J. F. WILSON.

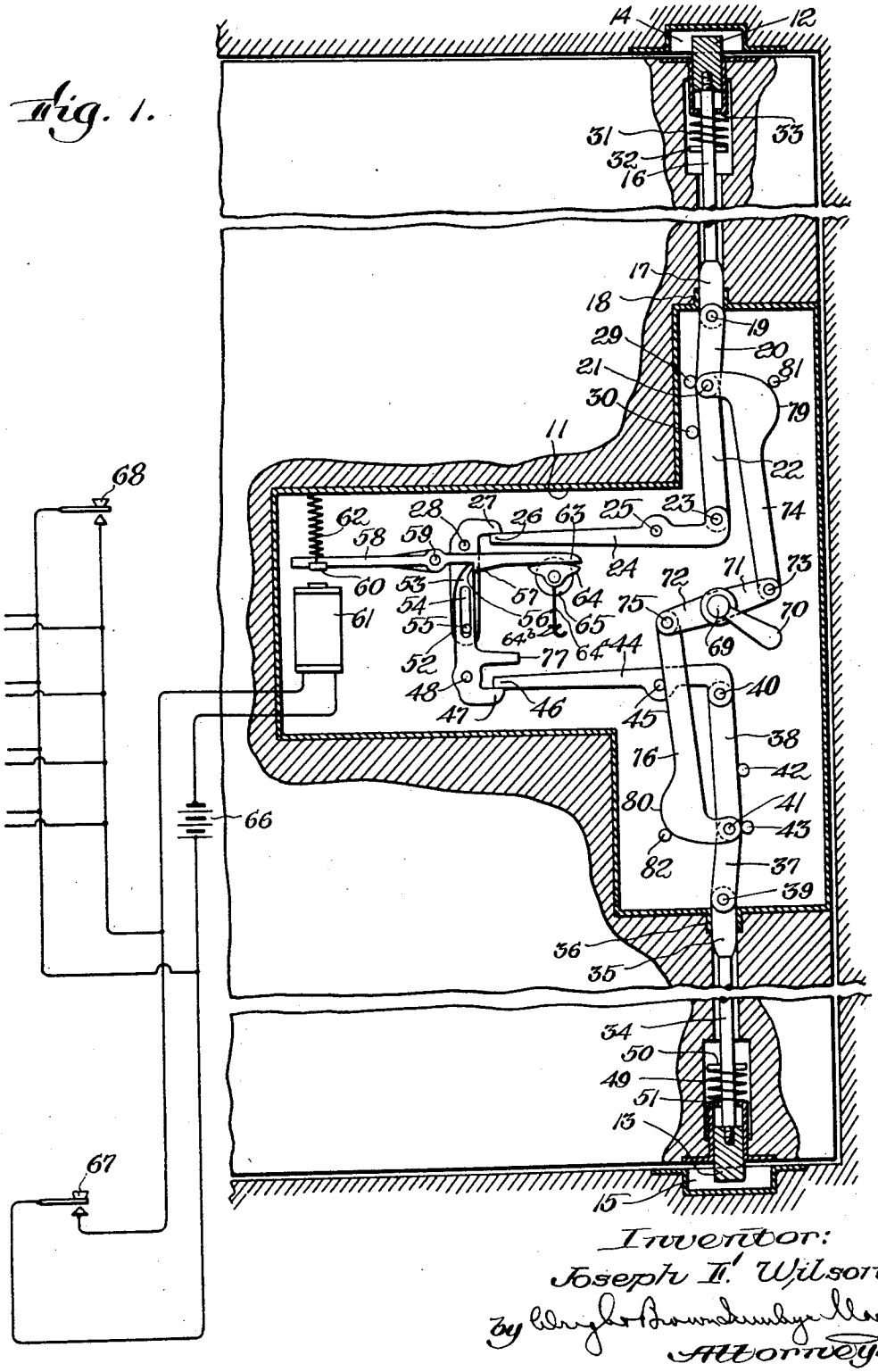
LOCK CONTROL FOR EMERGENCY EXIT DOORS.

APPLICATION FILED AUG. 13, 1917.

1,387,573. Patented Aug. 16, 1921.

2 SHEETS—SHEET 1.

Fig. 1.



Inventor:
Joseph F. Wilson,
by Wright Brownell & Mulloy
Attorneys.

J. F. WILSON.

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2 SHEETS—SHEET 2.

Fig. 2.

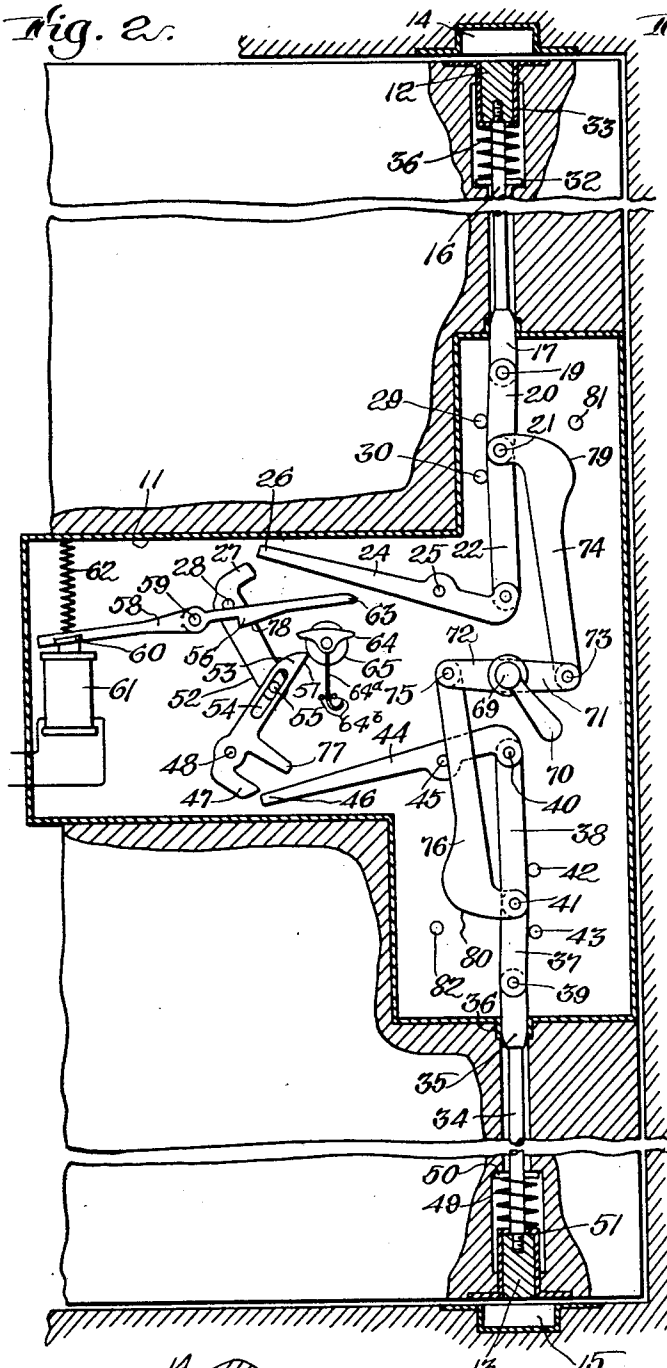
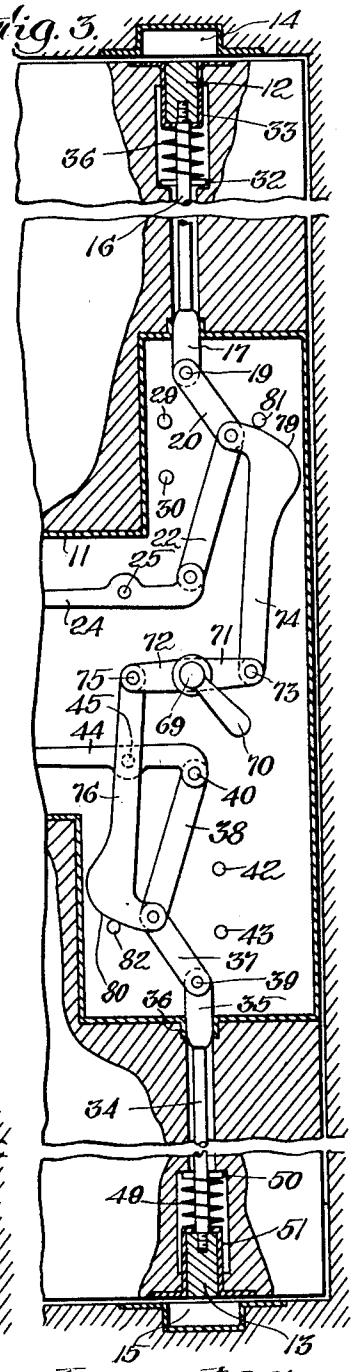


Fig. 3.



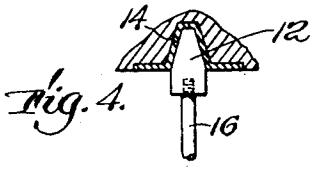


Fig. 4.

Inventor:
Joseph F. Wilson,
by Clyde & Brownell, Ely & May
Attorneys.

UNITED STATES PATENT OFFICE.

JOSEPH F. WILSON, OF LAWRENCE, MASSACHUSETTS.

LOCK-CONTROL FOR EMERGENCY EXIT-DOORS.

1,387,573. Specification of Letters Patent. Patented Aug. 16, 1921.

Application filed August 13, 1917. Serial No. 186,072.

To all whom it may concern:

Be it known that I, JOSEPH F. WILSON, a citizen of the United States, residing at Lawrence, in the county of Essex and State of Massachusetts, have invented new and useful Improvements in Lock Controls for Emergency Exit-Doors, of which the following is a specification.

The present invention relates to a lock and means for operating the same adapted to be applied in connection with the exit doors of theaters and other public gathering places for the purpose of enabling such doors to be opened quickly. The main object of the invention is to provide a lock of such construction, and so combined with controlling means that the same may be unlocked and caused to release the door, from a distant point, or from any one of a number of distant points, and by automatic agency if required. A further object is to provide in such a lock means for manually operating the same at the door itself. The particular features in which the invention consists are hereinafter set forth in the following specification, in connection with the drawing illustrating one embodiment of the invention, and are pointed out in the claims annexed. Referring to the drawings,

Figure 1 is an elevation of the essential elements of the lock in which my invention is embodied, the same being shown in connection with a sectional view of the casing in which these parts or elements are inclosed, in place in a door, that part of the door wherein the lock is mounted being also shown in section; said figure showing also a diagram of electrical connections for operating the lock to unlock the door.

Fig. 2 is a view similar to Fig. 1 but without the electrical diagram, showing the position of the parts when electrically operated to unlock the door.

Fig. 3 is a similar view of that part of the lock which is directly operated by hand, showing the manner in which the same is operated to release the lock and open the door.

Fig. 4 is an end elevation of one of the latch bolts in association with its socket, the latter being shown in section.

The same reference characters indicate the same parts in all the figures.

In Fig. 1 the door is represented as being closed and locked. The lock itself is contained in a casing 11 shown in section, which is mounted in any desired way in the door, preferably being concealed within the stock of which the door is built, although not necessarily so. The securing or locking means consists of bolts or latches 12, 13, here shown as adapted to project above and below the top and bottom edges, respectively, of the door and to enter sockets 14 and 15, respectively, in the lintel and sill of the door frame. The bolt 12 is mounted on the end of a rod 16, being here shown as screwed thereto, which rod is sufficiently long to pass from the upper side of the lock casing to the top of the door, and its lower end is connected to a block 17 which is adapted to slide through a guideway 18 in the casing and is connected by a pivot 19 with a link 20. Said link is connected by a pivot 21 with a second link 22, and the latter is connected by a pivot pin 23 with a lever 24 having its fulcrum on a pin 25 fixed in the casing. This lever has two arms, one being shorter than the other and the short arm is the one which is thus connected to link 22. The longer arm terminates in a finger 26 adapted to be engaged under the toe 27 of a locking dog which is pivoted on a fulcrum pin 28 fixed in the casing.

The links 20 and 22 constitute a toggle joint or linkage which, when extended in line, forms a continuation of the bolt rod 16. These links, when the knuckle 20 is brought slightly beyond the straight line through the pivots 19 and 23, rest against guide studs 29 and 30, preferably carrying antifriction rolls, by which the toggle linkage is guided, and is caused to act as a rigid extension of the rod 16. A spring 31 contained in a socket in the door surrounds the rod 16, presses against a collar or shoulder 32 on said rod and reacts against an abutment 33 which is fixed to the door, and may be a part of the guide or casing in which the bolt slides. The tendency of the spring is to withdraw or retract the bolt 12 from its socket 14 and this tendency is resisted by the locking dog 27 when the parts are in the position shown by Fig. 1.

The bottom latch 13 is associated in essentially the same way with a rod 34, block 35 sliding in a guide 36, toggle linkage 37 and 38, having pivots 39, 40, and 41, the latter being the knuckle of the toggle, guides 42 and 43 which hold the toggle linkage in the extended position, and a lever 44 pivoted on a fulcrum pin 45 and having a short arm en-

gaged with the pivot 40 and a long arm terminating in a finger 46 engaged with the toe 47 of a second locking dog which is mounted on a fixed fulcrum pin 48. A spring 49 between a collar 50 on the rod 34 and a fixed abutment 51 tends to retract the latch 13.

The two locking dogs 27 and 47 are connected together and are under the control of a single holding and releasing means. These dogs have tailpieces 52 and 53 which lie beside one another, the tailpiece 53 of dog 47 having a slot 54 into which projects a pin 55 on the tailpiece 52 of the dog 27. The tailpiece 53 terminates in a finger 56 engaged with a latch shoulder 57 on a latch lever 58 which is pivoted on a fulcrum pin 59. One arm of said latch lever carries the armature 60 of an electromagnet 61, being normally held away from such magnet by a spring 62 which thus retains the latch shoulder 57 in the path of the tail 53; thereby holding the dogs in their locking position shown in Fig. 1 and preventing them from becoming displaced by the pressure exerted through the previously described linkages by the springs 31 and 49. A second arm 63 of the latch lever 58 bears on a wiper or rocker 64 pivoted in the door and carrying an external handle or knob 65 by which it may be manually turned, controlled by a spring 64^a between pins 64^b.

The winding of the magnet is in an electric circuit shown diagrammatically in Fig. 1 which includes the battery or other source of electricity 66 and one or more switches 67, 68. These switches may be in the form of push buttons or any other sort of circuit closing device, and may be provided in any number and in any locations desired. For instance, in a theater I propose to connect one of the breaks or switches with an automatic fire alarm, one with an automatic sprinkler device, one with a drop curtain controlling mechanism, all of these being automatically operated by heat when a fire occurs; and to locate other switches adapted for manual operation at the station or office of the stage manager, chief usher, watchman, etc., and in the box office. I do not limit myself to the number or the location of the controlling means, but may provide other controls than those above stated located in other positions and stations. The foregoing statement is intended to illustrate the variety and scope of control which my invention gives to the exit doors. The principle involved is that a distant control means is effective to unlock the door so that it can be opened by a push applied to its side. In case of a theater or other place of assembly having a number of doors, it is part of my contemplated invention to connect all, or a number, of such doors, with a single distant controller in such manner that the operation of the one controller will cause all of the doors whose control magnets are connected therewith to be unlocked at once. When the circuit of the magnet 61 is closed by operation of any of the control means described, the armature 60 it attracted and the latch shoulder 57 displaced from the finger 56, leaving both dogs free to move. The pressures applied to these dogs by the fingers 26 and 46, respectively, tend to move the dogs in opposite directions of rotation about their respective pivots, whereby the tails 52 and 53 move in the same direction. The dogs are thus moved until they reach the position shown in Fig. 2, when their jaw portions are withdrawn from the fingers of the levers 24 and 44, respectively, whereupon these levers are released and the locking bolts are allowed to be retracted by their springs.

The same effect may be accomplished manually by a person near the door grasping and turning the knob 65, which causes one or the other of the two wiper projections on the rocker 64 to raise the latch and thus disengage and release the locking dogs. As the rocker 64 has two similar projections it is enabled to act when the knob 65 is turned in either direction.

I have provided a further means for withdrawing the bolts manually, and the same is also a means for projecting the bolts to lock the door. This means comprises a shank 69 adapted to turn and having a handle 70 which is external to the casing 11 and to the door. Instead of the lever handle shown, a knob may be applied. Inside the lock casing a rocker having two arms 71 and 72 is connected to the shank 69. Arm 71 is connected by a pivot 73 to a link 74 which is connected to the knuckle pivot 21 of the toggle 20, 22. Arm 72 is similarly connected by pivot 75 and link 76 with the knuckle 41 of the toggle linkage 37, 38. When the handle 70 is turned in right hand rotation, with respect to the drawings, the link 74 pulls the knuckle 21 away from the guides 29, 30 and likewise the link 76 pulls the knuckle 41 away from the guides 42, 43, thus breaking the toggles and allowing the bolts to be retracted while the locking mechanism consisting of the dogs and latch remain in their locking position. This result is possible because the line on which the rock arm 71 pulls upon the knuckle 21 through the link 74 passes on the opposite side of the pivot 23 from the guides 29 and 30; and the same thing is true with regard to the line of pull exerted on the knuckle 41 by the arm 72 in relation to the pivot 40 and the guides 42 and 43.

The same handle 70 is effective to project the locking bolts after they have been retracted in the manner shown in Fig. 2. To do this it is turned in left hand rotation

(with respect to the lay-out of the drawings), and it then exerts pressure almost directly upward on the bolt 12 and almost directly downward on the bolt 13, the lines of pressure so exerted being enough inclined toward the fixed guides 29, 30, and 42, 43, respectively, to avoid breaking the toggles. The lever fingers 26 and 46 then swing past the dogs 27 and 47, respectively, and when the finger 46 engages a longer projection 77 on the dog 47, it swings the dogs back to their locking position; the finger 56 then sliding under the inclined surface 78 of the latch 57 and raising such latch, until it slips past the shoulder, whereupon the latch is returned by its spring 62 into the locking position.

In projecting the bolts after they have been withdrawn in the manner shown in Fig. 3, the rotation of the handle 70 in the manner last described, causes the cam or wedge surfaces 79, 80 on the links 74, 75 to bear against stops 81, 82, respectively, which force the outer ends of these links toward the guides for the two toggles and thereby straighten the toggles and directly push out the bolts.

As a means for preventing jamming of the bolts in their sockets, as in case a crush of people should press against the door before the bolts are released, I preferably bevel the opposite sides of the bolts, or at least the side toward which the door is pushed by persons inside the room attempting to get out, whereby the withdrawal of the bolt causes its surface to be withdrawn from the adjacent portions of the socket, instead of sliding against a flat surface perpendicular to the line of pressure, as is the usual construction of a lock bolt. Thus even though strong pressure should be brought to bear upon the door, the springs are nevertheless able to retract the bolts because of the absence of frictional resistance, due to the condition just described.

It should be noted that the foregoing description of the construction and arrangement of the lock and its several parts are not to be understood as a limitation to the particular construction, arrangement, and numbers of parts shown, nor is it a limitation to a plurality of bolts, instead of a single bolt, nor to the arrangement of bolts which causes one to project to the top and the other from the bottom of the door, rather than from the outer edge or any other part of the door. The lock embodying the principles of that here shown may be applied as well to other devices than doors, for example, windows, shutters, and the like, and may be arranged in any position, so as to accommodate itself to members which swing about axes other than vertical, and as well to members mounted to slide in any plane. In the case of a door, shutter, or other swinging structure, the electrical connections between the block and the source of power and control may be readily made by slip contacts adjacent to the hinge axis, in a manner well known to those acquainted with the art of electrical conductors. Any suitable means for conducting current between a magnet on the door and fittings away from the door may be employed, but as such means are already known and my invention is not concerned with any modification therein, I have not deemed it necessary to illustrate the same. It is sufficient for my purpose to be understood that operative means for thus conducting electricity are provided. In the following claims the word "door" is used in a generic sense as including any movable stopper capable of closing an opening in a wall and being withdrawn so as to uncover such opening and it therefore includes not only doors, considered in the narrow sense of the term, but also windows, shutters, hatches and the like, whether the same are hinged so as to swing, or otherwise mounted so as to slide, or are removable bodily from the wall in which is contained the openings which they are adapted to cover.

What I claim and desire to secure by Letters Patent is:

1. A door, a bolt mounted on said door, a toggle linkage connected at one end to said bolt, a guide retaining said linkage extended substantially in the line of movement of the bolt, a movable abutment for the other end of said linkage, a latch for holding said abutment fixed in a position whereby said bolt is projected, means for releasing said latch, and other means for displacing the knuckle of said linkage and thereby permitting retraction of the bolt.

2. A door, a bolt mounted on said door, a toggle linkage connected at one end to said bolt, a movable abutment for the other end of said linkage, a latch for holding said abutment fixed in a position where said bolt is projected, a hand operated rocker, and a link connected to said rocker and to the knuckle of said toggle, having a line of draft oblique to the line of pivots of the toggle and operable to break the toggle and thereby retract the bolt.

3. A door, a bolt mounted on said door, a toggle linkage connected at one end to said bolt, a movable abutment for the other end of said linkage, a latch for holding said abutment fixed in a position where said bolt is projected, a hand operated rocker, and a link connected to said rocker and to the knuckle of said toggle, having a line of draft oblique to the line of pivots of the toggle and operable to break the toggle and thereby retract the bolt, said link having a cam surface, and a stationary guide against which said cam surface bears when the link

is returned following a retraction of the bolt, whereby to straighten the toggle and thereby project the bolt.

4. A door lock comprising a bolt, a bolt-actuating spring tending to withdraw the same, a lever to which said bolt is connected, a dog preventing movement of said lever under the influence of said spring and adapted to be displaced from the lever by pressure exerted thereby, a stop for preventing displacement of said dog, and means for displacing said stop and thereby releasing the dog.

5. A door lock comprising a bolt, a spring tending to withdraw said bolt, a stop for holding said bolt projected and adapted to be tripped to permit retraction of the bolt, manually operable means for projecting and retracting the bolt, and a displaceable transmission means connected with the bolt and said manually operable means arranged and guided to be shifted into and out of the line of movement of the bolt by operation of said manual means, whereby the last named means is enabled to operate the bolt independently of the stop.

6. A door lock comprising a bolt, yieldable means tending to retract the bolt, manual means and connections therefrom to the bolt for projecting and retracting the same, a displaceable abutment arranged to sustain the bolt-withdrawing pressure of said spring acting through a part of said connections, when the bolt is projected, and an electrically controlled stop for holding said abutment in its sustaining position adapted to be tripped to release said abutment and permit retraction of the stop, the said connections being movable by the manual means into and out of the influence of said abutment.

7. A door lock comprising a bolt, a pair of pivotally connected links forming a toggle linkage, one end of which is connected to the bolt, a lever to which the other end of said linkage is connected, guiding means holding said linkage substantially in line to form a rigid extension of the bolt, a stop for holding said lever in the position assumed when the bolt is projected, a spring arranged to exert force tending constantly to retract the bolt, means for releasing said stop to permit retraction of the bolt, and a manually operable device connected with said toggle for breaking or collapsing the same to enable said bolt to be retracted without tripping the stop.

8. In a door a bolt slidingly mounted, a rod connected to said bolt and moving endwise, a lever having one arm connected to said rod, a dog engageable with another arm of said lever holding the same in the position taken when the bolt is projected, but being displaceable from engagement therewith by pressure exerted by said last-named arm, a spring tending to retract the bolt, a latch engaged with the dog to hold the latter in the lever-engaging position, and means for displacing said latch to release said dog.

9. In a door a bolt slidingly mounted, a rod connected to said bolt and moving endwise, a lever having one arm connected to said rod, a dog engageable with another arm of said lever holding the same in the position taken when the bolt is projected, but being displaceable from engagement therewith by pressure exerted by said last-named arm, a spring tending to retract the bolt, a latch engaged with the dog to hold the latter in the lever-engaging position, and a manually operable contrivance for displacing said latch and thereby releasing the dog.

10. In a door a bolt slidingly mounted, a rod connected to said bolt and moving endwise, a lever having one arm connected to said rod, a dog engageable with another arm of said lever holding the same in the position taken when the bolt is projected, but being displaceable from engagement therewith by pressure exerted by said last-named arm, a spring tending to retract the bolt, a latch engaged with the dog to hold the latter in the lever-engaging position, an electromagnet arranged to exert force on said latch to displace the same and release the dog, and a distant controller in the circuit of said magnet operable to make the same active.

11. The combination with a door and a bolt for said door, of a trip device constructed, arranged, and adapted to hold said bolt in the projected or locking position, yielding means constantly acting with tendency to retract or unlock the bolt, a trip-releasing mechanism adapted to unlock said trip device whereby the bolt is made free to be retracted, and manual means for projecting the bolt and resetting the trip, said manual means and the trip device including a toggle linkage connected to the bolt and a control member connected to the knuckle of said linkage and being under manual control, whereby release and projection of the bolt by said manual means is permitted while the trip device is in its locked position.

12. The combination in a door of a plurality of bolts, levers each connected to one of said bolts, dogs each engaged with one of said levers to prevent movement thereof in given directions, said dogs being engaged one with the other so as to be movable simultaneously, a single trip device preventing movement of said dogs and a controller for disengaging said trip device.

13. The combination in a door of a bolt, a spring tending to withdraw said bolt, a hand operated member in connection with said bolt and operable to project the same, a lever connected to said bolt having a holding arm, a dog separate from said arm hav-

ing a toe adapted to engage and hold the said arm when the bolt is projected, the dog being located where pressure of said arm on said toe tends to displace the latter from its holding position, and a displaceable latch engaging said dog to retain it with said toe in the holding position.

14. The combination in a door of a bolt, a spring tending to withdraw said bolt, a hand operated member in connection with said bolt and operable to project the same, a lever connected to said bolt having a holding arm, a dog separate from said arm having a toe adapted to engage and hold the said arm when the bolt is projected, the dog being located where pressure of said arm on said toe tends to displace the latter from its holding position, and a displaceable latch engaging said dog to retain it with said toe in the holding position, the dog having a projection spaced apart from its toe located to be engaged by the aforesaid lever arm when the latter is brought into the position occupied upon projection of the bolt and being thereby movable to place the dog in engagement with said latch and the toe in position to hold said lever arm.

In testimony whereof I have affixed my signature.

JOSEPH F. WILSON.