June 20, 1961 H. M. CARTER 2,988,911

AUTOMATIC DOOR LOCK MECHANISM FOR SAFES, STRONGBOXES AND OTHER RECEPTACLES

Filed Aug. 2, 1957 3 Sheets-Sheet 1

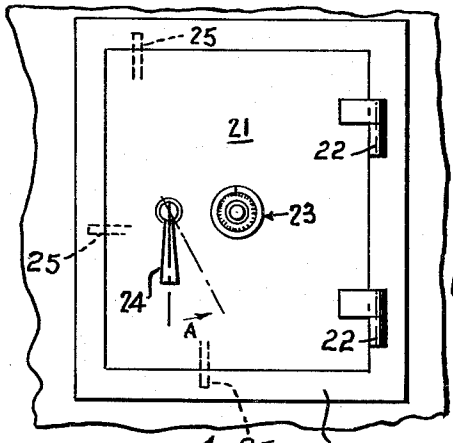


FIG. 1.

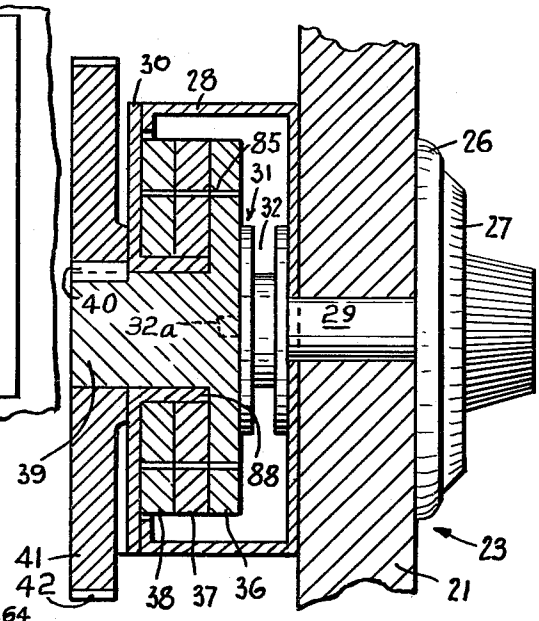


FIG. 2.

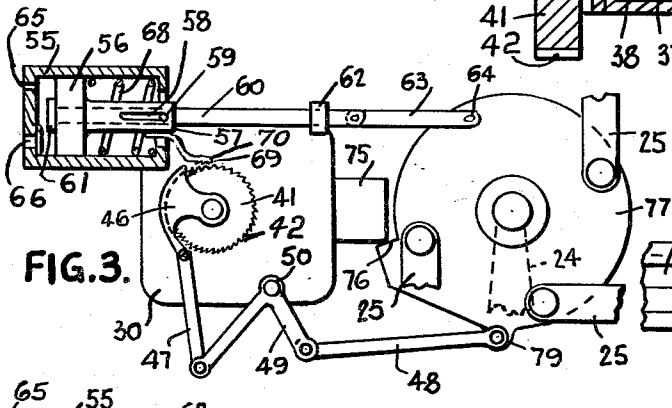


FIG. 3.

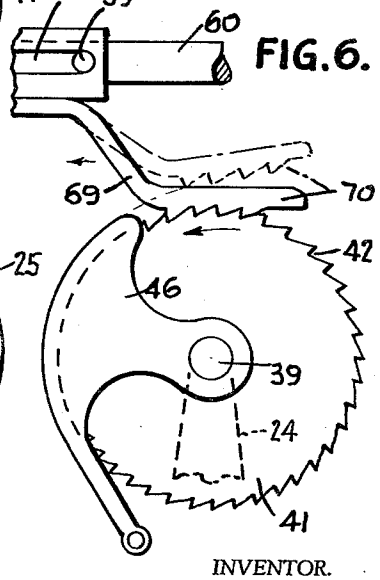


FIG. 6.

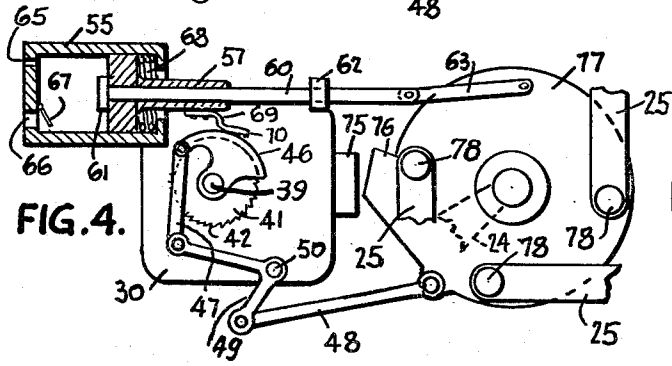


FIG. 4.

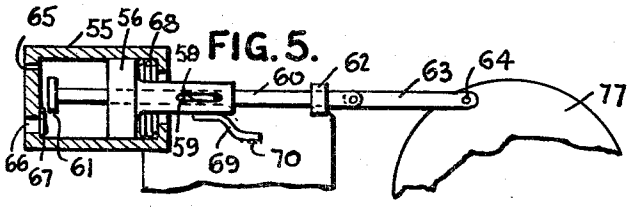


FIG. 5.

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AUTOMATIC DOOR LOCK MECHANISM FOR SAFES, STRONGBOXES AND OTHER RECEPTACLES

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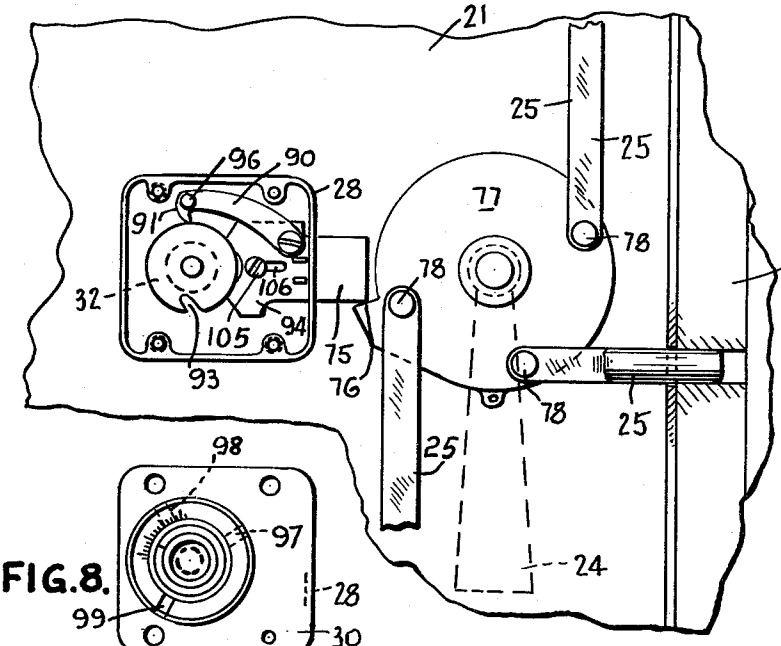


FIG. 7.

FIG. 8.

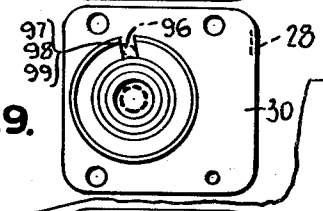


FIG. 9.

FIG. 10.

FIG. 11.

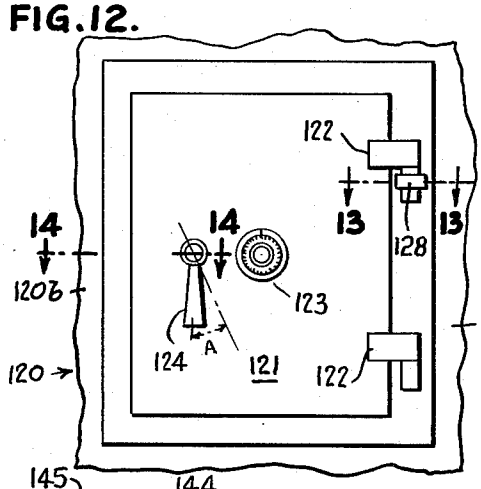
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AUTOMATIC DOOR LOCK MECHANISM FOR SAFES, STRONGBOXES AND OTHER RECEPTACLES

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FIG. 12.



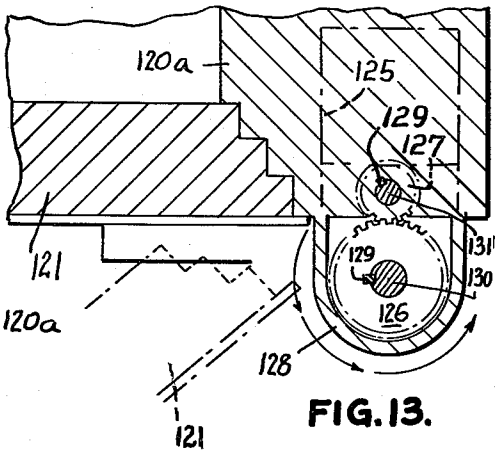


FIG. 13.

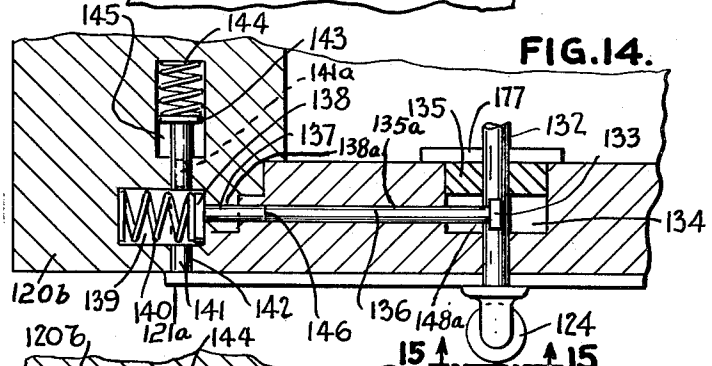


FIG. 14.

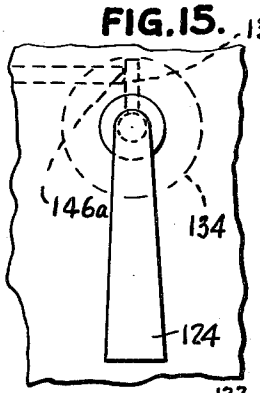


FIG. 15.

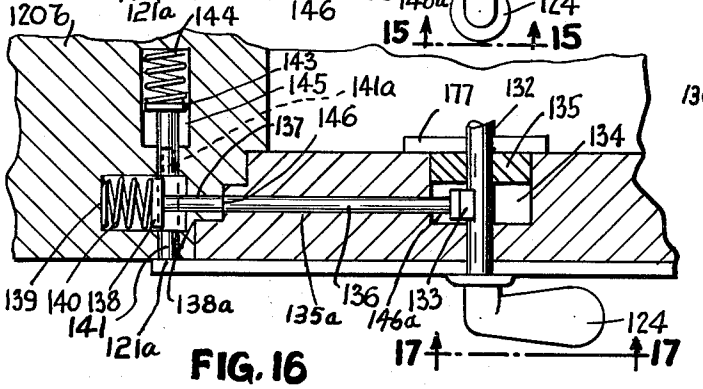


FIG. 16

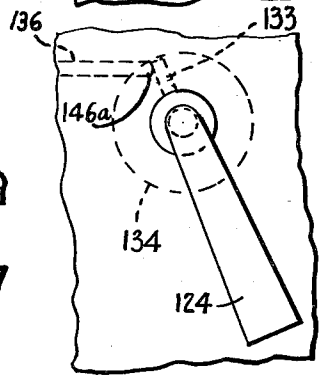


FIG. 17.

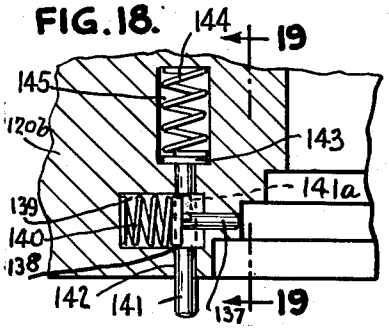


FIG. 18.

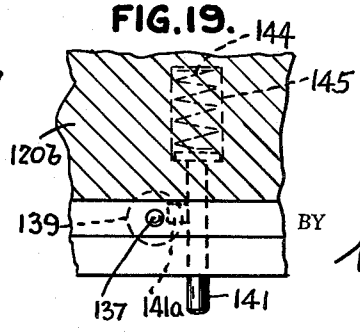


FIG. 19.

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United States Patent Office 2,988,911 Patented June 20, 1961

2,988,911

AUTOMATIC DOOR LOCK MECHANISM FOR SAFES, STRONGBOXES AND OTHER RECEPTACLES

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Filed Aug. 2, 1957, Ser. No. 676,004
11 Claims. (Cl. 70—314)

This invention relates to improvements in locks for safes, especially the kind generally known as combination locks.

One drawback with such locks is the fact that when the handle is turned into closed position, the dial must be spun to break up the opening combination. If this is not done, any unauthorized person can open the door of the safe by just turning the handle into open position.

It is therefore one of the objects of this invention to provide means affording automatic scrambling of the combination of the lock upon turning of the control handle therefor into closed position thereby locking said handle in secure position.

It is a further object of this invention to provide means conducive to a simple and foolproof combination-lock construction in connection with safes, in particular for home use etc.

Yet a further object of the invention resides in the provision of means for automatically closing the door of a safe after the same has been unlocked and after a predetermined lapse of time and of further means for simultaneously automatically resetting the control handle from a previous "open" position to its starting or "closed" position in which the latter position the aforesaid automatic scrambling mechanism of the safe lock combination is initiated.

These and many other objects of the invention will become further apparent from the following detailed description, reference being made to the accompanying drawings, showing preferred embodiments of the invention.

In the accompanying drawings, forming a part of this specification, and in which like numerals are employed to designate like parts throughout the same,

FIG. 1 is a front elevation of a safe door and frame made according to the invention;

FIG. 2 is an enlarged sectional view of the operating mechanism employable in the invention;

FIG. 3 shows schematically the mechanism in locked position;

FIG. 4 shows schematically the mechanism in unlocked door position;

FIG. 5 shows schematically the mechanism immediately after the handle has been turned to closed position;

FIG. 6 is an enlarged partial view of the ratchet wheel device incorporated in said mechanism;

FIG. 7 is a diagrammatic and fragmentary view of a combination mechanism in locked position;

FIG. 8 schematically indicates a plurality of combination disks in unscrambled position;

FIG. 9 schematically indicates a plurality of combination disks in aligned position;

FIG. 10 is a diagrammatic view of the locking mechanism according to the invention in open position;

FIG. 11 shows the arrangement of combination disks in open position and referred to in the specification.

FIG. 12 is a front elevation of a safe door and frame of another embodiment of the invention;

FIG. 13 represents a section on line 13—13 of FIG. 12 of a time controlled door closing mechanism according to this embodiment;

FIG. 14 is a section on line 14—14 of FIG. 12 showing the mechanism for resetting the control handle, with the latter in closed position;

FIG. 15 is a diagrammatic and fragmentary view on line 15—15 of FIG. 14 showing the control handle in closed position;

FIG. 16 represents a section on line 14—14 of FIG. 12 showing the mechanism for resetting the control handle, with the latter in open position;

FIG. 17 is a diagrammatic and fragmentary view on line 17—17 of FIG. 16 showing the control handle in open position;

FIG. 18 is a section on line 14—14 of FIG. 12 showing, in part, the mechanism for resetting the control handle, with the latter in open position; and

FIG. 19 is a diagrammatic and fragmentary section on line 19—19 of FIG. 18.

Referring now more particularly to FIGS. 1 to 6, there is shown at 20 a safe with a door 21. This door 21 has the conventional hinges 22, a combination dial 23 and a handle 24. The door 21 is conventionally secured by latching means including bolts 25 as indicated in dotted lines.

The dial 23 consists generally of the fixed ring 26 and a spinning ring disk 27. All these parts are conventional in safes and safe locks. Referring to FIG. 2, there is shown a metal housing or box 28 having a cover 30. A shaft 29 extends through the door 21 from the dial 23 to the box 28. Secured on the inside of the safe and the box 28 is a flanged wheel 31 having a recess 32 for a purpose later described. The wheel 31 is also provided with a square extension 32*a* thereby connecting a disk 36 to the dial 23. Conventionally, there are three disks 36, 37, 38 in this form of combination dial. However, the change in connection with this invention incorporates a shaft 39 integral with the disk 36. A key 40 connects a ratchet wheel 41 having the teeth 42 to the shaft 39.

To prevent the ratchet wheel 41 from turning while manipulating the dial preparatory to the opening of the safe, a segmental tooth cover 46 (FIG. 3) is interposed at the points of contact of teeth 42 of the ratchet wheel and arm 69 later described. This cover 46 is operated by disk 77 by means of links 47, 48; a bell crank 49 interconnecting the latter is secured to a fulcrum 50.

The fulcrum 50 is integral with the housing cover 30. Also secured to the housing cover 30 is a cylinder 55. Mounted within the cylinder 55 is a piston 56 provided with a sleeve 57 integral therewith. The sleeve 57 is provided with a slot 58 which is in engagement with a pin 59, which in turn is integral with a shaft 60, thus preventing the turning of the piston on the shaft. The shaft 60 is provided at one end with a head 61. Its other end passes through a bearing 62, connecting by means of a link 63 with disk 77 at 64. The cylinder 55 is provided with a bleeder hole 65 (FIG. 4) and a vent hole 66 which can be closed at the proper moment by valve flap 67. A spring 68 normally urges the piston head 56 toward the left or, in other words, toward the vents 65 and 66.

Secured to the sleeve 57 is an arm 69 having an extension with teeth 70. The safe lock is conventionally closed when a bolt 75 interferes with the free rotation of disk 77 by means of a tongue 76. Connected to the disk 77 by means of pins 78 are the locking bolts 25. FIG. 7 illustrates the locking device in closed position. To permit the disk 77 to rotate clockwise into opening position, it is necessary to move the bolt 75 out of the way of tongue 76. For this purpose any conventional combination lock is employed. Shown as an example is a sleeve 88 (FIG. 2), which is integral with the cover 30. Rotatably mounted on this sleeve 88 are the previously mentioned disks 37, 38. Disks 37, 38 as well as disk 36, are made in two parts divided by serrated cut 85 forming teeth.

The combination of the disks is changed by this means

in conventional manner. A hook-shaped arm **90** (FIG. 7) is swingably secured to the bolt **75**. This hook-shaped arm **90** carries the hook portion **91**, which in operative position (FIG. 10) engages a wheel **92** by means of a recess **93**. The bolt **75** is formed with an enlarged portion **94** inside the housing **28**. When slots **97**, **98** and **99** of respective combination disks **36**, **37** and **38** are in alignment (FIG. 9), a pin **96** of the hook arm **90** can drop into the slots when placed through correct combination. Thus, the last turn of the dial **23** will cause the hook arm **90** to slide the bolt **75** inwardly, the same entering the recess **32** of the flanged wheel **31**. The bolt is guided by a screw **105** slidably engaging a slot **106**.

The operation of the device is as follows: The dial **23** is spun in opposite directions, usually once to the right, then to the left, and then again to the right. This will conventionally permit the lever or handle **24** to be turned in the direction of arrow A (FIG. 1). With the handle **24** in the position as shown in FIG. 4, the disk **77** will have turned in a clockwise direction, thereby interposing segmental tooth cover **46** between teeth **70** of arm **69** and the teeth **42** of ratchet wheel **41**. The three bolts **25** pivotably secured to disk **77** are then moved into position shown at **25***a* (FIG. 10) and removed from the wall **21***a* of the door **21**, thereby unlocking the safe.

When the handle **24** is again turned into closed position, the aforesaid mechanism will assume the condition shown in FIG. 5. The guard **46** is adapted to be moved into position between teeth **70** and ratchet wheel **41** to prevent the meshing of teeth **70** with ratchet wheel **41**. Disk **77** now being returned to the position similar to that shown in FIG. 3, the segmental cover **46** will have moved in an anti-clockwise direction to its original position, similar to that shown in FIG. 3, thereby permitting the engagement of teeth **70** of arm **69** with the teeth **42** of ratchet wheel **41**. The shaft **60** and shaft head **61** will have moved to the right in the cylinder **55**. The spring **68** will then force the piston head **61** of piston **56** toward the vent **65** which will permit the air to escape very slowly, thus delaying the travel of the piston **56**. The teeth **70** of arm **69** secured to sleeve **57** will turn the ratchet wheel **41** (FIG. 6) and thus scramble the combination of the lock. Initial closing rotation of ratchet wheel **41** will cause the pivoted arm **90** to pivot counterclockwise and the hook **91** will remain in recess **93**. Further rotation causes the scrambling of the disks **36**, **37** and **38**. This is achieved since wheel **92** does not lie in the same vertical plane as arm **90**.

Referring now to the embodiment illustrated in FIGS. 12 to 19, there is secured within the right-hand wall **120***a* of safe **120** a conventional time mechanism **125**. A hinge pintle **130** passes through a gear **126** which is in mesh with another gear **127**. Swinging of the door **121** which is formed with a flanged portion **121***a* will cause the gear **126** to rotate the gear **127**, which in turn will load the spring (not shown) of the time mechanism **125**. When the door has been unlocked and opened, the time mechanism **125** will after a time lapse cause the door to swing shut.

As shown in FIGS. 14 to 19, shaft **132**, to which is secured handle **124** of the door **121**, is held in place by means of disk **177** and is provided with a lug **133** rotatably displaceable with that shaft in recess **134** of door **121**, this recess being provided with a cover or guide plate **135** for the shaft. Slidably mounted in bore **135***a* communicating with recess **134** of the door **121** is a first pusher rod **136**, one end **136***a* of which abuts against lug **133**, its other end **146** contacting a second pusher rod **137**, which is slidably mounted in bore **138***a* communicating with recess **139** of the left-hand wall **120***b* of the safe. Pusher rod **137** is provided with head **138** upon which impinges coil spring **140** mounted in the recess **139** of the safe wall.

A plunger **141** provided with an upwardly extending detent lug **141***a* and a head **143** is slidably mounted in bore **142** disposed below and at a right angle with respect to bore **138** in the left-hand wall **120***b* of the safe. Communicating with bore **142** is a recess **145** containing a coil spring **144**, the pressure of which causes the plunger **141** to protrude from the wall **120***b*, when the door **121** is open. With the door open and plunger **141** in protruding position, as shown in FIGS. 18 and 19, lug **141***a* is in the path of head **138** of the pusher rod **137**, thereby restraining the action of spring **140** and preventing this rod from protruding out of the wall **120***b* of the safe.

When the door **121** is closed, as shown in FIG. 16, its flanged portion **121***a* forces plunger **141** into bore **142** against the action of spring **144**, thereby displacing the lug **141***a* from the path of pusher head **138** and releasing the action of spring **140**. Spring **140** forces plunger **137** to move out of the left-hand wall **120***b*, thereby engaging the adjacent end **146** of pusher rod **136** and sliding the latter from the position shown in FIGS. 16 and 17 into the position shown in FIGS. 14 and 15. The end **146***a* of pusher rod **136** will now have forced lug **133**, and with it, shaft **132**, to which it is secured, together with handle **124**, back into locked position.

Simultaneously with the turning of shaft **132** to locked position, a scrambling mechanism, such as that to that illustrated in FIGS. 2 to 11 and including parts comparable to the teeth **70**, guard **46** and ratchet wheel **41**, connected with the shaft **132** and combination lock **123** will be brought into operation and scramble the combination lock.

It will be thus seen from the foregoing description that there has been disclosed a device for automatically locking a safe and scrambling the combination lock thereof following a predetermined lapse of time after the safe is unlocked, with the safe door in closed position, said device comprising motive means actuated by the lock mechanism itself, for returning the lock mechanism to locked position and for simultaneously scrambling the combination lock, link means operatively connecting said motive means and the lock mechanism, first means associated with said motive means to restrain the actuation of said motive means for a predetermined lapse of time after the safe is unlocked, and second means for locking the safe, while simultaneously scrambling the combination lock of the safe and returning the handle of the safe to closed position.

Various changes and modifications may be made without departing from the spirit and scope of the present invention and it is intended that such obvious changes and modifications be embraced by the annexed claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent, is:

1. In a safe provided with a spinning ring, disk type, combination lock and a lock control handle secured to a lock bolt bearing disk in the safe door, rotatable to move the lock bolts into open position for unlocking the safe, and closed position for locking the safe; automatic mechanism for scrambling the combination lock of the safe and locking the safe following a predetermined lapse of time after it is unlocked and the safe door is closed, comprising a ratchet wheel operatively connected with the spinning ring disk of the combination lock and with the lock bolt bearing disk, a ratchet arm actuable by and operatively connected to said lock bolt bearing disk, and capable of engaging with and rotating said ratchet wheel, whereby said spinning ring disk may be spun to scrambled position, and said lock bolt bearing disk operatively connected to said ratchet wheel may be rotated into closed position, spring means for operating said ratchet arm, said spring means becoming operative when the safe is unlocked, and spring retarding means for delaying the movement of said ratchet arm and said ratchet wheel, said spring means engaging said spring retarding means so that when the lock control handle and the lock bolt bearing disk are turned to open position to

unlock the safe, and the safe door is closed, said spring means becomes operative after a predetermined lapse of time to actuate said ratchet arm and said ratchet wheel for turning the lock bolt bearing disk and moving the lock bolts into closed position thereby locking the safe and simultaneously spinning the disk into scrambled position.

2. In a safe provided with a combination lock, a lock control handle for locking and unlocking its safe door with and from a wall member in the safe, and a time mechanism for closing the unlocked door at a predetermined time after the opening thereof; a device for automatically locking said door and for scrambling the combination lock after a predetermined lapse of time upon the closing thereof; said device comprising a rotatable shaft extending through the safe door and secured to the lock control handle, said shaft being operatively connected with the combination lock, first spring-operated means in the wall member of the safe and engaging with said rotatable shaft and second means in the safe door cooperating with said first spring-operated means and with said shaft for turning said shaft and said control handle to locking position upon closing of the safe door, spring-operable detent means in the wall member of the safe, movable into the path of movement of said first spring-operated means when the safe door is open, and displaceable from the path of movement of said first spring-operable means when the safe door is closed, and a flanged portion the safe door for engaging and displacing said detent means from the path of movement of said first spring-operated means after a predetermined lapse of time upon closing of the safe door, whereby when the safe door is closed, said flanged portion engages and displaces said detent means from the path of movement of said first spring-operated means, and said first spring-operated means moves said second means and said rotatable shaft and control handle into locked position while simultaneously scrambling the combination lock.

3. A safe comprising a wall having an opening therein, a door for closing said opening, hinge means pivotally mounting said door on said wall, latching means carried by said door engageable with said wall to secure said door to said wall in a closed position, a handle for actuating said latching means mounted in said door and engaging said latching means, a combination lock mounted in said door, said combination lock being engageable with said latching means, door closing means associated with said hinge means for closing said door, handle operating means mounted in said door engageable with said handle for actuating said handle to move said handle to a closed position to secure said door, and scambling means mounted in said door and associated with said combination lock for scrambling said combination lock, said handle operating means including a spring-operated plunger in said door engaging said handle for turning said handle to a closed position, spring-operable detent means in said wall and movable into the path of movement of said plunger when said door is open, said detent means being displaceable from the path of movement of said plunger when said door is open, said door having a flanged portion engageable with said detent means to displace said detent means from the path of movement of said plunger when said door is closed.

4. A safe comprising a wall having an opening therein, a door for closing said opening, hinge means pivotally mounting said door on said wall, latching means carried by said door engageable with said wall to secure said door to said wall in a closed position, a handle for actuating said latching means mounted in said door and engaging said latching means, a combination lock mounted in said door, said combination lock being engageable with said latching means, door closing means associated with said hinge means for closing said door, handle operating means mounted in said door engageable with said handle for actuating said handle to move said handle to a closed position to secure said door, and scrambling means mounted in said door and associated with said combination lock for scrambling said combination lock, said combination lock including a spinning ring disk and a lock bolt bearing disk engageable with said latching means, said scrambling mechanism including a ratchet wheel operatively connected with said spinning ring disk and with said lock bolt bearing disk, a ratchet arm actuable by and operatively connected to said lock bolt bearing disk for rotating said ratchet wheel, spring means for operating said ratchet arm connected thereto, and spring retarding means for delaying the movement of said ratchet arm and said ratchet wheel, whereby said spring means becomes operative after a predetermined time to actuate said ratchet arm and said ratchet wheel to move said latching means to a closed position while turning said spinning ring disk to a scrambled position, said handle operating means including a spring-operated plunger in said door engaging said handle for turning said handle to a closed position, spring-operable detent means in said wall and movable into the path of movement of said plunger when said door is open, said detent means beig displaceable from the path of movement of said plunger when said door is open, said door having a flanged portion engageable with said detent means to displace said detent means from the path of movement of said plunger when said door is closed.

5. A safe comprising a wall having an opening therein, a door for closing said opening, hinge means pivotally mounting said door on said wall, latching means carried by said door engageable with said wall to secure said door to said wall in a closed position, a handle for actuating said latching means mounted in said door and engaging said latching means, a combination lock mounted in said door, said combination lock being engageable with said latching means, door closing means associated with said hinge means for closing said door, handle operating means mounted in said door engageable with said handle for actuating said handle to move said handle to a closed position to secure said door, and scrambling means mounted in said door and associated with said combination lock for scrambling said combination lock, said door closing means including a timing mechanism in said door for actuating said door closing means, said timing mechanism including a spring, said door having a first gear thereon, said hinge means including a second gear engaging said first gear, said second gear being rotated by said timing mechanism upon action of said spring to close said door upon lapse of a predetermined period, said handle operating means including a spring-operated plunger in said door engaging said handle for turning said handle to a closed position, spring-operable detent means in said wall and movable into the path of movement of said plunger when said door is open, said detent means being displaceable from the path of movement of said plunger when said door is open, said door having a flanged portion engageable with said detent means, to displace said detent means from the path of movement of said plunger when said door is closed.

6. A safe comprising a wall having an opening therein, a door for closing said opening, hinge means pivotally mounting said door on said wall, latching means carried by said door engageable with said wall to secure said door to said wall in a closed position, a handle for actuating said latching means mounted in said door and engaging said latching means, a combination lock mounted in said door, said combination lock being engageable with said latching means, door closing means associated with said hinge means for closing said door, handle operating means mounted in said door engageable with said handle for actuating said handle to move said handle to a closed position to secure said door, and scrambling means mounted in said door and associated with said combination lock for scrambling said combination lock, said door closing means including a timing mechanism in said door for actuating said door closing means, said timing mechanism including a spring, said door having

a first gear thereon, said hinge means including a second gear engaging said first gear, said second gear being rotated by said timing mechanism upon action of said spring to close said door upon lapse of a predetermined period, said handle operating means including a spring-operated plunger in said door engaging said handle for turning said handle to a closed position, spring-operable detent means in said wall and movable into the path of movement of said plunger when said door is open, said detent means being displaceable from the path of movement of said plunger when said door is open, said door having a flanged portion engageable with said detent means, to displace said detent means from the path of movement of said plunger when said door is closed, said combination lock including a spinning ring disk and a lock bolt bearing disk engageable with said latching means, said scrambling mechanism including a ratchet wheel operatively connected with said spinning ring disk and with said lock bolt bearing disk, a ratchet arm actuable by and operatively connected to said lock bolt bearing disk for rotating said ratchet wheel, spring means for operating said ratchet arm connected thereto, and spring retarding means for delaying the movement of said ratchet arm and said ratchet wheel, whereby said spring means becomes operative after a predetermined time to actuate said ratchet arm and said ratchet wheel to move said latching means to a closed position while turning said spinning ring disk to a scrambled position.

7. In a closure arrangement for a wall having an opening and a door for closing said opening which door is equipped with hinge means pivotally mounting said door on said wall; latching means carried by said door engageable with said wall to secure said door to said wall in a closed position, a handle for actuating said latching means mounted in said door and connected to said latching means, a combination lock mounted in said door, said combination lock being engageable with said latching means, said combination lock including a toothed wheel, handle operating means mounted in said door and engageable with said handle for actuating said handle to move the latter to a closed position, and scrambling means including a toothed member mounted in said door, said toothed member engaging said toothed wheel of said combination lock for scrambling said combination lock, said door closing means including a timing mechanism in said door for actuating said door closing means, said timing mechanism including a spring, said door having a first gear thereon, said hinge means including a second gear engaging said first gear, said second gear being rotated by said timing mechanism upon action of said spring to close said door upon lapse of a predetermined period of time.

8. A closing arrangement for a wall having an opening, a door for closing said opening, hinge means supporting said door for movement into and out of said

opening to open and close said opening, latching means carried by said door and movable between positions in engagement with said wall to lock said door to said wall in a closed position and a position clear of said wall to release said door, a combination lock mounted on said door including a member engageable with said latching means to prevent movement of said latching means out of engagement with said wall when said combination is scrambled but releasing said latching means when not scrambled, said hinge means including means to move said door to a closed position after a predetermined interval after it has been opened and including means connected to said latching means and said combination lock means and effective to move said latching means into engagement with said door to lock said door after said door is moved to a closed position and to scramble said combination after said latching means is moved into engagement with said door.

9. A closing arrangement for a wall according to claim 8, wherein said latching means includes a bolt slidable on said door into engagement with said wall and handle means connected to said bolt to shift said bolt between locking and releasing position.

10. A closing arrangement for a wall according to claim 8, wherein said hinge means includes time delay means.

11. A closing arrangement for a wall having an opening, comprising a door for closing said opening, a hinge supporting said door for swinging movement into and out of said opening, a displaceable latching bolt mounted on said door for displacement into and out of engagement with said wall, a combination lock mounted on said door including a member engageable with said sliding bolt to prevent withdrawal of said bolt out of engagement with said wall when said combination is scrambled but releasing said bolt when not scrambled, time delay means connected to said hinge and effective to close said door by swinging it about said hinge after it has been opened a predetermined length of time, and means connected to said time delay means, said latching bolt and said combination lock effective to move said latching bolt into a closed position in engagement with said wall after said door is closed by said time delay means and to scramble said lock after said bolt is in a door locking position.

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