April 12, 1966 C. L. EADS ET AL 3,245,237

DOOR POSITIONER-BOLT

Filed Jan. 20, 1964

Fig. 1.

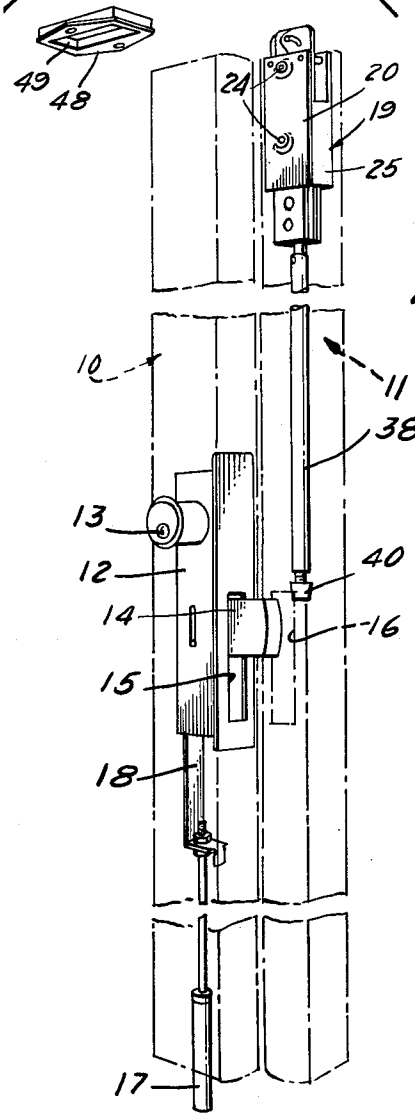


Fig. 2.

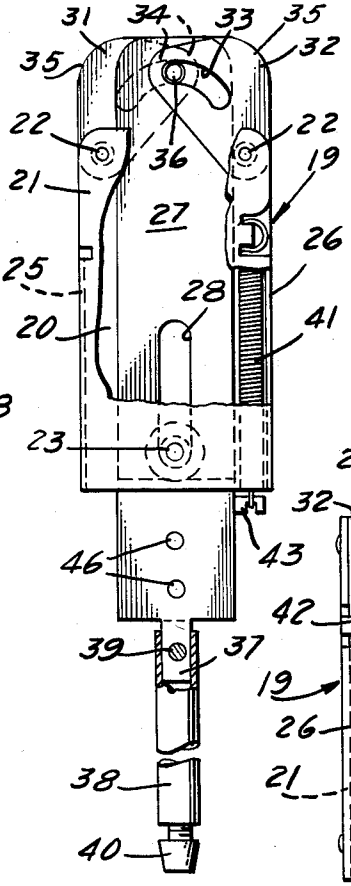


Fig. 3.

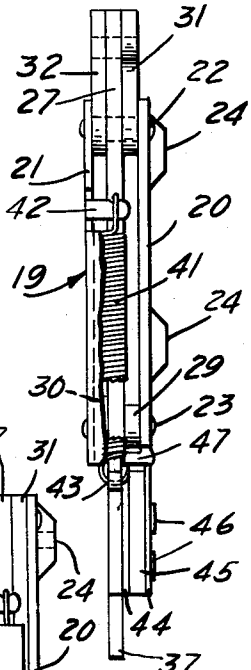
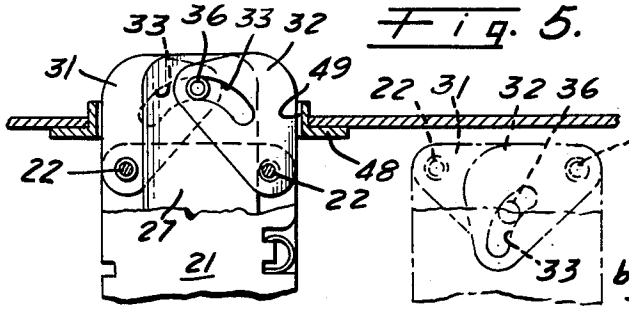


Fig. 4.

Fig. 5.



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DOOR POSITIONER-BOLT

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The present invention relates generally to lock mechanisms of the type utilized for doors having a narrow stile; and is more particularly concerned with improvements in such lock mechanisms in which a plurality of bolts are operatively associated in cooperable door structures.

Although the present invention is described in connection with mechanisms finding particularly advantageous use with narrow stile doors, the invention is also applicable to other types of doors, where space is not a limiting factor. It is therefore contemplated that the invention shall not be limited solely to use on narrow stile doors.

It is one object of the present invention to provide a maximum security locking mechanism for double doors, wherein a plurality of bolts will be operated simultaneously from a single location, and wherein at least one of the bolts will operate to separately secure each door, while another bolt will operate to secure one of the doors with respect to the other door.

A further object is to provide a door locking mechanism of the type described having a header bolt structure which will be held in locking position by the locking bolt of a companion door, when the latter is moved to a door interlocking position.

Another object is the provision of a locking mechanism for a door which embodies a positioner-bolt structure which is weight counterbalanced, and wherein certain of the bolt parts function with a "scissor" action as they move to a locking position, thus acting to center the bolt in an associated strike and compensate for door misalignment due to faulty installation or in-place abuse.

It is also an object to provide a door header bolt which may be manually moved to a bolting position in an associated keeper, and magnetically retained in such position, and which incorporates bolt parts arranged to operate with a camming action and move the bolt to released position when a predetermined opening force is applied to the door. Thus, emergency traffic will not be impeded.

Further objects of the invention will be brought out in the following part of the specification, wherein detailed description is for the purpose of fully disclosing the invention without placing limitations thereon.

Referring to the accompanying drawings, which are for illustrative purposes only:

FIG. 1 is a composite perspective view of door locking mechanism embodying the features of the present invention, the locking mechanism being applied to a pair of associated swinging doors, the adjacent edge faces of the doors being illustrated in angular relation;

FIG. 2 is an enlarged rear elevational view of the positioner-bolt at the header of one of the doors, portions of the casing being cut away to show the operative relationship of certain internal parts;

FIG. 3 is a fragmentary side view of the same showing the bolt members in extended position;

FIG. 4 is a similar view showing the bolt members in retracted position; and

FIG. 5 is a fragmentary action view illustrating the manner in which the bolt members are associated with a header keeper and automatically retracted.

Referring more specifically to the drawings, for illustrative purposes, there is disclosed in FIG. 1 in phantom lines, a pair of cooperatively associated stiles **10** and **11** which represents the coactive portions of a pair of swinging doors in which the stile **10** is carried by the active door and the stile **11** by the inactive door.

This active door stile **10** is shown as having mounted thereon a double bolt door lock structure as covered by the United States Letters Patent No. 2,989,859, issued June 27, 1961 and entitled Narrow Stile Double Bolt Door Lock. Briefly, the lock for the active door comprises a casing structure **12** which is mounted within the narrow stile of the door and contains the actuating parts of the lock which are motivated by means of a key cylinder **13** to extend and retract a swingable lock bolt **14** through a face plate opening **15**. In the extended position of the lock bolt **14**, the bolt is adapted to extend into a keeper receiving opening **16** in the face of the stile **11** of the inactive door. The bolt **14** thus acts to interlock the two doors in such a manner that if one of the doors is retained against swinging movement, both doors will be secured against opening.

As shown, provision is made in this case for securing the active door by means of a threshold bolt **17**, this bolt being connected to an actuating member **18** for simultaneous movement to bolt extended and unlocked retracted positions in concert with the actuation of the swingable lock bolt **14**.

In order to provide for a maximum of security, provision is made for further actuating a header bolt mechanism, as generally indicated by the numeral **19**, which will be carried by the stile **11** of the inactive door structure, and which will further be moved to a bolt extended locking position in response to the locking operation which motivates the bolt of the active door to its extended locking positions.

The header bolt mechanism **19** comprises a two part casing which includes a supporting front plate **20** which has a back plate **21** secured thereto and held in spaced relation by means of a pair of upper end spacing pins **22—22** and a lower end central pin **23**. The casing is secured in position at the header end of the stile **11**, with the front plate **20** in generally parallel relation to the edge face of the stile **11** having the keeper opening **16** therein, by means of mounting screws (not shown) which are adapted to extend into threaded bosses **24—24** formed on the front plate. The casing is closed on its opposite sides by deflected edge margins of the back plate **21** which form the opposite edge walls **25** and **26** of the casing structure.

Extending within the casing **19** is a bolt operator **27** formed from an elongate plate which has its uppermost end portion positioned for sliding movement between the spacing pins **22—22**. At the lower end portion of the casing, the bolt operator is provided with an axially extending slot **28** which guidingly receives therethrough the central spacing pin **23**. The plate is retained against movement axially of the pin **23** by engaging against a circumferentially extending projecting flange **29** on one side, and a spacing washer **30** on the other side.

Cooperatively associated with the uppermost end of the bolt operator to provide a positioner-bolt structure, is a pair of cam dogs **31** and **32**. The cam dogs are shown as being generally sector shaped and are constructed of any suitable material, a plastic such as nylon being found suitable for the purpose. The cam dogs are mounted on opposite sides of the uppermost end of the bolt operator **27** and are respectively pivoted on the spacing pins **22—22** for swinging movement. Each of the cam dogs carries an arcuate slot **33**, the slots in the extended positions of the cam dogs being so arranged that they extend outwardly away from the innermost corners **34** of the cam dogs. The outermost corner, as indicated by the numeral **35**, of each cam dog is rounded. A connecting pin **36** carried by the bolt operator **27** has its opposite

ends respectively extending into the slots 33—33 of the cam dogs. With this arrangement, movement of the bolt operator in a downward direction operates to move the cam dogs to retracted position as shown in FIG. 4, and in phantom lines in FIG. 5. The cam dogs may also be moved to retracted position by applying pressure against the outer side edge of either of the cam dogs, in which case the camming action of the slot 33 will move the bolt operator to a downward position, and the cam dogs to retracted position, this being the unlocked position of the bolt.

As shown in FIG. 2, the lowermost end of the bolt operator 27 is provided with an integral end extension 37 which serves as means for attaching thereto a tubular extension rod 38, the end extension 37 being inserted within the upper end of the rod and retained by a suitable pin 39. The lowermost end of the extension rod 38 is provided with an adjustable end plug 40, this plug having threaded engagement with the lower end of the rod and being axially adjustable therein.

Provision is made for counterbalancing the weight of the bolt operator and connected parts by providing a counterbalancing tension spring 41 which is connected at its uppermost end to a lateral finger extension 42 carried by the back plate 21, and at its other end is connected with a finger extension 43 carried by the lower end portion of the bolt operator 27. Thus, the bolt structure may be easily moved from retracted to extended position by exerting a very small force.

Once the bolt structure is extended, and the cam dogs occupy an extended position as shown in FIG. 2, and in full lines in FIG. 5, it is desirable that the bolt parts be releasably retained in this position by a force somewhat greater than the balancing force of the spring 41. For such purpose, provision is made for magnetically latching the bolt structure in its extended position. As shown in FIGS. 2, 3 and 4, a pair of pole plates 44—44 are assembled at the lowermost end of the bolt operator 27 with a permanent magnet 45 therebetween, the pole plates and magnet being secured to the bolt operator as by spaced non-magnetizable rivets or pins 46—46. The uppermost edges of the pole plates project slightly beyond the adjacent edge of the magnet and are adapted, in the bolt extended position, to engage with an armature 47. The armature may be formed as a separate element and secured to the front plate 20, if desired. However, in the present instance the armature is integrally formed with the front plate and comprises an inwardly deflected edge portion positioned in the line of movement of the pole plates 44—44, and for engagement thereby in the extended position of the bolt structure. While the magnet acts to releasably latch the bolt structure in extended position, the magnet is readily released by exerting a downward pulling force on the extension 38, or by applying a force against the outer edge of one of the cam dogs 31.

With the header bolt mechanism 19 mounted in the stile 11, as shown in FIG. 1, the extension 38 is of such length that the end plug 40 will extend to the rear of the keeper opening 16 and to a position in which it will be engaged by the lock bolt 14 as it is swung through the opening 16 to a locking position with respect to the stile 11. Thus, movement of the lock bolt 14 to locking position will raise the extension 38 and actuate the positioner-bolt to bolt extended position. The end plug 40 should be so adjusted that in the extended position of the positioner-bolt, there will be a slight clearance between the end plug 40 and the swingable bolt 14. It will also be obvious that the extension 38 may be digitally raised by inserting a finger through the opening 16 and applying a raising force against the plug 40.

The positioner-bolt is arranged to be cooperatively associated with a header keeper 48 which defines a substantially rectangular opening 49 adapted to receive therein the positioner-bolt as described above, when the bolt

is moved to extended position. The relationship of the cam dogs 31 and 32 in relation to the keeper is best known in FIG. 5. Since the cam dogs operate with a "scissor" action in moving between folded retracted position and extended position, the action of these cam dogs will also serve to position the door and center the bolt in the strike opening. Such action will compensate for door misalignment due to faulty installation or inplace abuse.

With the inactive door in latched closed position as just explained, both the active and inactive doors will be securely held when the bolt 14 is in locking position between the doors. Maximum security is produced at this time by the action of the threshold bolt 17, and the header bolt mechanism 19. The active door may be actuated to open position upon operating the lock bolt 14 to its retracted position, the threshold bolt being simultaneously moved to its retracted position. However, it will be observed that the magnetic latching means retains the positioner-bolt in its extended bolted position as shown in full lines in FIG. 5. The inactive door will thus be maintained closed against ordinary opening, but does not present a traffic impediment in the case of emergency, since the application of pressure against the stile 11 will cause the application of pressure against the side edge of one of the cam dogs, and as a result will force the positioner-bolt structure to retracted position and thus release the door for opening movement. The dogs will be in a position shown in phantom lines in FIG. 5.

Various modifications may suggest themselves to those skilled in the art without departing from the spirit of our invention, and, hence, we do not wish to be restricted to the specific form shown or uses mentioned except to the extent indicated in the appended claims.

We claim:

1. A door positioner-bolt, comprising:
   (a) a fixed casing;
   (b) a bolt operator supported in said casing for movements respectively to bolt extended and bolt retracted positions;
   (c) a pair of bolt members supported on pivots fixed to said casing for swinging movements in adjacent planes of movement to a folded overlapped retracted position in the casing, and to an unfolded extended position projecting beyond said casing;
   (d) a connection between said bolt operator and said pair of bolt members operable to simultaneously move said bolt members in opposite directions; and
   (e) means releasably retaining said bolt members against movement from their extended position by the application of an external force thereagainst, but releasing the members for movement to a retracted position when such force exceeds a predetermined amount.

2. A door positioner-bolt, comprising:
   (a) a fixed casing;
   (b) a bolt operator supported in said casing for movements respectively to bolt extended and bolt retracted positions;
   (c) a pair of bolt members supported on pivots fixed to said casing for swinging movements to a folded overlapping retracted position in the casing, and to an unfolded extended position projecting beyond the casing;
   (d) a connection between said bolt operator and said pair of bolt members operable to simultaneously swing said bolt members in opposite directions; and
   (e) means releasably retaining said bolt members against movement from their extended position by the application of an external force thereagainst, but releasing the members for movement to a retracted position when such force exceeds a predetermined amount, said means including a pair of permanently magnetized pole members carried by said bolt operator, and an armature member on said casing engaged

by said pole members, when the bolt operator is moved to bolt extended position.

3. A door positioner-bolt, comprising:

(a) a casing adapted to be mounted in a fixed position at the top margin of a door;

(b) a bolt operator supported in said casing for vertical movements in opposite directions respectively to bolt extended and bolt retracted positions;

(c) a pair of bolt members supported on pivots fixedly mounted on said casing, said members being swingable on said pivots to a folded retracted position in said casing, and to an unfolded extended position projecting beyond the casing;

(d) a connection between said bolt operator and said pair of bolt members for simultaneously moving the bolt members to retracted position in response to downward movement of the bolt operator, and to extended position in response to upward movement of the actuator; and

(e) spring means for applying a force to said operator in a direction in opposition to the downward acting force of gravity thereon.

4. A door positioner-bolt, comprising:

(a) a casing including a mounting plate and a spaced cover plate;

(b) an elongate bar supported between said plates for axial vertical movements respectively between raised and lowered stop positions;

(c) a pair of coacting bolt members pivotally supported between said plates on pivots fixed to said casing on opposite sides of said bar for swinging movement to a bolt extended position projecting beyond the casing, and to a bolt retracted position in the casing, each of said members having an arcuate cam slot therein; and

(d) a pin carried by said bar extending into said slots, whereby movements of said bar are transmitted to said bolt members and movements of the bolt members by an external force in a direction to move them to retracted position will be transmitted to said bar.

5. A door positioner-bolt, comprising:

(a) a casing including a mounting plate and a spaced cover plate;

(b) an elongate bar supported between said plates for axial vertical movements respectively between raised and lowered stop positions;

(c) a pair of coacting bolt members pivotally supported between said plates on opposite sides of said bar for swinging movement to a bolt extended position, and to a bolt retracted position, each of said members having a cam slot therein;

(d) a pin carried by said bar extending into said slots, whereby movements of said bar are transmitted to said bolts members; and

(e) a magnet carried by said bar engageable with a part of said casing in the raised stop position of the bar.

6. A door positioner-bolt, comprising:

(a) a casing including a mounting plate and a spaced cover plate;

(b) an elongate bar supported between said plates for axial vertical movements respectively between raised and lowered stop positions;

(c) a pair of coacting bolt members pivotally supported between said plates on opposite sides of said bar for swinging movement to a bolt extended position, and to a bolt retracted position, each of said members having a cam slot therein;

(d) a pin carried by said bar extending into said slots, whereby movements of said bar are transmitted to said bolt members; and

(e) a tubular extension extending from the lowermost end of said bar having an adjustable end piece whereby the extension length may be varied.

7. A header positioner-bolt for a door having a stile opening for receiving the outer end of an associated swingably mounted main locking bolt, comprising:

(a) a casing mountable at the door top;

(b) bolt means including an operator supported in said casing for reciprocable movements respectively to bolt extended and bolt retracted positions; and

(c) an extension on said operator having a lowermost end positioned rearwardly of the door stile opening, when the operator is in a bolt retracted position, and in the path of movement of said main locking bolt to its locking position, whereby movement of the main locking bolt to a locked position will activate said bolt means to a bolt extended position and lock said bolt means in such position.

8. A header positioner-bolt for a door having a stile opening for receiving the outer end of an associated swingably mounted main locking bolt, comprising:

(a) a casing mountable at the door top;

(b) bolt means including an operator supported in said casing for reciprocable movements respectively to bolt extended and bolt retracted positions; and

(c) a lowermost extension on said operator having an end positioned rearwardly of said stile opening, when the operator is in bolt retracted position, and being accessible through said stile opening for digital movement in an upward direction.

9. Door locking mechanism, comprising:

(a) a pair of bolt members carried by the door, said members being mounted on spaced apart fixed pivots for swinging movements to a folded retracted non-locking position, and to an unfolded extended lock-position in which the members are adapted to extend into an opening of an operatively associated strike, each of said bolt members having an arcuate cam slot therein;

(b) an actuator between said pivots supported for movements in opposite directions; and

(c) a camming pin carried by said actuator and having its opposite ends respectively movable along said slots to selectively move the bolt members to said non-locking and locking positions in response to movements of the actuator, and upon engagement of one of the bolt members in its locking position with the strike by a door opening movement, actuate the bolt members to non-locking position.

10. A multibolt locking mechanism for a pair of doors having associated stiles movable into closed and opened relation, comprising:

(a) a main bolt supported in the stile of one of said doors for selective movement to a retracted unlocked position and an extended locked position projecting from said stile;

(b) a second bolt at the threshold of said one of said doors supported for selective movement to a retracted unlocked position and an extended locked position projecting from a lower edge of the door;

(c) means for simultaneously actuating said bolts to unlocked and locked positions, the main bolt in locked position extending through a keeper opening in the stile of the other of said doors, when the doors are in closed relation;

(d) a third bolt at the header of the said other of said doors supported for selective movement to a retracted unlocked position and an extended locked position projecting from the upper edge of the door; and

(e) means for actuating said third bolt including a member extending rearwardy of said keeper opening to a position lying in the path of movement of said main locking bolt to a locked position, whereby movement of the main locking bolt to a locked position will activate said third bolt to and retain it in a locked position.

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