





# UNITED STATES PATENT OFFICE.

WILLIAM H. MONTZ, OF PACKERTON, PENNSYLVANIA.

## SUPPORTING DEVICE FOR SLIDING DOORS.

SPECIFICATION forming part of Letters Patent No. 467,822, dated January 26, 1892.

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*To all whom it may concern:*

Be it known that I, WILLIAM H. MONTZ, of Packerton, in the county of Carbon, and in the State of Pennsylvania, have invented certain new and useful Improvements in Supporting Devices for Sliding Doors; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which—

Figure 1 shows in side elevation a portion of a freight-car provided with my improved door-supporting devices; Fig. 2, an end view of the door with the supporting devices; Fig. 3, a view, on an enlarged scale, of a section on line *xx* of Fig. 1; Fig. 4, a plan view of one of the hangers on an enlarged scale; Fig. 5, a bottom view of the same.

Letters of like name and kind refer to like parts in each of the figures.

The object of my invention is to provide improved supporting devices for sliding doors which shall insure the easiest and most free movement of the doors past the frame or casing of the opening to be closed; and to this end, my invention consists in the devices and the combination of them with a door and the casing of a door opening, as hereinafter specified.

In the ordinary form of rolling support for a sliding door there are suitable hangers carrying one or more rollers engaging a track constructed so that the rollers will not tend to roll off of the same. The idea is simply to get a supporting and guiding of the door so that it will move in a straight line, and in order to secure a close shutting of the door the plane of movement of its inner face must be close to the surface of the casing or the bearings around the door-opening against which the door is to rest when closed. With this arrangement the door is apt as it is moved to scrape and grind against the casing or said bearings, and where there is any irregularity in the face of the door, such as might be caused by warping or otherwise, there will be such binding and sticking as will interfere materially with the movement of the door to open and shut it, and a scraping and marring of both casing and door. With these objections to the straight-running door-supporting devices as heretofore made and used in view I have devised the hereinafter-described

means whereby a sliding door as it is being moved in either direction will be automatically supported and guided out of contact with the casing or bearings for it around the opening to be closed, while being free to be moved in toward the casing, so as to rest closely against it or the door-frame when it is in closed position.

In the drawings, A designates the casing containing the door-opening A', to be closed by the sliding door B. That casing which I have shown is such as is used on a freight-car, for my door-supporting devices were especially intended for use in connection with freight-car doors; but I desire it to be understood that I do not limit myself to such special use of said devices, as they are applicable to any sliding doors wherever it is desirable that the latter should move most easily and should be out of contact with the casing or frame of the doorways while being moved.

Attached to the upper part of the door are the hangers C, each consisting of the legs or downwardly-projecting pieces C' C', to be attached by bolts or otherwise to the outside of the door, and the main part C<sup>2</sup> extending inward over the rail D, and provided with the vertical longitudinal slot C<sup>3</sup> to receive the roller C<sup>4</sup>, whose axle or arbor C<sup>5</sup> rests against and rolls upon the under face of part C<sup>2</sup> on each side of the slot therein. To prevent said roller from becoming detached or separated from the hanger when the door is not put in running position, I provide the guard-piece C<sup>6</sup>, which, having its body or central portion divided to extend along on both sides of the roller just under its axle, has its ends adapted to be attached to the main part C<sup>2</sup>.

While I do not limit myself to the special construction of the guard shown or any particular manner of fastening it in place, I prefer to have one of its ends arranged to enter a recess *c* on the under side of the main part of the hanger, and the other perforated or forked, as shown, so as to be capable of being fastened to said part by a rivet *c'* or a screw, as desired. Each roller is made conical with a slight taper toward its outside away from the casing, and has its outer edge rounded off, as shown at *c*<sup>2</sup>.

The track or rail D consists of the attaching part *d*, adapted to be fastened to the cas-



ing or other support by one or more screws or otherwise, as desired, the outwardly-extending roller supporting part  $d'$ , having its face upon which the rollers rest, formed with an upward and outward inclination corresponding to the taper of the rollers, and the upwardly-extending flange  $d^2$  along the outer edge of part  $d'$ . The angle between the inner face of such flange and the upper face of part  $d'$  is, as shown best in Fig. 3, rounded off to correspond in shape with the rounded outer edges of the rollers.

To prevent the rollers from becoming disengaged from the track or rail D, as by a jumping or tilting up of either end of the door, I provide each hanger with a small roller  $c^3$ , which engages the outer side of the part  $d'$  of the track or rail.

The flange  $d^2$  is preferably made, as shown, like that on a car-wheel, the inclination of the upper face of part  $d'$  being substantially like that of the periphery of such a wheel, while the form of that part of each roller which runs upon said face is much like that of the tread of a rail with inclined upper surface. It will be observed that the axles or arbors of the rollers are not confined in journal-bearings on the hangers, which would always keep them exactly in the same position, but rolling as they do on the under side of the part  $C^2$  are capable of a slight movement to change their angles with reference to the hangers and the doors. This arrangement is especially desirable, in order to secure the required movement of the door away from the casing or support for the track or rail as said door is slid in one direction or the other.

The operation of my supporting devices shown and described hereinbefore is as follows: With the first longitudinal movement of the door the rollers  $C^4$   $C^4$  on account of their conical shape will work outward toward the flange  $d^2$  on the track  $D'$ . On account of the tendency of cones rolling on a surface to roll about their apexes or smaller ends, the larger inner portions of the rollers will tend to run forward of the other portions upward and outward on the inclined face of the rail, so that the roller-axes will be at a slight angle to lines at right angles to the door and the respective hangers. The result is the travel of both rollers and door outward toward the outer flanged part of the track and away from the casing or support to which the inner portion  $d$  of the track or rail is attached. The door is then, while being moved or slid longitudinally, out of contact with the casing or the face of the doorway-frame, and can consequently be most easily pushed or pulled along to open or shut it. The flange  $d^2$  limits the outward movement of the rollers, which, when their rounded outer edges strike the rounded surface connecting the inner face of the flange with surface  $d'$ , will be guided easily along, so as to roll longitudinally over the rail. Where, as I prefer, both rollers and rail are of metal, the friction of the rounded portions

or edges of the former against the flange, as it prevents the rollers from further outward movement and turns them with their axes substantially at right angles to the door and the respective hangers, is but a slight one, easily overcome, and not interfering materially with the sliding of the door. Because of the downward and inward slant of the surface  $d'$  of the track or rail D the door can, when not being slid longitudinally, be easily moved in toward the casing or door-frame, so as to rest closely against the same. In the case of a freight-car the motion of the latter will tend to cause the door to work inward against the casing, so as to close the door-opening most closely. The small rollers  $c^3$   $c^3$ , engaging the under side of the rail or track, as hereinbefore specified, effectually hold the large door-supporting rollers down upon surface  $d'$  and prevent their getting outward over the flange  $d^2$ .

I have not shown or described any stops to limit the longitudinal movement of the door, as it will be understood that such devices in any of the well-known forms and constructions thereof are to be used, so as to prevent the rollers from rolling off of the end of the rail or track.

The construction and operation of the guard devices for securing the roller-axes to the hangers while leaving them free to change their angles with reference to the latter have been fully set forth hereinbefore.

It will be seen from the foregoing description and the drawings that my door-supporting devices are most simple and cheap in construction, and that they operate entirely automatically and without any care or attention from one closing or opening a sliding door to move the latter, so that during its longitudinal travel it will not be in contact with or rub against the casing or support to which the rail or track is attached. There will then be none of the friction of door against casing or doorway-frame, which is present, when the straight running door-supporting devices, as heretofore made, are used and the door is to close tightly against the frame of the doorway.

The only friction which exists during the sliding of a door provided with my supporting devices, as hereinbefore described and shown, is that of the peripheries of the rollers upon the track or rail and the rounded outer parts of the former upon the track or rail flange, and is principally a rolling one, which offers the slightest resistance to longitudinal movement of the door.

Having thus described my invention, what I claim is—

1. In a supporting device for sliding doors, in combination with the rail or track and the hanger to be attached to the door, a conical roller resting on the track with its larger end toward the casing side of the hanger, and bearings for the roller-axle on the hanger, leaving such axle free to change its angle



with reference to a longitudinal line through the hanger, substantially as and for the purpose described.

2. In a supporting device for sliding doors, 5  
in combination with the rail or track with inclined roller-supporting face and the hanger to be attached to the door, a conical roller and loose connections between the roller-axle and the hanger, whereby the hanger is supported 10  
upon the axle, while the latter is left free to change its angle with reference to a longitudinal line through the hanger, substantially as and for the purpose shown and described.

3. In a supporting device for sliding doors, 15  
in combination with the rail or track having the upwardly and outwardly inclined roller-supporting face and a flange along the edge of the latter and a hanger to be attached to the door, a conical roller and loose connections 20  
between the roller-axle and the hanger, whereby the hanger is supported upon the axle, while the latter is left free to change its angle with reference to a longitudinal line through the hanger, substantially as and for the purpose 25  
set forth.

4. In a supporting device for sliding doors, in combination with the rail or track having the inclined roller-supporting face and the flange, the conical roller having its inclined 30  
periphery resting upon the inclined face of the rail or track, and the hanger to be attached to the door, having longitudinal parallel bearing-surfaces resting upon the roller-axle on

opposite sides of the roller, along which the opposite ends of the axle can slide freely in 35  
opposite directions, so that the angle of the axle with reference to a longitudinal line through the hanger can be changed, substantially as and for the purpose described.

5. In a supporting device for sliding doors, 40  
in combination with a rail or track with inclined roller-receiving face, the flange and the rounded surface at the angle between the inclined face of the rail and the inner side of the flange, the roller with inclined periphery resting 45  
on the inclined face of the rail or track and having its edge toward the flange rounded, the hanger for attachment to the door, having a slotted portion to receive the roller and resting and rolling upon its axle, substantially as 50  
and for the purpose set forth.

6. In combination with the hanger having the longitudinally-slotted portion, the conical roller having its axle engaging the under side of such portion, so that it can move with reference 55  
to the same, and the guard attached to the hanger and extending on both sides of the roller below its axle, substantially as and for the purpose described.

In testimony that I claim the foregoing I 60  
have hereunto set my hand this 28th day of April, 1891.

WILLIAM H. MONTZ.

Witnesses:

F. PIERCE LENTZ,  
EDMUND HIBBLER.