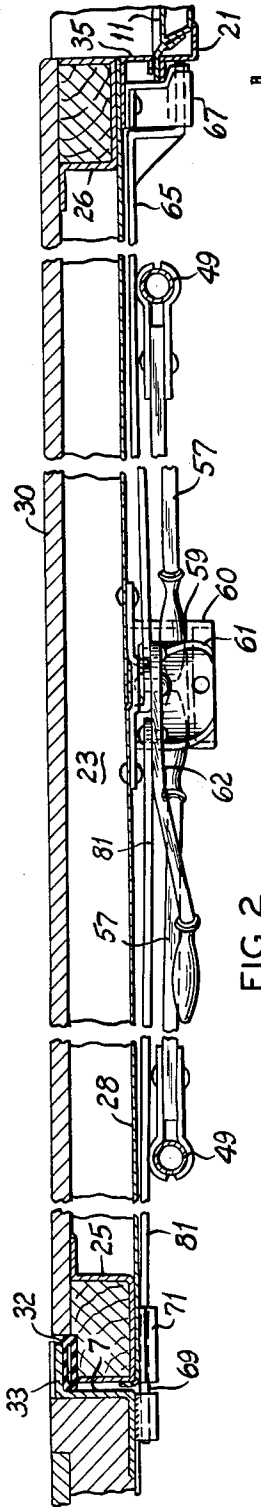


FIG. 2.

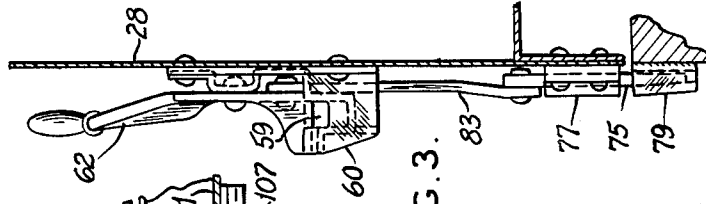


FIG. 3.

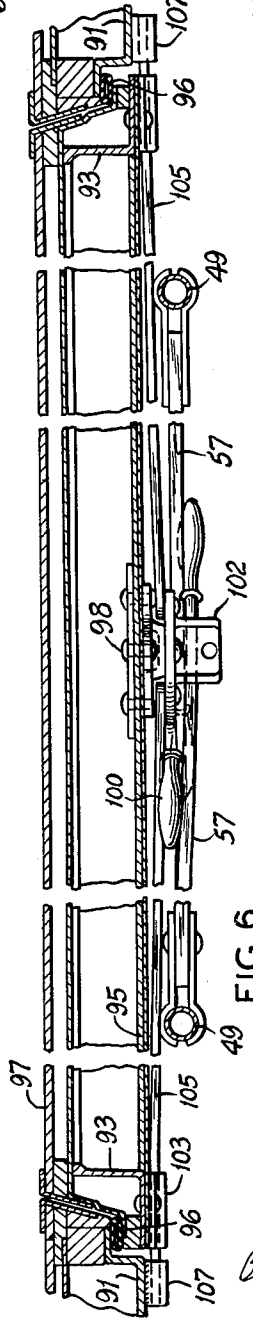


FIG. 6.

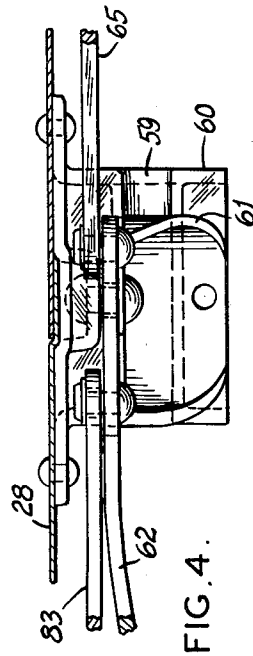


FIG. 4.

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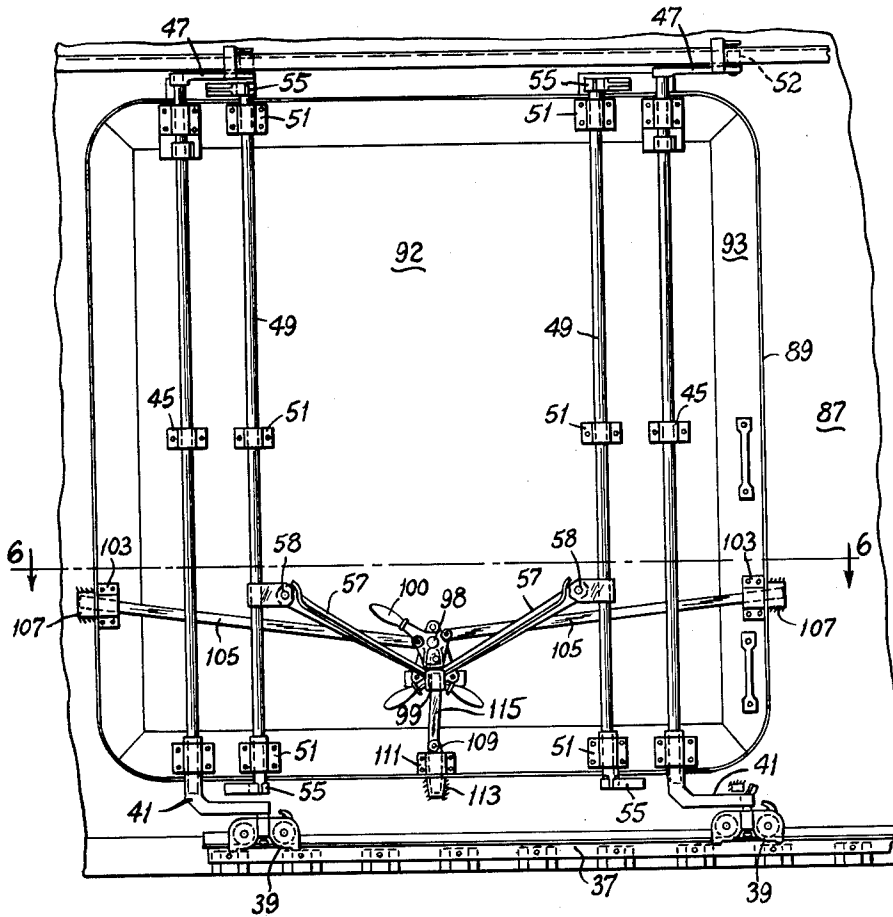


FIG. 5.

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LATCHING ARRANGEMENTS FOR SLIDING FLUSH DOORS

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 14 Claims. (Cl. 20—23)

The invention relates to doors for railway house cars and consists particularly in improved locking apparatus for sliding doors of the flush type.

Sliding flush doors are commonly locked in the closed position by offset lugs, mounted on vertical shafts near the sides of the door and engageable with keepers on the car wall above and below the door. Doors locked solely in this manner are likely to bulge outwardly, particularly along their vertical edges, if subjected to heavy pressure from the lading of the car; e.g., from grain or other bulk lading. If the doors are very wide, so that the distance between the locking lugs is proportionally large, the door may bulge along its lower edge.

This problem can be solved by applying additional locking devices to the sides and bottom of the door, but this creates the additional problem that if the locking shafts and lugs are rotated, so as to initiate outward movement of the door from its recess in the car side, unless the additional locking devices have been released, they will be damaged and probably jammed, preventing operation of the door.

It accordingly is a principal object of the invention to provide a simple, durable, and inexpensive locking means between the vertical edges and bottom edge of a sliding flush door and the corresponding edges of the door opening in the car side wall.

It is a further object to provide common actuation for all edge locks.

It is a further object to provide an interlock between the edge lock means recited above and the means by which outward movement of the door is initiated whereby to prevent actuation of the latter unless the former is released.

The foregoing and additional detailed objects and advantages are achieved by the structure illustrated in the accompanying drawings, in which:

FIGURE 1 is a fragmentary side view of a car showing door structure comprising a main door and a flush door equipped with edge locking means embodying the invention.

FIGURE 2 is an enlarged horizontal sectional view along line 2—2 of FIGURE 1, showing a top view of the locking means.

FIGURE 3 is a view along line 3—3 of FIGURE 1.

FIGURE 4 is an enlargement of the central portion of FIGURE 3.

FIGURE 5 is a fragmentary side view of a car showing a single flush door equipped with the edge locking means embodying the invention.

FIGURE 6 is a horizontal sectional view along line 6—6 of FIGURE 5.

Referring now to FIGURE 1, the numeral 1 refers to a car side wall with a rectangular opening 3 therein having a horizontal top edge 5, a vertical side edge 7, comprising a post of Z-section, and a horizontal bottom edge, or threshold 9. The right hand portion of opening 3 is closed by a main door 11 mounted outwardly of the car wall and slidable therealong on track 13. Main door 11 is held in the closed position by latch bar 15 which is vertically slidably mounted in spaced brackets 16 and 17 on the door, with its lower end adapted for abutting engagement with stop element 19 fixedly mounted on track 13. The left hand ver-

tical edge 21 of main door 11 comprises a Z-bar. The left hand portion of opening 3, defined by top edge 5, vertical edge 7, threshold 9 and main door edge 21 is closed by an auxiliary door 23 of the flush type. Door 23 comprises a rectangular steel frame having upright members 25 and 26 at each side, outer metal sheathing 28, and interior wood lining 30. The left hand frame member mounts a hollow rubber gasket 32 on its inside surface for sealing engagement with the inner flange 33 of the Z-section post 7 when the door is in closed position. Right hand door frame member 26 mounts a vertical outwardly extending channel member 35 adapted to underlie the flange of Z-section edge 21 of the main door and close the gap between the outer surface of the auxiliary door 23 and the inner surface of the main door 11.

Auxiliary door 23 is supported, for movement inwardly and outwardly of the opening 3 and lengthwise of the car from and to its closed position, by track 37 mounted on the car side below the door opening, and spaced roller carriages 39 carried by said track and pivotally mounting crank arms 41. At their outer ends crank arms 41 are secured to upright shafts 43 which are journaled on door 23 at 45. Crank arms 47 are secured to the upper ends of shafts 43, and each mounts a roller 52 engageable with guide track 48, which is secured to the car side wall 1 above door opening 3.

For locking the door 23 in closed position and initiating its movement to open position and completing its movement to closed position, a pair of vertical shafts 49 are journaled on the outer surface of the door as at 51, and mount, at their upper and lower ends, offset lugs 53 which are received in slotted keepers 55 mounted on the car side wall above and below the door opening, when the door is closed. For rotating shafts 49 to initiate opening movement of the door and to complete closure of the door and fully compress gasket 32, each shaft 49 is provided with a handle lever 57, pivotally mounted at 58 to swing vertically; i.e., parallel to the door when the door is closed. When the door is locked in closed position, the free ends of handle levers 57 rest in an upwardly open recess 59 in a bracket 60 mounted on the door intermediate operating shafts 49.

When door 23 is closed, removal of handle levers 57 from recess 59 is prevented by locking lever 62 which is pivoted to the door at 64 immediately above bracket 60, so that its arcuate lower flange 61 overlies or closes recess 59 and mates with the concave arcuate upper surface of bracket 60 to prevent undesired removal of the handle levers and operation of shafts 49. A stop projection 63 on lever 62 engages the left hand edge of bracket 60 when the lever 62 is in its locking position, so as to limit lever 62 to clockwise movement from its locking position.

Since the left hand edge of main door 11 overlappingly engages the right hand edge of auxiliary door 23, inadvertent attempts to force the latter out of locked position by operation of handle levers 57 and shafts 49 might result in substantial damage to the door structure because of opposition by the cooperating edges of doors 23 and 11. In order to prevent actuation of handle levers 57 when the main door is in its fully closed position, and the damage likely to result therefrom, a safety latch bar 65 is connected at one end to locking lever 62, with its other end slidably supported in retainer 67 near the right hand edge of the door and abutting the left hand edge 21 of main door 11, so that, when the main door is closed, clockwise rotation of lever 62 from its handle lever locking position is prevented. Since stop projection 63 on lever 62 prevents counterclockwise movement of lever 62 from its locking position, lever 62 cannot be moved in either direction away from locking position until main door 11 is

3 moved sufficiently to the right to clear the right hand edge of auxiliary door 23. When this occurs, bar 65 is similarly movable to the right, permitting clockwise rotation of lever 62 and consequent release of handle levers 57 from their locked inoperable position in pocket 59.

Bulging of the right hand edge of auxiliary door 23, throughout its height, is prevented by its underlapping engagement with the left hand edge of main door 11. For preventing bulging of the left hand and bottom edges of the door 23, respectively, a substantially horizontal bolt 69, slidably mounted in a retainer 71 on the door near its left hand edge is retractably received within a pocket 73 mounted on left hand door post 7, and a vertical bolt 75, slidably mounted in a retainer 77 on the door adjacent its bottom edge and substantially midway between locking shafts 49 is similarly retractably received within a pocket 79 on the car wall below the door. In the absence of excessive loading against the door, such as by grain, bolts 69 and 75 fit loosely in pockets 73 and 79, but with excessive loading of grain, these bolts will fit tightly in their respective pockets. Bolts 69 and 75 are each pivotally connected respectively, by transversely extending bar 81 and substantially vertical bar 83, to locking lever 62, so that when lever 62 is rotated clockwise from its locking position, as permitted by bar 65 bolts 69 and 75 will be simultaneously retracted from pockets 73 and 79, respectively, to positions substantially flush with the adjacent edges of the door, thus preventing damage which might be caused the structure if an attempt were made to utilize handle levers 57 to force open the door with the bolts in locked position. When grain is unloaded through the main door opening, the internal load on flush door 23 is reduced, thus returning bolts 69 and 71 to their original loose fit in their pockets and facilitating their retraction by rotation of lever 62.

Another form of the invention is illustrated in FIGURES 5 and 6, in which elements substantially identical to elements shown in FIGURES 1-4 bear the same reference numbers. The numeral 87 indicates a car side formed with a door opening 89 bounded by Z-section members 91.

Opening 89 is closed by a door 92 having a substantially rectangular metal frame 93, exterior metal sheathing 95, and an inner wooden lining 97, the periphery of the door being relatively shallow and mounting a gasket 96 adapted to sealingly seat against the inner flange of Z-section members 91. The door mounting and operating means are substantially identical to that illustrated in FIGURE 1 and bear the same reference characters. A bracket 99 on the outer surface of the door, midway between operating shafts 49, is formed with a recess in which handle levers 57 are received in crossed relationship, and, for locking them against inadvertent movement out of the closed position, a locking lever 100 is pivoted to the door at 98 above bracket 99 and has an arcuate flange 102 adapted to overlie the recess in bracket 99 and thereby prevent inadvertent removal of the handle levers from the recess.

For assuring that the edges of the door will remain in sealing engagement, through gasket 96, with the adjacent car wall structure even though urged outwardly by a heavy lading, the door mounts, adjacent each of its sides, a retainer in each of which is slidably mounted a nearly horizontal bolt 105, adapted to be retractably received in registering pockets 107 on the car wall adjacent the sides of the door opening. A third bolt 109 is vertically slidably mounted in a retainer 111 near the bottom edge of the door midway between the operating shafts 49 and is retractably receivable in a registering pocket 113 on the car side wall below the door. Bolts 105 are both pivotally connected directly to locking lever 100, and bolt 109 is pivotally connected to locking lever 100 by a bar 115, so that bolts 105, 105 and 109 are retracted by rotation of lever 100 from the locking position, so that, whenever locking lever 100 is in the unlocked position, whereby handle levers 57 are free, bolts 105, 105 and 109 will also be in the retracted position, thereby eliminating the

4 likelihood of damage to the structure by inadvertently using handle levers 57 to force the door open when bolts 105, 105 and 109 are locked.

In both embodiments of the invention, the edge locking means are interlocked with the door operating handle levers 57, so that the latter cannot be manipulated to force the door out of its closed position unless the edge locking means are released.

Substantial variations in the details of the construction may be made without departing from the spirit of the invention, and the exclusive use of modifications coming within the scope of the appended claims is contemplated.

What is claimed is:

1. Door structure for a wall having an opening for a flush door, a flush door in said opening, means carried by said door for initiating outward movements of said door and including a lever swingable parallel to the surface of said door when said door is fully closed and movable outwardly from said door to initiate outward movements thereof, means on said door forming an upwardly open recess receiving and supporting said lever when the door is closed, a member pivoted to the door and closing the top of said recess when said lever is supported therein and preventing undesired removal of said lever, and bar means pivotally connected to said pivoted member and extending therefrom toward at least two different edges of said door and movable toward and away from said edges by rotation of said pivoted member into and out of its recess-closing position, at least one of said bar means including a bolt slidably substantially normal to the associated edge of the door, there being a pocket on said wall adapted to receive said bolt when said door is closed and said pivoted member is in its recess-closing position, said bolt being retractable from said pocket by rotation of said pivoted member from its recess-closing position.

2. Door structure according to claim 1, in which there are three of said bar means each including a bolt and extending respectively to both side and bottom edges of the door, there being pockets on said wall adapted to receive said bolts when said door is closed and said pivoted member is in the recess-closing position, said bolts being simultaneously retractable from said pockets by rotation of said pivoted member from its recess-closing position.

3. Door structure according to claim 1 in which another door when closed overlaps one vertical edge of said flush door and is horizontally slidably along the wall away from said flush door toward an open position, and the end of one of said bar means abuts said other door and prevents rotation of said pivoted member from the recess-closing position while said other door overlaps said flush door, said one bar means being movable in the direction of opening of said other door to permit rotation of said pivoted member from the recess-closing position when said other door clears said flush door.

4. Door structure for a wall having an opening for a flush door, comprising a flush door movable outwardly from a closed position within the door opening substantially flush with the wall and closing said opening, to a sliding position outward of the wall, and for sliding movement on the outside of said wall to an open position clear of the door opening, rotatable upright locking shafts spaced apart lengthwise of the door and journaled on the door with locking elements at their ends, locking elements on the wall above and below the door opening, said locking elements cooperating to secure said door in closed position, individual levers pivoted on said shafts to swing parallel to the door when said door is closed, bracket structure on said door forming an upwardly open recess receiving and supporting said levers when said door is closed, a member pivoted on said door and having a surface adapted to close the top of said recess to retain said levers therein, and rotatable to permit removal of

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said levers therefrom, a pair of bars each connected at one end to said pivoted member and each extending therefrom toward an opposite side of said door, said bars being movable crosswise of said door, by rotation of said pivoted member, to and from positions wherein their other ends are substantially flush with the sides of said door, at least one of said bars including a bolt slidable substantially normal to the associated edge of the door, there being a pocket on said wall adapted to receive said bolt when said door is closed and said pivoted member is in its recess-closing position, said bolt being retractable from said pocket by rotation of said pivoted member from its recess-closing position.

5. Door structure for a wall having an opening for a flush door, comprising a flush door movable outwardly from a closed position within the door opening substantially flush with the wall and closing said opening, to a sliding position outward of the wall, and for sliding movement on the outside of said wall to an open position clear of the door opening, a rotatable upright locking shaft journaled on said door with locking elements at its ends and locking elements on the wall above and below the door opening, said locking elements cooperating to secure said door in closed position, a lever pivoted on said shaft to swing parallel to the door when said door is closed, bracket structure on said door forming an upwardly open recess receiving and supporting said lever when said door is closed, a member pivoted on said door and having a surface adapted to close the top of said recess to retain said lever therein and rotatable to permit removal of said lever therefrom, a pair of bars each connected at one end to said pivoted member and each extending therefrom toward an opposite side of said door, said bars being movable crosswise of said door, by rotation of said pivoted member, to and from positions wherein their other ends are substantially flush with the sides of said door, at least one of said bars including a bolt slidable substantially normal to the associated edge of the door, there being a pocket on said wall adapted to receive said bolt when said door is closed and said pivoted member is in its recess-closing position, said bolt being retractable from said pocket by rotation of said pivoted member from its recess-closing position.

6. Door structure for a wall having an opening for a flush door, comprising a flush door movable outwardly from a closed position within the door opening substantially flush with the wall and closing said opening, to a sliding position outward of the wall, and for sliding movement on the outside of said wall to an open position clear of the door opening, a rotatable upright locking shaft journaled on said door with locking elements at its ends and locking elements on the wall above and below the door opening, said locking elements cooperating to secure said door in closed position, a lever pivoted on said shaft to swing parallel to the door when said door is closed, bracket structure on said door forming an upwardly open recess receiving and supporting said lever when said door is closed, a member pivoted on said door and having a surface adapted to close the top of said recess to retain said lever therein and rotatable to permit removal of said lever therefrom, bars each operatively connected at one end to said pivoted member and each extending therefrom toward a different edge of said door, said bars being movable by rotation of said pivoted member to and from positions wherein their other ends are substantially flush with the edges of said door, at least one of said bars including a bolt slidable substantially normal to the associated edge of the door, there being a pocket on said wall adapted to receive said bolt when said door is closed and said pivoted member is in its recess-closing position, said bolt being retractable from said pocket by rotation of said pivoted member from its recess-closing position.

7. Door structure according to claim 6 wherein one of said bars extends toward a side of said flush door and

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another of said bars extends toward the bottom of said flush door, there being another door on said wall forming an end of said opening and slidable along the wall away from said flush door, said one bar abutting the adjacent edge of said other door and being held substantially flush therewith when said other door is closed and thus preventing rotation of said pivoted member from its recess-closing position, there being an upwardly open pocket on the wall below said opening registrable with said other bar, said other bar extending downwardly from the lower edge of said door into said pocket and being retractable therefrom upon rotation of said pivoted member from its recess-closing position.

8. Door structure according to claim 7 wherein a third bar extends toward the edge of said flush door remote from said other door, there being a pocket on the wall adjacent the corresponding edge of said opening and registrable with said third bar, said third bar projecting into said pocket, when said flush door is closed and said pivoted member is in the recess-closing position, and being retractable from said pocket by rotation of said pivoted member from its recess-closing position.

9. Door structure according to claim 7 wherein two of said bars extend from said pivoted member toward the sides of said door and a third bar extends toward the bottom of said door, said bars being arranged to project outwardly from the edges of said door when said pivoted member is in the recess-closing position and being retractable to a position substantially flush with the edges of said door when said pivoted member is rotated from its recess-closing position there being pockets on the wall at one side and bottom of the door opening registrable with said bars and adapted to receive the projecting ends of said bars.

10. Door structure for a wall having a door opening, comprising a flush door movable outwardly from a closed position within the door opening substantially flush with the wall and closing a part of said opening to a sliding position outward of the wall and for sliding movement on the outside of said wall to an open position clear of the door opening, a rotatable upright shaft journaled on said flush door with elements at its ends, elements carried by the wall above and below the door opening, said elements cooperating with each other to initiate outward movement of said flush door from its closed position upon rotation of said shaft, a lever pivoted on said shaft to swing parallel to said flush door when said flush door is closed, bracket structure on the door forming an upwardly open recess receiving and supporting said lever when said flush door is closed, a member pivoted on said door and having a surface adapted to close the top of said recess to retain said lever therein and rotatable to permit removal of said lever therefrom, a second door closing the remainder of said opening and mounted outwardly of said wall for sliding movement to an open position clear of the door opening, said second door having an edge portion overlapping an edge portion of said flush door when both said doors are closed, a bar connected to said pivoted member and having an end abutting said edge portion of said second door when said doors are closed, to prevent rotation of said pivoted member, and movable crosswise of said flush door toward said second door when said second door is opened sufficiently to clear the edge of said flush door to permit rotation of said pivoted member from its locking position, a bolt slidably mounted on the door adjacent another edge thereof, and a registering pocket for said bolt on said wall, said bolt being receivable in said pocket when said flush door is closed, means connecting said bolt with said pivoted member for retracting said bolt from said pocket when said pivoted member is rotated from its locking position.

11. Door structure according to claim 10 in which there are a plurality of said bolts including one on the

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bottom and one on the side of said flush door remote from said second door.

12. Door structure for a wall having an opening for a flush door, comprising a flush door movable outwardly from a closed position within the door opening substantially flush with the wall and closing said opening to a sliding position outward of the wall, and for sliding movement outside of the wall to an open position clear of the door opening, a rotatable upright shaft journaled on said door with elements at its ends, elements carried by the wall above and below the door opening, said elements cooperating with each other to initiate outward movement of said door from its closed position upon rotation of said shaft, a lever pivoted on said shaft to swing parallel to said door when said door is closed, bracket structure on said door forming an upwardly open recess receiving and supporting said lever when said door is closed, a member pivoted on said door and having a surface adapted to close the top of said recess to

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retain said lever therein and rotatable to permit removal of said lever therefrom, and a bolt slidably mounted on said door adjacent an edge thereof, and a registering pocket for said bolt on said wall, said bolt being receivable in said pocket when said door is closed, means connecting said bolt with said pivoted member for retracting said bolt from said pocket when said pivoted member is rotated from its locking position.

13. Door structure according to claim 12 in which there are a plurality of said bolts including one on each side of said door.

14. Door structure according to claim 13 including a third bolt on the bottom of said door.

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