A. J. ROSENTRETER.

SLIDING DOOR LOCKING MECHANISM.

APPLICATION FILED MAR. 26, 1917.

1,287,443.

Patented Dec. 10, 1918.

2 SHEETS—SHEET 1.

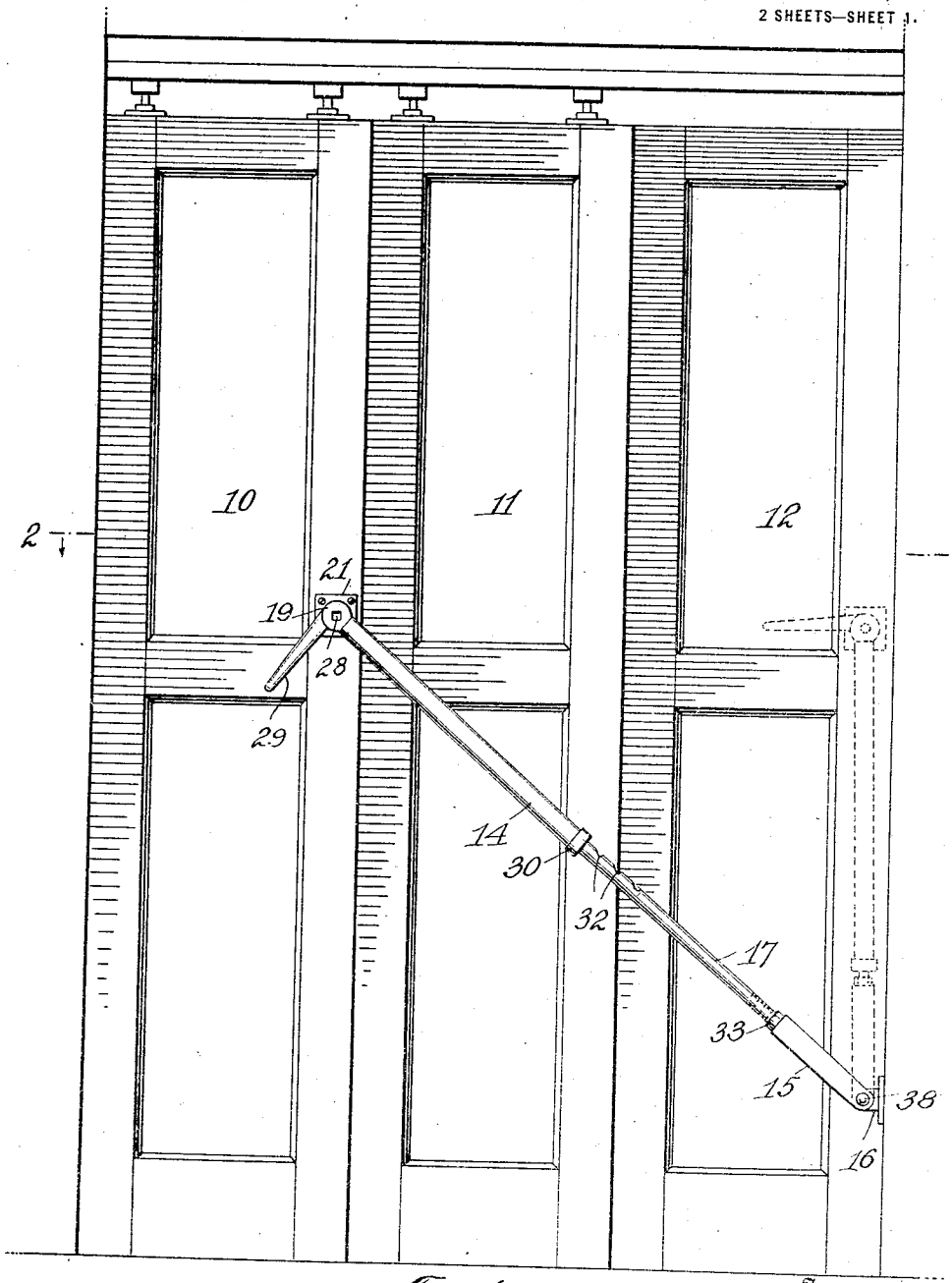


Fig. 1.

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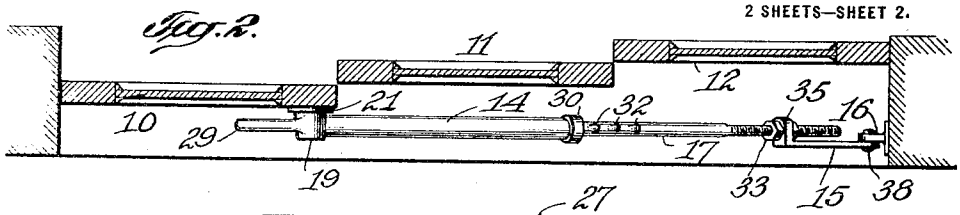
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2 SHEETS—SHEET 2.

Fig. 2.



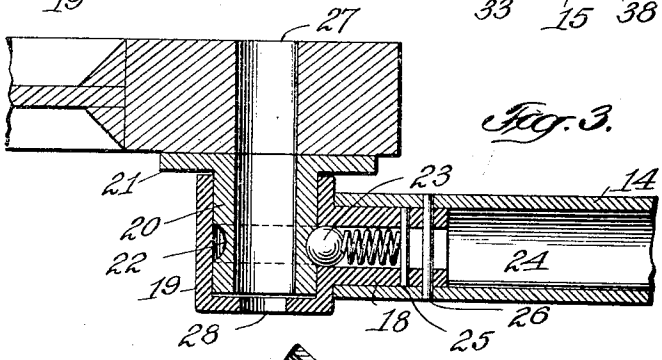


Fig. 3.

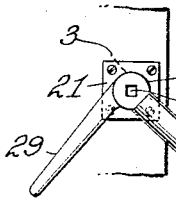


Fig. 4.

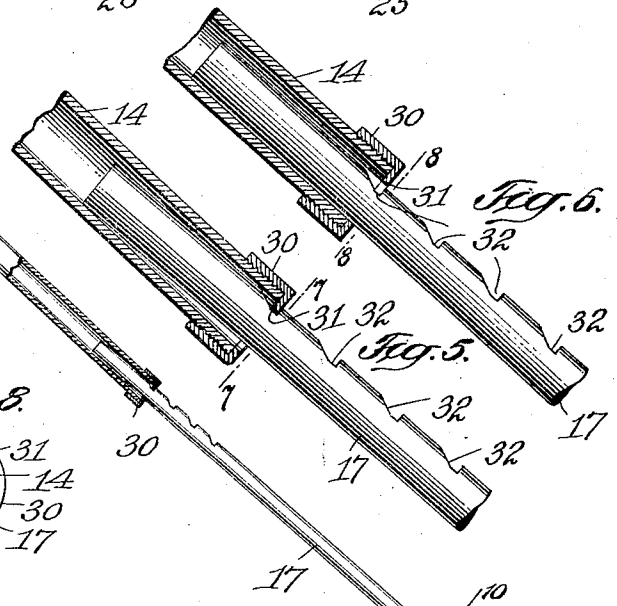


Fig. 5.

Fig. 6.

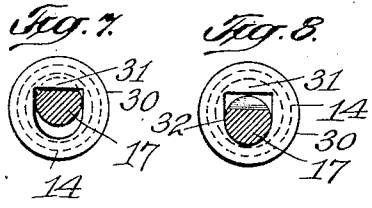


Fig. 7.

Fig. 8.

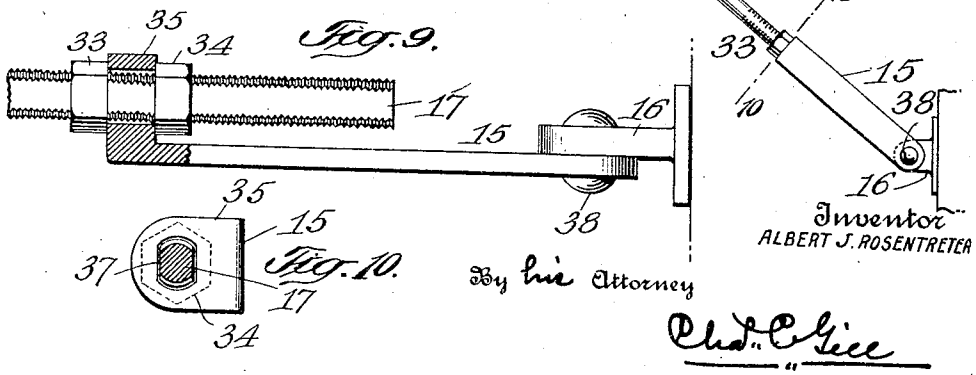


Fig. 9.

Fig. 10.

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UNITED STATES PATENT OFFICE.

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SLIDING-DOOR-LOCKING MECHANISM.

1,287,443. Specification of Letters Patent. Patented Dec. 10, 1918.

Application filed March 26, 1917. Serial No. 157,391.

To all whom it may concern:

Be it known that I, ALBERT J. ROSENTRETER, a citizen of the United States, and a resident of Boonton, in the county of Morris and State of New Jersey, have invented certain new and useful Improvements in Sliding-Door-Locking Mechanisms, of which the following is a specification.

The invention pertains more particularly to locking mechanism for sliding doors of the character employed at the different floors of buildings for guarding the entrances at the elevator shaft or shafts and permitting, when open, access to the elevator car or cars when arrested at the several floors of the building. These sliding doors are of various types, there being in some instances a stationary door, or panel imitating a door, with one sliding door to be moved by the operator on the car or hoist, and in other instances such panel with two sliding doors arranged to telescope one on the other and to be operated by the elevator attendant, and in still other instances the said panel representing a door is in fact a door and hinged so that it may be opened and fully expose the car, this latter class usually being employed in connection with elevator cars designed to carry freight and in which use it is desirable that a wide opening be provided for the admission of desks and the like to the elevator car.

My invention is intended for use in connection with any of the sliding doors above mentioned, whether there be a single sliding door or two-speed sliding doors or other type of sliding door, but I illustrate my invention herein as connected with a pair of two-speed sliding doors.

My invention, does not modify the arrangement or action of the door, but provides a means for locking the door in closed position, the lock acting automatically and with certainty when the sliding door to which the mechanism is connected reaches its closed position. The locking mechanism of my invention also prevents a person who may be on the floor of the building from sliding the door, after the same has nearly reached its closed position, to an open position in an attempt to enter the car. One purpose of the invention is to provide durable, inexpensive and efficient sliding-door locking-mechanisms which may be applied to doors already installed, as well as to new doors to be placed in position; and one of the main objects of my invention is to provide suitable sliding-door locking-mechanism which may be relied upon to automatically lock the door when the door reaches its closed position and to prevent the unauthorized opening of the door from the hall side of the elevator shaft. Many accidents have occurred to persons who on finding an elevator-shaft door moving to its closed position, make an attempt to force the door open and enter the car, and one purpose of my invention is to render any such accident impossible.

The mechanism of my invention comprises two main telescopic members normally standing in inclined position, the upper end of one of the members being pivotally connected with the sliding door and the lower end of the other member being pivotally connected with a stationary abutment, and said members at their adjoining portions are adapted to automatically interlock one with the other when the door reaches its closed position to thereby resist the opening of the door until said members have been manually disengaged from each other. Usually one of said members will have a projection or lip to enter a ratchet tooth recess in the other member, and thereby become interlocked therewith so as to prevent opening movement of the door, and preferably the member having the notch or recess will have several such notches or recesses so as to resist after the door has approached its closed position, any opening of the door by a force exerted against the same from the outer side of the door by a person attempting to push the door open for the purpose of entering the elevator car. The two members of the locking mechanism may respectively be a piece of tubing and a rod to telescope with the same, the lower end of the piece of tubing having the lip or projection and the rod the notches or recesses to interlock with said lip or projection. I also provide means for adjusting the locking mechanism with relation to variations in doors, and also means for the convenient application of said mechanism to and the detachment of the same from the sliding door.

The invention will be fully understood from the detailed description hereinafter presented, reference being had to the accompanying drawings, in which:

Figure 1 is an elevation of a pair of two-speed sliding doors and an imitation or panel door for an elevator shaft equipped with the mechanism of my invention, this figure showing the side of the doors which face the elevator shaft;

Fig. 2 is a horizontal section through the same, on a larger scale, taken on the dotted line 2—2 of Fig. 1;

Fig. 3 is a sectional view on a much larger scale through a portion of the back stile of the first sliding door and through a portion of the locking mechanism, taken about on the dotted line 3—3 of Fig. 4;

Fig. 4 is a detached side elevation, partly in section, of the locking mechanism, a portion of the first sliding door and the stationary abutment for said mechanism being also shown;

Fig. 5 is a sectional view, on an enlarged scale, of the adjoining portions of the two main members of the locking mechanism, Fig. 5 showing the position of the parts when the same are interlocked and lock the sliding door or doors in closed position;

Fig. 6 is a like view of the same illustrating the relation of the telescopic parts when that member connected with the sliding door has been tilted to free it from locking engagement with the other member preparatory to the doors being moved to open position;

Fig. 7 is a transverse section through the same, taken on the dotted line 7—7 of Fig. 5;

Fig. 8 is a transverse section through the same, taken on the dotted line 8—8 of Fig. 6;

Fig. 9 is a top view, partly in section and partly broken away, of the means for connecting, in an adjustable manner, the lower member of the locking telescopic mechanism with the stationary abutment, and

Fig. 10 is a transverse section through the same, taken on the dotted line 10—10 of Fig. 4.

In the drawings, 10 designates the outer sliding door, 11 the inner sliding door and 12 a stationary imitation door or pannel behind which in the usual course of practice the elevator operator stands, with his right hand near the starting and stopping devices of the elevator. The doors 10, 11, 12 are of usual type, and the door 12 customarily corresponds in appearance with the doors 10, 11, but is stationary under usual conditions, although sometimes hinged at its right hand edge, looking at Fig. 1, so that it may be opened and expose the full width of the elevator car to receive freight. In the drawings I illustrate my invention as applied to sliding doors of the two speed variety, the door 10 traveling at greater speed than the door 11 so that both doors may reach their open and closed positions at the same time.

The mechanism of my invention comprises three main members, one being a tubular member 14 pivotally connected with the sliding door 10, another being a link or bar 15 pivotally connected with a stationary bracket 16 and the other a rod 17 adapted to telescope with the member 14 and held at its lower end in the link or bar 15. The bracket 16 is secured to the jamb or framing of the general door opening and affords a fixed abutment for the locking mechanism.

The tubular member 14 has secured in its upper end a hub 18 which is tubular and in one piece with a cap 19 adapted to fit upon a sleeve 20 forming a stud part of a bracket 21 which is fastened to the first sliding door and preferably upon the back stile thereof, as shown in Fig. 1. The cap 19 is adapted to have rotary or rocking movement upon the sleeve 20, and said sleeve has an annular shallow groove 22 to engage and be engaged by a ball-pawl 23 mounted in the hub 18 and pressed by a spring 24 against the sleeve 20. A pin 25 serves to retain the spring 24 in place and a pin 26 fastens the hub 18 to the tubular member 14. The spring-pressed ball 23 serves to lock the cap 19 upon the sleeve 20 and at the same time permits the member 14 to have a hinged movement upon said sleeve, and in addition should it ever be desired to remove the member 14 from the door 10, the ball 23 will yield (by being forced against the spring 24) to a sharp outward jerk on the member 14 parallel with the sleeve 20 sufficiently to permit said member to be slipped off from said sleeve, and this feature of the construction I regard as of importance. The sleeve 20 is hollow and in line with an opening 27 extending through the door 10 to the outer face thereof, and the end of the cap 19 is formed with a polygonal opening 28 in line with said opening 27, and this arrangement is provided so that, should occasion require, a person on the floor of a building, with the use of a proper key, may be able to unlock the door 10 so as to start the doors on their opening movement. The locking mechanism of my invention is ordinarily to be operated by the attendant on a car and at the shaft side of the doors, but should occasion ever arise, said mechanism may be unlocked from the hall side of the elevator shaft by a person using a proper key adapted to the openings 27, 28, as will be hereinafter more fully explained.

The cap 19 is by preference formed with a lever-handle 29 by which the elevator operator may effect the unlocking of the mechanism and the movement of the door 10 toward its open position, said handle 29 being provided as a matter of convenience and not of necessity, because the said operator may unlock the mechanism and start the door 10

to its open position by lifting pressure on the lower side of the tubular member 14, should he so desire.

The tubular member 14 is simply a plain straight piece of tubing secured by a pin 26 or the like to the hub 18 and having on its lower end a cap 30 which is open in its central portion to admit the lower rod or member 17 of the locking mechanism. The opening in the cap 30 is of the outline more fully illustrated in Figs. 7 and 8, in which it will be seen that said opening is not a circle, but is circular at its lower part and affords a lip 31 at its upper part adapted to enter a notch or recess 32 in the rod 17, and thus interlock said rod with the tubular member 14. The tubular member 14 is of greater diameter than the rod 17, as shown in Figs. 5 and 6, and hence when the doors are in closed position and the members 14, 17 sag into interlocking relation in the closed position of the doors, said members may become interlocked by the engagement of the lip 31 on the sleeve 30 with a recess 32 in the rod 17. When it is desired to unlock the doors so that they may be opened, the tubular member 14 is tilted upwardly at its lower portion so as to free the lip 31 from the notch or recess 32 it engages of the rod 17, and at that time during the opening movement of the door 10, the member 14 and the rod 17 may telescope upon each other, until finally they stand in substantially vertical alinement near the jamb of the door, as indicated by dotted lines in Fig. 1. The rod 17 will preferably have several notches or recesses 32 each affording a shoulder to resist the opening movement of the door 10, and during the closing movement of the door the lip 31 on the member 14 will slide over said notches or recesses and not interlock with the same. I provide several of the notches or recesses 32 so that during the closing movement of the door 10 a person in the hall may not, when the door 10 is reaching its closed position, push said door open, the action of pushing on the outer edge of the door 10 serving to effect the engagement of the lip 31 on the member 14 with the notch or recess 32 which then may be nearest to said lip. The rod 17 is a plain straight rod having the notches or recesses 32 at its upper portion, and at its lower portion said rod is flattened at opposite sides, as shown in Figs. 9 and 10, and threaded at its other or segmental sides to receive internally threaded nuts 33, 34. The lower end of the rod 17 extends through an arm 35 which is integral with the arm or link 15 and is at the upper end thereof, said arm having a free hole through which the lower portion of said rod 17 passes and which rod is secured to said arm 35 and link 15 by the aforesaid nuts 33, 34, which serve to bind the rod in adjusted position with respect to the link 15. The threads on the lower end of the rod 17 permit said rod to be adjusted with relation to the arm or link 15 and member 14 so as to adapt the locking mechanism to varying dimensions and conditions which may be found in sliding doors to which it may be desired to apply the mechanism. The hole in the arm 35 through which the lower portion of the rod 17 extends is elongated, as indicated in Fig. 10, at 37, and hence said rod 17 can not rotate in the hole in the arm 35, but must be slid longitudinally therethrough and then secured by means of the nuts 33, 34. The arm or link 15 is secured at its lower end by a rivet 38 or the like to the bracket 16 and becomes a hinged member connected with said bracket and the rod 17 and is in effect a continuation of said rod, the arm or link 15 being provided as a convenient way of connecting the rod with the stationary bracket or abutment 16 and of providing for the adjustment of said rod, with respect to its length, to meet the varying conditions incident to the application of the mechanism to doors already installed.

The operation of the mechanism embodying my invention will largely be understood from the description hereinbefore presented. The mechanism comprises, mainly, two telescopic members arranged in inclined position with the upper end of one member pivotally connected with a sliding door and the lower end of the other member pivotally connected to a stationary abutment, and said members at their adjoining portions are of varying diameter so that the members may, at such portions, sag downwardly for the purpose of causing the projecting lip 31 on one member to automatically engage and interlock with a recess or notch 32 in the other member, thereby preventing movement of said members with relation to each other which would permit the opening of the door. When the door is to be slid to its open position, the operator by pressing downwardly on the crank handle 29 may cause the member 14 to turn upwardly sufficiently for the lip or projection 31 to leave the notch or recess 32 in the member 17, as shown in Fig. 6, and thereupon the pressure on the crank handle 29 will move the sliding door toward its open position. After the lower end of the member 14 has passed beyond the several notches or recesses 32, the operator may release his hold on the handle 29 and complete the opening movement of the door by the pressure of his hand applied directly to the edge thereof. In lieu of using the handle 29 for starting the sliding door toward its open position, the operator may take hold of the member 14 and elevate its lower end to free the lip or projection 31 from the member 17 and then by continued pressure in a horizontal direction against

the member 14 cause the door to slide toward its open position. When the door is in closed position it cannot be opened by pressure applied directly thereto, because of the interlocking engagement of the lower end of the member 14 with the upper portion of the member 17; as the door is reaching its closed position, the projection or lip 31 will slide over the notches or recesses 32, but will interlock with some one of said notches or recesses on any reverse movement of the door tending to open the same, one purpose of the invention being to prevent a person on the floor of a building from pushing the sliding-door open at a time when the door is intended to move to its closed position. The sliding door may, however, be opened from the hall-side of the same by the insertion of a key through the opening 27 in the door and into the polygonal opening 28 in the cap 19, the key in outline corresponding at its end to said opening 28. When a key of this kind is inserted through the openings 27, 28 and given a rotary movement, it may cause the member 14 to turn upwardly at its lower end and become freed from the notch or recess 32 in the member 17, and while the key is thus in position and pressure maintained on the same to keep the lower end of the member 14 turned upwardly, the sliding door may be opened, since at that time the locking mechanism will be in disengaged condition. As hereinbefore explained, the mechanism is rendered adjustable to variations in doors by reason of the adjustable connection of the lower end of the member 17 with the arm 15, which in effect constitutes an extension of said member 17. The cap 19 at the upper end of the member 14 may be applied upon the sleeve 20 by being pushed directly thereon, the ball 23 yielding inwardly with the spring 24 during the application of the cap to said sleeve and then springing into the annular groove 22 for releasably locking said cap on said sleeve. The upper end of the member 14 may also be detached from the door by an outward pull on said member in line with the sleeve 20, the ball 23 again yielding inwardly by being forced against the side of the annular groove 22, to permit the detachment of the part 14 from the door.

I have shown and described in this application the preferred embodiment of my invention, but I do not limit my invention to all of the details of form and construction shown, since it is obvious that these details may be varied in many respects without departing from the spirit of the invention.

What I claim as my invention and desire to secure by Letters-Patent, is:

1. In combination, a sliding door, and locking mechanism connected therewith comprising two main telescopic members arranged in inclined position with the upper end of one of said members provided with a crank handle and pivotally connected with the door, and the lower end of the other member pivotally connected with an abutment, the adjoining portions of said members having means adapted to interlock with each other when the door reaches its closed position.

2. In combination, a sliding door, and locking mechanism connected therewith comprising two main telescopic members arranged in inclined position and provided at their adjoining portions with parts to interlock with each other when the door is moved to closed position, means pivotally connecting the upper end of one of said members to the door, an arm pivotally secured to an abutment and having an angle member provided with a hole which has flattened sides and receives the lower end portion of the lower main member, and nuts engaging said member at opposite sides of said angle for securing said lower member in adjusted position, said lower member being threaded at opposite sides to engage said nuts.

3. In combination, a sliding door, and locking mechanism connected therewith comprising two main telescopic members arranged in inclined position, means pivotally connecting the upper end of one of said members to the door, and means pivotally connecting the lower end of the other of said members with an abutment, the adjoining portions of said members being adapted to interlock with each other when the door reaches its closed position, and the means pivotally connecting the upper end of one of said main members to the door comprising a hub secured to the end of said member and having a cap, a concealed spring and a ball-pawl, and a stud fastened to the door and receiving said cap and having an annular groove affording a race-way for said ball spring-pressed into it.

4. In combination, a sliding door, and locking mechanism connected therewith comprising two main telescopic members arranged in inclined position and adapted to slide one within the other and respectively having at their adjoining portions parts to automatically interlock when the door is closed, one of said members being a tube pivotally connected at its upper end with the door, and the other of said members being a rod pivotally connected at its lower end with an abutment and at its upper end entering said tube.

5. In combination, a sliding door, and locking mechanism connected therewith comprising two main telescopic members arranged in inclined position and adapted to slide, in the line of their length, along and upon each other, one of said members being a tube pivotally connected at its upper end

with the door and the other of said members being a rod pivotally connected at its lower end with an abutment and at its upper end entering said tube, and said tube being provided on its lower end with a cap affording a projecting lip and the upper portion of said rod being formed with a ratchet recess to receive and interlock with said lip when the door is moved to closed position.

6. In combination, a sliding door, and locking mechanism connected therewith comprising two main members to slide one upon the other and having at their adjoining portions means for interlocking said members to resist opening movement of the door, one of said members being pivotally connected with the door and the other member with an abutment, and means loosely securing adjacent portions of said members against complete lateral separation from each other, this loose connection affording to the adjacent portions of said members a limited freedom to sag downwardly when the door is moved to closed position, so that the sagging of said portions may serve to effect the automatic interlocking of said members with each other when the door is moved to closed position.

7. In combination, a sliding door, and door opening mechanism connected therewith pivotally connected at one end with said door and at the other end with an abutment, the means pivotally connecting said mechanism to the door comprising a stud secured to the door and having a circumferential groove, a cap secured on the end of said mechanism and adapted to be slipped upon and off said stud, and a spring pressed pawl carried by the end of said mechanism and adapted to said groove for pivotally mounting the mechanism on the stud and permitting the same, when force is applied, to be withdrawn therefrom or applied thereto.

Signed at New York city, in the county of New York and State of New York, this 24th day of March, A. D. 1917.

ALBERT J. ROSENTRETER.

Witnesses:

CHARLES C. GILL,

ARTHUR MARION.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."