Feb. 22, 1955 R. S. SCHAMPEL 2,702,467

VAULT AND SAFE DOOR LOCKING MECHANISM

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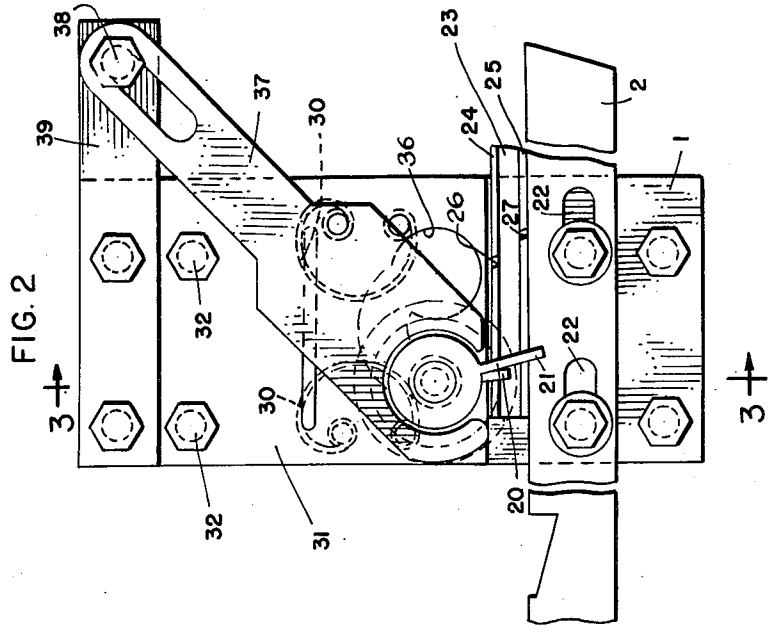


FIG. 2

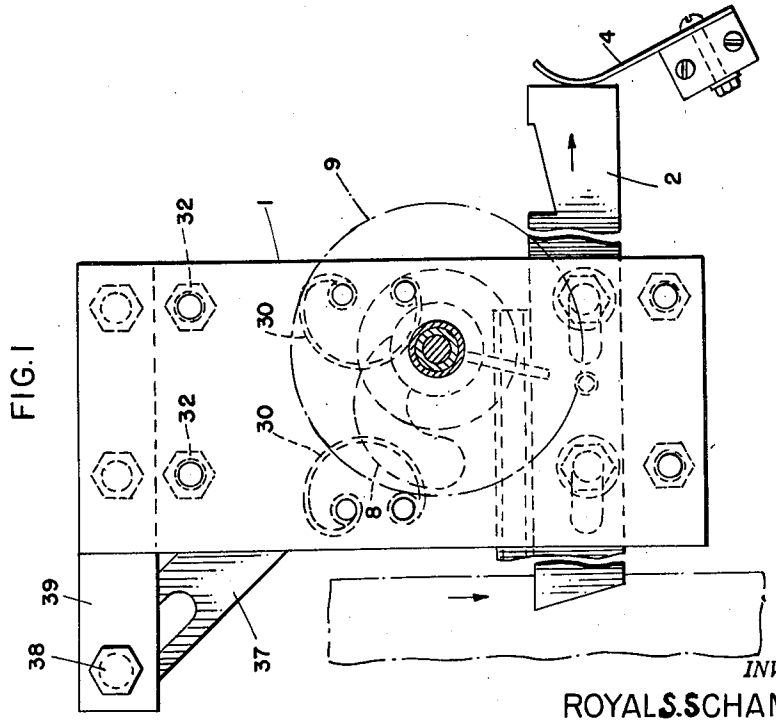


FIG. 1

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FIG. 3

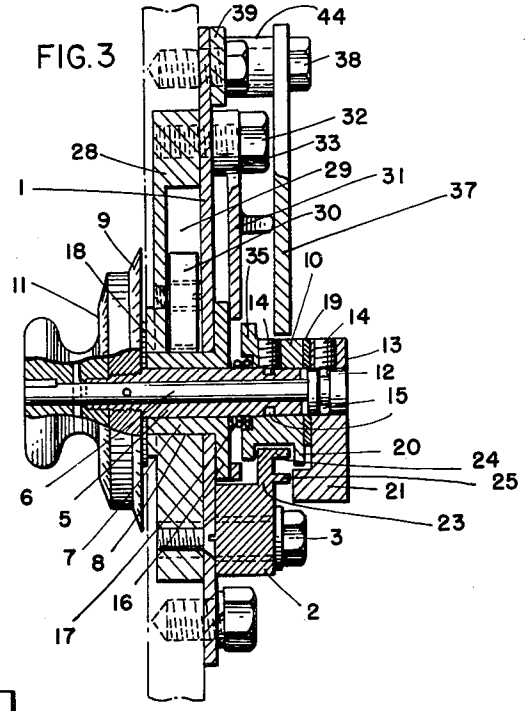
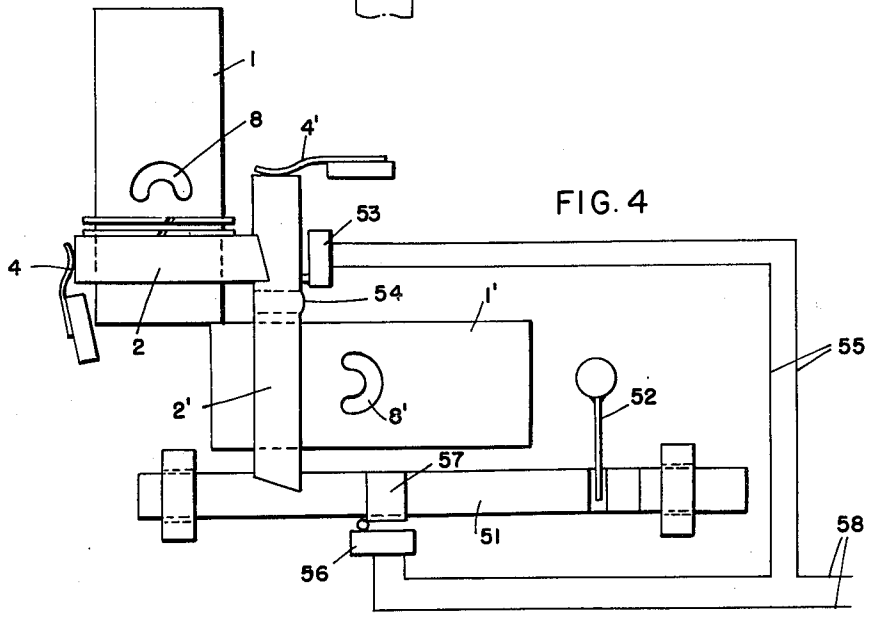


FIG. 4



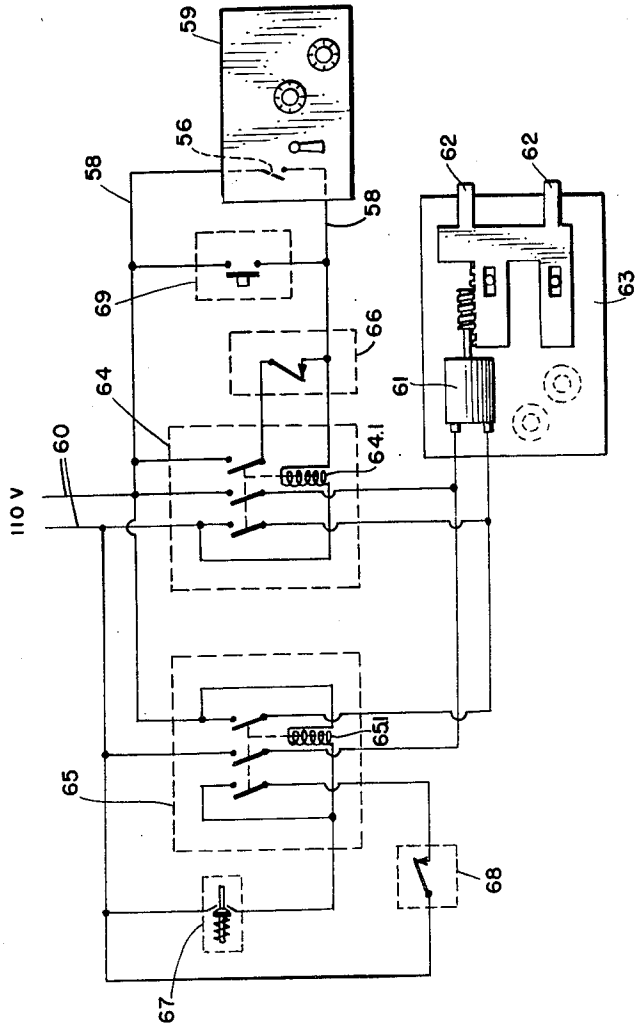
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VAULT AND SAFE DOOR LOCKING MECHANISM

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FIG. 5



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VAULT AND SAFE DOOR LOCKING MECHANISM

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FIG. 6

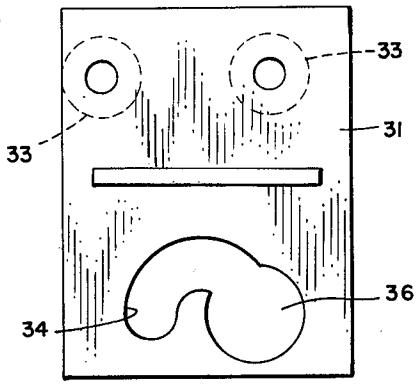


FIG. 7

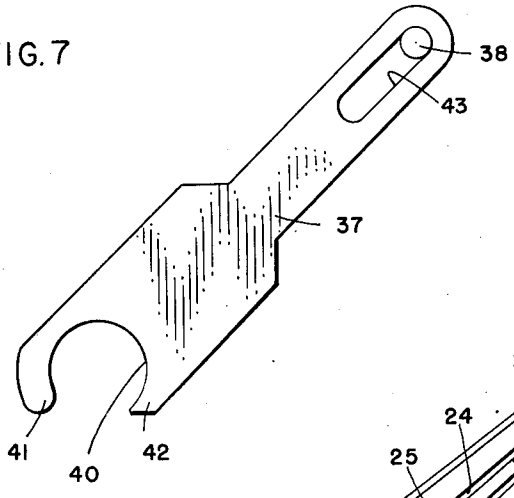


FIG. 8

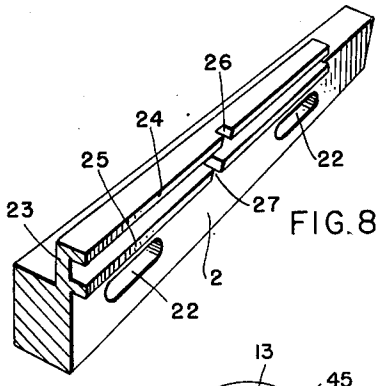


FIG. 9

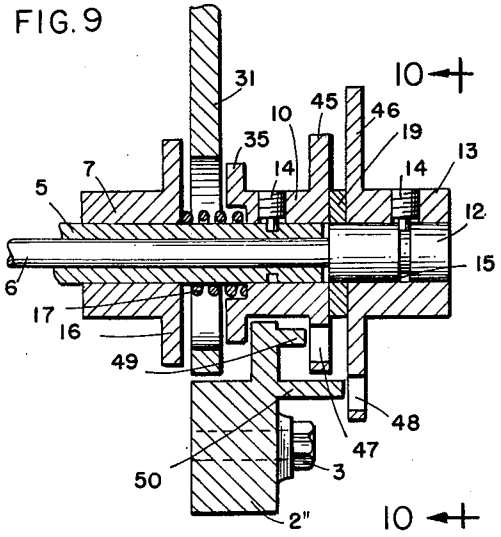
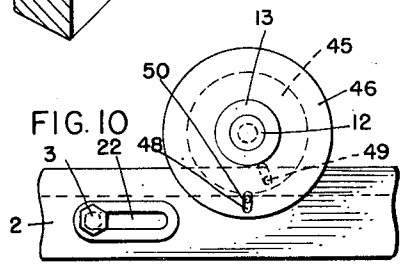


FIG. 10



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United States Patent Office 2,702,467 Patented Feb. 22, 1955

2,702,467

VAULT AND SAFE DOOR LOCKING MECHANISM

Royal S. Schampel, La Grange, Ill.

Application August 24, 1951, Serial No. 243,508

18 Claims. (Cl. 70—280)

This invention relates to combination or permutation locks for vault doors and safe doors and particularly to an improved system of vault door lock control and operation and an improved permutation lock arrangement therefor.

The main objects of this invention are to provide an improved system and lock mechanism for either direct or remote control of the operation of vault door locking bolts; to provide such a system that is readily adaptable for the operation of the vault door bolts by a power means; to provide such system for remotely controlled operation of one or more vault doors either manually or by power means; to provide an improved permutation lock mechanism for controlling the operation of vault and safe door locking bolts; to provide such a lock mechanism that is of more simple construction and which requires fewer precision-made parts; to provide a lock mechanism which utilizes a new and improved movement in its operational procedure; and to provide an improved lock mechanism which requires knowledge of its particular operating procedure as well as a predetermined combination of indices before it can be unlocked.

A specific embodiment of this invention is shown in the accompanying drawings, in which:

Figure 1 is a front elevational view showing the improved lock mechanism.

Fig. 2 is a back elevational view of the same.

Fig. 3 is a vertical sectional view, as taken on line 3—3 of Fig. 2, showing the lock operating mechanism.

Fig. 4 is a schematic elevational view showing a progressive arrangement of lock mechanisms for controlling a drawbar or lock bar.

Fig. 5 is a diagrammatic view showing an arrangement for remote control or operation of a vault door lock bar by means of the improved lock mechanism.

Fig. 6 is a plan view of a guard plate for the lock assembly.

Fig. 7 is a plan view of a guard arm for the latch bar driving means.

Fig. 8 is a perspective view showing the form and construction of a latch bar.

Fig. 9 is a sectional view showing a modified arrangement for the latch bar driving means, and

Fig. 10 is an end view of the modified drive means as taken on line 10—10 of Fig. 9.

In the form shown in the drawings the improved vault, or safe, door locking mechanism comprises a mounting plate or mounting means 1, adapted to be suitably secured on the inner side of the vault, or safe, door, a latch bar 2, slidably mounted on the plate 1 by means of spaced studs 3, which extend from the mounting plate, a spring means 4 which normally urges the latch bar 2 toward the latching position, and a permutation or combination type of lock device having a plurality of actuators, or drive members, adapted to be engaged with the latch bar when the lock device is shifted axially, after the drive members have been set to a predetermined angular position, so that rotation of the lock device will cause shifting of the latch bar.

In the present invention, this association of elements is particularly characterized by an arrangement of the mounting plate 1, and the manner of mounting the permutation lock device thereon, whereby the lock device is laterally shiftable between at least two blind positions, only one of which is operable; and by an arrangement of guard means which obviates any possibility of "feeling out" the combination. Thus in addition to the protection of a combination, which must be preset according to a predetermined plan, the lock mechanism can be operated only when the lock device is at a predetermined position along its extent of lateral movement.

As shown the lock device, or lock assembly, comprises a pair of coaxial shafts 5 and 6, journaled one within the other, carried by a bushing or bearing member 7 which in turn is mounted in and extends through a suitable opening 8 in the mounting plate 1. The mounting plate 1 is adapted to be secured on the inner side of a suitable safe or vault door or panel and the length of the shafts is such as to extend entirely through the panel from the front to beyond the rear.

The outer shaft 5, which is hollow or tubular, is provided with a disc-like dial 9 fixedly secured on its outer end and extends through the bushing 7 to a predetermined distance beyond the inner side of the mounting plate 1 where, at its inner end, it carries a fixedly attached collar 10. The inner shaft 6 is a solid member rotatably journaled within the outer shaft 5, and is provided with a dial and hand knob 11, suitably secured on its outer end, whereby the lock device assembly may be manipulated. The inner shaft 6 is also provided with an enlarged inner end portion, or hub, 12 which has a diameter substantially the same as the outer diameter of the outer shaft 5, and a collar 13 is suitably secured on this hub immediately beyond the collar 10.

The collars 10 and 13 carry the keys, or drive members, for actuating the latch bar 2 and the collars are therefore suitably secured on their respective shafts so as to be fixed against both axial and angular movement relative to the respective shafts, and yet be angularly adjustable relative to the dials 9 and 11. For example, the collars may have a splined connection with their respective shafts to fix them against angular motion relative to the shaft and may be fixed against axial motion by means of setscrews 14 which have cylindrical inner ends adapted to fit into appropriate annular grooves 15 formed circumferentially about the shafts adjacent their ends. Such connections between the shafts and the collars will permit changing of the angular position of the collars relative to the dials in order to adjust or change the combination according to which the lock assembly may be operated.

In the form shown, the bushing or bearing 7 which extends through the opening 8 in the mounting plate 1 is provided, on its inner end, with a radial flange 16 which overhangs and lies against the margin of the opening 8; and in order to provide for axial movement of the lock assembly in the course of its operation, the collar 10 is spaced a predetermined distance inwardly beyond the flange 16 of the bushing. A coiled spring 17 is disposed over the outer shaft 5 so as to bear between the bushing 7 and the outer or adjacent face of the collar 10, the outer face of the collar 10 being counterbored or recessed—as shown in Fig. 3—to receive the spring.

The spring 17 thus normally urges the lock assembly axially inward, the extent of inward motion being limited by engagement of the dial 9, carried by the outer shaft 5, against the outer face of the door or panel on which the lock assembly is mounted. In order to minimize friction between the dial 9 and the outer face of the panel, the inner face of the dial 9 may be provided with a small bearing or hub 18 which will space the dial a small distance away from the outer face of the panel.

As shown, the collars 10 and 13 may also be spaced by a washer 19, which may be readily lubricated so as to permit free relative rotation of the collars when the shafts 5 and 6 are turned and yet secure the shafts 5 and 6 against axial movement relative to each other.

As shown in Figures 1, 2 and 3, the collars 10 and 13 of the lock assembly are provided with radially projecting fingers or keys 20 and 21, respectively, which are engageable with the latch bar 2 upon axially outward shifting of the lock assembly and which thus function as driving members for the latch bar 2.

Preferably, the finger or key 21 is longer than the finger or key 20 and is of substantially L-shape so as to overhang the key 20, and the outer surfaces of the keys are arranged to lie in the same transverse plane, normal to the axes of the shafts 5 and 6, so that they

may simultaneously engage the latch bar **2**, as will be hereafter described.

In the form shown in Figs. 3 and 8, the latch bar **2** is slidably mounted on the inner side of the mounting plate **1** by means of the studs **3**, which pass through slots **22** spaced lengthwise of the latch bar and extending in the direction in which the latch bar is to move.

The latch bar is mounted adjacent the lock assembly and, in order to minimize the radial length of the keys or fingers **20** and **21**, the latch bar **2** is provided with an integral upwardly projecting flange portion **23** which extends lengthwise of the latch bar on the side next adjacent the lock assembly. This flange portion is provided with a pair of parallel ribs **24** and **25** which project beyond the inner face of the latch bar **2** to substantially the plane of the outer faces of the keys or fingers **20** and **21**.

The ribs **24** and **25** extend lengthwise of the latch bar **2** and are thus positioned so as to be engageable by the fingers **20** and **21**. Also each of the ribs **24** and **25** is provided with a transverse slot **26** and **27** respectively into which the fingers **20** and **21** may be received, upon axial shifting of the lock assembly, when the fingers are in predetermined angular relation with respect to each other. The slots **26** and **27** are formed so as to be substantially radial with respect to the common axis of the shafts **5** and **6** and, when the fingers **20** and **21** are engaged in the slots, rotation of the shaft of the lock assembly will cause the fingers to drive the latch bar **2** so that it will slide lengthwise on its mounting studs **3**.

As before mentioned, the lock assembly of the present invention is mounted in the mounting plate **1** so as to be laterally shiftable between at least two blind positions and this is accomplished by providing the opening **8** in the mounting plate **1**, which receives the lock assembly, in the form of an elongate slot having a width substantially the same as the outer diameter of the bushing **7**, in which the shafts **5** and **6** are mounted, whereby the bushing **7**, together with the shaft assembly, can be shifted laterally from end to end of the opening **8**.

In the form shown, the slot or opening **8** is arcuate so that the lateral movement afforded the shaft assembly of the lock mechanism will be other than along a straight line. Preferably, this elongate opening is arranged so as to be wholly within the area of the dial **9** so that, regardless of the position of the shaft assembly along the length of the opening **8**, the opening will be hidden behind the dial **9**.

As shown in Fig. 3, the mounting plate **1** is provided with a bearing block **28** secured on its outer side, which block is also provided with an elongate opening of the same length and width as the opening **8** and which is exactly registered with the opening **8**. Also the inner side of the bearing block **28** is provided with a hollow space **29**, which includes the area of the bearing block opening, in which a pair of positioning or detent springs **30** are mounted. The bearing block **28** thus, in combination with the mounting plate **1**, provides a sufficiently wide support or bearing for the bushing **7**, to prevent any wobble of the bushing during manipulation of the lock assembly along the length of the opening **8**, and at the same time provides a housing for the springs **30**.

In the form shown, the springs **30** are arcuate members which extend into the path of the lock assembly as it moves laterally along the slot **8** and are adapted to bear resiliently against the bushing **7** so as to function as detents to hold the bushing at one end or the other of the slot **8**. Thus, when the shaft assembly is positioned at either end of the elongate slot **8**, it is held firmly seated by the respective spring **30**, so that the lock assembly can be manipulated to set the combination and to shift the shaft axially without inadvertent lateral movement.

As shown, one position only along the length of the slot **8** is intended to be an operative position for the lock assembly, this position being at the right-hand end of the slot as viewed from the rear of the lock mechanism and as it appears in Fig. 2.

Thus, as shown in Fig. 2, the slots **26** and **27**, in the ribs **24** and **25** of the latch bar **2**, are located so as to be engageable by the fingers **20** and **21** only when the lock assembly is at the right-hand end of the elongate slot **8** in the mounting plate; and at any other position of the lock assembly, along the length of the opening, operative engagement of the fingers **20** and **21** in the slots **26** and **27** will be impossible.

In order to prevent any axial shifting movement of the lock assembly, except at its opeartive position along the length of the mounting plate opening **8**, a guard plate or stop means **31** is mounted on the rear side of the mounting plate **1** by means of studs **32**, which studs may also be employed to attach the bearing block **28**, as shown in Fig. 3.

The guard plate **31** is provided with suitable bosses **33** so as to space the guard plate away from the rear side of the mounting plate a distance only slightly greater than the thickness of the flange **16** on the bushing **7** and the guard plane is of a size sufficient to wholly overlap the flange **16** at any position of the shaft assembly along the length of the mounting plate opening **8**. Also the guard plate **31** is provided with an elongate opening **34** located and formed to be exactly in registry with the mounting plate opening **8**, so as to permit lateral shifting of the lock assembly.

As shown, the inner end of the collar **10** is provided with a radial flange **35** which will overlap the margins of the guard plate opening **34** at all times, except when the lock assembly is in its operative position. At the operative position of the lock assembly, the opening **34** is enlarged as to **36** to provide a circular passage of sufficient size to receive the flange **35**. Thus at the operative position of the lock assembly, the flange **35** will be alined with the enlarged portion **36** of the guard plate opening and axial movement of the shaft assembly against the action of the spring **17** may be had.

In order to prevent "feeling out" the combination of the lock assembly through engagement of the keys with the ribs **24** and **25** of the latch bar **2** at the operative position of the lock assembly, I have provided a second guard plate **37** which is shown in Figs. 2, 3 and 7. This second guard plate **37** is in the form of a swinging arm pivotally mounted on a stud **38** carried by a bracket **39** attached at the upper end of the mounting plate **1**. The lower end of the arm **37** is provided with a fork having a circular opening **40** formed to embrace the collar **10**, the fingers **41** and **42** of the fork terminating immediately above the upper surface of the flange **22** on the latch bar **2**, and the space between the ends of the fingers being just sufficient to clear the angular movement of the driving members or fingers **20** and **21** in their operation to shift the latch bar **2**.

The upper end of the arm **37** is provided with an elongate slot **43** through which the stud **38** extends, the length of the slot **43** being sufficient to permit sliding pivotal movement of the arm **37** so that it may shift and swing from side to side as it is carried by the collar **10** during lateral movement of the shaft assembly from end to end of the mounting plate opening **8**.

As shown, the mounting of the second guard plate, or arm **37**, includes a spacer **44** surrounding the stud **38** so that the inner face of the arm **37** will lie in the same plane as the inner edges of the ribs **24** and **25** on the latch bar **2**. Thus, since "feeling out" of the combination for the lock assembly can only be attempted when the lock assembly is at the operative end of the mounting plate opening **8**, due to engagement of the flange **35**, on the collar **10**, with the margin of the guard plate opening **34** at all points except the operative position, the second guard plate or arm **37** will provide a continuation of the inwardly facing surfaces of the ribs **24** and **25** around the entire periphery of the collar **10** and provide a barrier that will make it difficult to "feel out" the positions that the keys **20** and **21** must assume in order to be received in the slots **26** and **27** on the latch bar **2**.

A modified arrangement for the driving members, which actuate the latch bar **2''**, is shown in Figs. 9 and 10, wherein the collars **10** and **13** are provided with relatively wide, radially projecting, annular flanges or driving discs **45** and **46** respectively, instead of keys or fingers. As shown in Fig. 9, each of the flanges **45** and **46** is provided with an opening **47** and **48**, respectively, located adjacent the periphery of the flange and the latch bar **2''** is provided with vertically spaced, inwardly projecting, pins **49** and **50**, instead of ribs as in the arrangement first described.

The flange **45** on the collar **10** is of a diameter that will just clear the side surface of the lower pin **50** on the latch bar **2''** and the inner face of the flange **45** is located to just clear the end of the pin **49**. The opening

47 in the flange 45 is of a size to fit and receive the pin 49 upon axial shifting of the shaft assembly and this opening is also elongate, in the radial direction, in order to permit sliding movement of the pin 49 in the opening upon rotation of the collar 10 by the shaft 5, since the movement of the latch bar in the arrangement shown is linear.

The flange 46 on the collar 13 is disposed at the outer end of the collar next adjacent the flange 45 and is of greater diameter than the flange 45 so as to overlap the end of the lower pin 50 on the latch bar 2'', the length of the pin 50 being such as to just clear the adjacent face of the flange 46.

The opening 48 which receives the pin 50 upon axial movement of the shaft assembly is also elongate in the radial direction, as in the case of the opening 47 in the flange 45, to permit sliding of the pin 50 in the opening upon rotation of the collar 13 by the shaft 6.

In the modified arrangement, the second guard plate, or guard arm employed in the arrangement first described, is not needed since its function is fulfilled by the faces of the flanges 45 and 46 which are next adjacent the ends of the pins 49 and 50. Also since the flanges 45 and 46 of the modified form are spaced apart axially of the driving shafts, the pin 50 is longer than the pin 49 by the exact amount of such axial spacing of the flanges. Thus since the collars 10 and 13 cannot shift axially relative to each other, it will be difficult to "feel" the location of the openings 47 and 48, since the faces of the flanges 45 and 46 will engage the ends of the pins at the same time upon any axial movement of the shaft assembly.

It will now be apparent that in the operation of my improved permutation lock assembly, it is first necessary for the operator to know the location of the operative position of the lock assembly along the length of the elongate opening 8 in the mounting plate 1; and that, because of the arrangement of the guard plates and driving members, it will be difficult to "feel out" this operative position.

When the operative position of the lock assembly is known and the lock assembly is properly located, the proper combination of the dials 9 and 11 may then be set to position the keys, or driving members in the predetermined angular relation for driving engagement with the latch bar 2.

When the keys or driving members have been properly set, the shaft assembly may then be shifted axially outward, by pulling on the hand knob forming part of the dial 11, which will cause the keys or driving members to become engaged with the latch bar 2 so that rotation of the shaft assembly in the proper direction will cause the latch bar 2 to slide on its mounting studs 3 and become disengaged from the lock bolt or other member which it secures. Also, because the latch bar 2 is at all times urged towards its latching position by the spring 4, release of the lock mechanism by the operator will immediately release the latch bar and at the same time the lock mechanism will be shifted inwardly in the axial direction through the action of the spring 17 so as to disengage the driving means from the latch bar.

Fig. 4 illustrates, diagrammatically, a locking mechanism which includes two of the lock devices, before described, arranged so that the operation of one lock device will control the operation of the other lock device, the second lock device in turn controlling the operation of a lock bolt 51 which may be manually operated, as by a lever 52. In this case, the latch bar 2 is normally engaged in a notch formed in the second latch bar 2' so as to prevent its operation until the latch bar 2 is withdrawn by operation of the first lock mechanism; and the latch bar 2' is engaged in a notch in the lock bolt 51, so that the lock bolt cannot be operated until the latch bar 2' is withdrawn.

Thus to operate the arrangement of Fig. 4, it will be necessary to set the proper combination for each lock mechanism and then operate the first lock mechanism with one hand following which the second lock mechanism is operated with the other hand. The second latch bar is then held in its withdrawn position, while the first hand, having released the first lock mechanism, is employed to operate the lock bolt 51 by means of the handle or lever 52. Such use of plural lock mechanisms provides a further safeguard against operation of the lock mechanism by any one other than a person who has knowledge of the operating procedure.

Fig. 4 also illustrates an arrangement of the locking mechanism for the remote control of one or more vault doors, the remotely controlled vault door operating mechanism being illustrated in Fig. 5. As shown in Fig. 4, a normally open switch mechanism 53 is mounted adjacent the latch bar 2' in position to be actuated by a cam 54 mounted on the latch bar 2' so as to engage the switch mechanism when the latch bar 2' is operated. Thus, when the latch bar 2' is operated to withdraw it from engagement with the lock bolt 51, the switch mechanism 53 will be operated to close an electric circuit therethrough.

As shown, the switch 53 is connected in series, by leads 55, with a second switch mechanism 56 mounted for operation by a cam 57 on the lock bolt 51, so that operation of the lock bolt 51, as well as withdrawal of the latch bar 2', will be required to complete the circuit through the leads 58, which in turn are connected to operate a power means for controlling the opening of a remotely located vault door.

With this arrangement, and as illustrated in Fig. 5, the locking mechanism may be installed in a panel 59 remotely located from the controlled vault door or doors, as in the office of some high official, and the electric leads 58 from the switches 53—56, incorporated with the lock mechanism, may be connected with a power source 60 and, through suitable control means, to a motor 61 arranged to drive a gear device for operating the lock bolts 62 of the remotely located vault door 63.

As shown in Fig. 5, the system for controlling the operation of the lock bolt motor 61 may comprise a pair of magnetic starters 64 and 65, each connected to the power source 60 and the motor for operating the motor in one direction of rotation. Thus the magnetic starter 64 is connected to drive the motor to withdraw or unlock the vault door bolts 62 and the starter 65 is connected to drive the motor to project or lock the door bolts 62.

The magnetic starter 64 is closed for operating motor 61 to unlock the vault door by lock-controlled switches 53—56 (only switch 56 being shown) which are connected through the starter operating coil 64.1 to one side of the power line in the usual manner. A normally closed limit switch 66, suitably mounted for operation by the vault door locking bolts 62, when they reach fully withdrawn position, is employed as a holding means and stop switch to open the starter 64 and stop the motor 61 when the vault door becomes unlocked.

The magnetic starter 65, which operates the motor 61 to drive the lock bolts to closed or locking position, is controlled by a momentary contact switch 67 mounted for operation by the vault door and connected between one side of the power source 60 and the operating coil 65.1. The switch 67 may be of a plunger type in which circuit-closing contact is made momentarily as the plunger passes through the mid-portion of its stroke, while moving in one direction only, the plunger being operated back and forth by opening and closing of the vault door. The switch 67 is arranged for operation to close the circuit upon closing of the door only and is inoperative to close the circuit during opening of the door. Thus, when the vault door is swung on its hinges to closed position, a momentary contact is made by the switch 67 to close the circuit to the operating coil 65.1 of the starter 65 and thereby start the bolt driving motor 61.

A normally closed limit switch 68, mounted for operation by the door bolts 62 when they reach their fully projected or locking position, is employed as a holding means. This limit switch is normally closed and is opened by the lock bolts only when they reach the end of their stroke and the door is fully locked.

Thus, upon closing of the vault door, the lock bolts are automatically actuated to lock the door and the operation of the locking control is prevented when the door is being swung open after being unlocked by the fact that the momentary contact switch 67 is unidirectional in its circuit closing function.

Preferably, all of the control system for operating the motor 61, with the exception of the lock control switches 53—56. will be mounted within the vault so as to be inaccessible for unauthorized manipulation or tampering. The leads 60 from the power source and the leads 58

from the lock control switches 53—56 are the only leads necessary outside of the vault proper.

As shown in Fig. 5, an emergency switch 69 of the normally-open push-button type may be provided inside the vault and connected across the leads 58 from the lock control switches for operating the motor 61 to unlock the vault door in case any person should inadvertently become locked inside the vault.

With such an arrangement, the vault door could be closed at any time and would become automatically locked upon closing; and the vault door could be opened only by operation of the remotely located lock mechanism or the emergency push-button inside the vault. Also, in such an arrangement, the usual combination dials may be mounted on the vault door to deceive unauthorized persons who might attempt to open the vault door, the combination dials in such case being merely inoperative dummies.

The main advantages of this invention reside in the arrangement of the lock mechanism whereby, in addition to the ordinary operational procedure of setting dials in accordance with a predetermined combination or plan, specific mechanical movements of the lock mechanism must also be performed to successfully operate the lock; and in the fact that because of the improved lock construction, the particular mechanical movement of the lock mechanism which must be performed cannot be detected by one who does not know the complete operational procedure. Other advantages reside in the arrangement whereby plural lock mechanisms, one controlled by the other, may be employed to further confound unauthorized operation; and in the fact that the lock mechanism operating positions cannot be detected by either mechanical or electronic detecting means.

Still further advantages reside in the simple construction of the lock mechanism and in the arrangement whereby a minimum of precision-made parts is required; and in the fact that the lock mechanism can be manufactured at a relatively low cost.

And still further advantages are to be found in the improved vault door control system embodying the improved lock mechanism whereby remote control of one or more vault doors may be had from some central place of security that may be unknown to all except authorized persons.

Although but one specific embodiment of this invention is herein shown and described, it will be understood that numerous details of the construction shown may be altered or omitted without departing from the spirit of the invention as defined by the following claims.

I claim:

1. A lock and latch mechanism comprising a mounting plate having an elongate opening therethrough, a rotatable permutation lock assembly mounted in said opening for both axial and lateral movement therein, a latch bar slidably mounted on the inner side of said mounting plate adjacent said opening, drive means actuated by rotation of said lock assembly and engageable with said latch bar upon axial movement of said assembly for shifting said latch bar, and means on said latch bar for operatively receiving said drive means when said lock assembly is at a predetermined position along said opening, said lock assembly being operable to shift said latch bar only when preset according to a predetermined plan.

2. A lock and latch mechanism comprising a mounting plate having an elongate opening therethrough, a rotatable permutation lock assembly mounted in said opening for both axial and lateral movement therein, a latch bar slidably mounted on the inner side of said mounting plate adjacent said opening, drive means actuated by rotation of said lock assembly and engageable with said latch bar upon outward axial movement of said assembly for shifting said latch bar, resilient means bearing between said lock assembly and mounting plate for normally urging the lock assembly in the axially inward direction, and means on said latch bar for operatively receiving said drive means when said lock assembly is at a predetermined position along said opening, said lock assembly being operable to shift said latch bar only when preset according to a predetermined plan.

3. A lock and latch mechanism comprising a mounting plate having an elongate opening therethrough, a rotatable permutation lock assembly mounted in said opening for both axial and lateral movement therein, a latch bar slidably mounted on the inner side of said mounting plate adjacent said opening, drive means actuated by rotation of said lock assembly and engageable with said latch bar upon outward axial movement of said assembly for shifting said latch bar, resilient means for normally urging the lock assembly in the axially inward direction relative to said mounting plate, and means on said latch bar for operatively receiving said drive means when said lock assembly is shifted axially outward at a predetermined position only along said opening, said lock assembly being operable to shift said latch bar only when preset according to a predetermined plan.

4. A lock and latch mechanism comprising a mounting plate having an elongate opening therethrough, a rotatable permutation lock assembly mounted in said opening for both axial and lateral movement therein, a latch bar slidably mounted on the inner side of said mounting plate adjacent said opening, drive means actuated by rotation of said lock assembly and engageable with said latch bar upon axial movement of said assembly for shifting said latch bar, and means on said latch bar for operatively receiving said drive means when said lock assembly is shifted axially outward, the last named means being positioned to receive said drive means when said lock assembly is only at a predetermined position along said opening, and said lock assembly being operable for axially outward shifting movement only when its elements are preset according to a predetermined plan.

5. A lock and latch mechanism comprising a mounting plate having an elongate opening therethrough, a rotatable permutation lock assembly mounted in said opening for both axial and lateral movement therein, means on the outer end of said lock assembly for manual operation thereof, said means including an annular dial plate having a radius greater than the shortest distance between the ends of said opening, a latch bar slidably mounted on the inner side of said mounting plate adjacent said opening, drive means actuated by rotation of said lock assembly and engageable with said latch bar upon axial movement of said assembly for shifting said latch bar, and means on said latch bar for operatively receiving said drive means when said lock assembly is at a predetermined position along said opening, said lock assembly being operable to shift said latch bar only when preset according to a predetermined plan.

6. A lock and latch mechanism comprising a mounting plate having an elongate opening therethrough, a rotatable permutation lock assembly mounted in said opening for both axial and lateral movement therein, means on the outer end of said lock assembly for manual operation thereof, said means including an annular dial plate having a radius greater than the shortest distance between the ends of said opening, a latch bar slidably mounted on the inner side of said mounting plate adjacent said opening, drive means actuated by rotation of said lock assembly and engageable with said latch bar upon axial movement of said assembly for shifting said latch bar, means on said latch bar for operatively receiving said drive means when said lock assembly is at a predetermined position along said opening, and spring means mounted adjacent said opening for resiliently holding said lock assembly at each of at least two selective locations along said opening, one of said locations being said predetermined position, said lock assembly being operable to shift said latch bar only when preset according to a predetermined plan.

7. A lock and latch mechanism comprising a mounting plate having an elongate opening therethrough, a rotatable permutation lock assembly mounted in said opening for both axial and lateral movement therein, a latch bar slidably mounted on the inner side of said mounting plate adjacent said opening, drive means actuated by rotation of said lock assembly and engageable with said latch bar upon axial movement of said assembly for shifting said latch bar, means on said latch bar for operatively receiving said drive means when said lock assembly is at a predetermined position along said opening, and stop means extending along the margin of said opening on the inner side of said mounting plate and engageable with said lock assembly to hold the same against axial movement, said stop means having a passage adapted to receive said lock assembly axially at said predetermined position, and said lock assembly being operable to move axially when its permutation elements are preset according to a predetermined plan.

8. In a permutation lock mechanism having an operating shaft assembly comprising a plurality of independently rotatable coaxial shafts journaled one within the other, each shaft having a radially projecting key and being rotatable to shift the angular position of said key; a mounting plate having an opening therethrough, means for mounting said shaft assembly in said opening for both lateral and axial movement of the assembly therein, said shaft assembly extending through said mounting plate with said keys disposed on one side thereof, and a latch bar slidably mounted between said keys and said mounting plate and adjacent said opening; and means on said latch bar engageable by one of said keys upon axial movement of the shaft assembly when said shaft assembly is at a predetermined position only in said opening for shifting said latch bar upon rotation of said shaft assembly.

9. In a permutation lock mechanism having an operating shaft assembly comprising a plurality of independently rotatable coaxial shafts journaled one within the other, each shaft having a radially projecting key and being rotatable to shift the angular position of said key; a mounting plate having an opening therethrough, means for mounting said shaft assembly in said opening for both lateral and axial movement of the assembly therein, said shaft assembly extending through said mounting plate with said keys disposed on one side thereof, resilient means normally urging said shaft assembly axially relative to said mounting plate to hold said keys spaced from said one side of said mounting plate, and a latch bar slidably mounted between said keys and said mounting plate and adjacent said opening; and means on said latch bar engageable by one of said keys upon axial movement of the shaft assembly against said resilient means when said shaft assembly is at a predetermined position only in said opening for shifting said latch bar upon rotation of said shaft assembly.

10. In a permutation lock mechanism having an operating shaft assembly comprising a plurality of independently rotatable coaxial shafts journaled one within the other, each shaft having a radially projecting key and being rotatable to shift the angular position of said key; a mounting plate having an opening therethrough, means for mounting said shaft assembly in said opening for both lateral and axial movement of the assembly therein, said shaft assembly extending through said mounting plate with said keys disposed on one side thereof, means normally urging said shaft assembly axially relative to said mounting plate to hold said keys spaced from said mounting plate, handle means on the outer end of said shaft assembly for manipulation thereof, said handle means including a dial plate concentric with the shaft assembly and having a radius greater than the maximum distance across the opening in said mounting plate, and a latch bar slidably mounted between said keys and said mounting plate and adjacent said opening; and means on said latch bar engageable by one of said keys upon axial movement of the shaft assembly when said shaft assembly is at a predetermined position only in said opening for shifting said latch bar upon rotation of said shaft assembly.

11. In a permutation lock mechanism having an operating shaft assembly comprising a plurality of independently rotatable coaxial shafts journaled one within the other, each shaft having a radially projecting key and being rotatable to shift the angular position of said key; a mounting plate having an opening therethrough, means for mounting said shaft assembly in said opening for both lateral and axial movement of the assembly therein, said shaft assembly extending through said mounting plate with said keys disposed on one side thereof, and a latch bar slidably mounted between said keys and said mounting plate adjacent said opening; means on said latch bar engageable by one of said keys upon axial movement of the shaft assembly when said shaft assembly is at a predetermined position only in said opening for shifting said latch bar upon rotation of said shaft assembly, and means adjacent the opening in said mounting plate for resiliently holding said shaft assembly at each two selective locations within the span of said opening, one of said locations being said predetermined position.

12. In a permutation lock mechanism having an operating shaft assembly comprising a plurality of independently rotatable coaxial shafts journaled one within the other, each shaft having a radially projecting key and being rotatable to shift the angular position of said key; a mounting plate having an opening therethrough, means for mounting said shaft assembly in said opening for both lateral and axial movement of the assembly therein, said shaft assembly extending through said mounting plate with said keys disposed on one side thereof, and a latch bar slidably mounted between said keys and said mounting plate adjacent said opening; stop means extending along the margin of said opening on the side of said mounting plate adjacent said keys and engageable by said keys for holding said shaft assembly against axial movement, said stop means having a passage at a predetermined position within the lateral span of said opening adapted to receive said shaft assembly axially; and means on said latch bar engageable with one of said keys upon axial movement of the shaft assembly at said predetermined position for shifting said latch bar upon rotation of the shaft assembly.

13. In a permutation lock mechanism having an operating shaft assembly comprising a plurality of independently rotatable coaxial shafts journaled one within the other, each shaft having a radially projecting key and being rotatable to shift the angular position of said key; a mounting plate having an opening therethrough, means for mounting said shaft assembly in said opening for both lateral and axial movement of the assembly therein, said shaft assembly extending through said mounting plate with said keys disposed on one side thereof, means normally urging said shaft assembly axially relative to said mounting plate to hold said keys spaced therefrom, handle means on the end of said shaft assembly opposite said keys for manipulation thereof, said handle means including a dial plate concentric with the shaft assembly and having a radius greater than the maximum distance across the opening in said mounting plate, and a latch bar slidably mounted between said keys and said mounting plate adjacent said opening; stop means extending along the margin of said opening on the inner side of said mounting plate and engageable by said keys for holding said shaft assembly against axial movement, said stop means having a passage at a predetermined position within the span of said opening adapted to receive said shaft assembly axially; and means on said latch bar engageable with one of said keys upon axial movement of the shaft assembly at said predetermined position for shifting said latch bar upon rotation of the shaft assembly.

14. A permutation lock mechanism having an operating shaft assembly comprising a plurality of independently rotatable coaxial shafts journaled one within the other, each of said shafts having an annular radially projecting flange fast on one end, and said flanges being of progressively increasing diameter; a mounting plate having an opening therethrough, means for mounting said shaft assembly in said opening normal to the plane of said mounting plate for both lateral and axial movement of the assembly therein, and a latch bar slidably mounted adjacent said shaft assembly and parallel with said mounting plate; a plurality of pins on said latch bar projecting toward said flanges parallel with the axis of said shaft assembly, said pins being spaced radially relative to the shaft assembly for engagement of each with the margin of a respective one of said flanges, and each of said flanges having a marginal opening adapted to be alined with a respective pin by rotation of said shafts to predetermined angular positions and to receive the respective pin upon axial movement of the shaft assembly when the shaft assembly is at a predetermined lateral position only in said mounting plate opening.

15. A lock and latch mechanism comprising a mounting plate having a pair of laterally spaced elongate openings therethrough, a rotatable lock assembly mounted in each opening for both axial and lateral movement therein, a pair of latch bars slidably mounted on the inner side of said mounting plate one adjacent each of said openings, a tongue portion on one of said latch bars extending toward and engageable with the other latch bar, a catch portion on said other latch bar adapted to engage said tongue portion for holding said other latch bar against sliding movement, means normally urging said one latch bar into engagement with the other latch bar, radial drive means on each lock assembly engageable with the respective latch bar upon axial movement

of the lock assembly for shifting the latch bar upon rotation of the lock assembly, and means on each latch bar for operatively receiving the drive means of the respective lock assembly when the same is at a predetermined position only along its respective mounting plate opening.

16. In a door lock having a lock bolt and power actuated means for operating the lock bolt, a locking mechanism comprising a mounting plate having an opening therethrough, a rotatable lock assembly mounted in said opening for both axial and lateral movement therein, a latch bar slidably mounted adjacent said opening, radially projecting drive means on said lock assembly engageable with said latch bar upon axial movement of the lock assembly for shifting the latch bar upon rotation of the lock assembly, means on said latch bar for operatively receiving said drive means when said lock assembly is at a predetermined position only within the span of said mounting plate opening, and means for controlling the operation of said lock bolt, said controlling means including a power flow control device mounted adjacent said latch bar and arranged for operation by said latch bar during its shifting movement.

17. In a door lock having a lock bolt and power actuated means for operating said lock bolt, a remotely located locking mechanism comprising a mounting plate having an opening therethrough, a rotatable lock assembly mounted in said opening for both axial and lateral movement therein, a latch bar slidably mounted adjacent said opening, radially projecting drive means on said lock

assembly engageable with said latch bar upon axial movement of the lock assembly for shifting the latch bar upon rotation of the lock assembly, means on said latch bar for operatively receiving said drive means when said lock assembly is at a predetermined position only within the span of said mounting plate opening, and a power flow control means mounted adjacent said latch bar and arranged for operation by said latch bar during its shifting movement, said power flow control means having operative connections with the lock bolt operating means.

18. A lock and latch mechanism comprising a mounting plate having an opening therethrough, a rotatable permutation lock assembly mounted in said opening for both axial and lateral movement therein, a latch bar slidably mounted on said mounting plate adjacent said opening, drive means actuated by rotation of said lock assembly and engageable with said latch bar upon axial movement of said assembly for shifting said latch bar, and means on said latch bar for operatively receiving said drive means when said lock assembly is at a predetermined position within lateral span of said opening, said lock assembly being operable to shift said latch bar only when preset according to a predetermined plan.

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