July 12, 1927. D. E. CONRAD 1,635,926

SLIDING DOOR FOR CARS OR BARNS

Filed Sept. 4, 1926 2 Sheets-Sheet 1

Fig. 1.

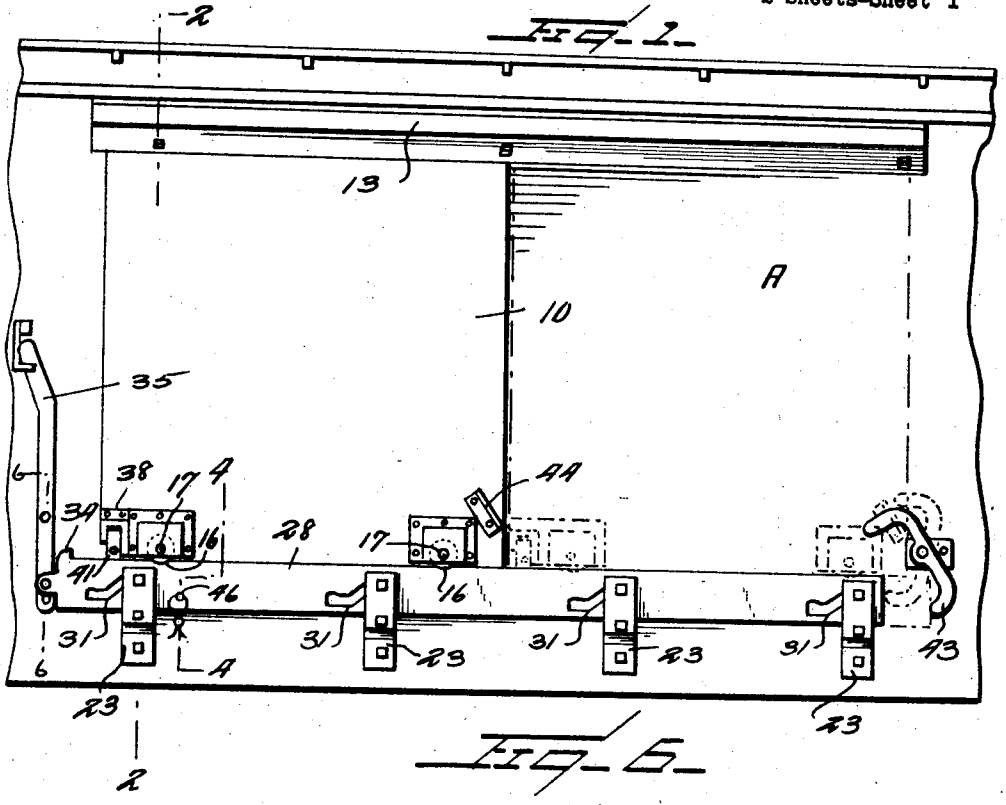


Fig. 6.

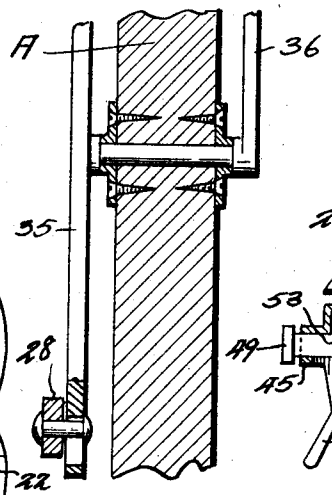


Fig. 4.

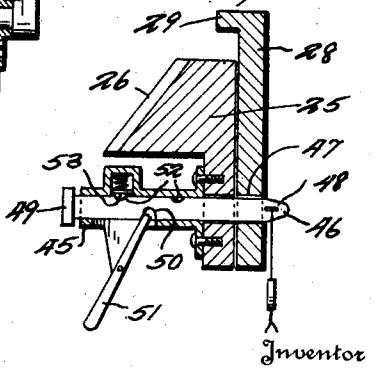
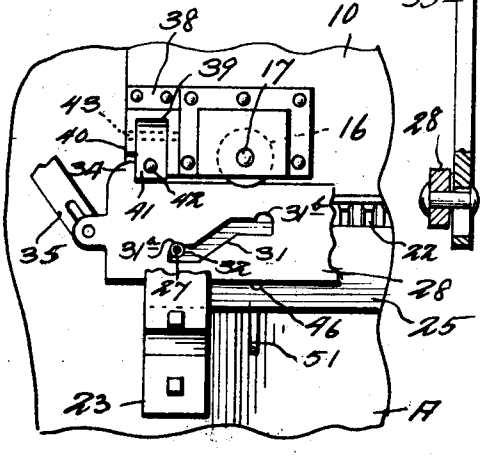


Fig. 5.



Inventor

D. E. Conrad

By Watson E. Coleman

Attorney

July 12, 1927. 1,635,926

D. E. CONRAD

SLIDING DOOR FOR CARS OR BARNS

Filed Sept. 4. 1926 2 Sheets-Sheet 2

Fig. 2.

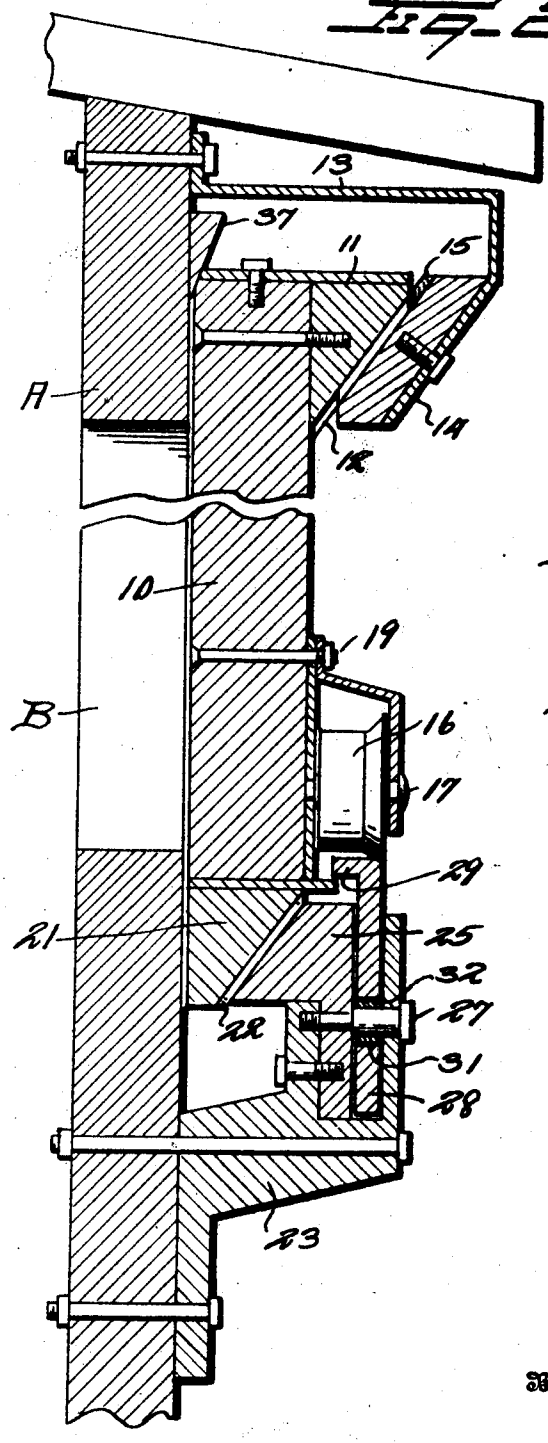
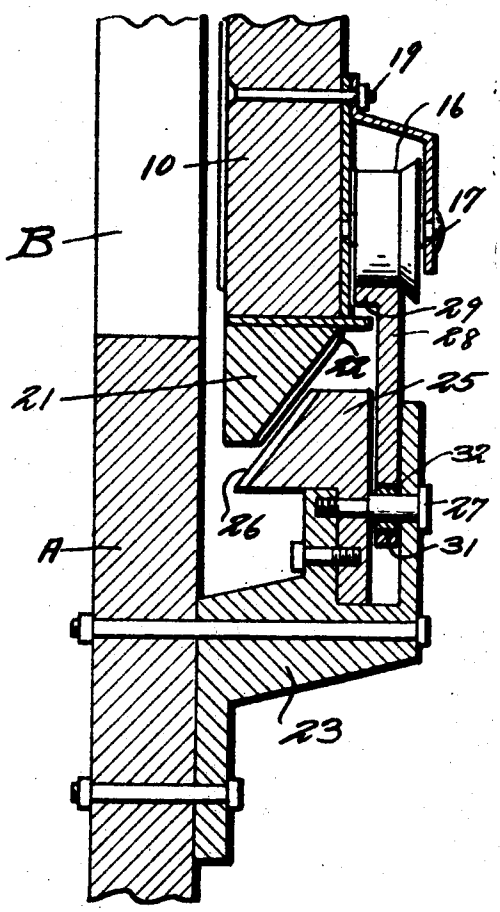


Fig. 3.



Inventor

D. E. Conrad

By Watson E. Coleman

Attorney

Patented July 12, 1927. 1,635,926

UNITED STATES PATENT OFFICE.

DAVID EMERY CONRAD, OF ELDON, IOWA, ASSIGNOR OF ONE-HALF TO VAN V. BALDWIN, OF ELDON, IOWA.

SLIDING DOOR FOR CARS OR BARNS.

Application filed September 4, 1926. Serial No. 133,668.

This invention relates to sliding doors which are supported upon rollers and particularly to sliding doors such as are used on railway cars and barns where the door slides from an open to a closed position and vice versa.

The general object of the present invention is to improve upon the construction illustrated, described, and claimed in my Patent No. 1,569,799, granted January 12, 1926, and more particularly to provide means whereby the act of releasing the door from its locked position by raising the door from engagement with a fixed rack, will cause the door to be shoved open and whereby when the door is open and engaged with said rack and locked thereby, the raising of the door from the rack will give an impulse to the door, causing it to close.

A further object in this connection is to provide means for this purpose which may be shifted into or out of operative position.

Another object is to provide a track operated by a lever which will raise or lower the door into or out of its locked position and provide a plunger operated bolt or sealing device engaged with this track and holding the track lowered and the door locked.

Other objects will appear in the course of the following description.

My invention is illustrated in the accompanying drawings wherein:—

Figure 1 is a front elevation of my improved door;

Fig. 2 is a section on the line 2—2 of Figure 1;

Fig. 3 is a fragmentary section on the same line as Figure 2 but showing the door raised;

Fig. 4 is a secton on the line 4—4 of Figure 1;

Fig. 5 is a face view of the rail and allied parts;

Fig. 6 is a section on the line 6—6 of Figure 1.

Referring to these drawings A designates the side of a railway car, a barn, or any other structure upon which the door may be mounted and having a door opening B. Adapted to be shifted over this door opening is the sliding door 10. This door is formed on its upper margin and upon its outer face with the outwardly projecting flange 11 preferably of metal having an outwardly and upwardly inclined toothed face 12. Disposed over the top of the door is a hood 13 which extends downward in front of the flange 11 and carries the downwardly and inwardly extending flange 14 having upwardly facing, downwardly inclined teeth 15. The teeth 12 and 15 mesh with each other, though I do not wish to be limited to the use of intermeshing teeth on the members 11 and 14.

The lower margin of the door is provided with a plurality of rollers 16, two for each door mounted on a suitable bearing stud 17 supported by a bolt 19. The lower edge of the door is formed with the downwardly extending flange 21 triangular in cross section and having downwardly and inwardly extending gear teeth 22.

Mounted below the door opening are a plurality of brackets 23 which support the rack 25, triangular in cross section and having downwardly and inwardly extending teeth 26 with which the teeth 22 are adapted to mesh when the door is lowered. Extending outward from each bracket are the two bolts or equivalent members 27 and mounted upon these stud bolts is a rail 28, the upper margin of which is inwardly turned at 29, and disposed immediately below the rollers 16. The rail is formed with a plurality of cam-shaped slots 31, these slots extending longitudinally, then upward and longitudinally and then parallel to the top of the rail and through these slots the stud bolts 27 extend.

Each slot 31 at its rear end is upwardly extended slightly to form a pocket 31^a and at its forward end each slot is vertically increased in height as at 31^b for a purpose to be later stated. Preferably the stud bolts 27 and 27^a carry chilled steel bushings 32 constituting rollers engaging the walls of the slots.

The rail 28 is provided at one end with an upwardly extending lug 34 having a flat inner face and the rail is pivotally connected at this end to an operating lever 35 on the exterior of the wall, there being an operating lever 36 on the interior of the wall. The levers 35 and 36 may be locked in their shifted positions by any desired locking means.

So far I have described essentially all the features of my prior patent and with the construction described it is obvious that when the rail 28 is lowered, the door will

move downward until the toothed faces 22 and 26 of members 21 and 25 will engage. Then the door will be locked from longitudinal movement and the same will be true of the toothed faces 12 and 15 of flanges 11 and 14. Thus, when the door is lowered, the upper margin of the door and its lower margin will both be locked to the housing 13, and to the brackets 23. As the faces 15 and 22 are downwardly and inwardly inclined, the door, as it is lowered, will be forced tightly against the face of the door frame. Preferably I mount upon the upper margin of the door frame the member 37 so that when the door is raised, its upper margin will be thrown outward and thus the greater portion of the door lifted away from and free from contact with the face of the door frame and the door will be free to be shifted longitudinally.

The lug 34, previously referred to, is one of the improvements which I have added to the construction illustrated in my prior patent and this lug coacts with an abutment member mounted upon the door. This consists of a base 38 having a rectangular recess 39 formed in its under face. One wall of this recess is shorter than the other wall, as at 40, and pivoted within this recess is the block 41 having a knob 42 upon its outer face, the block 41 being pivoted upon a pin 43. Assuming that the door is closed, then when the rail 28 is pushed toward the right in Figure 1 and raised by the cam slot, the lug 34 will strike the block 41 and an impulse will be given to the door acting to throw the door towards its open position. If the block 41 be swung upward by knob 42, however, it will be out of the path of movement of the lug 34 and thus no opening impulse will be given to the door but the door may be pushed open or left simply in its raised position.

For the purpose of shoving the door towards its closed position after it has been opened or giving the door an impulse in this direction, I provide a lever 43 which is pivotally mounted upon the door frame of the wall A, the arms of this lever being turned inward and the extremity of one of these arms being disposed in the path of movement of the rail 28. If now the door is opened and lowered and it be desired to close the door, the lever 35 is operated to shift the rail 28 toward the right in Figure 1 and to lift the door out of its engagement with the toothed faces of members 15 and 25, and the movement of the rail toward the right will cause the upper end of the lever 43 to strike a stop 44 mounted upon the door which will cause the door to close. This stop 44 is in the form of an angle iron. When the door is moving from its closed to its open position and nearly reaches its fully open position, this stop 44 will strike against the upper end of lever 43 and shift the lever so as to bring its lower end in contact with the adjacent extremity of the rail 28.

For the purpose of locking the track in its lowered position I provide a locking and sealing device which consists of a housing 45 mounted upon the wall of the car and through this housing operates a locking pin 46 or plunger. This pin operates through the gear rack 25 and passes through an opening 47 in the rail 28. The extremity of the pin or plunger 46 is tapered so that it will enter the opening in the track very readily and the extremity of this pin or plunger 46 is also provided with an opening 48 through which a sealing wire may be placed. The opposite end of the plunger 46 has a head 49 which will prevent the plunger from being pulled through this casing or housing. The lower face or side face of the plunger is formed with a recess 50 in which operates the extremity of a plunger actuating lever 51 mounted upon the housing. One face of the plunger is formed with a pair of recesses 52 which are preferably slightly concave, and engaging with these recesses in either the projected or retracted positions of the plunger is a spring actuated detent pin 53. Thus, the plunger may be held either in its locked or unlocked position while at the same time the lever 51 may be actuated to shift the plunger outward or inward and when force is applied to the lever, the pin 53 will ride upward and out of the recess 52 with which it is engaged. Preferably, as before stated, an extra lever 36 will be used in conjunction with the operating lever 35. This is only in case this door is used for a building and is not designed for use with a box car and this lever 36 may be disposed upon the inside of the wall if desired so as to permit the operation of the door from either side of the wall.

If the door is shut and the locking plunger or pin 46 engages the track, the door cannot be moved by the lever 36 and the lever can be removed and the track will remain lowered with the door locked in its closed position. If the seal is broken on the plunger, the plunger may be retracted, releasing the track. Thus in order to open the door, the lever 36 is pulled. The track starts to rise and this raises the door out of its engagement with the toothed faces 15 and 22. As soon as the door clears the teeth, the lug 34 will come in contact with the block 41 and this will start the door open or if the block 41 be raised by the knob so as to clear the hump or lug 34, the door will rise straight up. When the door is raised and is pushed wide open the angle iron stop 44 will come in contact with the upper end of the lever 43 and this pushes the track back to its original position to such point that the track is low enough to let the teeth

on the door engage the teeth on the members 14 and 25 and the door is locked. When it is necessary to close the door, the lever 35 is pulled, raising the track high enough to cause the door to clear the gear rack 25 and the track will come in contact with the lower end of lever 43 and this lever will strike the part 45 on the door and will start the door towards its closed position. When the door is closed or nearly so, the block 41 will again strike the lug 34 and shift the track 28 toward the left in Figure 1, lowering the door into the teeth 15 and 22 and the door is again locked.

The mechanism which I have described not only starts the door open when it is closed and starts the door towards the closed position when open but without this mechanism in case anyone carelessly left the door and track raised after unloading the car, the door would run back and forth when the car was coupled up in a train and this would damage the door more or less but with my new construction, if the door is left raised then the first time the car is coupled onto the train, the door will be shifted towards its closed position or towards its open position and will be locked.

In case of a fire door on large buildings, the track 28 can be set on an incline. The door can then be pushed open and the track dropped, locking it in place. In case of fire all that would be necessary to do would be to pull the lever and the door will run shut itself and when it struck the trip, that is the lug 34, or the member 43, whichever is used, it would cause the track to drop and lower the door into a locked position. By having two levers 35 and 36 and placing one of these levers on the inside of the door frame, anyone who happened to get locked in could open the door.

Especial attention is called to the fact that each of the slots 31 is enlarged at its right hand end sufficiently to let the upper flange of the track drop down on the gear rack when the door is open. This saves the track and takes load off of the studs and reduces wear on the track, slots and studs. The lower or left hand end of each slot is recessed at its top wall, as before stated, so as to provide for a slight interlock of the track with the stud so that the track will not move off of the stud while the door is being moved.

I claim:—

1. The combination with a sliding and vertically movable door, a vertically movable track upon which the door slides, and means automatically locking the door when the door and track are lowered, said means freeing the door for longitudinal movement when the door is raised, of means acting as the door and track are raised, automatically shoving the door towards open position when the door is closed, and means acting as the door and track are raised, automatically shoving the door towards closed position when the door is open, said second named means being manually shiftable out of operative position.

2. The combination with a sliding and vertically movable door and a vertically movable track upon which the door runs when the track is raised, and means lockingly engaging the door when the door is lowered, of means acting automatically, as the door nears its closed position, to cause the lowering of the track and door to thereby lock the door.

3. The combination with a sliding and vertically movable door and a vertically movable track upon which the door runs, and means lockingly engaging the door when the door and track are lowered, of means acting automatically as the door nears either its closed or open position to cause the lowering of the track and door to thereby lock the door.

4. The combination with a vertically movable door and a vertically and longitudinally movable track upon which the door slides, means for longitudinally shifting the track, means causing the track to rise as it is shifted longitudinally in one direction and lower when shifted in the opposite direction, and means for locking the door against longitudinal movement when lowered, of means acting automatically as the door nears the limit of its longitudinal movement in one direction to shift the track in a direction to lower the door and cause it to lock.

5. The combination with a sliding and vertically movable door and a vertically and longitudinally movable track upon which the door slides, means for longitudinally shifting the track, means for causing the track to rise as it is shifted longitudinally in one direction and lower when shifted in the opposite direction, and means for locking the door against longitudinal movement when lowered, of coacting members mounted on the track and door respectively and adapted to engage each other as the track is raised and longitudinally shifted to thereby cause the door to receive an initial shove from the track.

6. The combination with a sliding and vertically movable door and a vertically and longitudinally movable track upon which the door slides, means for longitudinally shifting the track, means for causing the track to rise as it is shifted longitudinally in one direction and lower when shifted in the opposite direction, and means for locking the door against longitudinal movement when lowered, of coacting members mounted on the track and door respectively and adapted to engage each other as the track is raised and longitudinally shifted to there-

by cause the door to receive an initial shove from the track, and upon a return of the door to its initial position to cause a longitudinal movement of the track to a depressed position.

7. The combination with a sliding and vertically movable door, a vertically and longitudinally movable track upon which the door slides, means for manually shifting the track longitudinally, cam slots in the track and supporting pins engaging said slots, the cam slots being so formed that as the track is shifted in one direction, the track will be raised and in the other direction it will be lowered, means locking the door against longitudinal movement when the track and door are lowered, a lug on the track and an abutment on the door adapted to contact with each other when the track is raised and shifted longitudinally to thereby give an initial impulse to the door in one direction and upon a release of the door and its return to its initial position to cause the track to shift longitudinally and descend to thus automatically lower the door and cause it to be locked.

8. The combination with a sliding and vertically movable door and a vertically and longitudinally movable track upon which the door slides, said track having cam slots formed therein having their middle portions extending at an angle to the direction of movement of the track, supporting pins passing through said slots, means for giving longitudinal movement to the track, and means for locking the door from longitudinal movement when the track is lowered, of a lug projecting upward from one end of the track, an abutment member mounted upon this end of the door and with which said lug is adapted to engage to give an initial shove to the door to an open position when the track is moved longitudinally, a second abutment member mounted upon the opposite end of the door, and a lever mounted beyond the end of said track and having one arm disposed in the path of movement of the track and the other arm disposed in the path of movement of said second named abutment, said lever when struck by the second named abutment when the door reaches its fully open position acting to shift the track in a direction to cause it to be lowered, and when the door is fully open acting when the track is raised and shifted longitudinally, to strike said second named abutment and shift the door towards its closed position.

9. The combination with a sliding and vertically movable door and a vertically and longitudinally movable track upon which the door slides, said track having cam slots formed therein having their middle portions extending at an angle to the direction of movement of the track, supporting pins passing through said slots, means for giving longitudinal movement to the track, and means for locking the door from longitudinal movement when the track is lowered, of a lug projecting upward from one end of the track, an abutment member mounted upon this end of the door and with which said lug is adapted to engage to give an initial shove to the door to an open position when the track is moved longitudinally, a second abutment member mounted upon the opposite end of the door, and a lever mounted beyond the end of said track and having one arm disposed in the path of movement of the track and the other arm disposed in the path of movement of said second named abutment, said lever when struck by the second named abutment when the door reaches its fully open position acting to shift the track in a direction to cause it to be lowered, and when the door is fully open acting when the track is raised and shifted longitudinally, to strike said second named abutment and shift the door towards its closed position, the first named abutment including a member against which the lug on the track strikes, said member being manually movable out of the path of movement of the lug.

In testimony whereof I hereunto affix my signature.

DAVID EMERY CONRAD.