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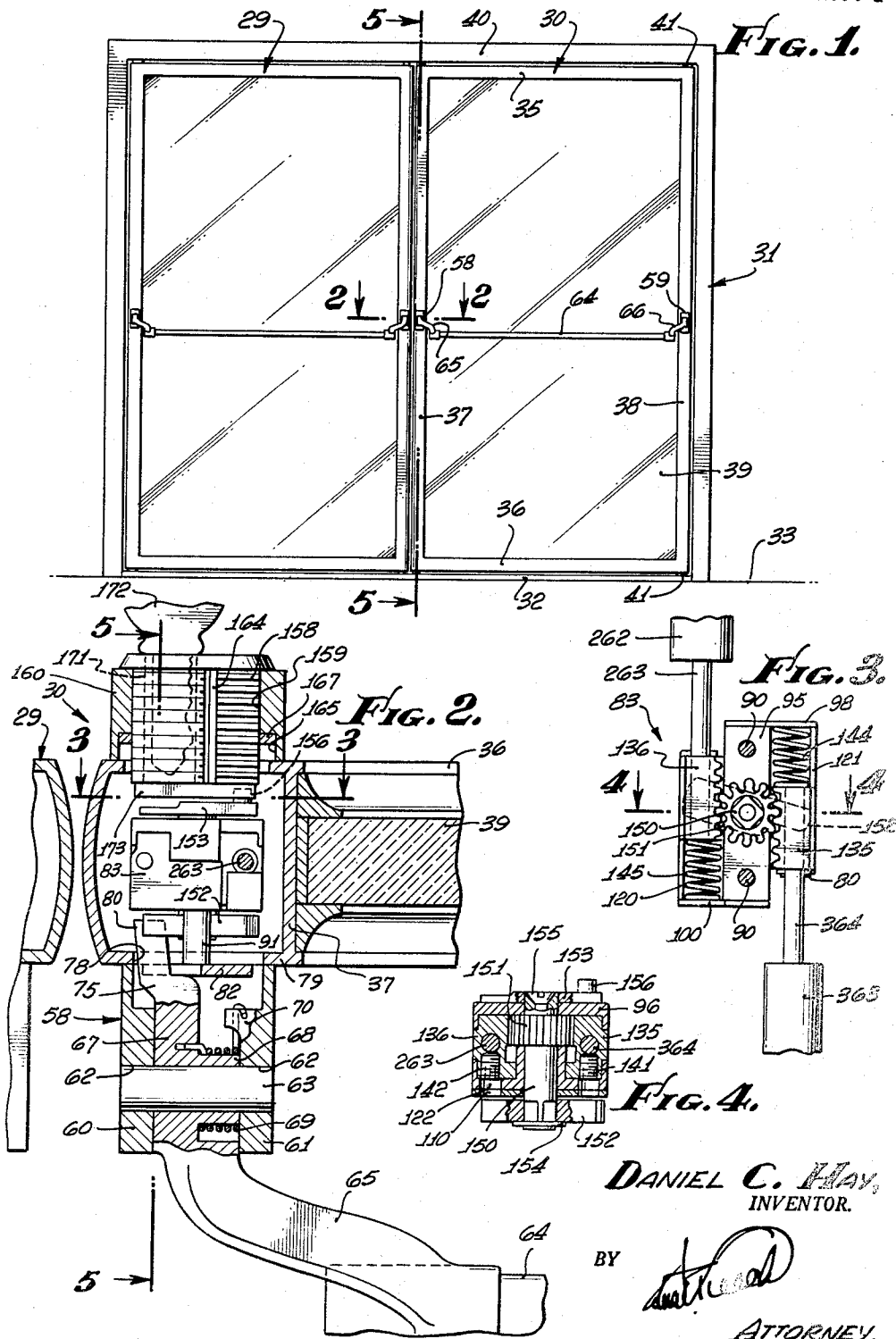
D. C. HAY

2,959,440

EMERGENCY EXIT DOOR AND LOCK MECHANISM THEREFOR

Filed July 30, 1958

7 Sheets-Sheet 1



Nov. 8, 1960

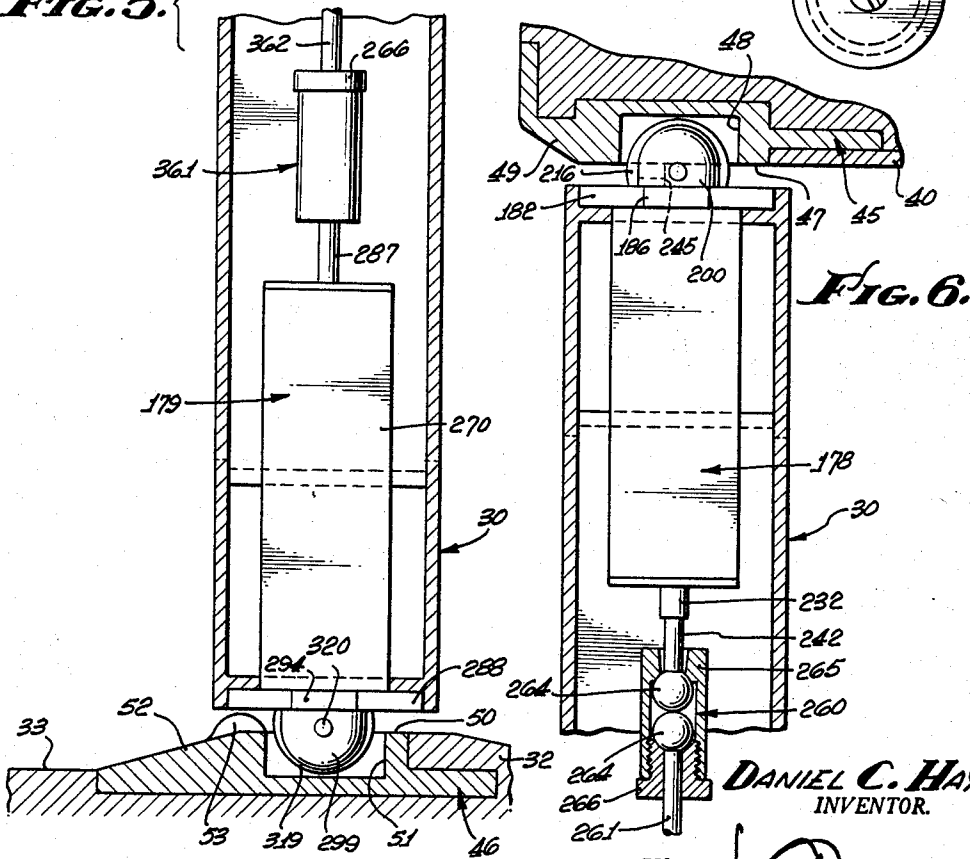
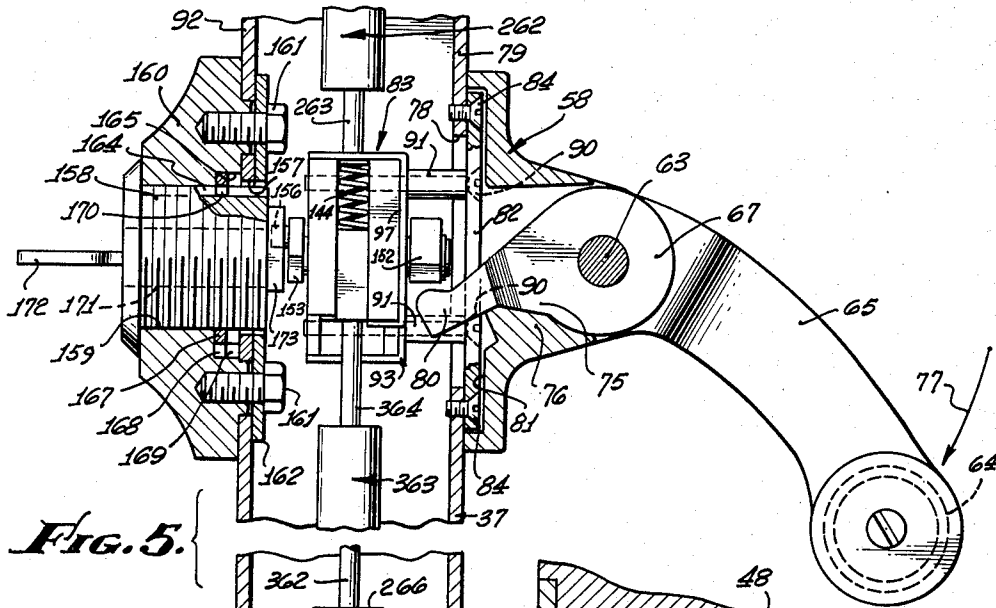
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EMERGENCY EXIT DOOR AND LOCK MECHANISM THEREFOR

Filed July 30, 1958

7 Sheets-Sheet 2



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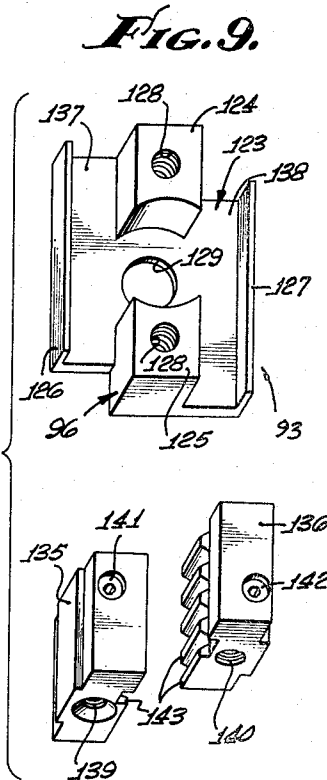
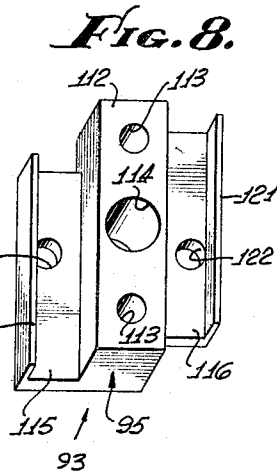
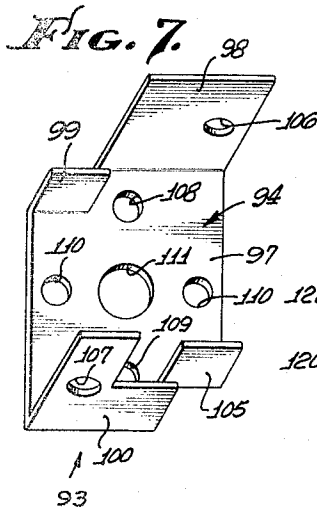
D. C. HAY

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EMERGENCY EXIT DOOR AND LOCK MECHANISM THEREFOR

Filed July 30, 1958

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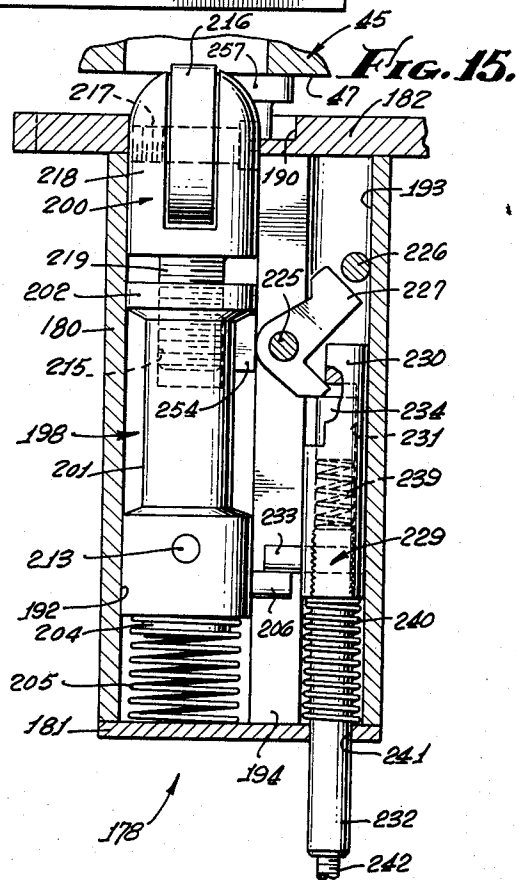
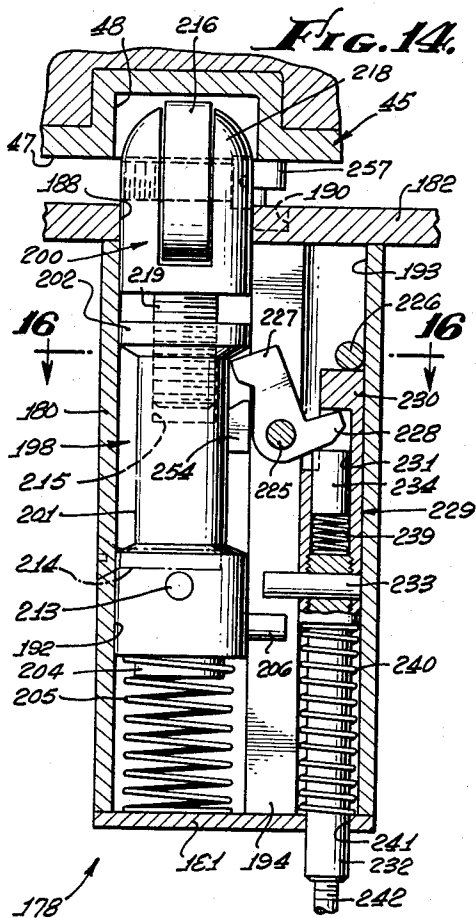
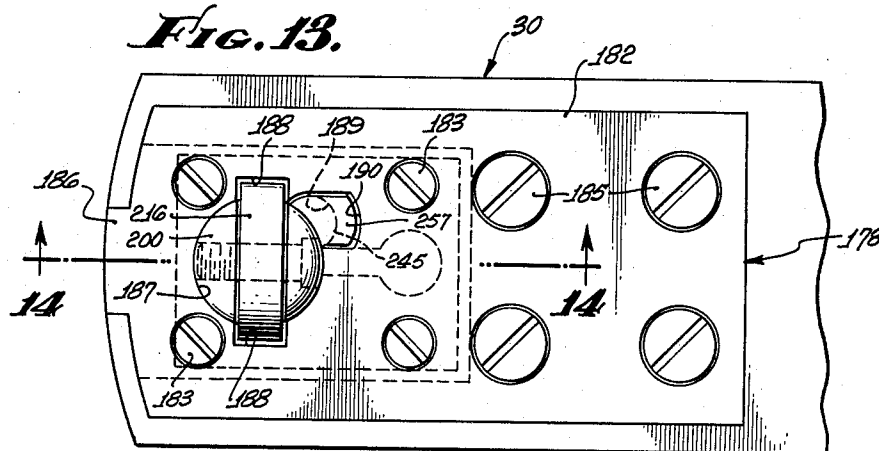
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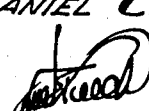
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EMERGENCY EXIT DOOR AND LOCK MECHANISM THEREFOR

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7 Sheets-Sheet 4



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2,959,440

EMERGENCY EXIT DOOR AND LOCK MECHANISM THEREFOR

Filed July 30, 1958

7 Sheets-Sheet 5

Fig. 16.

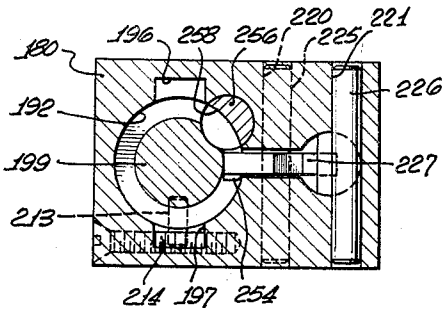


Fig. 17.

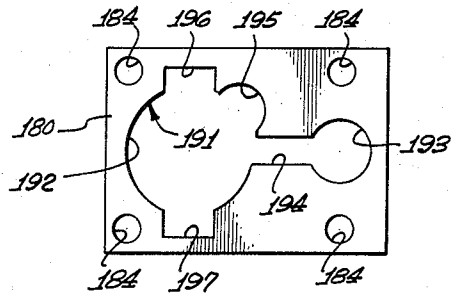


Fig. 18.

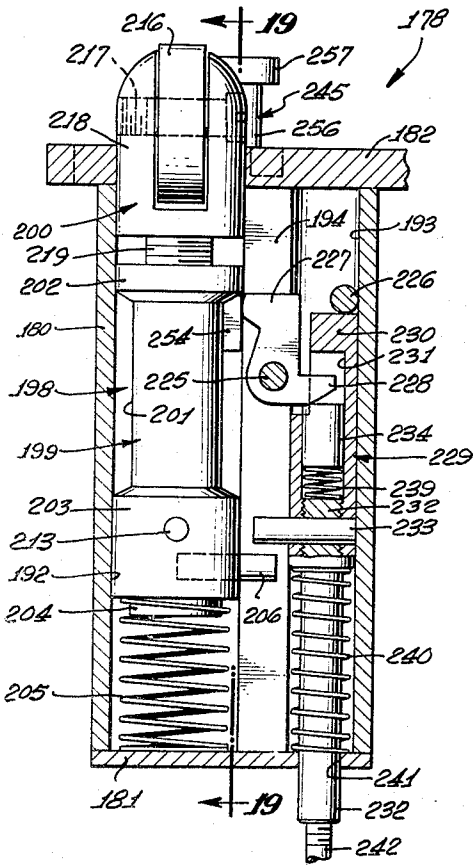
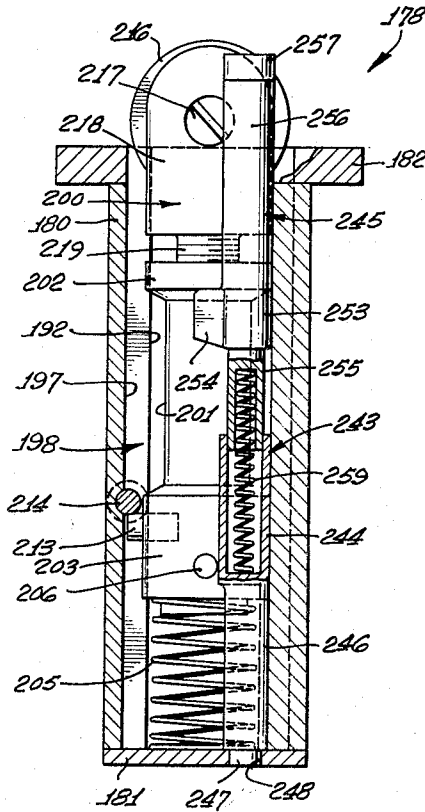


Fig. 19.



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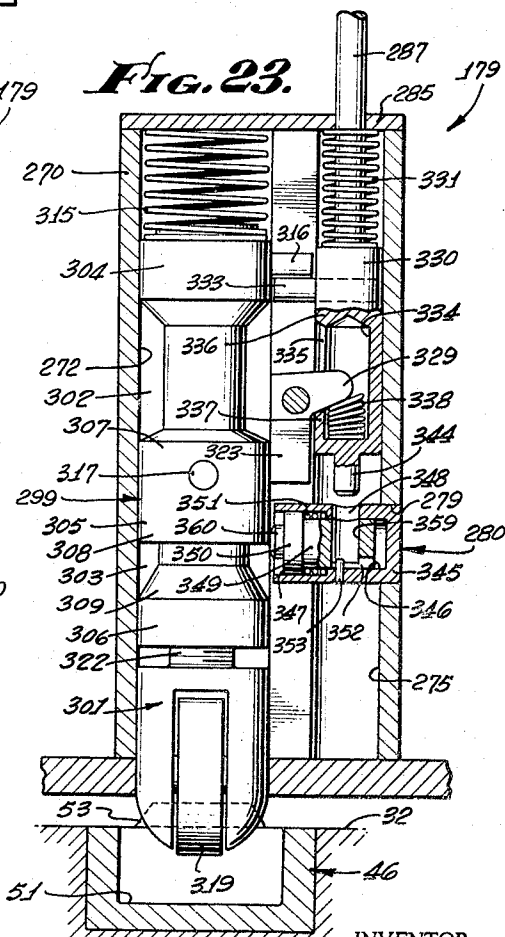
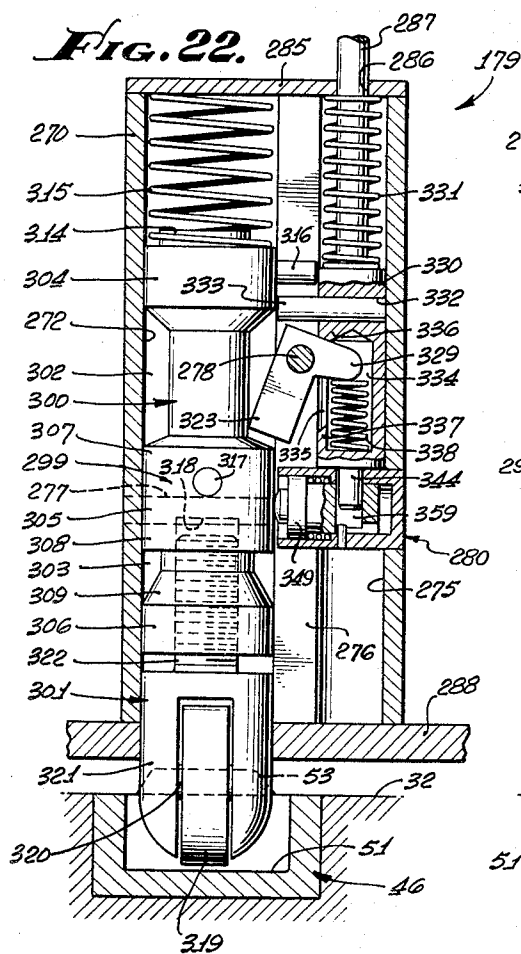
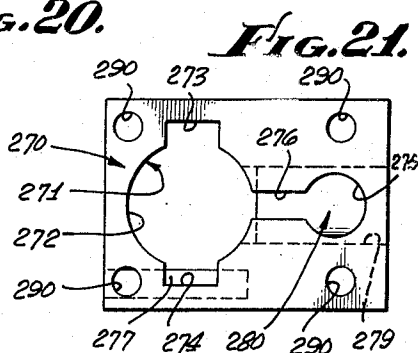
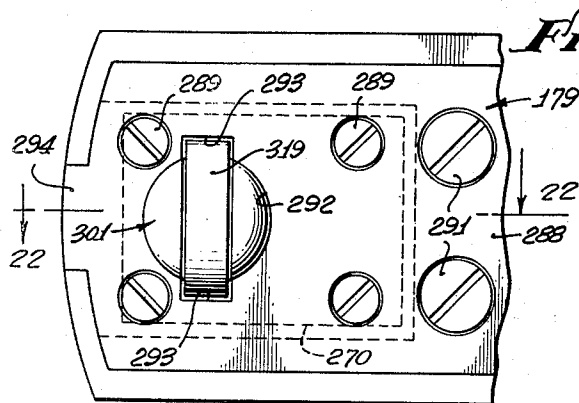
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EMERGENCY EXIT DOOR AND LOCK MECHANISM THEREFOR

7 Sheets-Sheet 6



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2,959,440

EMERGENCY EXIT DOOR AND LOCK MECHANISM THEREFOR

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9 Claims. (Cl. 292—92)

This invention relates to emergency exit doors provided in public buildings to facilitate the rapid escape of people therefrom in case of fire, and particularly to a lock mechanism for rendering said doors automatically operative.

Of first importance in any door lock mechanism is its capacity to resist all efforts to pick it and open the door from the outside. Attainment of this heretofore in emergency exit door lock mechanisms has generally been at the expense of one or more other highly desirable characteristics.

It is an object of the present invention to provide an emergency exit door and lock mechanism, therefor, which will be proof against such picking, and yet will open in response to only a slight pressure from inside; will be quiet and dependable in operation; will be relatively inexpensive to build, easy to install and free from maintenance troubles; and will have a rugged durability assuring a long, trouble-free service.

Another object is to provide such a lock mechanism which is non-pickable but which will readily respond to the manual control on the inside, to release the door and allow it to open, even when substantial outward pressure is being exerted against the door from the inside at the time said normal control is actuated.

Yet another object is to provide such a lock mechanism having a novel bolt unit which automatically dead-locks the door closed, and which does not depend for operation upon the presence of a back stop for the adjacent edge of the door, and therefore may be used at the bottom edge of the door as well as on the upper edge or the free vertical edge of the door.

A further object of the invention is to provide such a lock mechanism having a novel lower edge bolt unit having means for automatically retaining the bolt in relatively retracted position when the door is open so as to provide ample clearance between the bolt and the floor, and yet automatically releasing said bolt for dead-locking said door closed when said door is swung shut, and which does not require a door stop to operate the same.

A still further object is to provide a novel, simple, compact and efficient mechanism disposed in close coupled relation with and controlled optionally by the emergency cross bar inside the door and the key lock accessible from outside the door for translating the control rods actuating the upper and lower door bolts.

The manner of accomplishing the foregoing objects as well as further objects and advantages will be made manifest in the following description taken in connection with the accompanying drawings in which

Fig. 1 is an inside view of a pair of doors constituting preferred embodiments of the door of the invention,

Fig. 2 is an enlarged fragmentary sectional view taken on the line 2—2 of Fig. 1 and illustrating the lock mechanism of the invention as embodied in the right hand door of the two doors shown in Fig. 1.

Fig. 3 is a detail vertical sectional view taken on line

2

3—3 of Fig. 2, this view illustrating the rotation-translation motion converter of the invention.

Fig. 4 is a horizontal sectional view taken on the line 4—4 of Fig. 3.

Fig. 5 is a vertical cross-sectional view in full scale taken on line 5—5 of Figs. 1 and 2 and illustrating said motion converter and the juxtaposition of this between the inside cross bar for actuating the same and the outside key lock for actuating said converter, said view also showing the lower bolt unit of the invention.

Fig. 6 is a vertical sectional view also taken on line 5—5 of Figs. 1 and 2 and illustrating the upper bolt unit of the invention.

Fig. 7 is a perspective view of the housing shell of said motion converter.

Fig. 8 is a perspective view of one of the halves of the body of said motion converter.

Fig. 9 is a perspective view of the other half of said motion converter, said view also showing perspective views of the two rack members of said converter juxtaposed in their normal relation when the door is closed.

Fig. 10 is a perspective view of the bolt of the upper bolt unit of the invention.

Fig. 11 is a perspective view of the latch neutralizing plunger of the upper bolt unit of the invention.

Fig. 12 is a perspective view of the spring holding cup of the aforesaid latch neutralizing plunger.

Fig. 13 is a plan view of the upper bolt unit of the invention.

Fig. 14 is a vertical sectional view of said upper bolt unit taken on the line 14—14 of Fig. 13 and showing this unit with the parts thereof disposed as when the door is closed and locked, and no pressure is being applied to the motion converter of the invention.

Fig. 15 is a view similar to Fig. 14 and illustrates the upper bolt unit with the parts thereof disposed as when the door is closed and the motion converter has just been actuated as by pressing against said cross bar for the purpose of opening the door from the inside.

Fig. 16 is a horizontal sectional view taken on the line 16—16 of Fig. 14 and illustrates the manner in which the latch of the upper bolt unit is swung inwardly into bolt latching position when the door of the invention is closed and the lock mechanism thereof is not actuated.

Fig. 17 is a plan view of the body block of the upper bolt unit of the invention when this is viewed separate from the parts normally assembled therewith.

Fig. 18 is a view similar to Fig. 15 and illustrates the parts of the upper bolt unit of the invention disposed as when the door of the invention has been opened and before this door has again been closed.

Fig. 19 is a vertical sectional view taken on the line 19—19 of Fig. 18 and illustrates the latch neutralizing plunger and the spring cup associated therewith.

Fig. 20 is a fragmentary bottom plan view of the lower bolt unit of the invention.

Fig. 21 is a bottom plan view of the body block of said lower bolt unit when the other elements assembled therewith have been removed therefrom.

Fig. 22 is a vertical sectional view taken on the line 22—22 of Fig. 20 and illustrates the lower bolt unit of the invention with the parts thereof positioned as when the door of the invention is closed and the lock mechanism thereof is not actuated.

Fig. 23 is a view similar to Fig. 22 and illustrates the parts of the lower bolt unit disposed as at the moment the lock mechanism is actuated as the first step in opening the door of the invention, but before the door has been opened.

Fig. 24 is a view similar to Fig. 23 and illustrates the parts of the lower bolt unit disposed as at the moment

the door is opened and while the bolt of the lower unit is riding over the hump provided on the lower strike.

Fig. 25 is a view similar to Fig. 24 and illustrates the parts of the lower bolt unit of the invention disposed as when the door is open, showing how the lower bolt at this period of operation of the invention is withheld upwardly a substantial distance above and out of contact with the floor.

Fig. 26 is an enlarged fragmentary cross-sectional view of the lower bolt retainer of the invention, and shows this being locked in inactive position as the door is being closed.

Because emergency exit doors are usually provided in pairs, a pair of such doors 29 and 30 are shown in Fig. 1 as mounted in a single inverted U-shaped door frame 31 and between this frame and a sill 32 mounted on the floor 33. The lock mechanism 34 of the invention is embodied in and controls the opening and closing of a single emergency exit door and each of the doors 29 and 30 is so equipped. As the lock mechanisms 34 of the invention are substantially identical in their installation in all doors, a description of one of these mechanisms installed in the right hand door 30 of the twin doors shown in Fig. 1 will suffice to disclose the invention.

The door 30 is preferably constructed of hollow metal tubing approximately square in cross-section, this tubing forming upper and lower rails 35 and 36 and vertical stiles 37 and 38. Panels 39, which may be glass or of an opaque material are framed within the rectangle formed by said rails and stiles. The upper cross element 40 of door frame 31 and the sill 32 are provided with hinge bearings 41 which pivotally support the door 30 on the axis of these bearings. Also provided in the cross member 40 of the door frame and in the sill 32, for the door 30, are upper and lower strikes 45 and 46 (see Figs. 5 and 6).

The strikes 45 and 46 are preferably cast from a metal such as bronze and the upper strike 45 has a lower face 47 which is flush with the lower face of the frame element 40 in which it is mounted. Extending upwardly from the face 47 is a lock bolt receiving recess 48. The end of the strike facing outside is provided with a ramp 49 for guiding the bolt of the upper lock unit of the mechanism 34 into the recess 48 when the door 30 is closed.

The lower strike 46 has an upper surface 50 which is flush with the top surface of the sill 32 in which the strike is mounted, and a recess 51 extends downwardly from this surface for receiving the lock bolt of the lower bolt unit of the lock mechanism 34. The strike 46 is also provided with a ramp 52 which is disposed toward the outside of the door from the recess 51. This ramp has provided thereon a hump 53 for giving said lower lock bolt an extra high lift as this bolt passes over the ramp 52 during the opening and the closing of door 30.

Mounted on inward faces of the stiles 37 and 38 of the door 30 (visible in Fig. 1) are bearings 58 and 59, each of these bearings having parallel ears 60 and 61 (Fig. 2) in which aligned bores 62 are provided for receiving pivot pins 63. A manual pressure means provided for actuating the lock mechanism 34 from inside the door 30 comprises a cross bar 64 having short arms 65 and 66 fixed on the opposite ends of said bar. The extremities of the arms 65 and 66 form eyes 67 which fit between the respective ears 60 and 61 of the bearings 58 and 59 and are pivotally mounted on pins 63. The eyes 67 have bearing sleeves 68 formed thereon which sleeves are concentric with the pins 63 and carry coil springs 69 one end of each of said springs being anchored to its respective eye 67 and the other end hooking over a lug 70 provided on the adjacent bearing ear 61 so that said springs cause lugs 75 formed on the respective eyes 67 to be spring-biased into engagement with shoulders 76 provided on the bearings 58 and 59. This normally spring-biases the cross bar 64 in a counter clockwise direction about pins 63 so as to elevate the bar 64 into the position in which it is

shown in Figs. 2 and 5. Bar 64 retains this position throughout the operation of the device except when it is depressed by manually pressing against this bar as when, during an emergency, it is desired to open the door 30 from the inside. When the bar 64 is thus manually depressed it is rotated in a clockwise direction about the axis of the pins 63, as indicated by arrow 77 in Fig. 5.

The lug 75 on the arm 65 extends through an opening 78 formed in the wall 79 of the stile 37 in the area covered by the bearing 58, to form an actuating arm 80. The bearing 58 has a hollow 81 on its inner face which fits against the wall 79 and which provides a space to receive a mounting plate 82 of a rotation-translation motion converter 83. The plate 82 is secured to the stile wall 79 as by screws 84.

Referring now to Figs. 2, 3, 4, 5, 7, 8 and 9, the motion converter 83 is seen to be a very compact little mechanism. The function of this converter is to convert rotary motion to motion of translation, which is to say: motion in a straight line. Converter 83 is mounted on plate 82 by two fairly long screws 90 which extend through tubular sleeves 91 which space the converter 83 from the plate 82 and hold this converter approximately midway between the inner wall 79 and the outer wall 92 of the door stile 37. The converter 83 has a body or frame structure 93 which comprises an outer shell 94 and two body members 95 and 96.

The shell 94 has a back plate 97 which is disposed adjacent the sleeves 91 as shown in Fig. 5. Flanges 98 and 99 are bent from the upper edge of the back plate 97 and flanges 100 and 105 are bent from the lower edge of the back plate. Rod-receiving holes 106 and 107 are provided in the flanges 98 and 100. Screw holes 108 and 109 are provided in back plate 97. Set screw adjusting holes 110 are provided in the back plate 97. Also provided in the back plate 97 is a shaft hole 111.

The body member 95 has a central portion 112 which is rectangular in cross-section and is provided with bolt holes 113 and a shaft bearing hole 114. Extending laterally from the outer face of the portion 112 of member 95 are flanges 115 and 116 which have short up-turned flanges 120 and 121 at their outer edges. Flanges 115 and 116 are provided with set screw adjusting holes 122.

The body member 96 has a front plate 123 and bosses 124 and 125 extending inwardly therefrom as well as short flanges 126 and 127 extending in the same direction as bosses 124 and 125 along the outer edges of plate 123. The bosses 124 and 125 are provided with threaded holes 128 and the back plate 123 is provided with a shaft hole 129.

The entire motion converter 83 is assembled at the same time but it is believed in the interest of clarity to first point out how the frame structure 93 of said converter is assembled. This is done by shifting the first body member 95 towards the shell 94 as these elements are shown in Figs. 7 and 8 so as to bring the member 95 to rest within the shell 94 with the respective holes shown in these views in alignment with each other. The body member 96 is now inverted 180° from the position in which it is shown in Fig. 9 and applied to the up-turned face of body member 95. The three frame structure elements 94, 95 and 96 are now properly related to be assembled (when the other parts are placed therein) by inserting the screws 90 through the plate 82 and the sleeves 91 and then successively through the holes 108 and 113 after which these screws are screwed into the holes 128 in the member 96.

Having pointed out the mode of assembly of the converter frame structure 93 it is to be noted that the converter 83 also includes a pair of racks 135 and 136 which are trapped in the converter frame structure 93 so as to be slidable along parallel vertical lines in slideways 137 and 138 formed by the flanges 115, 116, 120 and 121, the back plate 123 of member 96, and the flanges 126

and 127 thereof. The central portion 112 of member 95 and the bosses 124 and 125 of member 96 form the inner faces of said slideways and the flanges 98, 99, 100 and 105 of the shell 94 form the end walls of said slideways.

The racks 135 and 136 have threaded holes 139 and 140 extending longitudinally therethrough and tapped transverse holes are provided in said racks as shown in Fig. 9 to accommodate set screws 141 and 142. The racks 135 and 136 have inwardly disposed rack teeth 143 and are shown in Fig. 9 in their true relation to each other when the lock mechanism 34 is not being actuated. When assembling converter 83, the racks 135 and 136 are thus positioned in the slideways 137 and 138 of the converter 83 in symmetrical relation to the axis of the aligned shaft holes 111, 114 and 129. The set screws 141 and 142 face upwardly when said racks are placed in their slide ways in member 96. When the frame structure 93 of the converter is assembled, however, and the body member 96 is inverted before being placed over the body member 95, the racks 135 and 136 are also inverted with the member 96 so that the set screws 141 and 142 are aligned with the set screw adjusting holes 122 of the body member 95 and 110 of the shell 94.

Racks 135 and 136 are spring-biased toward their normal inactive positions at the opposite ends of their respective slideways 137 and 138 by coil springs 144 and 145 which are placed in said slideways as shown in Fig. 3 before applying body member 96 to the body member 95 in assembling converter 83.

The converter 83 also includes a short shaft 150 (Figs. 3 and 4) which extends through and journals in the holes 111, 114 and 129 of the frame structure 93 and this shaft has fixed thereon a pinion gear 151 which, in the assembled converter, lies between the bosses 124 and 125 and meshes with the teeth 143 of the racks 135 and 136. The opposite ends of shaft 150 are squared to receive actuating levers 152 and 153 which are optionally employed for actuating the converter. The arm 152 is held in place by a split washer 154 and the arm 153 is held in place by a screw 155 which screws into an axial tapped hole in the corresponding end of shaft 150. A crank pin 156 is formed on lever 153 for use in actuating the latter.

Formed in the wall 92 of the stile 37 of door 30 directly opposite the opening 78 in wall 79 of said stile (Fig. 5) is an opening 157 for the reception of a threaded cylindrical key lock 158 which is screwed into tapped bore 159 of a lock mount 160 which is secured to wall 92 by screws 161. A washer plate 162, placed just inside the wall 92, strengthens the mounting of the lock 158 on this wall. The lock 158 is provided with an axially aligned peripheral notch 164 and the inner end of bore 159 of mount 160 has a counterbore 165 to receive a ring 167 having a lug 168 which extends into a pocket 169 formed radially outwardly from the counterbore 165. The ring 167 also has an inwardly extending tooth 170 which extends into the notch 164 in the lock 158 as shown in Fig. 5 thereby holding the lock 158 against rotation in the threaded bore 159 of the mount 160.

The key lock 158 has a key actuated lock cylinder 171 mounted therein to be controlled by a key 172. The lock 158 is approximately concentric with the shaft 150 of the converter 83 and the lock cylinder 171 is offset horizontally from the axis of the lock 158. The lock cylinder 171 has an arm 173 fixed on its inner end and this arm extends over the crank pin 156 which is provided on the lever 153.

Thus, when key 172 is inserted in lock cylinder 171 as shown in Figs. 2 and 5 and said cylinder rotated in an anticlockwise direction, the arm 173 bears down on the pin 156 and rotates the shaft 150 of the converter 83. It is also to be noted in Fig. 2 that the actuating arm 80 of the cross bar 64 is disposed underneath the left end of lever 152 so that when the cross bar 64 is

manually depressed in the direction of arrow 77 about the pins 63, the arm 80 rises against the adjacent end of lever 152 so as to rotate the shaft 150 of converter 83. It is thus clear that the converter can be actuated optionally either from the inside of the door 30 by depressing the cross bar 64 or from the outside of said door by application of a key 172 to the lock 158. When the converter 83 is thus actuated to rotate the shaft 150, this rotary motion is converted to straight line motion through the racks 135 and 136 and transmitted simultaneously to upper and lower bolt units 178 and 179.

Referring now to Figs. 13 to 19 inclusive, it is to be noted that the upper bolt unit 178 embraces a case or body 180 formed preferably of a single block of metal or other solid material, the lower end of said block being covered by a plate 181 which is secured by suitable screws to said block and the upper end of the block is covered by a mounting plate 182 which is secured to said block by screws 183 which extend downwardly through suitable apertures in said plate and are screwed into tapped holes 184 provided in the block. The bolt unit 178 is mounted in the upper left corner of the door 30 by plate 182 being recessed downwardly in the material of the door and being secured to the door by four screws 185 which pass downwardly through suitable apertures in the plate 182 and are screwed into tapped holes provided therefor in the door 30. The mounting plate 182 has a lug 186 at its outer end which is rabbeted into the material of the door 30 so as to rigidly unite the bolt unit 178 with the door.

The mounting plate 182 has a round hole 187 and roller guide recesses 188, and a fractional bore 189 recessed from the bore 187. A recess 190 is also formed in the upper surface of the plate 182 contiguous with the fractional bore 189 for a purpose to be made clear hereinafter.

Referring to Fig. 17, it is to be noted that the block 180 has a vertical hole 191 of irregular outline which extends vertically throughout the length of the block. This hole may be formed, in the manufacture of the invention, by broaching or by any other suitable metal forming process. Functionally, the hole 191 may be broken down into a bolt guiding bore 192, a latch actuating plunger bore 193, a latch mounting passageway 194 (which connects bores 192 and 193), a latch neutralizing plunger bore 195, and bolt roller accommodating channels 196 and 197.

Slidable in bore 192 is an upper lock bolt 198 which includes a plunger 199 and a bolt head 200 (see Figs. 10, 18 and 19). The bolt plunger 199 is of substantially cylindrical form and makes a close sliding fit with the bore 192. It has a long peripheral spool-like channel 201 formed therein which divides the plunger into an upper narrow shoulder 202 and a base section 203 the lower end of which has a stud 204 for centering a coil spring 205 which is trapped in the lower end of bore 192 between the plunger 199 and the bottom plate 181 of the unit.

The plunger section 203 has a pin 206 extending laterally therefrom into passage 194 which prevents substantial rotation of the plunger 199 in the bore 192. The plunger also has a fractional bore 212 which extends the full length of the plunger and is concentric with and complements the fractional bore 195 formed in the block 180 for accommodating the latch neutralizing plunger, to be described later. Also provided in plunger section 203 and extending therefrom at right angles to the pin 206 is a stop pin 213 (Figs. 16, 18 and 19), which extends into channel 197 of the body block 180 and is engaged by a stop screw 214 (Fig. 19) which is screwed into a suitable tapped hole provided in the block 180, so as to limit the extension of the bolt 198 from the unit 178 under the bias constantly applied to said bolt by the coil spring 205.

Formed axially in the upper end of bolt plunger 199

is a tapped hole 215 (Fig. 14). The bolt roller head 200 includes a hardened roller 216 which is pivotally mounted on a roller shaft 217 in a forked yoke 218 of said head, the latter having a threaded axial stud 219 which screws into the tapped hole 215 of plunger 199. The depth to which stud 219 is screwed into tapped hole 215 determines the overall length of the bolt 198 and thus the distance that the roller head 200 of the bolt extends above the mounting plate 182 of bolt unit 178. It will be noted that the bolt head 200 extends upwardly through the hole 187 and roller guide recesses 188 of the mounting plate 182 of unit 178.

As shown in Figs. 16 and 18, bores 220 and 221 are provided extending transversely through the block 180 these bores receiving pins 225 and 226 with a tight fit. Rotatably mounted in passage 194 on pin 225 is a bolt latch 227. This latch has a leg 228 which extends into actuating plunger bore 193.

Slidably confined in the bore 193 is a latch actuating plunger 229 having a solid head 230 at its upper end and a bore 231 which is internally threaded at its lower end to receive the threaded upper end of a plunger stem 232. The plunger 229 has a transverse pin 233 fixed therein which extends into the block passage 194 so as to overlie pin 206 of bolt plunger 198. The head portion of plunger 229 which is disposed towards the latch 227 is cut away to form an opening into bore 231 into which the latch leg 228 extends. Trapped in bore 231 below latch leg 228 is a cylindrical slug 234 which is constantly spring-biased upwardly against the latch leg 228 by a coil spring 239 which is trapped between said slug and the upper end of plunger stem 232. A coil spring 240 is coiled about the plunger stem 232 within the lower portion of the bore 193 so as to constantly spring-bias the plunger 229 upwardly towards its uppermost position in which the head 230 of said plunger engages the pin 226 which thus constitutes a limit stop for said plunger. Whenever plunger 229 is in its uppermost position engaging pin 226 the spring 239, operating through the slug 234, constantly spring-biases latch 227 in a counter clockwise direction. The stem 232 extends downwardly through a hole 241 provided in the bottom plate 181 of unit 178 and has an axial tapped hole in its lower end into which an actuating rod 242 is screwed.

Referring now to Figs. 10, 11, 12, 16 and 19, the cylindrical space embraced by the partial bore 195 in the unit block 180 and the partial bore 212 formed in the bolt plunger 199 is occupied by a latch neutralizer 243. This includes a spring mounting cup 244 and a latch neutralizing plunger 245. As shown in Figs. 12 and 19 the cup 244 is cylindrical and is provided with a substantially semi-cylindrical leg 246 which extends downwardly therefrom to the plate 181 on which it rests. Provided on the lower end of leg 246 is a semi-cylindrical tit 247 which extends into a semi-circular hole 248 formed in plate 181 and so oriented that the diametral and slightly concave inner face 249 of leg 246 conforms to the cylindrical surface of bore 192 so as not to interfere with the operation of spring 205 in said bore.

The plunger 245 as shown in Fig. 11 has a relatively short cylindrical body 253 which closely conforms to and is slidable within the combined partial bores 195 and 212, there being a neutralizing arm 254 extending laterally from said body. A hollow cylindrical stem 255 extends downwardly from body 253 and an approximately semi-cylindrical element 256 extends upwardly from said body, element 256 having a head 257 formed on its upper end and extending outwardly therefrom. The returned diametral face 258 of plunger element 256 is concave so as to conform approximately to the shape of the bore 192 and therefore snugly lie against the yoke 218 of the bolt head 200. The hollow plunger stem 255 is coaxially aligned with the cup 244 and slidable therein, and a coiled spring 259 is trapped within said stem and said cup to constantly spring-bias the neutralizing plunger

245 in an upward direction. As the arm 254 of said plunger extends under the shoulder 202 of bolt plunger 199, the upper limit of axial movement of neutralizing plunger 245 relative to the bolt plunger 199 is when the arm 254 engages the shoulder 202, as shown in Figs. 18 and 19.

The bolt unit 178 is connected to the motion converter 83 for operation of said bolt unit in the following manner. Rod 242 is connected through a flexible connector 260 with a rod 261 which in turn is connected by a flexible connector 262 to a rod 263 which is screwed downwardly into the threaded hole 140 in converter rack 136 as shown in Fig. 3 and set screw 142 is then tightened on rod 263 to secure this to said rack. Each of the connectors 260 and 262 includes a pair of brass balls 264, which are permanently secured on the extremities of the two rods joined by said connector. It also has a hollow cylindrical cup 265 which is centrally apertured to permit a rod to pass axially therethrough but to confine one of the balls 264 in said cup. The mouth of said cup is internally threaded to receive a centrally apertured screw plug 266 which bears against the other ball 264 to bring these two balls into contact in said connector and form a permanent flexible connection, having no end play, between the two rods on which said balls are formed.

Referring now to Figs. 5 and 20 to 25, the bottom bolt unit 179 includes a body block 270 having a hole 271 of irregular configuration formed by broaching or any other preferred method, and extending lengthwise throughout the block 270. The hole 271 is of uniform cross-section throughout its length and includes a cylindrical bolt bore 272 having roller guide channels 273 and 274 formed laterally from opposite sides of said bore. Said hole 271 also includes a latch actuating plunger bore 275 and a latch accommodating passage 276 which joins bores 272 and 275. The body block 270 is bored transversely to receive a pin 277 (Figs. 21 and 22) which constitutes an extension limit stop for the bolt of the unit. Block 270 is also bored horizontally to receive a latch pivot pin 278. The block 270 has a horizontal bore 279 intersecting bore 275 and passage 276 and opening into bore 272 for receiving a bolt retainer 280. This retainer is for retaining the bolt of unit 179 in retracted position, as will be made clear hereinafter.

Unit 179 also has a top plate 285 which is secured to block 270 by suitable screws (not shown) and which has a hole 286 to allow the passage therethrough of an operating rod 287, with said rod in axial alignment with the bore 275. Plate 285 thus covers the upper end of irregular hole 271 while the lower end of this irregular hole is covered by a mounting plate 288 on which the block 270 is mounted by four screws 289 which extend through suitable bevelled holes provided therefor in the plate 288 and are screwed into tapped holes 290 in the block 270. Plate 288 is counter-sunk upwardly in the lower left corner of the door 30 in a similar manner to the counter-sinking of mounting plate 182 of the upper bolt unit in the upper left corner of said door. Four heavy screws 291 extend through suitable bevelled holes provided in mounting plate 288 and are screwed into tapped holes (not shown) provided in door 30 to permanently mount bottom bolt unit 179 on said door. Mounting plate 288 is provided with a hole 292 having diametrically opposed roller guide recesses 293 which are in vertical alignment respectively with the bolt bore 272 and roller guide channels 273 and 274 formed in the body block 270. The mounting plate 288 also has a lug 294 at its extremity which is rabbeted into the material of the door 30 so as to rigidly unite the door and the bolt unit 179.

Slidably confined within the bore 272 in the block 270 is the bolt 299 of lower bolt unit 179. This bolt includes a bolt plunger 300 and a bolt head 301. With the exception of annular channels 302 and 303 formed in said plunger this is of uniform diameter. These channels divide the plunger into an upper section 304, a middle

section 305, and a lower section 306. The lower end of channel 302 is steeply shaped radially to provide a lock shoulder 307. The upper end of channel 303 is steeply shaped radially to provide on the lower end of section 305 a bolt retaining shoulder 308. The lower portion of annular channel 303 provides an annular cam face 309 for a purpose to be made clear hereinafter.

The upper end of plunger 300 has a spring centralizing stud 314 which centralizes a coil spring 315 which is trapped between the upper end of the bolt 299 and the top plate 285 of unit 179. Mounted in section 304 of plunger 300 is a pin 316 which extends into block passage 276 and thus prevents rotation of the plunger 300 in the bore 272. Provided in section 305 is a pin 317 which extends therefrom at right angles to pin 316 and into block channel 274 so as to engage stop pin 277 and limit the extension of the bolt 299 downwardly from the unit 179. Formed axially upwardly in the plunger 300 is a tapped hole 318.

The lock bolt head 301 includes a stainless steel roller 319 which is rotatably mounted on a shaft 320 provided on a bifurcated yoke 321 having a threaded stud 322 which screws into the threaded hole 318 on the plunger 300 and thus provides a means of uniting the plunger and the head 301 and adjusting the length of the bolt 299. This adjustment may not be accomplished without a certain amount of disassembly of the unit 179 as rotation of the bolt head is normally prevented by the roller 319 being guided by the recesses 293 in the mounting plate 288 and the channels 273 and 274 in the body block 270.

Pivotaly mounted in block passage 276 on pin 278 is lower bolt latch 323, this latch having a leg 329 which extends into the block bore 275.

Slidably confined in the bore 275 above the bolt retainer 280 is a lower bolt actuating plunger 330 the upper end of which is united with the lower end of control rod 287. Confined in the bore 275 between the upper end of plunger 330 and the cover plate 285 is a coil spring 331 which imposes a spring-bias on the plunger 330 constantly urging this downwardly. Secured in a transverse bore 332 in the plunger 330 is a pin 333 which extends from said plunger into the block passage 276 thus preventing the rotation of said plunger in the bore 275. Pin 333 is disposed below the pin 316 on bolt 299.

Near its lower end the plunger 330 is provided with an axially aligned cylindrical pocket 334 which is closed as both ends but has a vertical slot 335 opening towards the block passage 276, latch leg 329 extending through said slot into said pocket. At the upper and lower ends of slot 335, latch actuating shoulders 336 and 337 are provided. Trapped within the pocket 334 between the lower end thereof and the latch leg 329 is a coil spring 338 which places the leg 329 constantly under a spring-bias upwards. Formed axially on the plunger 330 and extending downwardly a short distance therefrom is a retainer locking pin 344.

The lower bolt retainer 280 includes a cylindrical shell 345 which is pressed into the bore 279 in the body block 270 so that its inner end is just tangent with the bolt bore 272. Formed in the shell 345 is a bore 346 this having a counterbore 347, and a hole 348 opening upwardly in alignment with the plunger pin 344. Slidably within the bore 346 and counterbore 347 is a retainer plunger 349. This plunger has an annular shoulder 350 on its inner end which compresses a coil spring 351 between this shoulder and the shoulder at the juncture of the counterbore 347 and bore 346 so as to impart a spring-bias to the plunger 349 constantly urging this towards the lower bolt 299. Formed lengthwise in the plunger 349 from beneath is a slot 352 into which a pin 353 provided on the shell 345 extends upwardly to prevent rotation of the plunger 349 in the bore 346. Formed vertically in the plunger 349 is a hole 359 which is in alignment with the hole 348 whenever a round nosed pin 360 provided axially on the inner end of plunger 349

is in engagement with the cylindrical outer surface of either the plunger section 305 or the plunger section 306.

The control rod 287 of lower bolt unit 179 is connected by a flexible coupling 361 (Fig. 5) with a rod 362 which in turn is connected by a flexible coupling 363 with a rod 364, the upper end of the latter rod being threaded and screwed into the tapped hole 139 of rack 135 of the motion converter 83 and the set screw 141 of said rack is then set to retain said rod in said rack. The flexible connections 361 and 363 are of identical construction to the flexible connections 260 and 262 previously described. Due to the use of these flexible connections in the rod systems through which the upper and lower bolt units 178 and 179 are controlled from the motion converter 83, it is unnecessary for the rods 263 and 364 which connect directly with this converter to be in true alignment, respectively, with the rods 242 and 287 which directly connect with the bolt units.

Operation

The lock mechanism 34 of the present invention is designed to be operable only in one of two ways. The first of these is to depress the cross bar 64, swinging this downwardly in the direction of arrow 77 in Fig. 5 about the axis of pins 63 and thereby swing the arm 80 upwardly against the converter lever 152 thereby rotating shaft 150 of converter 83 which pulls downwardly on rod 263 and upwardly on rod 364 thereby actuating upper and lower bolt units 178 and 179 to unlatch and slightly retract the bolts thereof so that outward pressure on the door will swing this open. The other way of opening door 30 is to insert a key 172 into the lock cylinder 171, rotate the latter in an anti-clockwise direction so that the arm 173 on the inner end of said cylinder depresses the crank pin 156 on the lever 153 of the motion converter 83 thereby rotating shaft 150 of the latter and thus unlatching and slightly retracting the bolts in the bolt units 178 and 179 and permitting the door to be swung open by pulling on the key 172, or on a hand-pull (not shown) provided on the outside of the door stile 37.

It is believed the operation of the rotary converter 83 has already been made clear but it may be noted that the rod systems above and below this unit counterbalance each other about the shaft 150 and the springs 143 and 144 disposed immediately above and below the racks 135 and 136 respectively in the converter 83 merely function to overcome the friction present in the converter and restore the parts thereof to their normal position shown in Fig. 3 when manual pressure, applied to said converter either through the cross bar 64 or key 172, is relaxed.

The functioning of the upper bolt unit 178 of the lock mechanism 34 will now be described, reference being had to Figs. 14, 15, 18 and 19. Fig. 14 shows the elements of said bolt unit positioned as when the door 30 stands closed and locked. This unit contributes to this locking by the presence of the latch 227 behind the shoulder 202 of the bolt 198 thereby positively preventing the retraction of this bolt from the upper strike 45. At this time the latch actuating plunger 229 is spring-biased upwardly by its spring 240 against the stop pin 226 so as to release the latch 227 to permit the slug 234, under the pressure of spring 239, to rotate the latch 227 into the position in which it is shown in Fig. 14 behind the bolt shoulder 202. It may be noted that at this time the head 257 of the latch neutralizing plunger 245 of the unit 178 is in spring-biased contact with the lower flush face 47 of strike 45, being held there by its spring 259 (Fig. 19) and the engagement of this plunger with strike face 47 prevents the upward extension of this plunger and results in the arm 254 of the neutralizing plunger being also depressed a substantial distance below the shoulder 202 on the bolt 198 and leaves a space between

said arm and said shoulder into which the latch 227 may move.

Actuation of the motion converter 83 so as to pull downwardly on latch actuating plunger 229 is illustrated in Fig. 15. This causes the plunger head 230 to rotate the latch 227 out from behind the bolt shoulder 202 and, following this action, causes the pin 233 to engage the bolt pin 206 and partially withdraw the bolt 198 from the strike 45. The anti-friction character of the roller 216 when it engages the strike ramp 49, as outward pressure is now applied to the door 30, effects the necessary further compression of spring 205 to permit this roller to ride outwardly under the ramp 49 with very little resistance to the opening of the door.

Immediately after the "cracking" of the door so as to move the bolt 198 outwardly past the ramp 49 of strike 45, pressure on the motion converter 83 is normally relaxed and the latch operating plunger 229 is permitted to return under the pressure of its spring 240 into contact with its upper stop limit pin 226 as shown in Fig. 18. This, however, does not enable the latch 227 to return to its position behind the bolt shoulder 202 because while the bolt 198 is retracted, as shown in Fig. 15, this shoulder comes into contact with latch neutralizing arm 254 of the latch neutralizing plunger 245, the upper end of which plunger at this moment is still in contact with the lower face 47 of strike 45. As the bolt roller 216 then rides outwardly over the ramp 49 of strike 45, the latch neutralizing plunger 245 is in advance of the point of contact between the roller 216 and the ramp so that the ramp does not engage the head 257 on this plunger. For this reason, plunger 245 continues to be spring-biased upwardly to keep the arm 254 thereof pressed against the bolt shoulder 202 and in the way of the latch 227 returning behind said shoulder. Thus when the latch actuating plunger 229 returns upwardly against pin 226, as shown in Fig. 18, the latch 227 is spring-biased in a counter clockwise direction into engagement with the arm 254 of plunger 245. The bolt 198 is of course now in its fully extended position with the pin 213 thereof resting against the stop screw 214 as shown in Fig. 19.

The latch neutralizer 243 is thus seen to prevent the latch 227 being returned behind shoulder 202 while the door 30 is open. When the door 30 is subsequently closed, the roller 216 of bolt 198 engages the ramp 49 of strike 45 thereby causing the bolt to be cammed downwardly to a position where it will ride over the ramp and then rise into the recess 48 of this strike. When it comes opposite this recess of course the bolt 198 is spring-biased upwardly into said recess, but the engagement of the head 257 of latch neutralizing plunger 245 with lower face 47 of said strike prevents this plunger rising with the bolt, as the latter is extended into the strike, thereby leaving arm 254 spaced downwardly from bolt shoulder 202 whereupon the spring-bias applied to the leg 228 of latch 227, through the slug 234, rapidly rotates the latch in a counter clockwise direction to position this behind shoulder 202 again as shown in Fig. 14. A complete cycle of operation of the bolt unit 178 has now been described, and the door 30 is again locked closed.

The manner in which the lower bolt unit 179 functions in the operation of the lock mechanism 34 of the invention, will now be described, by reference to Figs. 22, 23, 24 and 25. Fig. 22 shows the unit 179 with the parts thereof positioned as when the door 30 is closed and locked. This unit contributes to the locking of the door by the fact that the latch 323 is disposed behind shoulder 307 of bolt 299 while the lower end of this bolt is extended into recess 51 of strike 46. The latch 323 thus prevents the withdrawal of bolt 299 from strike 46 and locks the lower end of the door closed.

Fig. 23 shows the parts of bolt unit 179 positioned as at the moment the motion converter 83 is actuated to pull upwardly on control rod 287 of this unit. The effect of this is to elevate the latch actuating plunger 330 to remove the

shoulder 336 from engagement with latch 323, thereby enabling the pressure of spring 338 and shoulder 337 against leg 329 of said latch to rotate the latter in a counter clockwise direction away from behind bolt shoulder 307. Upward movement of plunger 330 also causes pin 333 to engage bolt pin 316 and partially withdraw bolt 299 from strike 46 so that, only a slight outward pressure need be now applied to the door 30 in order to open the same.

Upward movement of plunger 330 withdraws pin 344 from the hole 359 in retainer plunger 349 but it does not withdraw bolt 299 upwardly far enough for the round-nosed pin 360 to be free of contact with the bolt section 305. Thus, if the lock mechanism 34 is actuated without sufficient outward pressure being applied on the door 30 so as to open the same, and then the lock mechanism be allowed to return to normal, the bolt 299 will be spring-biased back downwardly to its normal position, as shown in Fig. 22, into the strike 46, and the latch 323 will return to its position behind shoulder 307 thereby relocking the door 30 closed.

If actuation of the lock mechanism 34 to position the parts of bolt unit 179 as shown in Fig. 23 is followed by a sufficient outward pressure on the door 30 to swing the same open, the roller 319 causes the bolt 299 to be further elevated as this roller rides outwardly over the hump 53 on the strike 46 (Fig. 24). In this movement, the bolt 299 is lifted to a point where the round nosed pin 360 of retainer plunger 349 has been allowed to drop into the annular channel 303 of said bolt and then be cammed outwardly again by engagement with the cam face 309 thereof until said retainer plunger nose rides on the cylindrical part of bolt section 306 which has the same uniform external diameter as the section 305.

As the actuation of the converter 83 continues through the application of outward pressure on the door 30 tending to open the same, at least until the bolts clear the strikes, the plunger 330 is still in upward position as shown in Fig. 24 when the bolt 299 passes outwardly out of contact with the strike 46. When this occurs of course the bolt 299 is spring-biased downwardly again but its downward movement is halted by the round-nosed pin 360 of retainer plunger 349 being spring-biased into the annular channel 303 of bolt 299 where it is interposed in the path of shoulder 308 of said bolt. This results in the bolt 299 being suspended as shown in Fig. 25 a substantial distance above the floor 33 while the door 30 is open. The advantage of this feature of the invention derives from the fact that where the sill 32 is relatively shallow, the lower bolt 299, if not thus retained in a retracted position, would contact the floor in its downwardmost position, thereby marking the floor and collecting dirt on the bolt.

When the door 30 is now closed, the roller 319 of bolt 299 again engages the ramp 52 and hump 53 of strike 46 and is returned upwardly to its upwardmost position as shown in Fig. 24 just before the door closes. It is to be noted that as soon as pressure on the motion converter 83 is relaxed, as the door swings open, the latch actuating plunger 330 of bolt unit 179 is again spring-biased downwardly, but not to its lowermost position, because the pin 344 thereof now engages an imperforate portion of the retainer plunger 349 which is presented opposite the hole 348 in the shell 345 of the retainer 280 because of the fact that the plunger 349 is now extended inwardly into the annular channel 303 of bolt 299. It therefore follows that when the bolt 299 passes over the hump 53 of strike 46, as the door is being closed, the pin 344 is being spring-biased downwardly by the spring 331 against plunger 349, and when elevation of the bolt 299 brings section 306 of bolt 299 again opposite the round-nosed pin 360 of plunger 349, as shown in Fig. 24, the hole 359 in said plunger is again aligned with the pin 344 which, due to its being spring-biased downwardly, extends into hole 359 as shown in Fig. 26 thereby retaining plunger

349 in its inoperative position and permitting the bolt 299 to be spring-biased downwardly into the strike 46 when the bolt comes opposite recess 51 of said strike with the closing of the door. The provision of a bevelled end 370 on pin 344 gives this a cam action on plunger 349, as said pin enters hole 359, which perceptibly shifts this plunger to the right and out of frictional engagement with the bolt 299.

Thus the door, when closed, is automatically dead-locked in this position by both the upper and lower bolt units 178 and 179.

From the foregoing disclosure of a preferred embodiment of the present invention, it is believed manifest that it possesses numerous novel operational advantages over prior panic lock mechanisms. The use of rollers on the bolts, and means for slightly withdrawing the bolts from their strikes incidental to unlatching these bolts, produces an emergency exit door which not only opens with a very light pressure thereagainst but one in which the lock mechanism performs its functions almost silently.

Added to this advantage is the important distinction that the mechanism dead-locks the door, when shut, both at its upper and lower edges. This is possible by virtue of the fact that the lower bolt unit 179 does not require a door back stop for it to function.

In the present invention however, unique upper and lower bolt units 178 and 179 are provided, and neither of these requires a back stop. The special advantage of bolt unit 179 is that where normal clearance is lacking between the lower edge of the door and the floor, the bolt after leaving the strike when the door is opened, is retained in a relatively retracted position so as to provide adequate clearance between it and the floor. It is desired to point out however, that wherever normal clearance is present between the floor and the lower edge of the door, bolt unit 178 may be employed at the lower edge of the door as well as at the upper edge where it is described hereinabove as being used.

The claims are:

1. In a bolt unit of a lock mechanism for an emergency exit door swingably mounted in a door frame having a strike, the latter having a bolt ramp and bolt recess, the combination of: a block having parallel bolt and latch-actuating-plunger bores connected by a narrow latch-accommodating passage; means for mounting said block on said door so that, when said door is closed, said block is juxtaposed close to said strike with said bolt bore in alignment with the bolt receiving recess of said strike; a bolt axially slidable in said bolt bore and spring-biased to extend said bolt against said ramp and into said recess when said door is swung shut; a limit stop on said block limiting said extension of said bolt, there being a latch shoulder provided on said bolt; a latch pivotally mounted in said passage and rockable into a position behind said shoulder to prevent retraction of said bolt from said strike; at latch actuating plunger in said plunger bore spring-biased in the same direction said bolt is biased; a limit stop limiting movement of said plunger in said direction and with said plunger extending past the pivotal axis of said latch, said plunger engaging said latch to rotate the same away from behind said shoulder when said plunger is shifted in the opposite direction; and interengaging means on said bolt and plunger and operative upon said shifting of said plunger to partially withdraw said bolt from said strike after said latch is rotated out from behind said shoulder, to permit said bolt to be freely cammed out of said strike by the opening of said door.

2. A combination as in claim 1 in which latch neutralizing means is provided which is operable by the opening of said door to prevent said latch returning to its position behind said shoulder until said door is again closed, and said bolt is again spring-biased into said strike, said means thereupon releasing said latch where-

by said latch is again spring-biased into its position behind said shoulder and locks said door closed.

3. A combination as in claim 2 in which said latch neutralizing means includes and is actuated by a member which is spring-biased against an adjacent external face of said strike when said door is closed and which is released from the restraint of contact with said strike when said door is open.

4. A combination as in claim 3 in which a bore is provided in said block for said member, the latter comprising a plunger axially spring-biased parallel with said bolt and alongside the latter, as aforesaid, said bolt engaging said member to depress the latter below said external face of said strike as said bolt rides over the strike ramp in the closing of the door, and then releases said latch neutralizing member causing the latter to be spring-biased against said strike face as said bolt is spring-biased into the bolt receiving recess of said strike.

5. A combination as in claim 4 in which said latch neutralizing plunger has an arm which is interposed between said latch and said bolt to withhold said latch from the space behind said bolt shoulder when said door is open, said arm also being engaged by said bolt shoulder to depress said plunger as said bolt passes over the strike ramp, the engagement of said plunger with said strike face, when said door is closed, restraining said plunger with the latter depressed in its bore and with its arm out of the space immediately behind said bolt shoulder thereby allowing said latch to return to its position behind said shoulder.

6. A combination as in claim 1 in which said bolt has a substantially cylindrical body having a tapped axial hole, and a roller yoke having a roller pivotally mounted therein, and a threaded axial stud which screws into said hole, said roller forming the strike-engaging extremity of said bolt and rendering said bolt adjustable in length by the rotation of said yoke relative to said body; and means preventing the rotation of said body in said bolt bore, there being channels formed laterally in said bolt from said bolt bore which receive said roller and prevent the rotation of said yoke relative to said body except when said roller is dismounted from said yoke.

7. A combination as in claim 1 in which said bolt has a transverse channel forming a second shoulder and a cam shoulder; a pin formed axially on the inner extremity of said latch actuating plunger; a bolt retainer spring-biased against the side of said bolt between said first and second shoulders, said retainer having a hole which receives said pin whenever said retainer is not spring-biased into said transverse channel and said plunger is free to respond to its spring, said pin thus withholding said retainer from entering said bolt channel and permitting maximum extension of said bolt, the manual retracting of said latch actuating plunger, to effect the unlatching of the bolt whereby it will be cammed out of said strike recess by pressure on the door, withdrawing said pin from said bolt retainer and holding said pin withdrawn until after said bolt leaves contact with said strike, said retainer thereby dropping in said transverse channel to retain said bolt retracted into said bolt unit until the door is again closed after said plunger has been manually released to follow its spring-bias in which said pin is pressed against said retainer, the riding of said bolt over said strike ramp in the closing of said door causing said cam shoulder to cam said retainer out of said channel thereby aligning said retainer hole with said pin which is immediately spring-biased into said hole, thus withholding said retainer from re-entering said channel and freeing said bolt whereby it is spring-biased into said strike recess and said latch shifts behind said first-mentioned shoulder, locking said door closed.

8. In a lock mechanism for an emergency exit door, swingably mounted in a door frame having a strike, the combination of: a bolt having a roller on its outer end and spring-biased axially when the door is closed, to

produce a maximum extension of said roller into said strike, with the axis of said roller lying outside said strike, said bolt having a shoulder for latch engagement; a latch, spring-biased into position behind said shoulder and thus latching said bolt against retraction from said strike; emergency pressure operated means for removing said latch from behind said shoulder to permit said door to be opened, said latch being free to return behind said shoulder if said door is not then opened and if the pressure on said pressure operated means is relaxed; latch neutralizing means rendered operative by opening said door to prevent said latch dropping behind said shoulder until said door is again closed, said emergency pressure operated means, after removing said latch from behind said bolt shoulder, partially withdrawing said bolt from said strike thereby facilitating said roller camming said bolt out of said strike and the opening of said door by pressing against said door, this withdrawal of said bolt from said strike moving said shoulder out of position to be engaged by said latch, said latch neutralizing means including a bolt retainer which is spring-biased toward said bolt, said bolt having a second shoulder in advance of which said retainer moves as said first shoulder travels past said latch upon said bolt withdrawing from said strike as aforesaid, the engagement of said second shoulder by said retainer preventing the bolt being re-extended into a position where said latch can drop behind said first shoulder, until said door is again closed; and means for withdrawing said retainer from the path of said second shoulder incidental to the closing of said door, whereby said bolt is freed from said retainer and is spring-biased into said strike, said first shoulder thereby clearing said latch, and permitting the latter to drop behind said first shoulder to latch said bolt in door-locking position in said strike.

9. In a lock mechanism for a door swingably mounted in a door frame having a strike, the combination of: a bolt having a roller on its outer end and spring-biased longitudinally to produce a maximum extension of said

roller into said strike when said door is closed, the axis of said roller at this time lying outside said strike, said bolt having a shoulder for latch engagement; a latch spring-biased into a position close behind said shoulder to deadlock said bolt in its position of maximum extension; a pin on said bolt; a bolt retractor mounted for movement parallel with said bolt, said retractor being directly connected to said latch and having a retracting pin normally in spaced relation with said bolt pin, whereby an initial longitudinal movement of said retractor withdraws said latch from behind said shoulder while said bolt remains in its position of maximum extension, said retracting pin then contacting said bolt pin whereby a continuation of said movement of said retractor starts retracting said bolt and withdrawing said roller from said strike, following which completion of the withdrawal of said bolt from said strike being accomplished by the camming of said roller from said strike produced by pressure against said door; and a latch neutralizer spring-biased into engagement with said strike, when said door is closed, said neutralizer having a lug which at that time is spaced from said shoulder to allow said latch to move behind the latter and deadlock said bolt as aforesaid, the withdrawal of said bolt and the opening of said door causing said lug to occupy the space immediately behind said shoulder thereby blocking the return of said latch behind said shoulder until said door is again closed.

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