Jan. 1, 1935. E. W. CLARK 1,985,976

SLIDING DOOR CONSTRUCTION

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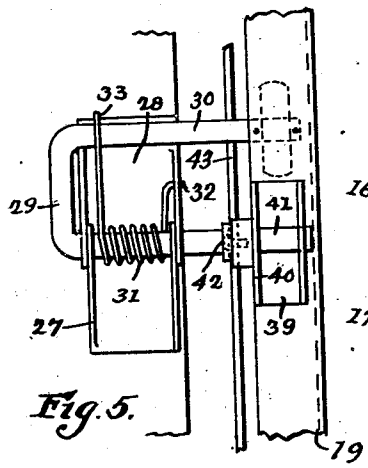


Fig. 5.

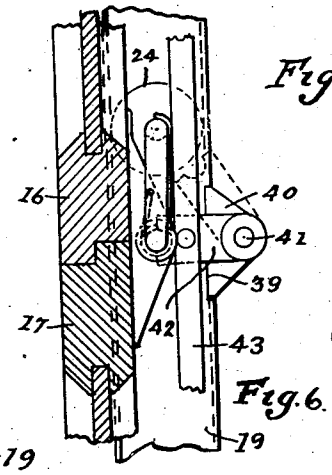


Fig. 6.

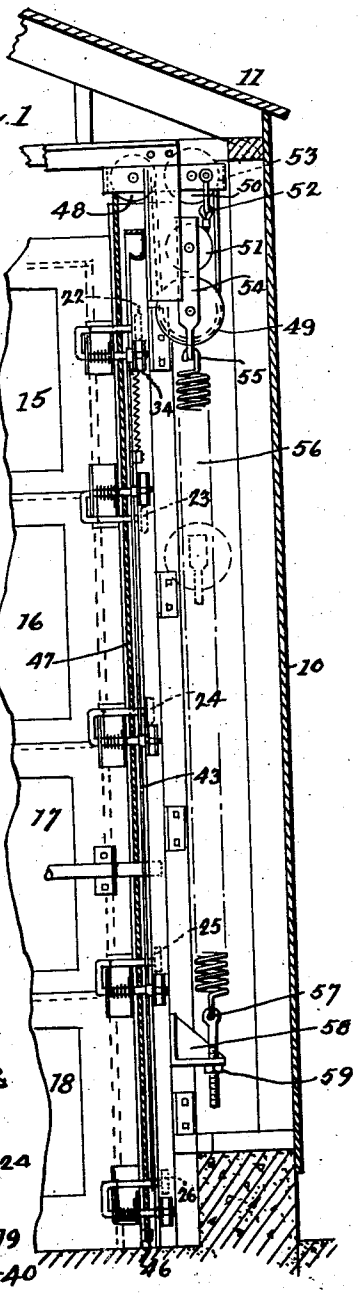


Fig. 1

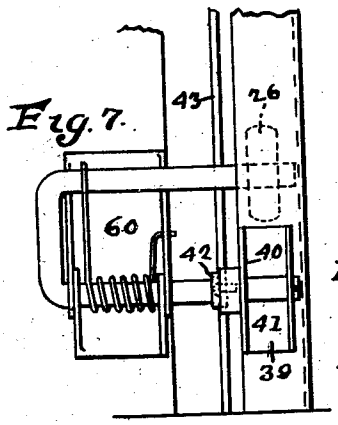


Fig. 7.

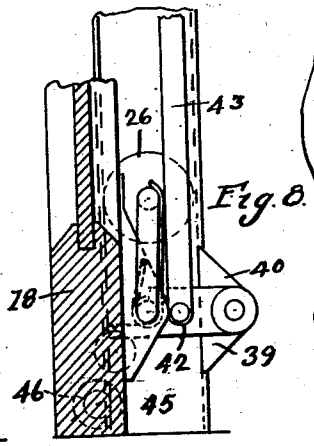


Fig. 8.

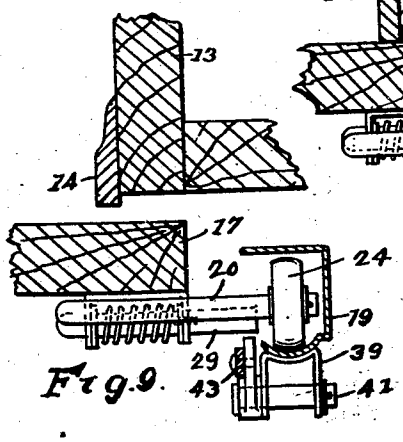


Fig. 9.

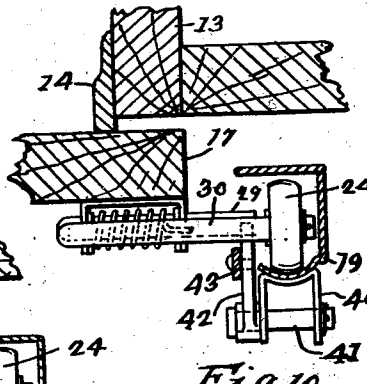


Fig. 10.

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Fig. 2.

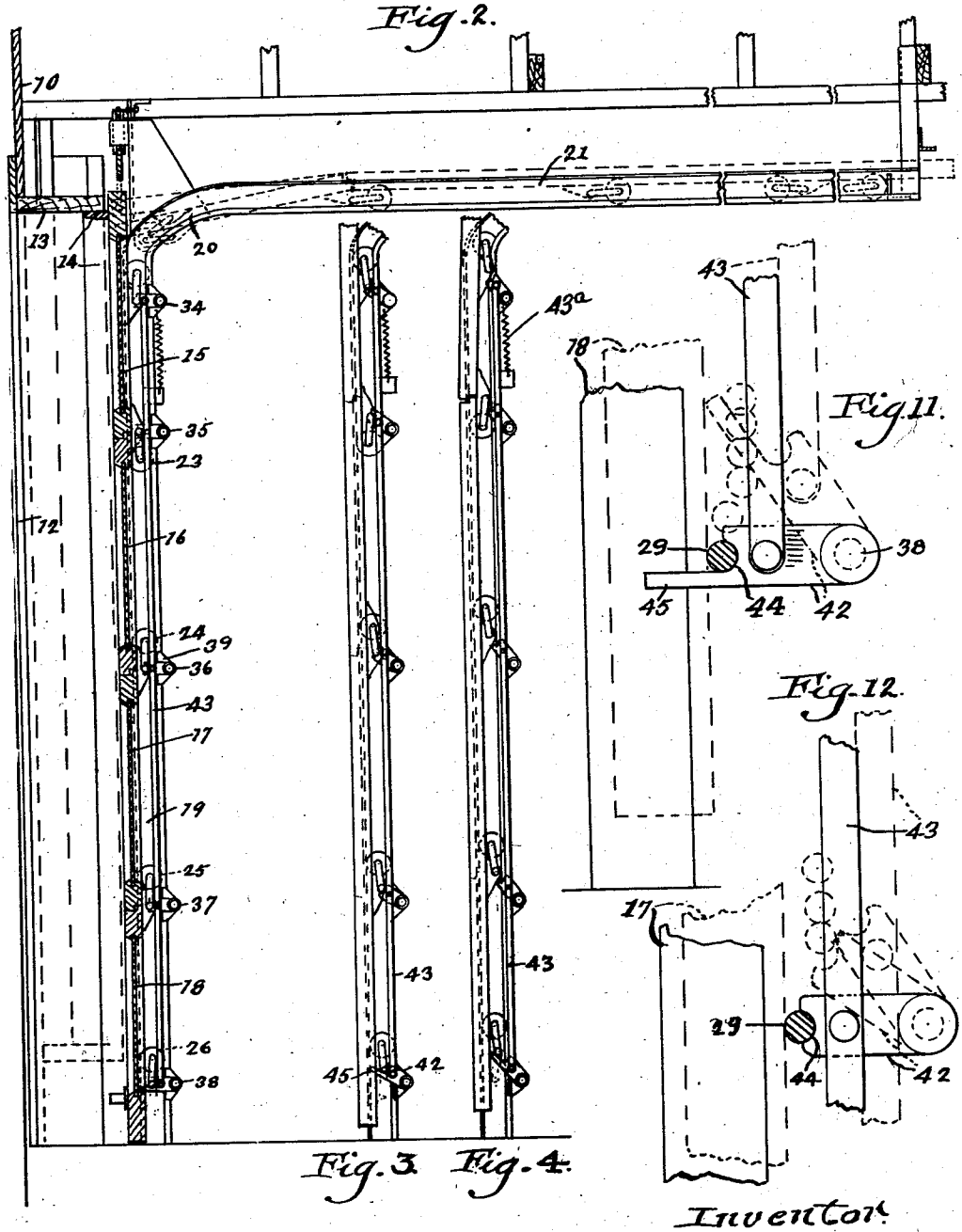


Fig. 3 Fig. 4.

Fig. 11.

Fig. 12.

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UNITED STATES PATENT OFFICE

1,985,976

SLIDING DOOR CONSTRUCTION

Earl W. Clark, Warren, Ohio, assignor, by direct and mesne assignments, to Barber-Colman Company, Rockford, Ill., a corporation of Illinois

Application August 17, 1929, Serial No. 386,623

17 Claims. (Cl. 20—20)

This invention relates to sliding door constructions, and more particularly to a modified species of the type comprising a plurality of sections flexibly connected together and adapted to move along a track from a closed position to an open position as disclosed in my copending application Serial No. 386,622 filed herewith and eventuating in Patent No. 1,948,065.

While the invention is of general application and embraces within its scope, warehouse and airplane hangar installation, and smaller structures such as cabinet type of furniture, it is of particular adaptability for garage doors. In the preferred embodiment, the sections are arranged one above the other in the closed position and the door is opened by sliding the sections upwardly in series around a curved track to a horizontal position above the door opening and extending into the garage, occupying a position just below the roof.

It is a general object of the invention to simplify and improve the construction and operation of devices of this character.

Specifically, an important object of the invention is to seal the door automatically with the closing movement of the door, in a modified manner.

Another specific object of the invention is to seal the door against the frame in a modified manner, in a construction in which the guiding track for the door is parallel to the door frame.

Other objects and features of novelty will be apparent as the following description proceeds, as taken in conjunction with the accompanying drawings, in which:

Fig. 1 is an interior elevation of the sliding door construction according to the present invention;

Fig. 2 is an interior elevation of one side of the garage showing the door in section;

Fig. 3 is a partial view of the structure shown in Fig. 2, showing the parts in a different position;

Fig. 4 is a view similar to Fig. 3 showing a still further position of the parts;

Fig. 5 is a partial elevation showing the mounting for one of the guide rollers;

Fig. 6 is a vertical section along line 6—6 of Fig. 5;

Fig. 7 is a view similar to Fig. 5 showing a mounting for another roller;

Fig. 8 is a vertical section along the line 8—8 of Fig. 7;

Fig. 9 is a partial horizontal section showing the position of the roller just before the door is sealed;

Fig. 10 shows the position of the parts of Fig. 9 after the door has been sealed;

Fig. 11 is an enlarged diagrammatic detail of the trip member associated with the lower roller for operating the sealing device; and

Fig. 12 is a similar view showing the position taken by the upper toggles corresponding to the positions of the structure shown in Fig. 11.

Referring more particularly to the drawings, the invention is illustrated in connection with a garage having a side wall 10, a roof 11, a door facing 12 and a door frame 13. Each side of the frame 13 carries a sealing member 14 against which the door is adapted to abut in the closed position.

The door comprises a plurality of sections 15, 16, 17 and 18 which are hingedly connected together.

For guiding the door from the vertical closed position to the horizontal position interior of the building and above the door opening, a track member is provided which comprises a straight vertical section 19, a curved section 20 and a straight horizontal section 21. The door is guided by and supported upon this track by means of rollers 22, 23, 24, 25 and 26.

The mounting for the rollers 24 and 25 is shown in Figs. 5 and 6. A hinge member 27 is secured to the section 17 and a mating hinge section 28 is secured to the door section 16. These two parts cooperate to form a hinge, the pintle of which is formed by a member 29. The member 29 is rotatable with respect to both sections 27 and 28 and comprises a substantially U-shaped member having an offset arm 30, on which the roller 24 is journalled. A spring 31 is coiled around the member 29 and has one end engaging a hinge member 28, as at 32, and its other end engaging the arm 30, as at 33.

The mounting for the roller 26 is shown in Figs. 7 and 8 and is identical with that described with respect to Figs. 5 and 6 with the exception that a single integral member 60 is employed instead of the hinge members 27 and 28.

From the above description, it will be apparent that the rollers 22 to 26 are yieldably mounted as the members 29 upon which they are journalled may rotate in their mountings. With only the arrangement described above, the door in its closed position would come to rest substantially parallel to the sealing member 14 but spaced more or less therefrom due to the yieldable mounting of the rollers.

Means are provided for automatically urging the door sections against the sealing member 14, as the door is moved into its closed position. Fixed pivots 34, 35, 36, 37 and 38 are located in a line parallel to the sealing member 14 but spaced therefrom and distributed along the length thereof. In the embodiment shown, these pivots are provided by strap members 39 which are secured to the track 20 and provided with outwardly projecting flanges 40, in which is journalled a pivot 41. Secured to the pivot 41 outside of the flanges 40 is an arm 42, one such arm being provided at each of the pivot points. Near the outer end of each of these arms, they are connected to a vertical link 43, which insures simultaneous and parallel movement of the arms. The outer end of each arm is provided with a notch or socket 44 which is adapted to receive the U-bolt arm 29. The arm 42 associated with the fixed pivot 38 is of slightly different construction from the remaining arms as it is provided with an extension 45 below the socket 44, which extension forms a trip for operating all of the arms 42.

In operation, as the door is lowered into its closed position, the arm 29 of the roller 26 will engage the extension 45 and pull the link 43 downward against the action of a suitable spring 43^a. It should be noted that the pins 41 are spaced exactly like the members 29 and, for this reason, as the extension 45 is moved downward, moving the arm 42 about its pivot, the remaining arms will also be correspondingly moved and will take a position in which the socket 44 will engage the arm 29 of each of the rollers. The pivotal movement of the arms will urge the rollers toward the sealing member 14 and in the final position of the door, the respective sections thereof will be urged tightly against the sealing strip.

Means are provided for counterbalancing the weight of the door to facilitate easy operation thereof. A pin 46 is provided at the bottom section of the door and secures one end of a chain or cable 47. This cable extends above the top of the door and passes over a fixed pulley 48, a movable pulley 49, another fixed pulley 50 and a further movable pulley 51. The other end of the cable is fixed as at 52 to the block 53 in which the fixed pulleys 48 and 50 are journalled. The movable pulleys 49 and 50 are carried by a block 54, the lower end of which carries an eye 55 receiving one end of a heavy coil spring 56. The lower end of the spring 56 is secured to an eye bolt 57, passing through an aperture in a bracket 58 and adjustably secured thereto by the nut 59.

While one embodiment of the invention has been shown and described in comparative detail for the purposes of adequate disclosure, the broader idea of the invention is not limited to any of the details disclosed herein, but instead includes such embodiments thereof as are within the scope of the sub-joined claims.

Having thus described my invention, what I claim is:

1. In an overhead door construction, a plurality of hingedly connected door members for traversing a door opening, stationary guide tracks for directing the movements of said door members between an overhead substantially horizontal position and a closed vertical position, shiftably supported door closing means movable relative to the door members at the hinged connections therebetween when the door approaches its closed position, said means being adapted when shifted with respect to the door members to effect lateral movement thereof toward the door opening, and means for automatically effecting the shifting of said door closing means as an incident to the edgewise movement of the door members into closed position.

2. The combination of a door, a door frame providing an opening with an abutment for engagement by marginal edge portions of the door, said door being movable edgewise across said opening, guiding and controlling means for the door including a plurality of pivotal elements supported for pivotal movement relative to the door, actuating means automatically swinging said elements relative to the door as it approaches its closed position and serving to impart to the door a relatively abrupt movement toward the plane of the door opening whereby to carry said marginal edge portions against said abutment, and spring means operable in the movement of the door edgewise away from its closed position to move it abruptly in a direction away from the abutment.

3. The combination with a door frame, of a door having marginal edge portions arranged to abut said frame and movable edgewise relative to the frame in opening and closing the door, a track spaced from the frame, an arm pivoted at one end to the door and having a guide element engaging in said track, spring means acting between said door and said arm and tending to rotate the arm in a direction to move the door laterally away from the frame, and means operable automatically in the approach of the door toward its closed position to rotate the arm against the action of said spring means and in a direction to move the door laterally against said frame.

4. The combination of a door having a plurality of panels hinged together in edge to edge relation, a door frame providing an opening with an abutment for engagement by marginal edge portions of the panels, a stationarily mounted guide track having a section disposed in a plane approximately parallel to the door opening and a section receding therefrom, a plurality of closing elements supported for pivotal movement relative to the door panels and spaced apart in the direction of movement of the door, and actuating means for swinging said elements relative to the individual panels automatically as an incident to the edgewise movement of the door into its closed position, said elements operating in such movement to impart to the individual panels a relatively abrupt lateral movement toward the door opening whereby to carry said marginal edge portions toward said abutment.

5. The combination of a door frame providing an opening, a door adapted for movement edgewise in a plane across said opening and parallel thereto, and means for governing the movement of the door relative to the door frame including a fixed guide member extending substantially parallel to the door opening, a plurality of arms pivotally mounted on said guide member and spaced apart in the direction of movement of the door, and a device operable automatically as an incident to the edgewise movement of the door into its closed position to move the arms into operative relation to the door, said arms acting in such closing movement of the door to impart to the door an additional relatively

abrupt movement in a direction laterally of the door opening.

6. An overhead door having a plurality of panels hinged together in edge to edge relation, a door frame providing an opening with an abutment for engagement by marginal edge portions of the panels, a guide means including a track having a section disposed in a plane approximately parallel to the door opening and a section receding therefrom, said door having a plurality of bearing elements thereon spaced apart in the direction of movement of the door and disposed on the inner face of the latter, a plurality of pivotal elements mounted on said track and spaced apart according to the spacing of said bearing elements on the door, said pivotal elements being normally held in a position clear of said pins, and means operating as the door moves into its closed position to swing said pivotal elements into positions to be engaged one by each of said bearing elements, said pivotal elements operating upon such engagement to impart to the individual panels a relatively abrupt lateral movement toward the door opening whereby to carry said marginal edge portions toward said abutment.

7. The combination of a door having a plurality of panels, hinges connecting the adjacent edges of the panels and including pintles at the inner side of the door, means for guiding the door edgewise across a door opening including a track having a section disposed in a plane spaced from the door opening and a section receding therefrom, a plurality of closing elements pivotally mounted on the track and normally held in a position clear of said hinge pintles, and means operable as the door moves into its closed position to swing said elements into the path of movement of the pintles for engagement by the latter, said elements operating upon the pintles in such closing movement of the door to impart lateral movement to the door.

8. The combination of a door adapted for movement edgewise in a plane across a door opening, and means for governing movement of the door relative to said opening including a fixed guide member extending along the door opening, a plurality of arms pivotally mounted on said guide member and spaced apart in the direction of movement of the door, a plurality of elements projecting from the inner face of the door and spaced apart a distance corresponding to the spacing of said arms, and means operable as the door moves into its closed position to swing said arms into the path of movement of said projecting elements, said arms operating in such movement to impart an abrupt lateral movement to the door into tightly closed relation to the door opening.

9. An overhead door comprising a plurality of panels hinged together in edge to edge relation, means for guiding said panels for movement across a door opening including a track stationarily mounted adjacent the door opening, rollers engaging in said tracks, said door panels having hinges connecting adjacent sections and including hinge pintles each having a crank arm carrying one of said rollers, and means operating as an incident to the movement of the door into its closed position to impart an abrupt lateral movement to the door panels relative to said track, said crank arms being adapted to rock in such lateral movement of the door panels.

10. An overhead door comprising a plurality of panels hinged together in edge to edge relation, means for guiding said panels for movement across a door opening including a track stationarily mounted adjacent the door opening, rollers engaging in said tracks, said door panels having hinges connecting adjacent sections and including hinge pintles each having a crank arm carrying one of said rollers, a plurality of pivotal elements mounted on said track and spaced apart in the direction of movement of the door a distance corresponding to said hinge pintles, said elements being normally held clear of said pintles in the movement of the door, and means operating as the door moves into its closed position to swing said elements into position to be engaged by said pintles for arcuate motion with the free ends of the elements during the closing movement of the door.

11. An overhead door comprising a plurality of panels hinged together in edge to edge relation, means for guiding said panels for movement across a door opening including a track stationarily mounted adjacent the door opening, rollers engaging in said tracks, said door panels having hinges connecting adjacent sections and including hinge pintles each having a crank arm carrying one of said rollers, a plurality of pivotal elements mounted on said track and spaced apart in the direction of movement of the door a distance corresponding to said hinge pintles, said elements being normally held clear of said pintles in the movement of the door, means operating as the door moves into its closed position to swing said elements into position to be engaged by said pintles for arcuate motion with the free ends of the elements during the closing movement of the door, and spring means acting upon said crank arms and tending to move the door panels laterally away from said opening

12. The combination of a door, a door frame providing an opening with an abutment for engagement by marginal edge portions of the door, said door being movable edgewise across said opening, guiding and controlling means for the door including a track and a plurality of pivotal elements supported on said track for movement relative to the door, actuating means operating automatically to swing said elements relative to the door as the latter approaches its closed position and serving to impart to the door a relatively abrupt movement toward the plane of the door opening whereby to carry said marginal edge portions against said abutment, and spring means operable in the movement of the door edgewise away from its closed position to move it abruptly in a direction away from the abutment

13. The combination of a door, a door frame providing an opening with an abutment for engagement by marginal adge portions of the door, said door being movable edgewise across said opening, guiding and controlling means for the door including a track stationarily mounted adjacent the door at the inner side thereof, a plurality of rollers swingably mounted on the door and engaging in said track, spring means acting upon said rollers and tending to hold the door in a position clear of said abutment, a plurality of pivotal elements mounted on said track and spaced apart in the direction of movement of the door, and means operable as the door moves into its closed position to swing said elements into operative engagement with the door, said elements operating in the closing movement of the door to impart an abrupt lat-

eral movement thereto toward said opening against the action of said spring means.

14. The combination with a door mounted for movement edgewise across a door opening, of a closing mechanism for the door comprising a plurality of pivotal elements mounted to turn on fixed axes adjacent the door, and means operable automatically as an incident to the approaching of the door toward its closed position to swing said elements directly into engagement with the door, said elements operating in such swinging movement to impart an abrupt lateral movement to the door.

15. An overhead door comprising, in combination, a plurality of panels hinged together in edge-to-edge relation, means for guiding said panels for movement across a door opening having a jamb, said means including a track stationarily mounted adjacent the door opening, rollers carried by the door at the hinged connections between the panels and cooperating with the tracks to provide an operating clearance between the door and the said jamb, and means operative as the door approaches its closed position for shifting the door panels as a unit toward said jamb and comprising a series of shifting devices mounted on the track for movement relative thereto and spaced apart in the direction of movement of the door a distance corresponding to the spacing of said rollers, and a second series of devices carried by the door and associated respectively with said guide rollers, the devices on the track being movable automatically as an incident to the approach of the door toward its final closed position into engagement with devices on the door and coacting therewith to shift the door into engagement with the jamb.

16. In an overhead door construction, a door having a plurality of hingedly connected door panels for traversing a door opening, a stationary track including a straight upright section and a section extending rearwardly from the door opening, means on said panels loosely engaging in said track so as to guide the door from a substantially vertical closed position to an overhead open position, an actuating member arranged for movement as an incident to the movement of the door as it approaches its closed position, and means operated by said member in such movement and acting upon all of said panels in the closed position thereof to hold the door in tightly sealed relation to the door opening.

17. The combination of a door, a door frame providing an opening with an abutment adapted for engagement by the door in the closed position thereof, and means including a guide member and a plurality of crank arms coacting with said guide member for governing the movement of the door relative to the door frame, said crank arms being spaced apart in the direction of movement of the door and acting between said guide member and the door to impart thereto a relatively abrupt movement in a direction toward or away from the frame as incidents to edgewise movements of the door into or out of closed position.

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