

July 12, 1932.

W. F. DIESEL

1,867,001

LOCK MECHANISM

Filed May 18, 1929

3 Sheets-Sheet 1

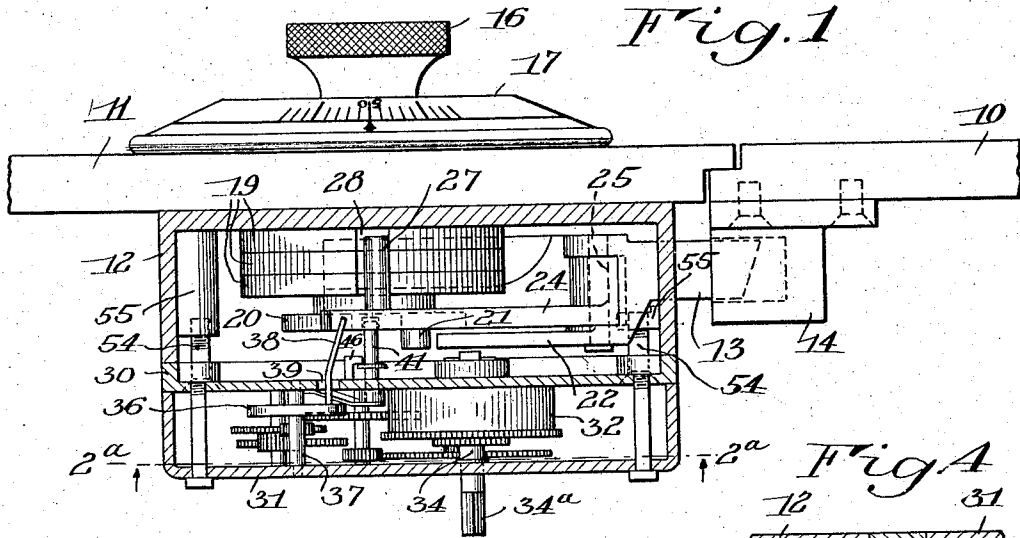


Fig. 1

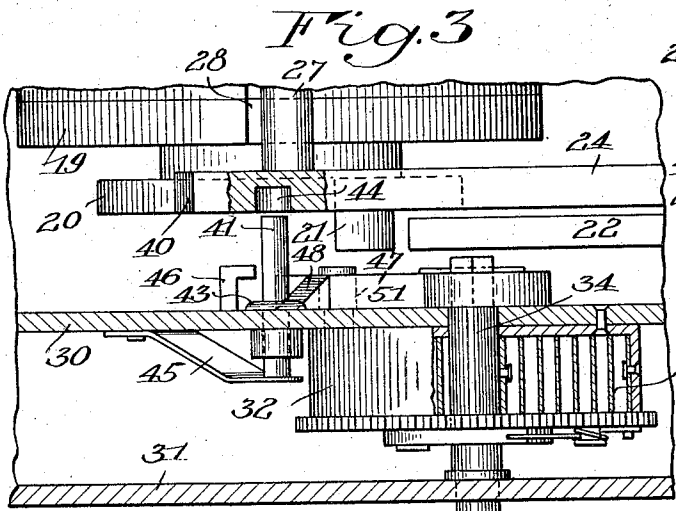


Fig. 3

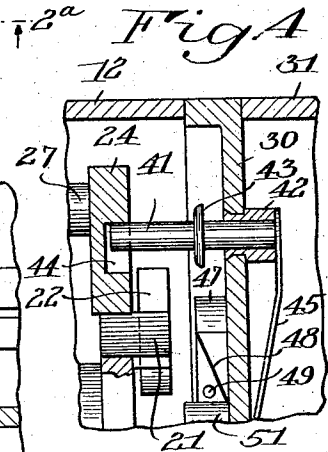


Fig. 4

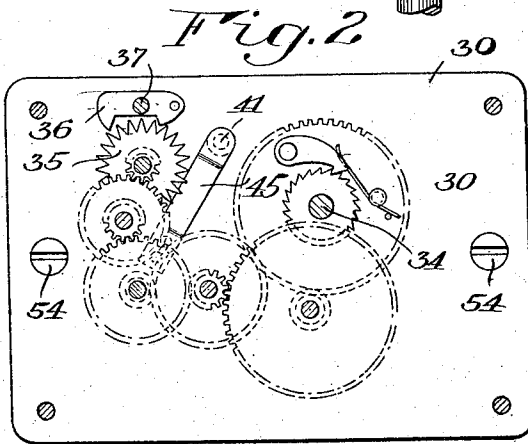


Fig. 2

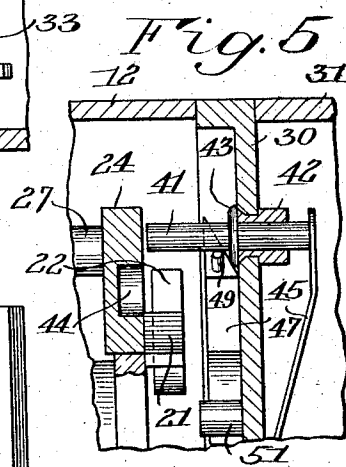


Fig. 5

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Fig. 6

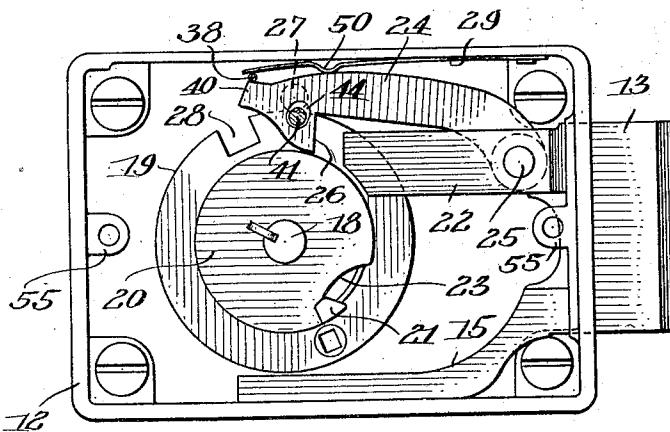
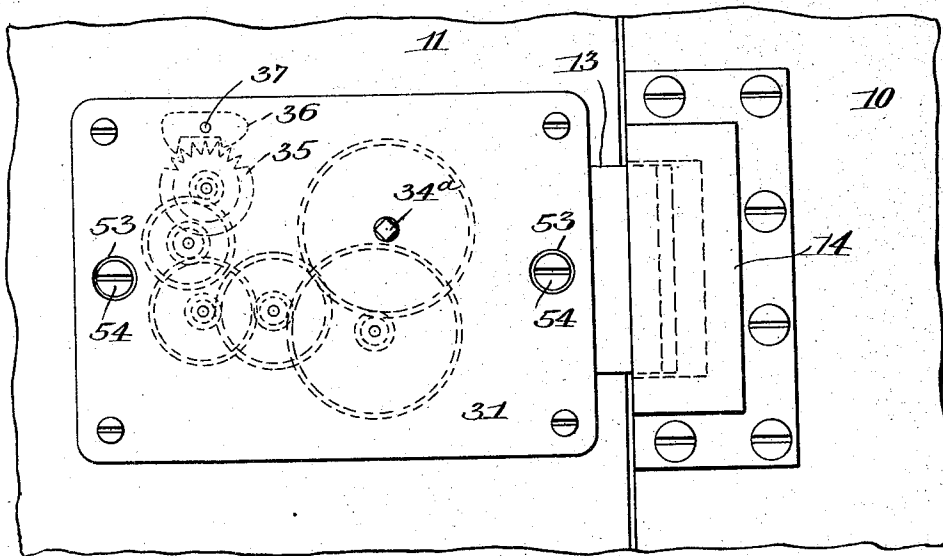


Fig. 7

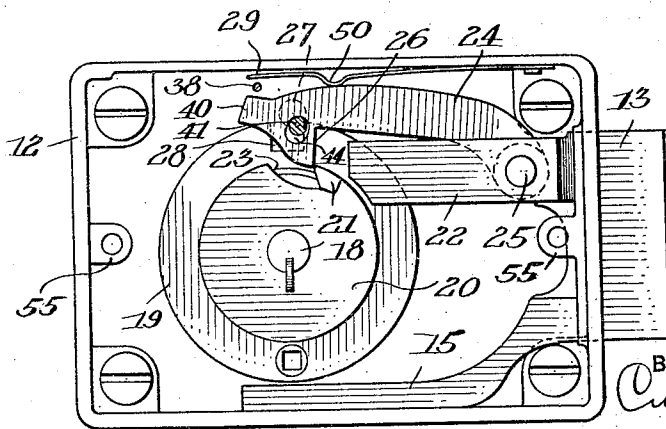


Fig. 8

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3 Sheets-Sheet 3

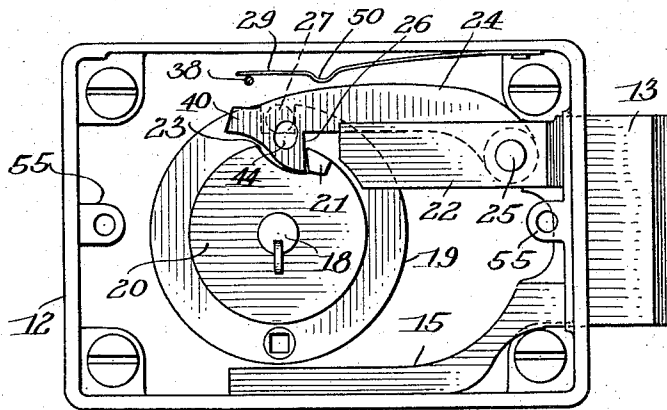


Fig. 9

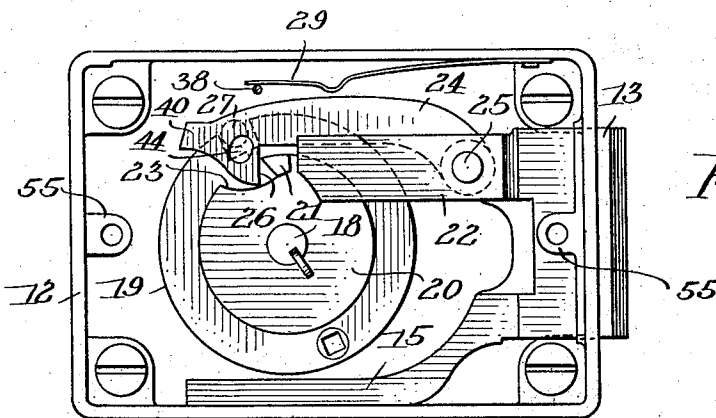


Fig. 10

Fig. 11

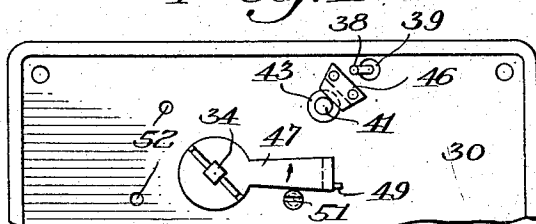


Fig. 12

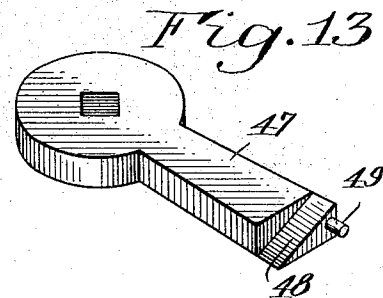
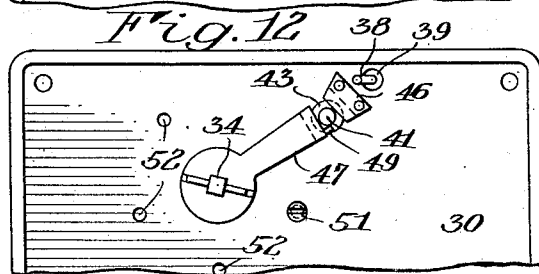


Fig. 13

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UNITED STATES PATENT OFFICE

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LOCK MECHANISM

Application filed May 18, 1929. Serial No. 364,250.

The present invention relates to a lock mechanism for guarding safes, vaults and other compartments employed for protecting valuables of various kinds.

One object of the invention is to provide improved means of the class described embodying a lock mechanism in conjunction with control means therefor, such as a timing mechanism, normally held in check and adapted to be released through manipulation of certain parts of the mechanism for operation for a selected period whereby to effect release of a guard for the bolt.

A further object of the invention is to provide in conjunction with a lock a device which will automatically move to protecting position with respect to the bolt when moved to locking position, and also to provide operating means for releasing said device normally held in check by one or more parts of the lock and arranged to be freed through manipulation thereof.

A further object of the invention is to provide in conjunction with a tumbler lock, preferably of the combination type, improved means for delaying release of the bolt after successful operation of the tumbler mechanism embodying a timing mechanism normally held in check, and a device to be released thereby after operation thereof for a selected period, said device automatically assuming a protecting position with respect to the bolt when the latter is moved to locking position and the timing mechanism being under the control of the lock and released thereby upon successfully operating the tumbler mechanism.

A further object of the invention is to provide an improved lock control mechanism applicable to different types of existing combination locks and which can be readily applied thereto with comparatively little expense, said mechanism being designed to delay release of the bolt for a given period after successfully operating the combination.

To these and other ends the invention resides in certain improvements and combinations of parts, all as will be hereinafter more fully described, the novel features being

pointed out in the claims at the end of the specification.

In the drawings:

Fig. 1 is a sectional plan of a locking mechanism embodying one form of invention;

Fig. 2 is a sectional elevation taken on line 2a—2a of Fig. 1;

Fig. 3 is a fragmentary part sectional plan showing the device for guarding the bolt moved to release position by the timing mechanism;

Fig. 4 is a fragmentary sectional elevation showing the guard in protecting position with relation to the bolt;

Fig. 5 is a similar view showing the guard in release position;

Fig. 6 is a view in elevation showing the lock and the keeper for the bolt thereof as applied to a safe or other enclosure;

Fig. 7 is a view in elevation of the lock proper with the cover of the casing removed showing the bolt extended with the operating parts therefor in position to hold the timing mechanism in check;

Fig. 8 is a similar view with the operating parts slightly shifted to free the timing mechanism for operation;

Fig. 9 is a view similar to Fig. 8 showing the bolt actuating member lowered into the recess of the operating disc in position to be actuated by the latter;

Fig. 10 is a similar view with the disc rotated to position to effect release of the bolt.

Fig. 11 is a view in elevation looking at the inner face of the cover plate for the casing containing the tumbler mechanism on which is shown the motor operated arm for effecting release of the guard for the bolt;

Fig. 12 is a view similar to Fig. 11 with the arm in position to effect release of the guard, and

Fig. 13 is a detailed perspective view of the arm.

Similar reference numerals throughout the several views indicate the same parts.

The present invention is designed to afford a safe-guard particularly against daylight holdups of bank vaults, safes, and other enclosures containing valuables of various kinds, by delaying opening of the safe for a

selected period after effecting successful operation of the lock for controlling the bolt work. In the present embodiment of the invention this is accomplished by providing 5 guard or protecting means for one of the operating parts of the lock which controls the movement of the bolt, preferably the gate associated with the tumbler mechanism where the device is to be used with a combination 10 lock as is shown in the drawings. The guard or protecting means is under the control of the timing mechanism which can be operated for various selected periods before releasing the guard means. Release of the timing 15 mechanism however is effected by successfully operating the combination, where a combination lock is employed, although other types of locks may be employed with means for effecting their release, in which case release of the timing mechanism will be effected 20 by a movable portion of the lock upon operation thereof to a predetermined position. In other words, the invention contemplates the use of a lock of any suitable type having operating or control means for the bolt which 25 when in locking position will be protected by the automatic operation of a guard to be subsequently released by a timing mechanism which in turn is released by the movement 30 of a portion of the lock to a predetermined position. In the present instance the guard is in the form of a spring pressed plunger which moves into holding position with respect to the gate of a tumbler lock of the combination type when the bolt is extended and 35 which when moved to said position serves as a means for holding in check the timing mechanism provided to effect release of the guard after the combination has been worked. By operating the combination the 40 gate is permitted to shift sufficiently to release the timing mechanism but not enough to become operatively connected with the rotary disc on the operating spindle of the 45 lock.

Referring to the drawings, 10 represents a portion of a safe or vault, and 11 a door or closure therefor, to the inner face of which 50 is secured by any suitable means a frame or casing 12 as best shown in Fig. 1. A bolt 13 is carried by the casing and when in locking position projects into a keeper 14 secured to the wall of the safe 10 as shown in Figs. 1 and 6. The bolt is guided in the end wall 55 of the casing and also by an offset portion 15 resting on the bottom of the casing as shown in Fig. 7.

The lock shown is of the combination type and includes the usual knob and dial plate 60 16 and 17 respectively located on the outside of the closure. Disposed on the operating spindle 18 are a plurality of tumblers 19 and on the inner end of the spindle is keyed the operating disc 20 having a lug 21 for engaging 65 the end of an arm 22 on the bolt for moving

the latter from release to locking position. The disc is provided with a cam surface 23 for raising the gate or bolt operating member 24 pivoted at 25 upon the bolt. The bolt 70 is retracted to the position shown in Fig. 10 by engagement of the lug 21 on the disc with a shoulder 26 on the gate when rotating the disc in a counter-clockwise direction from the position shown in Fig. 9. The gate carries a 75 laterally projecting member 27 engaging the peripheral portions of the tumblers to hold the gate in release position when the combination is destroyed, said member dropping into the notches 28 of the tumblers upon successful operation of the combination. The 80 shoulder of the gate is thus permitted to move into engagement with the cam portion 23 of the disc where it can be engaged and operated by the lug on the disc. When the 85 notches of the tumblers are all moved into registry with the projecting member 27 on the gate, a spring 29 will act to positively insure a downward movement of the gate from the position shown in Fig. 7 to that 90 shown in Fig. 9. The spring however has an additional function as will appear hereinafter.

The casing 12 has a cover plate 30 secured thereto and connected with said plate is a second 95 plate 31. The timing mechanism is located between said plates and comprises the usual spring motor and a suitable train of gears as best shown in Figs. 1 and 2. The drum 32 is shown partly in section in Fig. 3 and carries the driving spring 33 which is 100 connected with the drum and with the drive shaft 34 in the usual manner. The shaft has an extended portion 34a arranged to receive a key (not shown) for setting the timing mechanism for operation for any given period selected in accordance with the conditions under which it is desired to operate the locking mechanism. A train of gears operated by the motor shaft 34 serves to drive 105 the escapement wheel 35, the pallet for controlling the same being indicated at 36. The pallet is mounted to oscillate about the axis of the pivot 37 and is provided with a laterally extending finger 38 projecting through 110 an opening 39 in the plate 30, Fig. 1, and is extended between the spring 29 and the inner end portion 40 of the gate 24, which when in the position shown in Fig. 7 cooperates with the spring to hold the pallet against oscillation whereby to hold in check the timing mechanism. 115

The particular means shown for protecting or guarding the bolt comprises preferably a plunger 41 guided in a bearing 42 carried by the plate 30 as indicated in Figs. 4 120 and 5. The plunger has a collar 43 thereon for engagement with the bearing to limit the outward movement of the plunger. The gate or bolt control member 24 is recessed at 44 to receive the inner end of the plunger 125

when the safe is locked whereby to prevent dropping of the gate to the position shown in Fig. 9. The plunger is automatically moved to the protecting position shown in Fig. 4 preferably by a spring 45 having one end fixed on the plate 30 and the other engaging the outer end of the plunger for the purpose of urging it inwardly when the parts are in a predetermined relationship. Movement of the plunger inwardly is limited by a stop 46 on the plate 30 which lies in the path of the collar 43 and engages the latter as shown in Fig. 1 when the plunger is moved into the recess 44 to the position shown in Fig. 4. Release of the plunger or movement thereof to the position shown in Figs. 3 and 5 is effected by the timing mechanism through the operation of an arm 47 fixed on the motor shaft 34. The arm carries a cam or wedge-shaped portion 48 for engaging the inner face of the collar 43 to retract the plunger to the position shown in Fig. 5 on movement of the arm by the motor shaft from any predetermined set position such as that shown in Fig. 11, to release position as shown in Fig. 12. Movement of the arm to release the plunger is limited to the position shown in Fig. 12 by the contacting of a projection 49 on the arm with the plunger which preferably takes place before the motor becomes run down whereby to insure sufficient power at all times to effect release of the plunger.

The spring 29 for holding the pallet controlling finger 38 in engagement with the gate as shown in Figure 7 is provided with a downwardly offset portion 50 which rests on the gate. By successfully operating the combination to bring the parts into the relationship shown in Fig. 8 the spring will urge the gate downwardly until it is checked by the plunger 41, thus releasing the pallet control finger 38 which frees the timing mechanism for operation. The spring motor will then begin to rotate the shaft 34 to move the arm 47 upwardly until the cam 48 thereon engages the inner face of the collar 43 of the plunger to shift the latter to release position, after which the gate will drop to the position shown in Fig. 9. The knob 16 is then turned to effect rotation of the disc 20 to the position shown in Fig. 10 during which time the lug 21 on the disc will retract the bolt and permit the safe to be opened. Upon closing the safe door it can again be locked by rotating the knob to move the disc 20 in a clockwise direction as viewed in Fig. 10, during which time the lug 21 will engage the arm 22 and move the bolt to extended locking position as shown in Fig. 9, after which the knob is rotated in a reverse direction to destroy the combination as when the parts are in the position shown in Fig. 7.

Means is provided by which to regulate the period of operation of the timing mechanism in moving the arm 47 to release the gate hold-

ing plunger 41 in the manner described above. Any suitable means may be provided for this purpose, but I prefer to use an adjustable stop pin 51 in the path of the arm 47 which can be screwed into any of a series of threaded openings 52 in the plate 30 as shown in Figs. 11 and 12. By inserting the key mentioned above on the end 34a of the shaft 34 and turning it to rotate the arm 47 in a counterclockwise direction as viewed in Fig. 12, the arm can be brought into engagement with the stop pin 51 in whatever position it may be located. In other words for a relatively short period of operation of the timing mechanism the pin will be in the position shown in Figs. 11 and 12, but if it is desired to increase the time required for opening the safe after the combination has been successfully operated, the pin will be removed from the position shown and secured in one of the remaining holes 52. The particular position of the pin will of course depend on the time period selected which may be varied as desired. For the maximum period the arm 47 may be given substantially a complete revolution by omitting the pin in which event the projection 49 on the arm will engage the plunger on the side opposite to that shown in Fig. 12. In assembling the parts the pin can be set in any position desired and if it should become advisable to change the period of operation of the timing mechanism the plates 30 and 31 and the mechanism thereon can be removed as a unit merely by operating a tool through openings 53 in the plate 31 to withdraw the screws 54 which take into lugs 55 on the casing 12 to secure said unit to the casing. When this has been done the stop 51 can be secured within any one of the holes 52 desired.

While with the locking mechanism described herein it is intended primarily to use the protecting feature to secure safes, vaults and the like for comparatively brief intervals during banking or business hours, such for example as ten or fifteen minute periods after the combination is operated, it will be understood that the timing mechanism may be adjusted to effect protection for relatively long periods where the conditions of operation so demand.

In the operation of the locking mechanism, assuming that it is desired to keep the safe locked for the greater portion of the day and to open it only for short intervals at such times as may be required, the timing mechanism before closing the safe door will be set for a given period, say for example, ten minutes. Upon closing the door and destroying the combination the gate or bolt control member will be moved to the position shown in Fig. 7 and the recess 44 will be brought into alinement with the plunger or guard 41 at which time the latter under the action of the spring 45 will be automatically moved

into the recess. In this position of the parts the timing mechanism is held in check by reason of the fact that the laterally projecting portion 38 of the pallet controlling or escapement wheel is held against oscillation by the spring 29 and the end portion 40 of the gate, Fig. 7. This condition will prevail until the combination is successfully operated to permit the gate to move to the position shown in Fig. 8. In this position of the parts the gate would ordinarily drop into the recessed portion of the operating disc as shown in Fig. 9, but in the present arrangement it is arrested by the guard 41. Its movement however has been sufficient to release the pallet control member 38 so that the timing mechanism is freed for operation. As long as the guard remains within the recess 44 it will prevent retraction of the bolt as will be understood, although the combination has been previously operated. Upon operation of the timing mechanism for the period previously determined upon the cam portion 48 on the advancing motor operated arm 47 will move into engagement with the collar 43 and will withdraw the plunger from engagement with the gate to the position indicated in Fig. 5. The gate will then immediately drop to the position shown in Fig. 9, both under the action of gravity and the spring 29. The dial knob can then be turned to rotate the operating disc 20 to the position shown in Fig. 10 thus effecting release of the bolt. After operating the lock in the manner described, the plunger will be held in retracted position by the arm 47 which at this time is in the position shown in Figs. 5 and 12. In this position of the parts the timing mechanism is rendered inactive and is disconnected from the lock proper which can be operated in the usual way and entirely independent of the timing mechanism. However, when the arm is reset as shown in Fig. 11 and the safe locked the plunger will automatically return to protecting position with respect to the gate by moving into locking engagement therewith. It will be seen therefore that the present mechanism affords a safe guard particularly against daylight holdups by making it impossible for anyone in control of the vaults or safes to open the same immediately upon demand by those attempting to rob the bank. The delay in this manner of the successful operation of the present locking mechanism will be more or less hazardous to those attempting to gain access to the contents of the safe who are not authorized to do so since it will be necessary for them to await operation of the timing mechanism, thus running the risk of being captured.

I claim as my invention:

1. In mechanism of the class described, the combination of a lock comprising a bolt and relatively movable cooperating parts for shifting the bolt including an actuating mem-

ber for said bolt connected therewith and a rotary operating device arranged when rotated in one direction to cooperate with said member to effect release of the bolt and adapted when rotated in an opposite direction to move said actuating member to a non-cooperating position, a timing mechanism having a part engaged by said member when in said last mentioned position whereby the timing mechanism is held in check, a guard arranged for movement automatically into locking engagement with said actuating member when in said non-cooperating position and adapted to be released by the timing mechanism after operation thereof for a predetermined period, said rotary device being operable to permit said actuating member to shift relative to the guard whereby to free the timing mechanism for operation to effect release of the guard.

2. In mechanism of the class described, the combination of a lock for safe doors and the like comprising a bolt, means operable from the exterior of the safe when the door is closed including a rotary element and an actuating member pivotally connected with the bolt and arranged to cooperate with the rotary element when in a predetermined relationship relative thereto to shift the bolt, said rotary element having a cam portion for shifting the actuating member to a predetermined position after the bolt has been moved to locking position, a guard for the actuating member arranged to move automatically into engagement therewith upon movement of the actuating member to said position, a timing mechanism having a part engaged by said actuating member when in said position whereby the timing mechanism is held in check, said actuating member being movable automatically to a position at which it will release said part upon movement of the rotary element to a predetermined position whereby to release the timing mechanism for operation, and a member actuated by the timing mechanism arranged after operation thereof for a predetermined period to release the guard whereby to free said actuating member for cooperation with the rotary element.

3. In mechanism of the class described, in combination, a bolt, a combination lock having relatively adjustable parts for operating the bolt, a guard arranged to move automatically into holding position with respect to one of said parts when adjusted to a predetermined position whereby to prevent release of the bolt, timing mechanism arranged to be held in check by said part when in said position and adapted to be released thereby upon successfully operating the combination, and means actuated by the timing mechanism after operation for a predetermined period arranged to release the guard to permit operation of said parts to retract the bolt.

4. In mechanism of the class described, in combination, a bolt, a combination lock having relatively adjustable parts for operating the bolt, one of said parts having an abutment thereon, a spring pressed plunger arranged to move into engagement with said abutment when said last mentioned part is moved to a predetermined position whereby to prevent release of the bolt, and a timing mechanism for withdrawing said plunger after operation for a predetermined period, said timing mechanism being normally held in check by said last mentioned part when in said position and being released for operation upon successfully operating the combination.

5. In mechanism of the class described, in combination, a bolt, a combination lock having relatively adjustable parts for operating the bolt, one of said parts having an abutment thereon, a spring pressed plunger arranged to move into engagement with said abutment to prevent release of the bolt when said last mentioned part is moved to a predetermined position, a timing mechanism having a portion arranged to be engaged by said part when in said position, a spring engaging said portion and cooperating with said last mentioned part to hold the timing mechanism in check, and a member arranged to be operated by the timing mechanism and having a cam thereon for engaging the plunger to release the same, said timing mechanism being freed for operation upon successfully operating the combination.

6. In mechanism of the class described, the combination of a bolt, a combination lock having relatively adjustable parts for operating the bolt, a guard arranged to move automatically into holding position with respect to one of said parts when said part is adjusted to a predetermined position whereby to prevent release of the bolt, a spring associated with said last mentioned part, timing mechanism arranged to be held in check by said spring and said part when the latter is in said predetermined position and adapted to be released thereby upon successfully operating the combination, and means actuated by the timing mechanism after operation for a predetermined period arranged to release the guard to permit operation of said parts to retract the bolt.

7. In mechanism of the class described, the combination of a bolt, a combination lock having relatively adjustable parts, one comprising an operating part for the bolt and having an abutment thereon, a spring pressed plunger arranged to move into engagement with said abutment when said operating part is moved to a predetermined non-operating position, a spring associated with said last mentioned part for moving it to operating position upon movement of the plunger to release position, and a timing mechanism for withdrawing said plunger after operation for a predetermined period, said timing mechanism being normally held in check by said spring and said last mentioned part and released thereby upon successfully operating the combination.

8. In mechanism of the class described, the combination of a movable locking device, a combination lock having relatively movable parts, one comprising an actuating part for said device having an abutment thereon and being movable by the combination lock from operating position relative thereto to a predetermined non-operating position upon destroying the combination, a spring pressed element arranged to move into position to cooperate with said abutment to hold said actuating part at non-operating position, timing mechanism arranged after operation for a predetermined period to shift said element whereby to release said actuating part, and yieldable means cooperating with said part when in said non-operating position to hold the timing mechanism in check, said part automatically releasing the timing mechanism upon successfully operating the combination, said actuating part being automatically returned to operating position with respect to the combination lock when the timing mechanism has completed said period of operation.

9. In mechanism of the class described, the combination of a lock comprising a securing device, an operating element movable to actuate said device, a combination lock for controlling said element comprising tumblers and a spindle provided with a control member arranged to receive said element to effect operation thereof when the tumblers are in a predetermined position, said control member having a portion for moving said element to a non-operating position when the combination is destroyed, a guard movable automatically to secure said operating element in non-operating position when the combination lock is moved to locking position, normally inoperative timing mechanism arranged upon release and after operation for a predetermined period to shift said guard whereby to release said operating element, said timing mechanism having a part for holding it in check arranged to be engaged and held by said operating element when the combination is destroyed and freed by a movement of the operating element when the combination is successfully operated, said operating element being held by the guard against movement into position to be actuated by said control member subsequent to the successful operation of the combination and until the timing mechanism is operated for said predetermined period.

10. In combination, a door, lock mechanism comprising a securing device having an operating element and a combination lock

including a spindle having an actuating part for said operating element, said actuating part operating when the combination is destroyed to move said element from operating to non-operating position, a guard operating automatically to engage and hold said operating element at non-operating position when moved thereto, and timing mechanism arranged after operation for a predetermined period to move the guard to effect release of said operating element, the timing mechanism having a part for holding it in check engaged by the operating element when the latter is moved to non-operating position, said actuating part permitting of a slight movement of the operating element sufficient to release the timing mechanism upon successfully operating the combination with the operating element held against return to normal position by said guard.

11. In combination, a door, lock mechanism comprising a securing device having an operating element and a combination lock including a spindle having an actuating part for said operating element, said actuating part operating when the combination is destroyed to move said element from operating to non-operating position, a control unit for said operating element detachably associated with said combination lock comprising timing mechanism disposed at one side of the combination lock, said timing mechanism having a part for holding it in check engaged and held by said operating element when the latter is moved to a non-operating position and released by the operating element upon successfully operating the combination, and a plunger extending substantially parallel to the axis of the spindle arranged to move automatically into position to hold the operating element at non-operating position when it is moved to said position, said timing mechanism serving after operation for a predetermined period to shift the plunger whereby to release the operating element for return to operating position.

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