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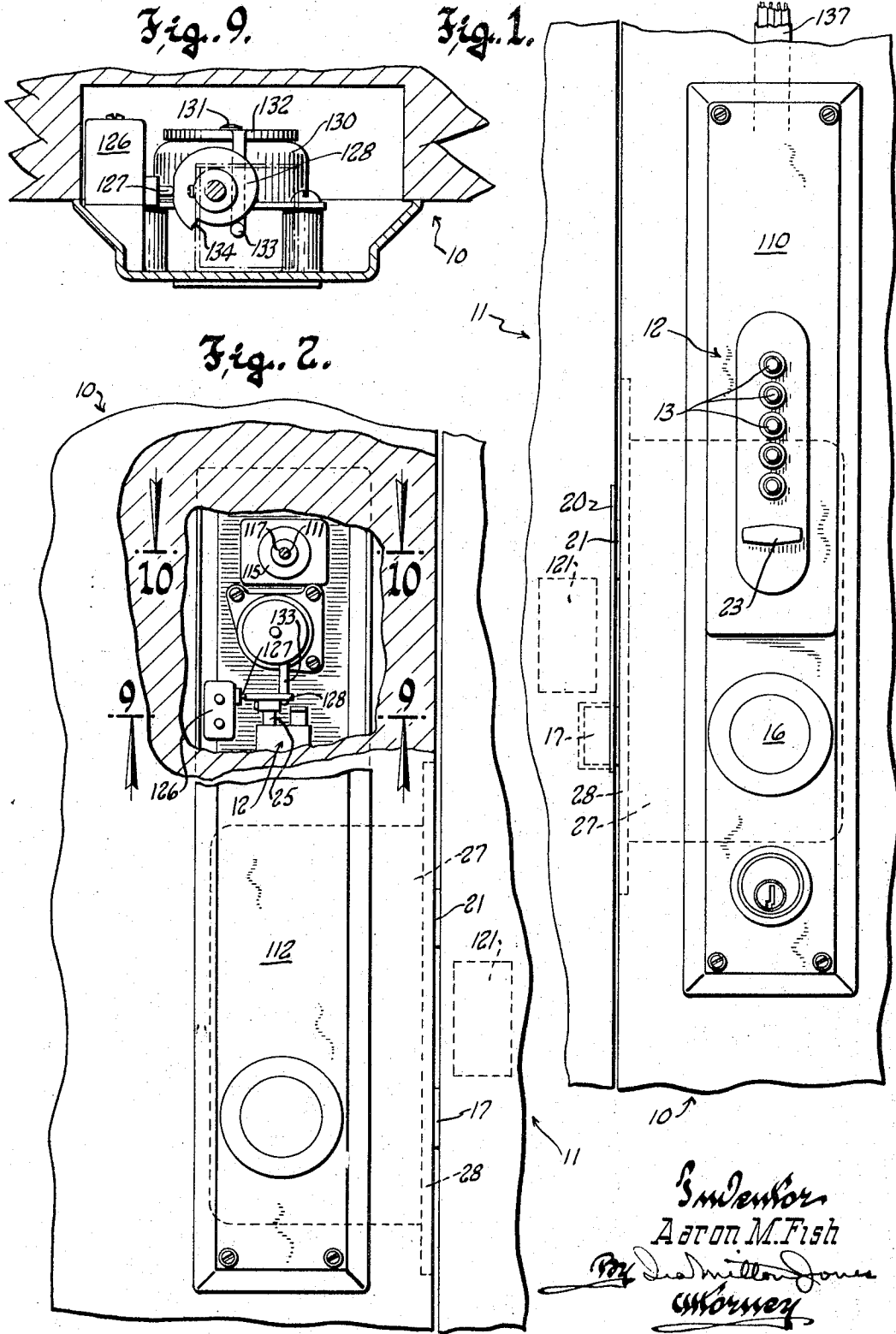
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3,353,383

DOOR LOCKING MEANS

Filed Dec. 18, 1964

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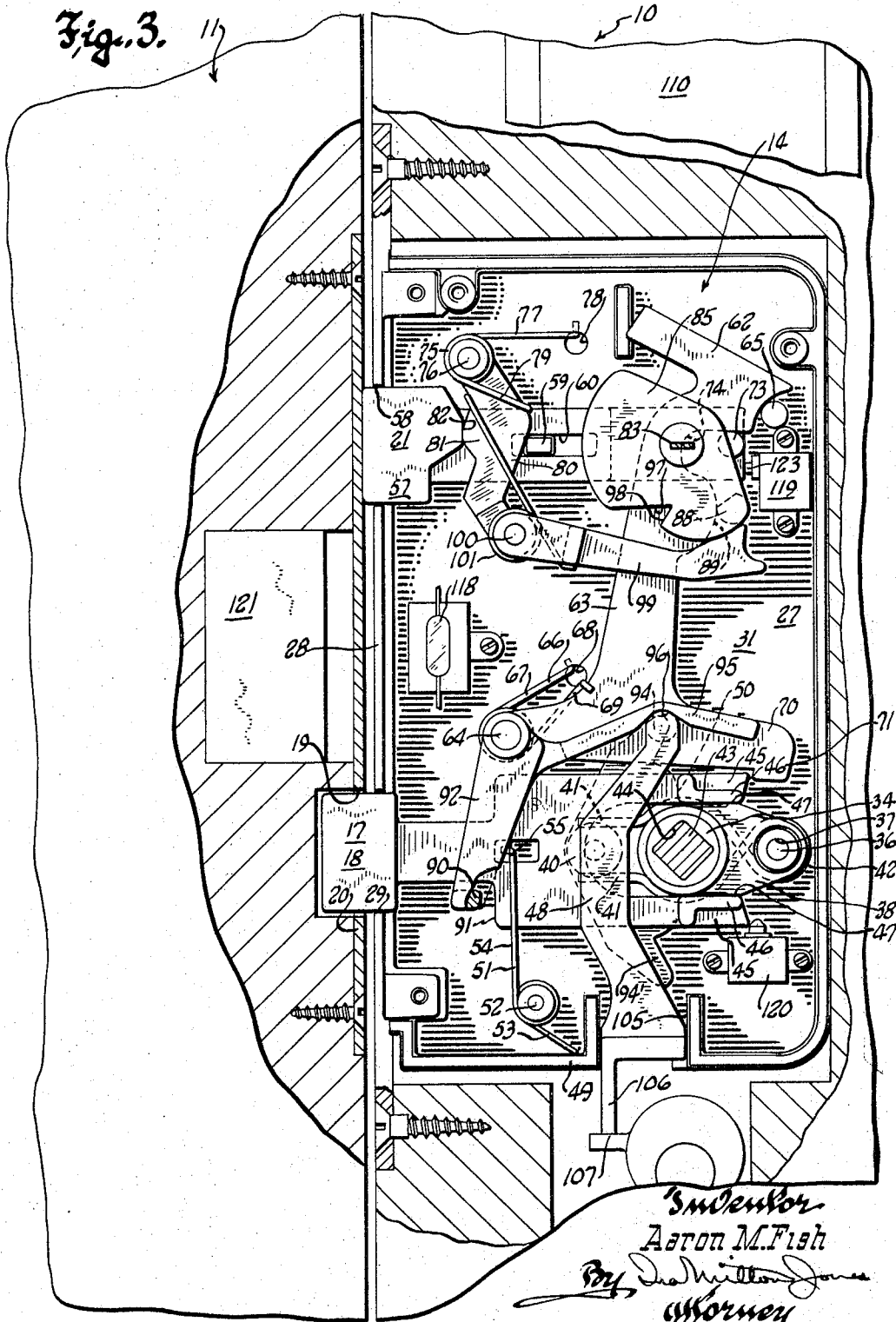
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Fig. 3.



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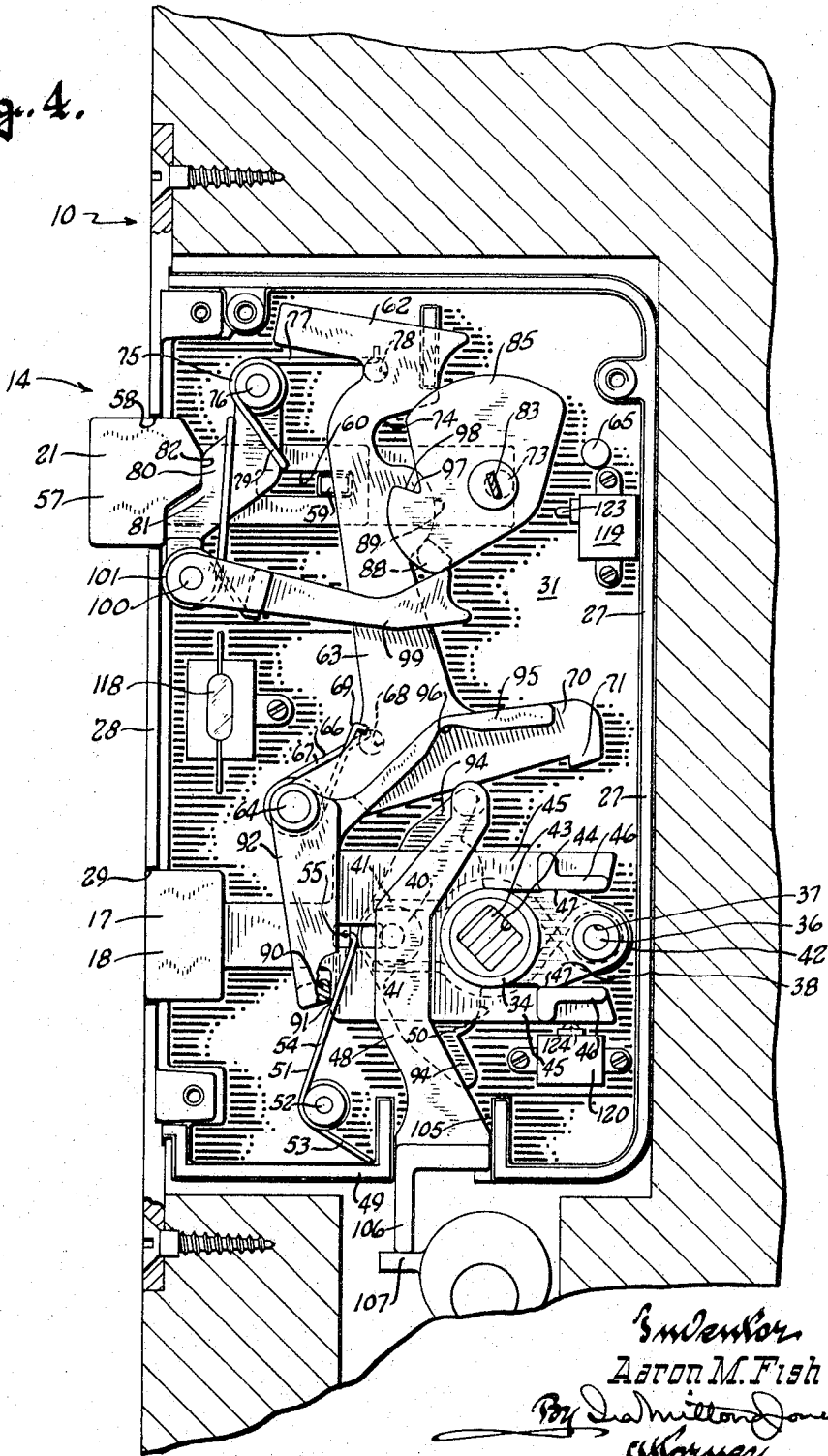
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Fig. 4.



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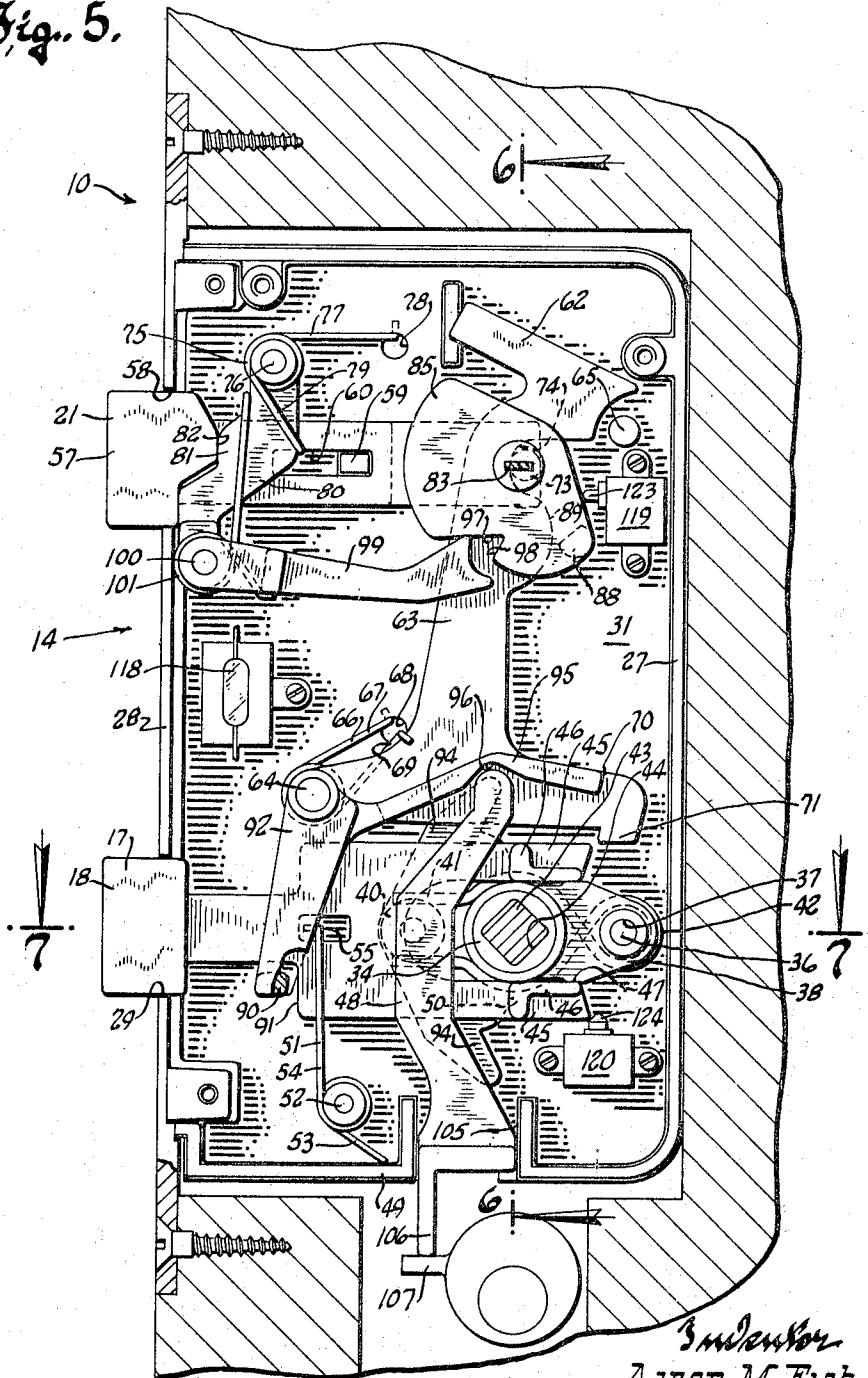
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Fig. 5.



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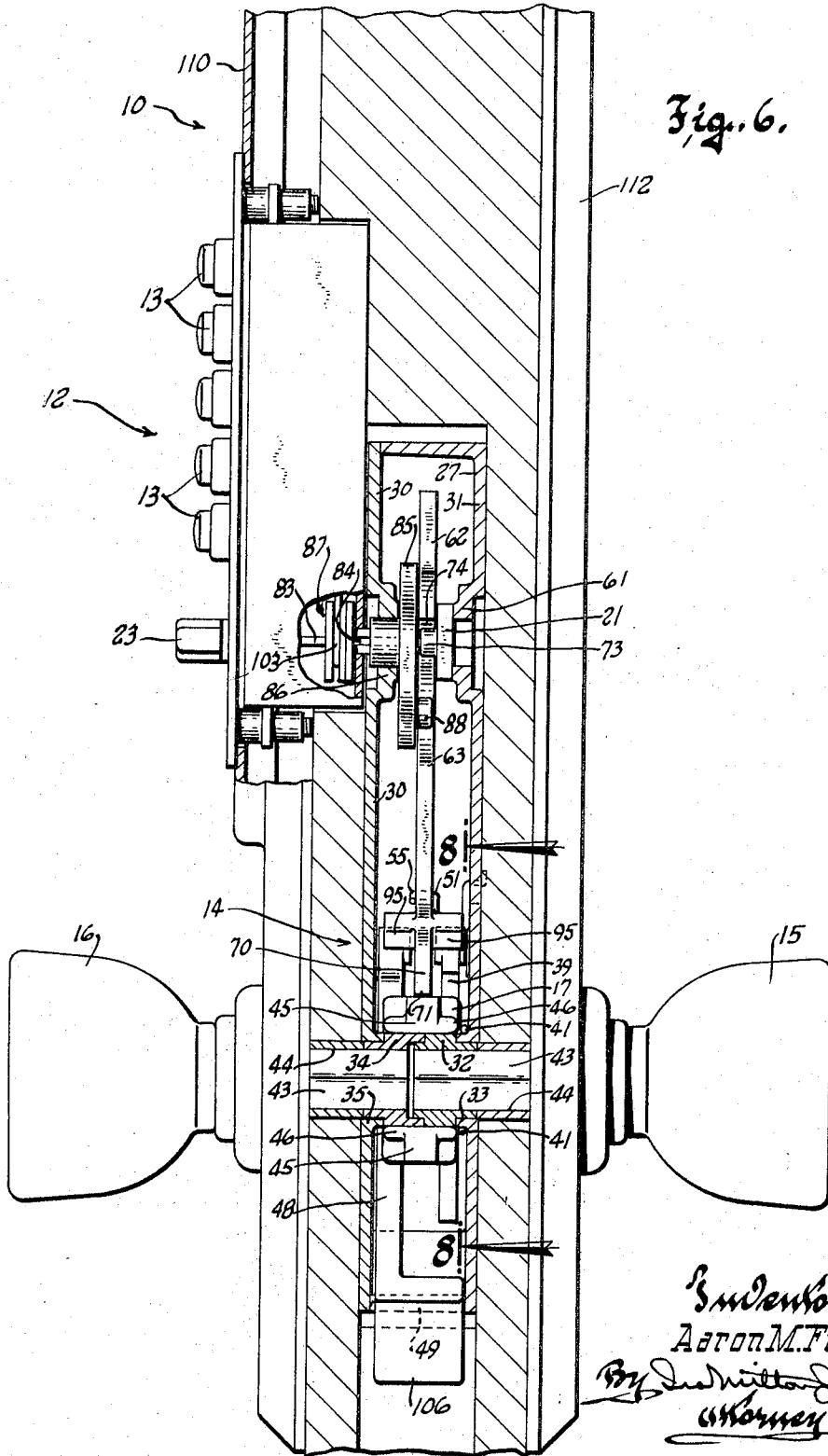
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DOOR LOCKING MEANS

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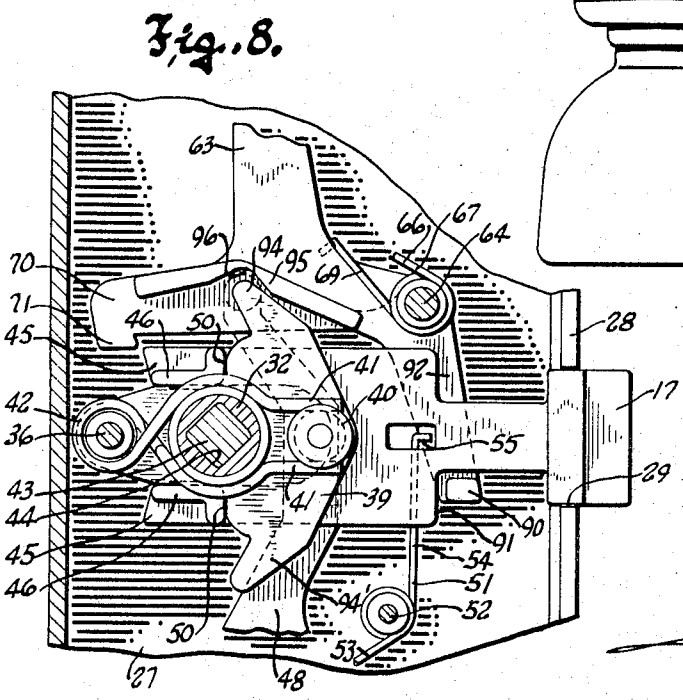
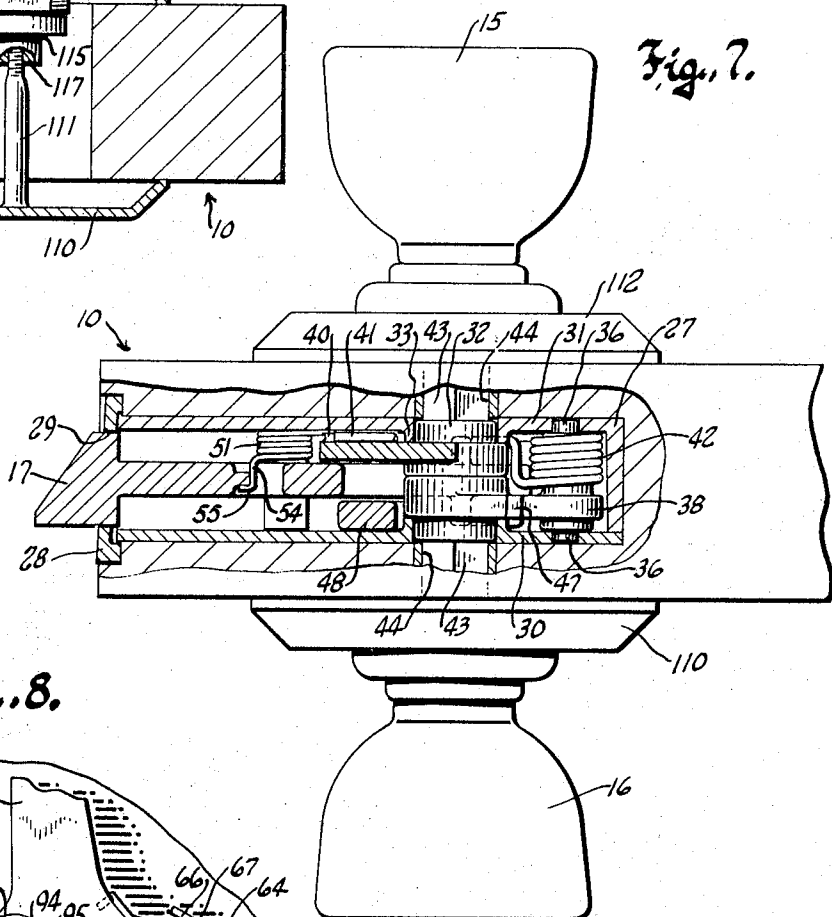
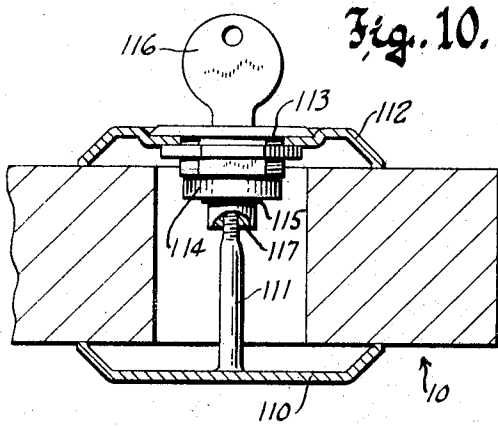
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DOOR LOCKING MEANS

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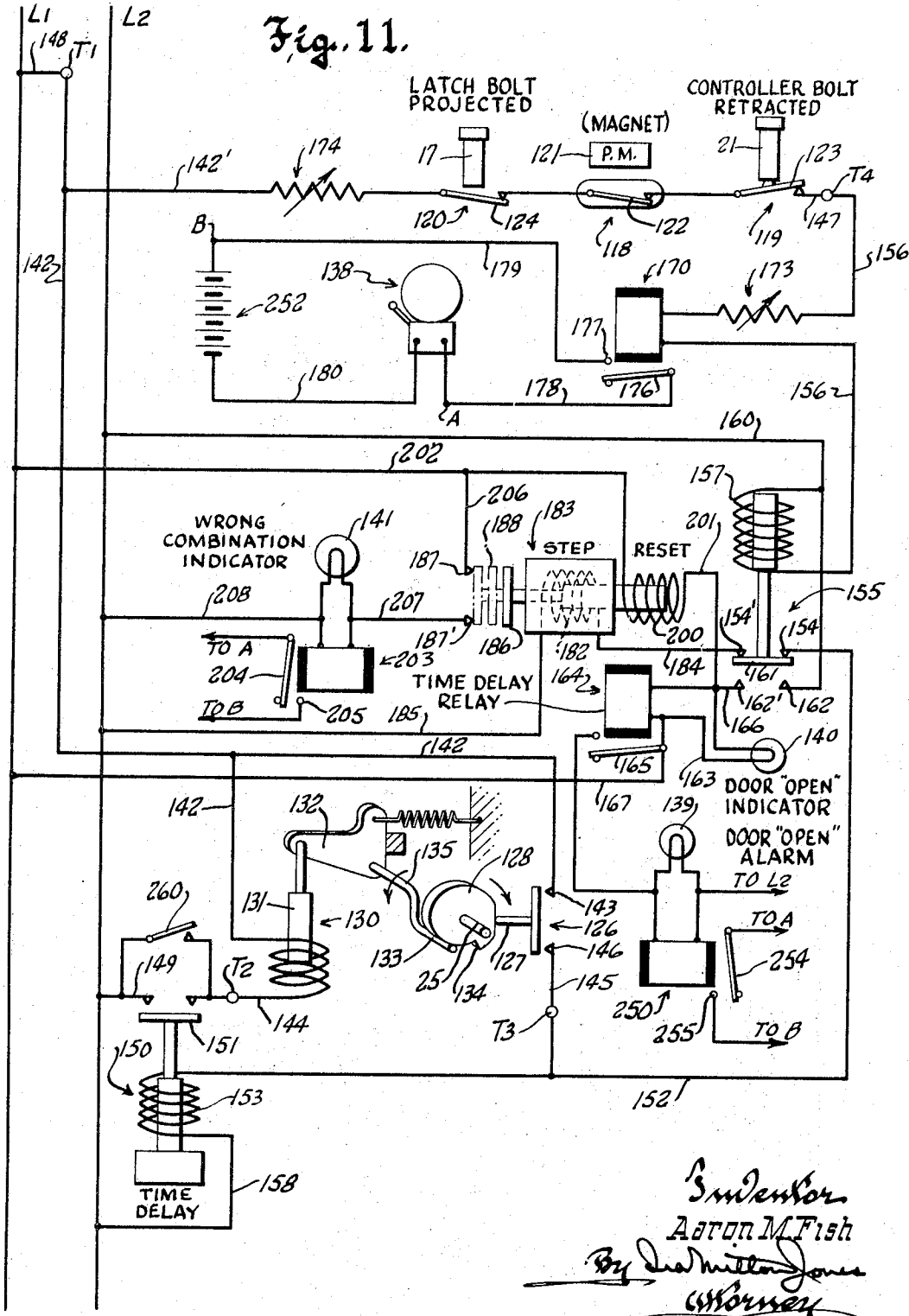
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3,353,383

DOOR LOCKING MEANS

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23 Claims. (Cl. 70—151)

ABSTRACT OF THE DISCLOSURE

Door latch mechanism is so combined with a combination lock mechanism as to assure resetting of the combination lock mechanism and cancelling of the combination in consequence of closure of the door. An electrically operated system associated with the latch and lock mechanisms provides safeguards which are automatically activatable to indicate and/or defeat unauthorized attempts to disable the system and/or to decode the combination lock mechanism, while permitting authorized operation of the door latch mechanism under the control of the combination lock mechanism entirely without dependence upon the electrically operated system.

This invention relates to locking devices generally, and has more particular reference to maximum security locking means for doors and the like.

Hence, it is a purpose of this invention to provide door locking means which will afford the best possible assurance against opening of a door through which access may be had to a restricted area such as a room or other enclosure in which equipment of valuable or confidential nature is kept, except by authorized persons whose presence at said restricted area is essential.

More particularly, it is a purpose of this invention to provide lock means for a door, featuring a combination lock mechanism that must be properly decoded before a latch operating member can be actuated to free the door for opening, and wherein the combination can be automatically cancelled as a consequence of reclosure of the door.

Another purpose of the invention resides in the provision of lock means of the character described incorporating an electrical control system by which the combination lock can be rendered inoperative in emergencies, and which normally functions to cancel the combination after decoding thereof has commenced, if such decoding does not eventuate in opening of the door within a predetermined period of time.

In this connection, it is a further purpose of the invention to provide lock means of the character described wherein the control system responds to repeated decoding attempts by an unauthorized person, to set off an alarm, thereby indicating that an unauthorized person is attempting to unlock the door to the restricted area or room.

Still another purpose of the invention resides in the provision of door locking means of the character described, wherein the electrical control system functions to produce a signal at a remote location whenever the door is opened, and to produce other signals or alarms whenever any attempt is made to jam the door latch mechanism while the door is open, or to defeat the electrical control system from within the restricted area by cutting or jumpering of its leads. It will be understood, of course, that the decoding or indexing means of the combination lock along with its latch operating member are located on the outside of the door closing off access to a restricted area, and that the leads of the electrical control system are at the inner side of the door and may run to a control box remote from the door.

A further purpose of this invention resides in the

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provision of door locking means of the character described featuring novel door latch mechanism which is controlled by the combination lock mechanism, and cooperates therewith to achieve an exceptionally high degree of security against unauthorized opening of the door.

With the above and other objects in view which will appear as the description proceeds, this invention resides in the novel construction, combination and arrangement of parts substantially as hereinafter described and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the hereindisclosed invention may be made as come within the scope of the claims.

The accompanying drawings illustrate one complete example of the physical embodiment of the invention, constructed according to the best mode so far devised for the practical application of the principles thereof, and in which:

FIGURE 1 is a fragmentary elevational view of a door having the locking means of this invention mounted thereon, showing the outside of the door in the closed and locked position thereof;

FIGURE 2 is a view similar to FIGURE 1 but viewing the inside of the door;

FIGURE 3 is an enlarged view corresponding to FIGURE 1, but having portions of the door broken away to show the latch mechanism in its interior;

FIGURE 4 is a view similar to FIGURE 3 but showing the operation of the latch mechanism at the time the door is opened;

FIGURE 5 is a view similar to FIGURE 4, but showing both the dead bolt and the latch bolt in the projected positions which they occupy at the time the door is to be reclosed;

FIGURE 6 is a sectional view through the latch mechanism, taken on the plane of the line 6—6 in FIGURE 5;

FIGURE 7 is a sectional view taken through FIGURE 5 on the plane of the line 7—7;

FIGURE 8 is a sectional view of the latch mechanism taken through FIGURE 6 on the plane of the line 8—8;

FIGURE 9 is a sectional view taken through FIGURE 2 on the plane of the line 9—9;

FIGURE 10 is a sectional view taken through FIGURE 2 on the plane of the line 10—10, and at an enlarged scale; and

FIGURE 11 is an electrical diagram showing the safety control system for the locking means of this invention.

Referring now to the accompanying drawings, wherein like reference characters indicate like parts throughout the views, the numeral 10 generally designates a door that may be hinged at one vertical edge for swinging movement to and from a closed position in a door jamb 11, to block access when locked, to a restricted area such as a laboratory or other room containing valuable equipment. The locking means of this invention is shown by way of example as mounted on the door, at its free edge portion, and comprises a combination or permutation lock mechanism generally designated 12 having its indexing means 13 exposed on the outer side of the door, and a latch mechanism generally designated 14 mounted in the door and controlled by the combination lock mechanism 12. Coaxial knobs 15 and 16 are also mounted on the door, one at each side thereof, and while the knob 16 on the outer side of the door is fixed against rotation, the inner knob 15 is at all times operable to retract a latch bolt 17 from an operative projected position such as seen in FIGURE 3 to free the door for opening. In its projected position, the outer end 18 of the latch bolt projects into a hole 19 in a strike 20 on the door jamb to hold the door closed.

During closure of the door, a controller bolt 21 forming part of the door latch mechanism is cammed inwardly

of the door by the strike 20, to an operative retracted position such as seen in FIGURE 3, at which it operates to prevent retraction of the latch bolt except by actuation of the knob 15 or by proper manipulation of the combination lock mechanism.

The combination or permutation lock mechanism here shown is of the type known in the trade as a "Simplex" lock, the indexing means 13 of which is provided by five push buttons arranged in a row and located one above the other on the door, and a rotatable latch operating lever 23. The lever is biased by a centering spring, not shown, to a normal or neutral position seen in FIGURE 1, and it can be turned in the clockwise direction only after the proper number of buttons 13 has been depressed in a predetermined sequence, to effect retraction of the latch bolt 17. The latch bolt 17 can thus be retracted from the outer side of the door independently of the knob 15 on the inner side of the door. When the latch operating lever 23 is turned to a predetermined resetting position, as for instance, by rotating the lever in the counterclockwise direction from its neutral position, it cancels the combination and effects scrambling of the combination.

As seen best in FIGURE 2, the combination or permutation lock mechanism of the type mentioned above also has an indexing or coding shaft 25, which projects from one end of the mechanism and which is rotated incrementally in one direction from a predetermined start position in correspondence with depression of each push button. As will appear at greater length hereinafter, this invention takes advantage of the fact that the indexing shaft 25 can be returned to its start position at any time to effect cancellation or scrambling of the combination independently of the latch operating lever 23 and to accordingly reset the mechanism of the combination lock. The indexing shaft, of course, also returns to its start position in consequence of turning of the latch operating lever 23 to a predetermined resetting position, as for example, by rotating the same in the counterclockwise direction from its neutral position seen in FIGURE 1.

The latch mechanism 14 is housed within a substantially narrow casing 27 that is fixed within the free edge portion of the door in a conventional manner, with its face plate 28 flush with the free edge of the door. In the closed position of the door, of course, the face plate is directly opposed to the strike 20, and the outer end 18 of the latch bolt projects through a hole 29 in a lower portion of the face plate for engagement in the hole 19 in the strike. The latch bolt 17 is supported in the casing for back and forth translating motion along a path normal to the face plate 28 and intersecting the axis of the knobs 15-16, partly by the engagement of its outer end portion 18 in the hole 29 in the face plate, and partly by its cooperation with a hub structure carried by the opposite side walls 30 and 31 of the casing. This hub structure comprises a rotatable hub 32 having a reduced outer portion journaled in a bearing 33 formed on the side wall 31 of the casing which is adjacent to the inner side of the door, and a fixed hub 34 likewise having a reduced outer portion received in a bearing 35 formed on the outer side wall 30 of the casing.

The hub 34 is held against rotation by means of a pin 36 on the casing, extending transversely thereacross at the side of the hub structure remote from the face plate 28 and projecting through a hole 37 in an arm 38 fixed to the hub 34. The rotatable hub 32 also has an arm 39 affixed thereto, a portion of which extends toward the face plate 28 and rotatably carries an idler disc 40, the periphery of which is grooved to receive the opposite legs 41 of a torsion type centering spring 42 having its main portion loosely coiled about the pin 36. The legs 41 of the spring, of course, are arched outwardly around the hub structure to loosely embrace the same, and thus assure that their free end portions will be in engagement with diametrically opposite sides of the grooved idler disc 40 to yieldingly resist rotation of the inner knob 15 in

either direction and to return the hub 32 to its centered position shown in FIGURE 3 when the knob is released.

It should be observed that the inner end of the rotatable hub 32 is also reduced, and it is rotatably received in a counterbore in the adjacent inner end of the fixed hub 34 so that the hubs tend to support one another. The stems 43 of the door knobs are here shown as having square cross sections, and their inner ends are received in correspondingly shaped holes 44 in the hubs.

The inner end of the latch bolt 17 is provided with spaced upper and lower bifurcations 45 which loosely slidably embrace exterior portions of both hubs 32-34 and thus cooperate with the sliding fit of its head 13 in the hole 29 in the face plate to guide the latch bolt for endwise back and forth movement along a path normal to the face plate. If desired, pads 46 may be formed on opposite sides of the bifurcations 45 to provide bearing surfaces of substantial area for sliding engagement with the hubs, and these pads may also slidably engage bearing projects 47 on the opposite side edges of the arm 38 of the fixed hub 34.

It should also be observed that the latch bolt is flatwise received between the arm 39 on the rotatable hub 32, and another arm 48 that projects downwardly in the casing and through the bottom wall 49 thereof, in which it is guided for vertical translating motion for a purpose to be described later. Hence, the arms 39 and 48 cooperate to confine the latch bolt against excessive sidewise motion in the casing.

As is customary, the latch bolt is yieldingly biased to its projected position seen in FIGURE 3 and defined by the engagement of its pads 46 with shoulders 50 on the hub arm 39. This bias is afforded by a torsion spring 51 loosely coiled about a cross pin 52 in the lower portion of the casing, having one end 53 bearing against the bottom wall 49 of the casing and its other end 54 connected with the bolt as at 55.

The controller bolt 21 is supported for back and forth translating movement along a path parallel to the path of motion of the latch bolt, but spaced a substantial distance thereabove. It also has an enlarged head 57 which is slidably received in a hole 58 in the face plate 28, through which the head extends in the door open and projected position of the bolt seen in FIGURE 5. The edges of the hole 58 thus cooperate with a lug 59 on the inner side wall 31 of the casing, which engages in a slot 60 in the dead bolt, to guide the bolt for back and forth motion between its extended position and its operative retracted position seen in FIGURE 3, to which it is crammed by the strike when the door is closed.

The inner end portion of the controller bolt is flatwise slidably confined between an internal boss 61 on the inner side wall 31 of the casing, and the upward extending arm 62 of a latch control lever 63 which is pivotally mounted on a cross pin 64 on the casing for rocking motion about a transverse axis slightly above the latch bolt 17 and only a short distance inwardly of the face plate 28. The latch control lever is yieldingly biased in the clockwise direction about its pivot toward a normal position defined by the engagement of its upper arm 62 with a stop 65 on the casing. A torsion spring 66 provides this bias. It is coiled about the pivot pin 64 and has one leg 67 anchored in a hole 68 in the inner side wall 31 of the casing, and its other leg 69 bears against that edge of the lever arm 62 which opposes the face plate 28.

The lever 63 has a second arm 70 which extends substantially horizontally from the pivot pin 64, away from the face plate 28 and over the upper edge of the latch bolt to the rear of the latter. This second arm 70 of the lever terminates in a hook 71 which extends downwardly behind the latch bolt 17 and normally blocks retracting movement of the latter as long as the controller bolt is in its operative retracted position which it occupies when the door is closed.

The purpose of the hook 71 on the latch control lever

63, therefore, is to prevent unauthorized retraction of the latch bolt by the blade of a case knife or the like inserted into the slight clearance space between the strike 20 and the face plate 28.

The controller bolt 21 is also yieldingly biased away from its retracted position seen in FIGURE 3, in which it is held by the strike 20 on the door jamb, toward a projected position seen in FIGURE 5 which it occupies when the door is opened. During travel of the controller bolt toward its projected position, a lug 73 on the side of the dead bolt at its rear is brought into engagement with an adjacent edge portion 74 on the upper arm 62 of the latch control lever to hold the same in a position at which the hook 71 on the lever clears the rear of the latch bolt 17 to enable the latter to be retracted.

Such biasing force is exerted on the controller bolt by means of a torsion spring 75 which is loosely coiled about a transverse pivot pin 76 in the casing, located just above the controller bolt 21 and near the face plate 28. One leg 77 of the spring is anchored in a hole 78 in the inner side wall 31 of the casing, and its other leg 79 bears against the rear edge of a lever 80 rockably mounted on the pivot pin 76 and extending downwardly therefrom across the controller bolt directly behind its head 57. The spring tends to rock the lever 80 clockwise about the pin 76, and its force is transmitted into bias on the controller bolt tending to urge it to its projected position through the engagement of a step 81 on the lever with a rearwardly facing abutment 82 on the head 57 of the controller bolt. The projected position of the controller bolt, of course, is defined by the engagement of the lug 59 with the inner end of the slot 60 in the bolt.

According to this invention, the latch operating lever 23 on the combination lock mechanism 12 is operable to effect retraction of the latch bolt 17 when the operating lever 23 is turned in the clockwise direction from its neutral position seen in FIGURE 1. For this purpose, the shaft 83 to which the lever 23 is fixed, is drivingly connected with a cam 85 that is rotatably journaled in a bearing boss 86 on the outer side wall 30 of the casing for rotation on a transverse axis intersecting the rear of the controller bolt and ahead of the lug 73 on its extremity. The cam 85 overlies the side of the lever arm 62 remote from the controller bolt, and is preferably connected with the latch operating lever 23 through the shaft 84 of a disc type coupling device 87 that compensates for axial misalignment between the combination lock and latch mechanisms.

The cam 85 is provided with a drive abutment 88 which, in the door closed and locked condition of the latch mechanism seen in FIGURE 3, directly opposes a rearwardly facing edge surface 89 on the upper arm 62 of the latch control lever 63, so that turning of the latch operating lever in the clockwise direction described rotates the cam 85 in the clockwise direction to in turn rock the lever 63 in the counterclockwise direction about its pivot pin 64. During initial counterclockwise motion of the latch control lever 63, its hook 71 is lifted clear of the rear of the latch bolt 17 to free the same for retraction. Thereafter, during continued pivotal movement of the latch control lever 63 in the counterclockwise direction, the latch operating lever acts through the cam 85 to carry a driver 90 on the lever 63 into driving engagement with a forwardly facing abutment 91 on the latch bolt to move the same rearwardly to its retracted position.

The driver 90 is formed as a finger on the extremity of a third arm 92 on the latch control lever 63, which third arm extends downwardly and slightly forwardly across the latch bolt at the side thereof adjacent to the outer side wall 30 of the casing.

Hence, it will be appreciated that the latch operating lever 23 on the combination lock mechanism 12 acts through the cam 85, the driving abutment 88 on the cam and the latch control lever to first free the latch bolt of the obstruction normally provided by the hook 71 on

the control lever during initial rotation of the operating lever 23 in the clockwise direction, and that continued rotation thereof in the same direction effects retracting movement of the latch bolt to its position seen in FIGURE 4, at which the door may be opened by pulling on the fixed knob 16 on the exterior of the door.

It will be recalled, however, that the latch operating lever cannot be turned in the door releasing direction until the required number of push buttons 13 has been depressed in the proper sequence to unlock the combination lock mechanism.

While the latch bolt 17 may thus be retracted from the outer side of the door, by a person having knowledge of the proper combination of the lock mechanism 12, it can also be opened at any time, from the inner side of the door, merely by turning the rotatable knob 15 in a clockwise direction as viewed in FIGURE 3. This swings the arm 39 on the rotatable hub 32 upwardly to effect tilting of the latch control lever 63 in the counterclockwise direction as seen in FIGURE 3, to first lift the hook 71 away from the rear of the latch bolt and to then drive the latch bolt into the casing through the engagement of the driver 90 on the lever with the abutment 91 on the latch bolt.

Such pivotal motion is imparted to the latch control lever by the rotatable knob 15 through an upward extension 94 on the arm 39 of the movable hub 32, and one of a pair of identical gabled ledges 95 on the opposite sides of the horizontal arm 70 of the latch control lever. The extension engages the underside of its gabled ledge 95, at the apex thereof, preferably in an indentation 96 at said apex. If desired, the arm 39 can have a second downward extension 94' symmetrical with the first to serve the same purpose as the first in the event the knobs 15 and 16 and their hubs are reversed for doors of opposite hand, whereby the same hub assemblies can be used with either right hand or left hand doors.

It is an important feature of this invention that the combination is cancelled and the combination lock mechanism is accordingly reset, entirely automatically in consequence of reclosure of the door. This is highly advantageous for security reasons, as it eliminates the possibility of accidentally or otherwise leaving the combination lock mechanism unlocked following reclosure of the door in the event the latch operating lever is not turned to a predetermined resetting position to scramble or cancel the combination and reset its mechanism.

For the above purpose, the cam 85 is formed with a step 97 on its underedge, to provide a shoulder 98 on the cam, facing forwardly toward the face plate, against which force can be applied during closure of the door to turn the cam and the latch operating lever 23 connected therewith in the counterclockwise direction necessary to reset and cancel the combination of the lock mechanism 12. Such force is applied to the shoulder 98 on the cam through a link 99 having its forward end pivotally connected as at 100 with the lower end of the controller bolt biasing lever 80, and extending substantially horizontally rearwardly therefrom toward the cam 85. This link is yieldingly biased by a torsion spring 101 connecting it with the lever 80, to turn in a counterclockwise direction on its pivotal connection 100, so as to maintain the link engaged with the periphery of the cam 85 from the underside thereof.

When the door is open, as seen in FIGURE 5, the controller bolt is in its projected position, and its biasing lever 80 is in a forward position on its pivot 76 at which it holds the link 99 with its rear extremity seated upon the step 97 of the cam, and in confronting relation to the shoulder 98 on the cam. Thus, when the door is reclosed and the controller bolt is cammed inwardly of the door by the strike, it swings its bias lever 80 rearwardly thereby driving the link endwise rearwardly against the shoulder 98 on the cam to impart the counter-clockwise rotary movement to it and the latch operating member 23 connected therewith necessary to cancel the combination of the

lock 12 and reset its mechanism. The link 99 is disengaged from and moves past the shoulder 98 after the cam has been rotated through the substantially small angle necessary to cancel the combination. Such disengagement of the link from the shoulder is effected by the peripheral portion of the cam ahead of the step 97. Consequently, when the link rides rearwardly past the cam shoulder, the centering spring acting on the latch operating lever 23 returns the cam to its normal position seen in FIGURE 3, which illustrates that the link is then held engaged with the peripheral portion of the cam behind its shoulder 98 when the dead bolt is fully retracted.

As an extra security measure, the coupling device 87 is provided with a torsion type centering spring 103 separate from that incorporated in the combination lock mechanism to bias the latch operating lever 23 to its neutral position. Hence, if the latter spring should break, the centering spring 103 is available to return the latch operating lever to neutral from its latch retracting position, thus assuring against the possibility of the combination lock mechanism remaining in an unlocked condition.

The arm 48 mentioned earlier, projects upwardly beyond the latch bolt to have its upper extremity in motion transmitting relation to the other gabled ledge 95 on the horizontal arm 70 of the latch control lever 63, to effect retraction of the latch bolt in the same way as the arm 39 and its upward extension 94, during upward movement of the arm 48. The arm 48 is not an essential component of the latch mechanism, and should be regarded as optional, to be provided whenever still another means of retracting the latch bolt is desired.

In the present case, the lower end portion of the arm 48 projects downwardly out of the bottom of the casing through a slideway 105 formed thereon, and which serves to guide the arm for up and down motion. The lower end 106 of the arm rests on the drive arm 107 of a cylinder lock that is accessible for key actuation from the outer side of the door, whereby the arm 48 can be moved upwardly in consequence of key produced rotation of the drive arm 107 in the clockwise direction as viewed in FIGURE 3, to effect rocking of the control lever 63 in the direction to retract the latch bolt. When the drive arm 107 is returned to its normal locked position shown, the arm 48 moves downwardly partly by gravity and partly by the force of the spring 66 acting on the latch control lever 63.

A feature of combination lock mechanisms of the type herein described is that they incorporate means by which their combinations can be changed. This, of course, entails manual manipulation of a combination change member, not shown, on the lock mechanism. According to the present invention access to the combination change member is afforded in an exceptionally simple manner while at the same time allowing such access to only a person authorized to change the combination. For this purpose, the door plate 110 on the outside of the door has a stud 111 which is fixed to its inner surface and projects into the door to have its threaded extremity near the door plate 112 on the inner side of the door, in alignment with a hole 113 in the plate 112. A cylinder lock 114 is mounted in the hole 113 and fixed on the door plate 112 to releasably lock it against detachment from the door. The cylinder 115 of the lock is of the type having tumblers not shown, that can be retracted to free the cylinder for unlimited rotation in its casing and for endwise displacement therefrom in consequence of insertion of a proper key 116 into the cylinder. Hence, when the key is inserted into the cylinder, it can be rotated in the direction to back off a nut 117 on its rear from the threaded extremity of the stud 111 to thus unlock the door plate 112 from the door. It will be understood, of course, that the cylinder lock 114 may be used in conjunction with plate retaining screws of a conventional type, and which must also be removed before the door plate can be detached to provide access to the change member of the combination lock mechanism.

Three electrical switches 118, 119 and 120 are mounted in the casing 27. The switch 118 is a normally open reed switch that is mounted close to the face plate 28 about midway between the latch and controller bolts, to be in the magnetic field of a permanent magnet 121 embedded in the door jamb when the door is closed. Its reed contactor 122 is thus normally held in an attracted switch closing position whenever the door is closed, and this switch opens whenever the door is opened.

The switch 119 is also of the normally open type. It is mounted adjacent to the rear of the controller bolt 21, which engages the actuator 123 of the switch to hold it in a switch closed position as long as the latch bolt is in its retracted (door closed) position. The switch 119 opens in consequence of movement of the controller bolt to its projected position when the door is opened.

The third switch 120 is of the normally closed type. It is mounted adjacent to the rear of the latch bolt 17, and its actuator 124 is engaged by the latch bolt during initial retracting movement thereof to effect opening of the switch.

A fourth switch 126, of the normally open type, is mounted on the inner side of the outer door plate 110, with its actuator 127 in position to be acted upon by a cam disc 128 fixed on the projecting end of the indexing or coding shaft 25. The cam disc is designed to depress the actuator 127 and close this switch during rotary indexing motion of the coding shaft in consequence of depression of an indexing button 13 on the combination lock mechanism.

An electromagnetic torque motor 130 is also mounted on the inner side of the outer door plate 110, alongside the cam disc 128. It has an armature 131 that is constrained to rotate on a horizontal axis, crosswise of the coding shaft 25, and a disc 132 fixed on the armature has a drive arm with a finger 133 that extends across the periphery of the cam disc 128 for engagement with a radial abutment 134 on the cam. This abutment is normally spaced a distance from the finger 133, and it is moved toward the finger during indexing motion imparted to the coding shaft in consequence of depression of the push buttons 13.

Assuming that the coding shaft 25 has been indexed one or more times to carry the abutment in the counter-clockwise direction part way toward the drive finger 133 from the normal position of the abutment 134, shown in FIGURE 9, the response of the armature 131 to energization of the motor 130 swings the drive finger 133 to the left, against the abutment 134, and returns the coding shaft to its start position. This, of course, cancels or scrambles the combination and resets the mechanism of the combination lock 12.

The electrical instrumentalities described thus far constitute components of an electrical control system shown in schematic form in FIGURE 11. For convenience of illustration, however, the disc 132 described above has been shown as a lever which pivots about the axis of a shaft 135 having the drive finger 133 eccentrically formed thereon.

A cable 137 having four leads connecting with the torque motor 130 and the switches identified above, extends along the inner side of the door as seen in FIGURE 1. This cable can run to a remote control box, not shown, containing all of the control instrumentalities except an alarm device 138 and three signal lights 139, 140 and 141.

Four conductors in the cable 137 lead from the door mounted electrical instrumentalities and terminate at terminals T1, T2, T3 and T4 on a junction block, not shown, mounted on the inner side of the door near its hinged edge. One of these conductors 142 is joined to the terminal T1 and has branches which lead to one end of the coil of the torque motor 130 and to one contact 143 of the cam operated switch 126. The second cable conductor 144 connects the other end of the coil of the torque motor with terminal T2. The third cable conductor 145

connects the other contact 146 of the cam operated switch 126 with the terminal T3.

A branch 142' of the first conductor 142 leads serially through the door switches 118, 119 and 120 and joins with the fourth cable conductor 147, which is connected to the terminal T4.

The terminal T1 is connected by a conductor 148 with one line L1 of a pair of supply lines L1 and L2. The terminal T2 is connected by a conductor 149 with the other supply line L2 through the normally open contacts of a time delay relay 150 having a contactor 151. The terminal T3 is commonly connected by a conductor 152 with one end of the coil 153 of the time delay relay 150, and with one stationary contact 154 of an electromagnetic switch 155. The terminal T4 is connected by a conductor 156 with one end of the solenoid 157 of the electromagnetic switch 155, through other electrical instrumentalities to be described later and in series with the solenoid 157.

The other end of the coil 153 of the time delay relay 150 is connected to line L2 through a conductor 158, so that the coil will be energized whenever the cam operated switch 126 is closed.

The solenoid 157 of electromagnetic switch 155 is energized by a circuit leading from line L1 through conductor 142' and the door switches 118-119-120, and conductors 147 and 156 to one end of the solenoid of the electromagnetic switch 155, and from the other end of the solenoid through a conductor 160 to line L2.

As long as the door 10 is in its closed and properly locked position, therefore, the switches 118, 119 and 120 will be closed as described earlier, to complete the energizing circuit for the solenoid of switch 155. When thus energized, the contactor 161 of the switch bridgingly engages the stationary contact 154 and a cooperating contact 154' and is disengaged from a pair of cooperating stationary contacts 162 and 162' of the switch 155. The contacts 162 and 162' are engaged by the contactor 161 of the switch when its solenoid is deenergized, to activate a signal circuit containing the "door open" signal lamp 140. Hence, the signal lamp 140 is inoperative as long as the contactor 161 of the switch 155 is held off of the contacts 162-162', which is the case as long as the door 10 is closed and properly locked.

All three switches 118, 119 and 120 open when the door 10 is opened, to break the circuit for the solenoid of switch 155 and allow the contactor 161 thereof to descend and bridge the contacts 162-162'. When this occurs, the signal circuit through the "door open" signal light 140 is completed via the conductor 160, the contactor 161 of switch 155, and a conductor 163 leading to Line L1 through the light 140.

Whenever the door is opened as described, an energizing circuit is completed for a time delay relay 164. This circuit comprises the conductor 160, which is connected to line L2 at one end and to switch contact 162 at its other end, a conductor 166 connecting the stationary switch contact 162' with one terminal of the relay 164, and a conductor 167 connecting the other terminal of the relay with line L1. The contactor 165 of the relay 164 moves to its switch closing position when the relay is energized in the manner described, only if the door is left open for longer than a predetermined period of time, or if the cable 137 is cut, which of course, results in deenergization of the coil of switch 155 in the same way as opening of the door.

From the description of the control system thus far, it will be appreciated that the lamp 140 will serve as a signal each time the door 10 is opened. This signal will also be made even through the door 10 is closed, in the event the latch bolt 17 has been jammed in its retracted position by a person attempting to defeat the latch mechanism. In that case, the solenoid of switch 155 will be deenergized due to the open condition of the switch 120 controlled by the latch bolt, to effect signalling that the

lock mechanism of this invention has been tampered with and is not functioning as intended.

If the door is left open for longer than a predetermined period of time, or if the cable 137 has been cut, the contactor 165 of the time relay 164 closes to activate door open alarm instrumentalities which include the alarm signal light 139, and a relay 250. The light 139 and the relay 250 are connected in parallel and are energized together in a manner which is obvious from the diagram.

The alarm 138 is provided to afford audible evidence of tampering with the cable 137 leading to the door 10, either by persons attempting to jumper its terminals or to otherwise defeat the electrical control system as by cutting the cable.

Energization of the alarm 138 is controlled by a relay 170 which is energized to activate the alarm as a consequence of jumbling of the terminals T1 and T4 in a way that would prevent the "door open" signal from functioning even though the door 10 were forced open.

The coil of relay 170 is connected in series with the coil 157 of electromagnetic switch 155, by conductor 156. A variable resistance 174 in the conductor 142' cooperates with another variable resistance 173 in the conductor 156 to normally limit current flow through the coil of relay 170 and maintain it to a value insufficient to effect response of its contactor 176. However, when terminals T1 and T4 are connected by a jumper, the variable resistor 174 is shunted out of the circuit and a current sufficient to effect response of the contactor 176 of relay 170 flows therethrough.

When the contactor 176 of relay 170 is brought into engagement with the normally open relay contact 177, it completes an energizing circuit for the alarm 138, here shown by way of example as a bell which is energized by a separate source of E.M.F., such as a battery 252. The contactor 176 is connected to terminal A of the bell by a conductor 178, and the relay contact 177 is connected by a conductor 179 with battery terminal B. A conductor 180 connects the other terminals of the bell and battery.

If the current is interrupted in conductor 156 for any reason, the resulting deenergization of switch 155 effects energization of signal light 140, relay 164, alarm light 139, and relay 250, so that the latter will in turn effect energization of the alarm 138. Note that the contactor 254 of relay 250 is connected to bell terminal A, while its stationary contact 255 is connected to battery terminal B.

A particularly desirable feature of the electrical control system is that it provides for automatically cancelling or scrambling of the combination of the combination lock mechanism in the event the door 10 is not opened within a predetermined period of time following initial indexing of the combination, and for energization of the wrong combination signal light 141 in the event of repeated attempts to decode the combination lock mechanism experimentally.

It will be recalled that the coding or indexing shaft 25 is rotated incrementally in one direction from a predetermined start position in consequence of depression of each push button 13 on the combination lock mechanism, and that this shaft can be rotated in the opposite direction to its start position to effect resetting of the lock mechanism, or scrambling of its combination. When this shaft is rotated through a predetermined angle from its start position, as by depression of one or more of the push buttons 13, the cam 128 on the shaft engages the actuator of the switch 126 to close the same. The switch 126, as stated previously, controls the energizing circuit for the time delay relay 150, and when the switch is closed by the cam 128, the time delay relay coil 153 is energized but its contactor does not respond and close the switch contacts of this relay until after a predetermined time interval has elapsed. This time interval is of such dura-

tion as to normally allow an authorized person sufficient time to decode the combination and open the door.

When the door is closed and properly locked, a person knowing the combination can depress the correct number of push buttons 13 in the proper sequence to decode the combination lock mechanism, and then turn the latch operating lever 23 in the direction to retract the latch bolt and free the door for opening. While such proper decoding is taking place, the incremental advance of the coding or indexing shaft 25 away from its start position will cause the switch 126 to be closed by the cam 128 on the shaft to not only effect energization of the time delay relay 150, but to also complete an energizing circuit for the coil 182 of a step relay 183 through the bridged contacts 154-154' of the electromagnetic switch 155. This last named circuit is completed through conductor 142 which connects with line L1, the switch 126, conductors 145 and 152, the then bridged contacts 154-154' of switch 155, a conductor 184 connecting the stationary contact 154' with one end of the coil 182 of the step relay 183, and a conductor 185 which connects with line L2.

When thus energized, the step relay advances its contactor 186 a first increment toward a pair of stationary relay contacts 187-187', to dispose the contactor in an intermediate position 188 between its normal position and an operative position bridging the stationary contacts 187-187' of the relay.

If the door 10 is then opened within the predetermined time interval before the time delay relay functions to move its contactor 151 to its switch closed position, the opening of the door mounted switches 118-119-120 breaks the energizing circuit for the coil of switch 155 and the contactor thereof falls away from engagement with the stationary switch contacts 154-154' and into bridging engagement with the second pair of contacts 162-162' of this switch. This breaks the circuit for the coil 182 of the step relay 183 and effects resetting of the contactor 186 of the step relay to its start position shown in solid lines in the diagram. The resetting of the step relay results from completion of an energizing circuit through the reset coil 200 of the relay in consequence of deenergization of the coil of switch 155. This circuit comprises the conductor 202 which connects with line L1 and leads to one end of the reset coil 200, a conductor 201 which is joined to the conductor 166, the contactor 161 of switch 155 then in engagement with contacts 162-162', and the conductor 160 leading to line L2. It is a feature of this invention that the reset coil 200 can never be energized simultaneously with the step coil 182 of the step relay, since each coil can only be energized through the contactor 161 of the switch 155.

Consequently, each time the door 10 is opened, the reset coil 200 of the step relay will be energized to return the contactor of the step relay to its start position and, of course, the signal lamp 140 will also be energized as described earlier, to indicate that the door is open.

In the event the predetermined time interval expires before the door 10 is opened, the contactor 151 of the time delay relay 150 is carried to its switch closing position to effect energization of the torque motor 130 and return of the coding shaft 25 to its start position to thus cancel or scramble the combination of the combination lock mechanism. The energizing circuit for the torque motor 130 comprises one branch of the conductor 142 connecting with one terminal of the motor, conductor 144 which is connected to the other terminal of the torque motor, the contactor 151 of the time delay relay 150, and conductor 149 which leads to line L2.

The time delay relay, of course, is deenergized by opening of the switch 126 as soon as the coding shaft and the cam 128 thereon are returned to their start positions.

In the event of such operation of the combination scrambling instrumentalities for failure to open the door

10 in the predetermined time interval set for response of the time delay relay 150, the contactor 186 of the step relay 183 will remain in its intermediate position designated by 183. Hence, if depression of the push buttons 13 is continued in an effort to unlock the mechanism of the combination lock by experimental methods, the cam 128 on the coding shaft 25 will again effect closure of the switch 126, to thereby again energize the coil 182 of the step relay 183 and move its contactor 186 the final increment necessary to bridge the stationary relay contacts 187-187'. When this occurs, an energizing circuit is completed for the coil of an alarm relay 203, the contactor 204 of which then moves from a normal switch open position into engagement with a stationary switch contact 205 to set off the alarm 138.

The energizing circuit for the coil of the alarm relay 203 leads from line L1 through conductors 202 and 206 to contact 187 of the step relay, the contactor 186 of the step relay, a conductor 207 connecting contact 187' of the step relay with one terminal of the alarm relay, and a conductor 208 connecting the other terminal of the alarm relay with line L2. The signal light 141, being connected in parallel with the relay 203, is also energized at this time.

The energizing circuit for the alarm 139 is completed through conductors which connect contactor 204 with terminal A of the bell 138, and stationary contact 205 with terminal B of the battery 252.

The step relay has here been shown and described by way of example as having a contactor which must be advanced twice before it effects energization of the alarm circuit. It may, of course, be set to require advance of its contactor three or more times, if desired, before the alarm circuit is energized. It is important to observe that the step relay 183 responds and advances each time an attempt is made to decode the combination lock mechanism due to the fact that the switch 126 is closed at the time each such attempt is made.

Another feature of the control system is that it enables an attendant at a remote location to prevent decoding of the combination lock mechanism. For this purpose, a switch 260 is provided. The switch 260 is connected across the stationary contacts of the time delay relay 150, to effect energization of the solenoid motor 130 whenever the switch is closed. Hence, if switch 260 remains closed, the solenoid motor can remain energized to prevent the coding shaft 25 from moving in consequence of force applied manually to the push buttons.

From the foregoing description, together with the accompanying drawings, it will be readily apparent to those skilled in the art that this invention provides a door locking system providing unusual security against entry into a restricted area such as a laboratory or the like containing valuable equipment that must be protected against tampering or examination by unauthorized persons especially if such equipment is of a classified nature.

What is claimed is:

1. Door locking means comprising the combination of:

(A) a combination lock having decodable mechanism and having

- (1) a latch operating member,
- (2) and a number of indexing elements which must be manually actuated in predetermined sequence in order to decode said mechanism and thereby free the latch operating member for movement in one direction to a door releasing position;

(B) and a latch mechanism cooperable with said combination lock and comprising

- (1) a latch bolt biased to a projected position and movable against its bias to a retracted position,
- (2) an operating shaft drivingly connected with the latch operating member to rotate in one direction in consequence of movement of the latch

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operating member to its door releasing position,

(3) a pivoted latch retracting lever having a part thereon which blocks retracting movement of the latch bolt except when the lever is swung in one direction about its pivot out of a normal position, 5

(4) a driving abutment on the lever engageable with the bolt during pivotal movement of the lever in said one direction to move the latch bolt to its retracted position, 10

(5) and means providing a motion transmitting connection between said shaft and lever operable to pivot the lever in said one direction out of its normal position in consequence of movement of the latch operating member to its door releasing position. 15

2. The combination of claim 1, further characterized by the following:

(A) that the latch mechanism includes a controller bolt movable between retracted and projected positions and biased toward the latter; 20

(B) that said lever is yieldingly biased toward said normal position thereof;

(C) and that an abutment on the controller bolt engages said lever in the projected position of the controller bolt to hold the lever against biased return movement to its normal position until the controller bolt is returned to its retracted position. 25

3. The combination of claim 2, further characterized by the following: 30

(A) that said combination type door lock mechanism includes a coding element which is moved incrementally in one direction from a start position in consequence of actuation of each indexing element, and which can be returned to its start position by the latch operating member, in consequence of movement of the latter in a direction counter to door releasing movement thereof, to cancel the combination; 35

(B) and that cooperating elements connected with the controller bolt and with said shaft impart movement to the latch operating member in the direction to return the coding element to its start position in consequence of retraction of the controller bolt. 40

4. In combination with door locking means of the type having a controller bolt which is movable from a projected position, toward which it is yieldingly biased, to a retracted position in consequence of closure of a door for which the locking means is provided: 45

(A) a combination lock mechanism having 50

(1) a number of indexing elements which must be manually actuated in predetermined sequence to unlock the mechanism,

(2) a coding element which is moved incrementally in one direction from a start position in consequence of actuation of each indexing element, and which effects cancelling of the combination when returned to its start position, 55

(3) and a rotatable latch operating member which can be rotated in one direction from a first position to a door releasing position only after actuation of the indexing elements in said predetermined sequence, and which, when rotated in the opposite direction from said first position thereof, effects return of the coding element to its start position; 60

(B) and means providing a motion transmitting connection between the controller bolt and the latch operating member operable upon retraction of the controller bolt to rotate the latch operating member in the direction to effect return of the coding element to its start position. 65

5. In combination with a door and locking means therefor having a latch bolt and controller bolt interconnected with the latch bolt to block retracting motion 70

of the latter whenever the controller bolt is moved from a projected position which it occupies when the door is open, to a retracted position to which it is moved when the door is closed:

(A) a combination lock mechanism having

(1) a number of push buttons which must be depressed in predetermined sequence in order to unlock the mechanism,

(2) a coding element which is moved incrementally in one direction from a start position in consequence of depression of each push button, and which effects cancelling of the combination when returned to its start position,

(3) and a rotatable latch operating member which is biased to a neutral position but which can be turned in one direction from neutral to effect return of the coding element to its start position, and can be turned in the opposite direction only after depression of the push buttons in said predetermined sequence;

(B) means interconnecting the latch operating member with the latch bolt whereby the latch bolt is retracted by the operating member when the latter is turned in said opposite direction, from its neutral position;

(C) and means providing a transient motion transmitting connection between the controller bolt and the latch operating member, by which retraction of the controller bolt effects turning of the latch operating member in the direction to return the coding element to its start position.

6. In combination with door locking means of the type having a latch bolt biased toward an operative projected position, and a controller bolt movable against bias to a retracted position: 35

(A) a combination lock mechanism having a latch operating member which is movable in one direction from a neutral position to cancel the combination, and which can only be moved in the opposite direction out of its neutral position after the combination has been decoded and the mechanism is unlocked;

(B) means providing a motion transmitting connection between the latch operating member and the latch bolt by which the latter is retracted in consequence of movement of the latch operating member in said opposite direction from its neutral position;

(C) and means providing a motion transmitting connection between the latch operating member and the controller bolt through which retraction of the latter effects movement of the latch operating member in the direction to cancel the combination.

7. The combination of claim 6, further characterized by means rendered effective by the controller bolt in the retracted position thereof for blocking retraction of the latch bolt.

8. The door latch mechanism of claim 7, further characterized by the following:

(A) that the operating shaft is rotatable in the opposite direction without interference from said third arm of the lever to cancel the combination;

(B) and by means providing a transient driving connection between the operating shaft and the controller bolt and operable to impart rotary movement to the operating shaft in the combination cancelling direction in consequence of retraction of the controller bolt.

9. In door locking means, the combination of:

(A) latch means biased to a projected door latching position;

(B) manually operated mechanism controlling retraction of the latch means and comprising a combination lock having a part which is coupled with said mechanism and which is movable in one direction 75

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to effect resetting of the mechanism and cancellation of the combination;

- (C) and a member having a motion transmitting connection with said part for actuating the same in said direction in consequence of closure of a door for which the locking means is intended.

10. The door locking means of claim 8 wherein said member comprises a controller bolt which is biased to a projected position from which it is retracted in consequence of closure of a door having the locking means thereon.

11. Door locking means comprising the combination of:

- (A) a manually retractable lock bolt;
 (B) a combination lock having
 (1) a member mechanically connected with the lock bolt and manually actuatable to effect retraction thereof,
 (2) manually actuatable decoding means,
 (3) mechanism driven by said decoding means and effective to block bolt retracting movement of said member except upon actuation of the decoding means in accordance with a predetermined combination,
 (4) and resetting means connected with said mechanism and by which cancellation of the combination can be manually effected;
 (C) an electrically operated driver for actuating the resetting means;
 (D) and electrical instrumentalities for effecting energization of the driver and comprising
 (1) an electric switch actuated in consequence of initial manipulation of the decoding means,
 (2) and time delay means controlled by the switch for delaying energization of the driver for a predetermined interval following initial manipulation of the decoding means.

12. Door locking means comprising the combination of:

- (A) a manually retractable lock bolt;
 (B) a member having a motion transmitting connection with the lock bolt and manually actuatable to effect retraction thereof;
 (C) a combination lock having
 (1) decoding means,
 (2) mechanism mechanically interlinked with said decoding means and effective to block bolt retracting movement of said member except upon proper actuation of said mechanism by the decoding means,
 (3) and resetting means mechanically connected with said mechanism and by which cancellation of the combination can be manually effected;
 (D) an electrically operated driver by which said resetting means can be actuated automatically;
 (E) a switch actuated in consequence of decoding movement of said mechanism;
 (F) and time delayed electrical instrumentalities rendered operative in consequence of closure of said switch for effecting energization of the driver at the expiration of a predetermined interval following initial decoding movement of said mechanism, which interval is of sufficient duration to permit proper decoding of the mechanism and bolt retracting actuation of said member by an authorized person.
13. Door locking means comprising:
 (A) a combination lock structure having
 (1) manually movable latch retracting means,
 (2) resettable mechanism blocking actuation of the latch retracting means except when decoded in accordance with a predetermined combination,
 (3) manually actuatable decoding means coupled

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with said mechanism and at all times operable to impart decoding movement thereto,

- (4) and combination cancelling means connected with said resettable mechanism and actuatable to effect resetting thereof;

(B) and an automatically operable electrical system which at no time interferes with proper functioning of said combination lock structure and which comprises

- (1) an electrical alarm,
 (2) a time delayed circuit which is completed in consequence of initial decoding movement of said mechanism and after expiration of a time interval longer than needed to effect proper decoding of said mechanism,
 (3) and electrical instrumentalities rendered operative to effect energization of the alarm in consequence of completion of said time delayed circuit a predetermined number of times corresponding to successive abortive attempts to decode said mechanism.

14. The combination of claim 13, further characterized by the following:

- (A) that said electrical instrumentalities include a step relay having contractor means which is incrementally advanced toward a circuit closing position by the step relay each time said time delayed circuit is completed.

15. The combination of claim 14 further characterized by: a reset solenoid; and switch means controlling energization of said reset solenoid, said switch means being effective to energize the reset solenoid in consequence of opening of a door having the locking means thereon.

16. In combination with door locking mechanism of the combination type having a number of indexing elements which must be manually actuated in predetermined sequence in order to free a latch retracting member for movement in one direction to a latch retracted position, and having a rotatable coding shaft which is moved incrementally in one direction from a start position in correspondence with actuation of each indexing element and which effects cancelling of the combination when returned to its start position:

- (A) a cam on the coding shaft;
 (B) an electric motor having a lost motion unidirectional driving connection with the coding shaft and effective when energized to move the coding shaft in the opposite direction toward its start position;
 (C) an electric switch adapted to be closed by said cam on the coding shaft during rotary movement thereof in correspondence with actuation of an indexing element;
 (D) and electrical instrumentalities activated in consequence of closure of said switch to effect completion of an energizing circuit for the electric motor, said electrical instrumentalities including time delay means for delaying energization of the motor until the expiration of a predetermined time interval longer than normally required for proper decoding of the combination.

17. Door locking means comprising:

- (A) a combination lock structure having
 (1) manually movable latch retracting means,
 (2) resettable mechanism blocking actuation of the latch retracting means except when decoded in accordance with a predetermined combination,
 (3) manually actuatable decoding means coupled with said mechanism and at all times operable to impart decoding movement thereto,
 (4) and combination cancelling means connected with said resettable mechanism and actuatable to effect resetting thereof;
- (B) and an electrically operated system which at no

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time interferes with authorized functioning of the combination lock structure and which comprises

- (1) an electric motor by which said combination cancelling means can also be actuated automatically, 5
- (2) an electric switch adapted to be actuated in consequence of decoding movement of said mechanism, 10
- (3) and electrical instrumentalities activated in consequence of actuation of said switch for completing an energizing circuit for the motor, said electrical instrumentalities including time delay means for delaying energization of the motor until the expiration of a predetermined time interval longer than normally required for proper decoding of the mechanism. 15

18. The combination of claim 17, further characterized by the following:

- (A) that said combination cancelling means comprises a rotatable shaft which is indexed in correspondence with actuation of the decoding means; 20
- (B) that a cam on said shaft effects closure of said switch during indexing movement of the shaft;
- (C) and that said motor has a lost motion unidirectional driving connection with said cam. 25

19. The door locking means of claim 17, further characterized by the following:

- (A) said motor being a solenoid having an armature which moves in one direction in response to energization of the solenoid; 30
- (B) and said combination cancelling means being actuated by the armature, during said response thereof, through a lost motion driving connection with the armature which permits decoding movement of said mechanism without interference from the motor. 35

20. In combination with door lock mechanism of the combination type having a number of indexing elements which must be manually actuated in predetermined sequence in order to free a latch retracting member for movement in one direction to a latch retracted position, and having a coding element which is moved incrementally in one direction from a start position in correspondence with actuation of each indexing element and which effects cancelling of the combination when returned to its start position: 40

- (A) an electric motor operatively connected with said coding element and effective when energized to move the coding element in the opposite direction toward its start position; 45
- (B) electrical instrumentalities including time delay means activated in consequence of actuation of an indexing element for completing an energizing circuit for the motor upon expiration of a predetermined time interval greater than the period of time normally required for proper decoding of the combination; 50
- (C) a first switch adapted to be closed in consequence of actuation of an indexing element to effect activation of said time delay means; 55
- (D) an alarm circuit; 60
- (E) and other electrical instrumentalities rendered operative in consequence of closure of said switch a predetermined number of times for effecting completion of the alarm circuit, and comprising
 - (1) a step relay having reset means comprising a resetting coil, 65
 - (2) an electrical circuit by which the step relay is energized and including said first switch and a second switch, 70
 - (3) a third switch through which the resetting coil of the reset means is energized, 75
 - (4) said second and third switches being part of an electromagnetic switch having a solenoid which, when energized, effects closure of said second switch and opening of said third switch,

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(5) and the solenoid of the electromagnetic switch being energized through a fourth switch having contacts which must be closed to complete an energizing circuit for said solenoid, and which are caused to open in consequence of opening of a door having the lock mechanism thereon, to effect deenergization of said solenoid and closure of said third switch so as to thereby effect energization of the resetting coil of said reset means.

21. Door latch mechanism of the type having latch and controller bolts, characterized by the following:

- (A) that the latch and controller bolts are constrained to back and forth movement between retracted and projected positions along spaced apart parallel paths; 5
- (B) an operating shaft constrained to rotate about a first axis; 10
- (C) a lever mounted to rock about a second axis adjacent to the latch bolt and yieldingly biased toward a defined normal position, said lever having
 - (1) a stop arm normally lying in the path of retracting movement of the latch bolt to block retraction thereof except upon rocking of the lever through a substantially small angle away from its defined position, 15
 - (2) a drive arm to engage and retract the latch bolt upon rocking of the lever through a greater angle away from its defined position, 20
 - (3) and a third arm which has an end portion adjacent to the controller bolt and to the operating shaft; 25
- (D) means providing a unidirectional driving connection between said third arm of the lever and the operating shaft effective to rock the lever away from its defined position through said greater angle in consequence of rotary movement of the operating shaft in one direction; 30

(E) lug means having a unidirectional lost motion driving connection with the controller bolt and said third arm of the lever and effective upon projection of the controller bolt to rock the lever away from its defined position through said substantially small angle; 35

(F) and combination lock mechanism connected with the operating shaft to normally prevent rotary movement thereof in the direction to retract the latch bolt, said combination lock mechanism having indexing means which must be operated in accordance with a predetermined decoding pattern in order to release the operating shaft for rotary movement in the direction to retract the latch bolt. 40

22. In door locking means, the combination of:

- (A) latch means biased to a projected door latching position; 45
- (B) manually operated mechanism controlling retraction of the latch means and comprising a combination lock having a latch operating member which is movable in one direction from a neutral position to effect retraction of the latch means but is held by said mechanism against such movement until the mechanism has been properly decoded, said latch operating member being movable in the opposite direction from neutral to effect resetting of the mechanism and cancellation of the combination; 50
- (C) and means having a motion transmitting connection with the latch operating member and movable in consequence of closure of a door having the locking means thereon to produce movement of the latch operating member in the combination cancelling direction. 55

23. In combination:

- (A) a combination lock mechanism having manually movable decoding and scrambling means by which the combination can be scrambled to enable decoding to be started afresh in the event experimental decod-

- ing by trial and error methods fail to unlock the mechanism;
- (B) electrical switch means controlled by said decoding means and actuated thereby each time decoding is attempted following scrambling of the combination; 5
- (C) electrical alarm means;
- (D) electrical instrumentalities governed by said switch means for effecting energization of said alarm means in response to actuation of said switch means 10 a predetermined number of times corresponding to successive attempts to decode the lock mechanism, so as to afford an indication that trial and error methods are being employed in an effort to decode the lock mechanism;
- (E) electrically controlled means which can be activated to prevent movement of said decoding means; 15
- (F) and a manually actuatable switch governing activation of said electrically controlled means, said

switch being located remote from the lock mechanism and enabling an authorized person alerted by said alarm means to effect disablement of the lock mechanism in the event of tampering therewith.

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BOBBY R. GAY, *Primary Examiner.*

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,353,383

November 21, 1967

Aaron M. Fish

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 10, line 5, after "time" insert -- delay --;
column 14, line 57, for the claim reference numeral "7"
read -- 21 --; column 15, line 7, for the claim reference
numeral "8" read -- 9 --.

Signed and sealed this 18th day of March 1969.

(SEAL)

Attest:

Edward M. Fletcher, Jr.

Attesting Officer

EDWARD J. BRENNER

Commissioner of Patents