May 11, 1937. W. F. DIESEL 2,079,703

LOCK MECHANISM

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Fig. 1

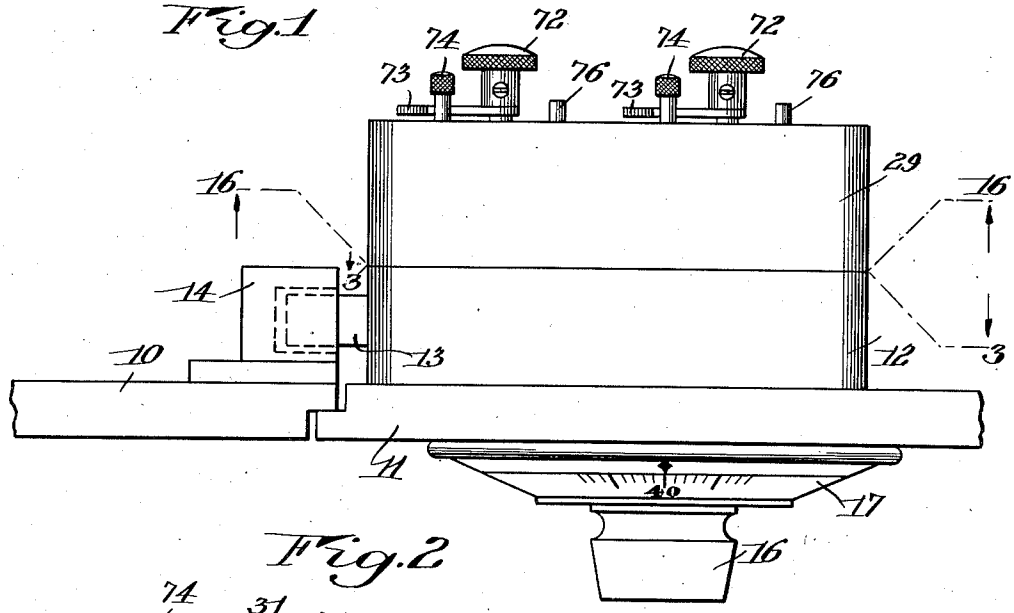
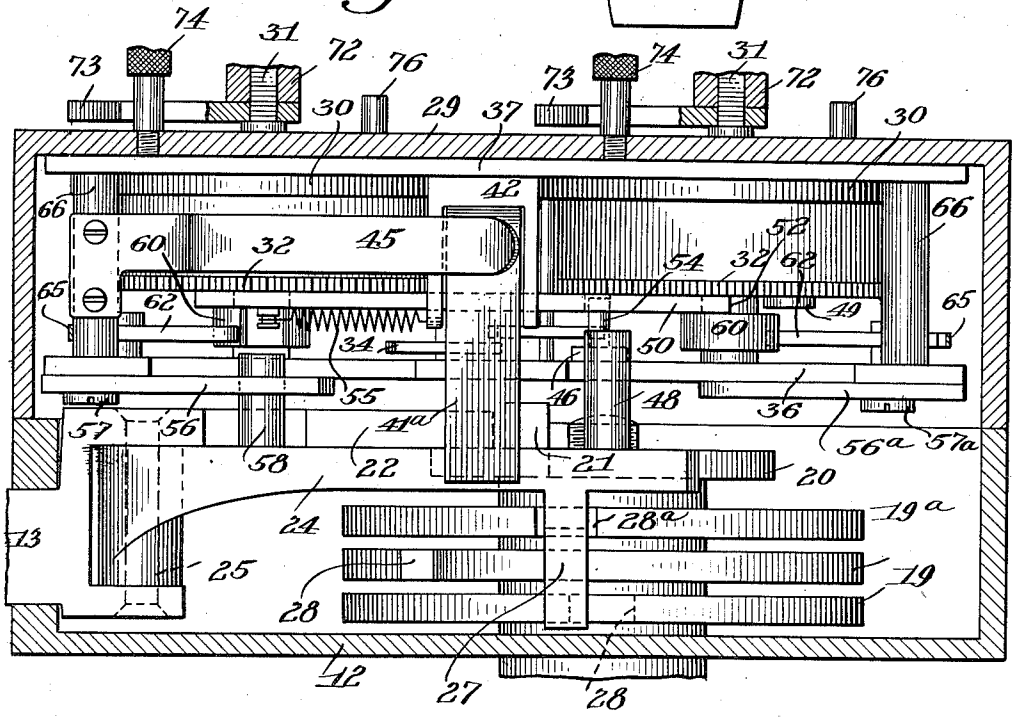


Fig. 2



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LOCK MECHANISM

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Fig. 3

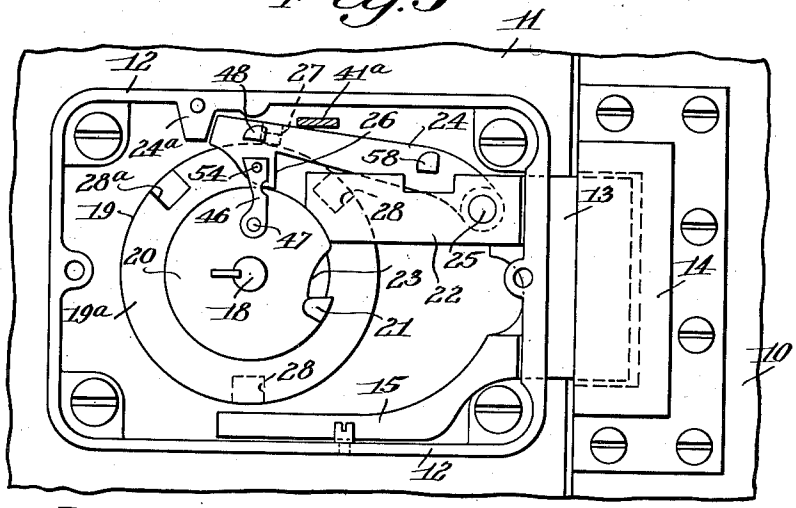


Fig. 8

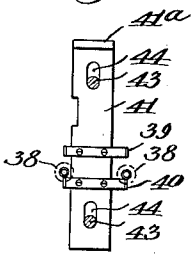


Fig. 4

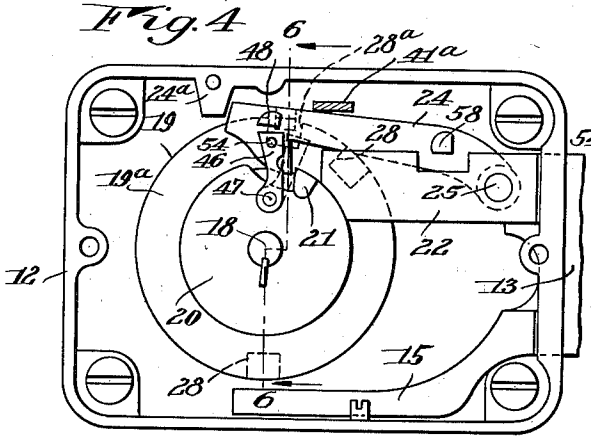


Fig. 6

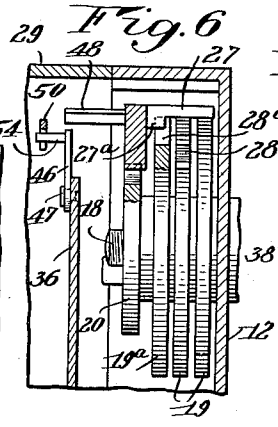


Fig. 9

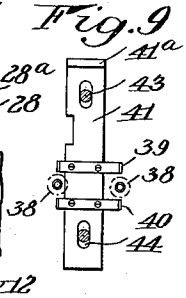


Fig. 5

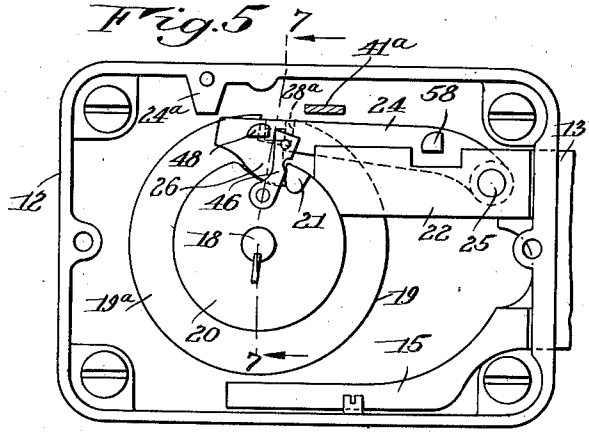


Fig. 7

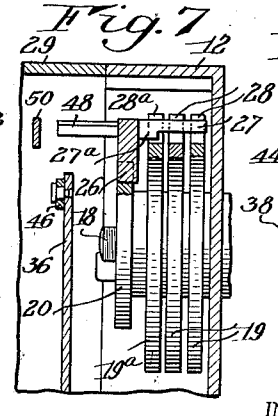
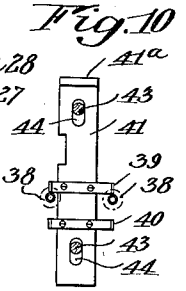


Fig. 10



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LOCK MECHANISM

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Fig. 11

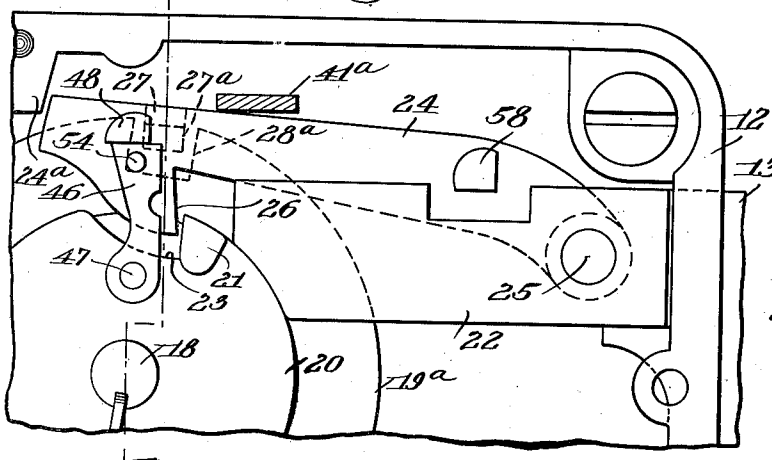


Fig. 13

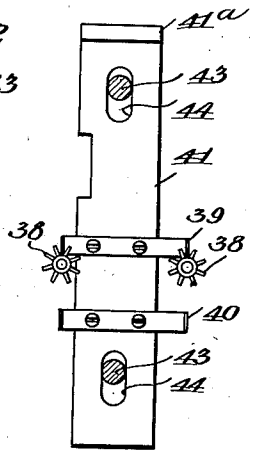


Fig. 12

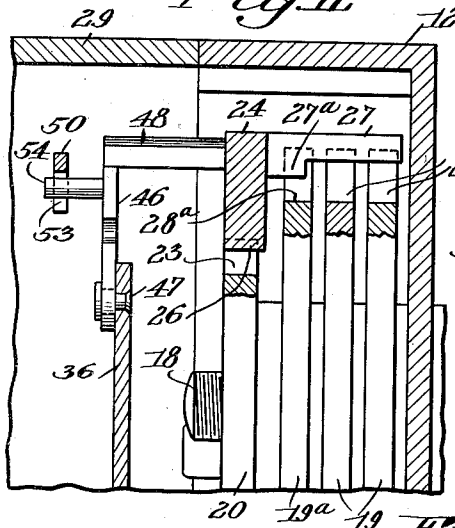


Fig. 14

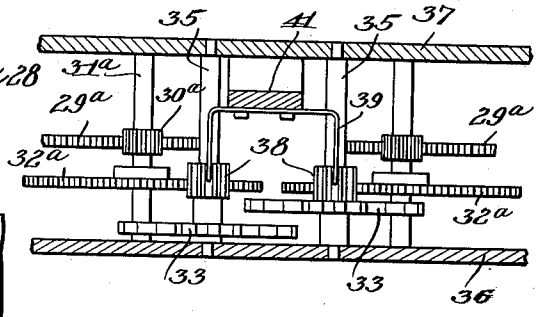
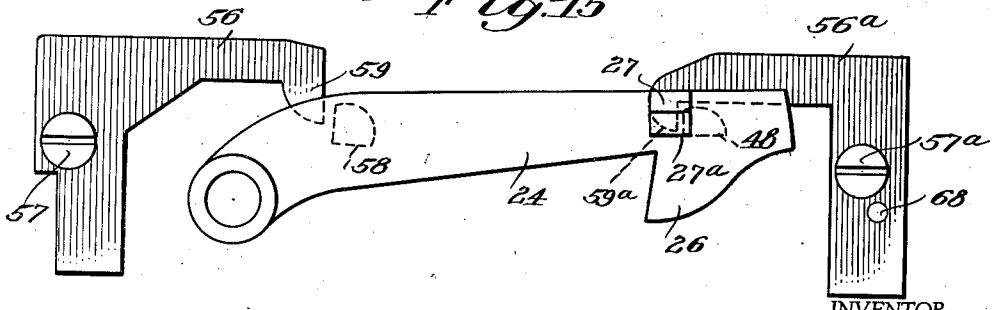


Fig. 15



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LOCK MECHANISM

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Fig. 17

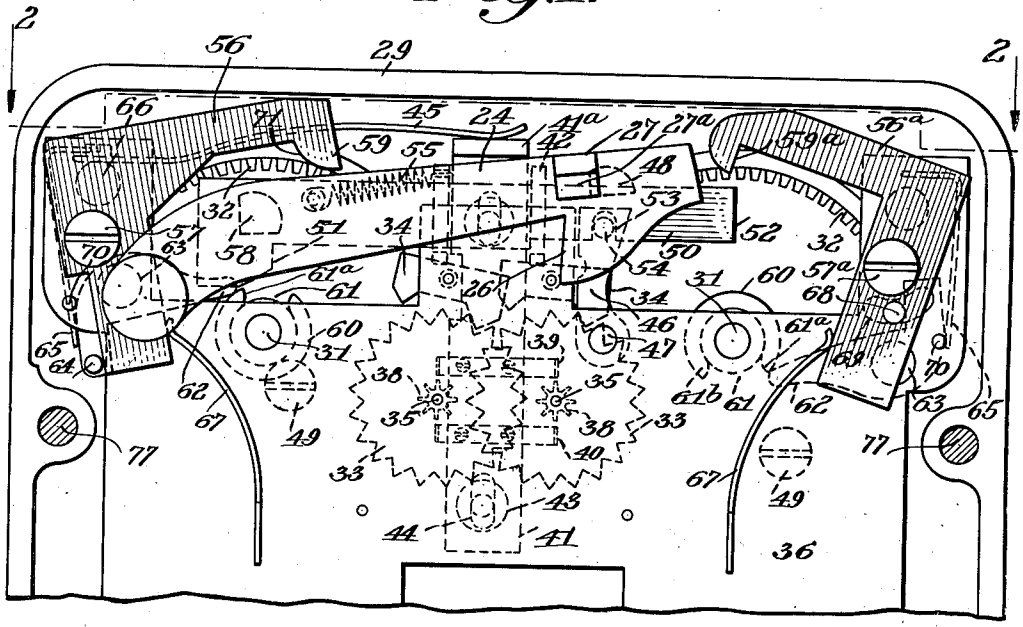


Fig. 16

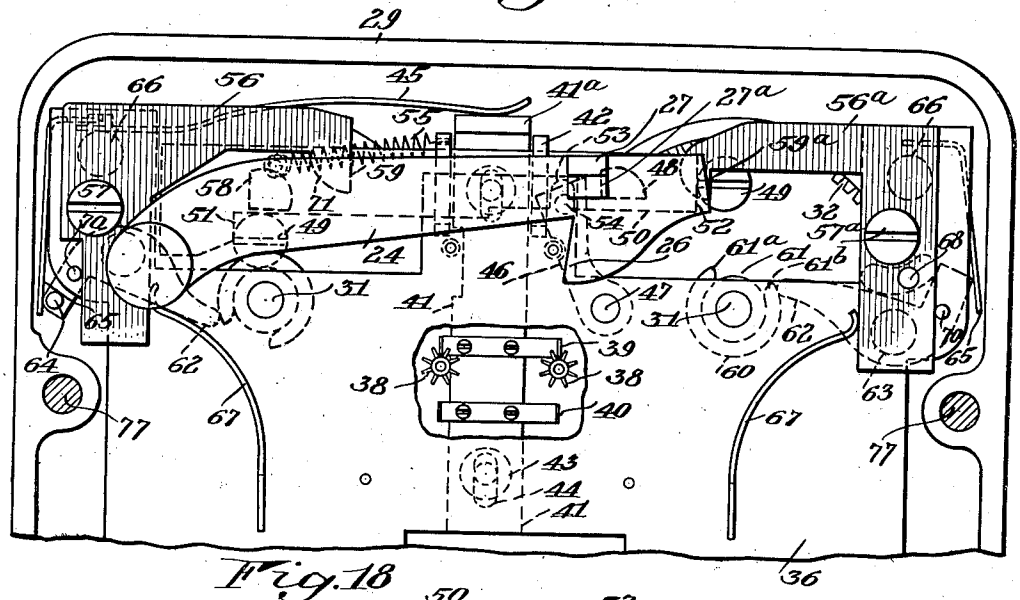
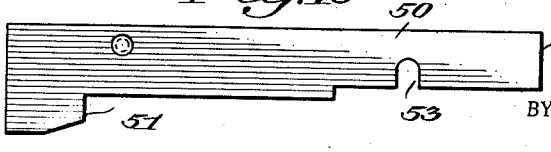


Fig. 18



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Patented May 11, 1937 2,079,703

UNITED STATES PATENT OFFICE

2,079,703

LOCK MECHANISM

William F. Diesel, Rochester, N. Y., assignor to Sargent & Greenleaf, Inc., Rochester, N. Y., a corporation of New York

Application August 27, 1936, Serial No. 98,221

15 Claims. (Cl. 70—269)

The present invention relates to lock mechanism and has for its object to provide an improved mechanism of this class having control and operating devices designed and related in such a manner as to afford a maximum degree of protection.

A further object of the invention is to provide locking mechanism in conjunction with a combination lock in which effective release of said locking mechanism is dependent upon the setting up of different combinations in a predetermined sequence.

A further object of the invention is to provide in combination with securing mechanism for a closure or the like, a combination lock mechanism for protecting the securing mechanism operable to set up different combinations, and a timing device adapted to be held in check by said lock mechanism and to be released for operation by the setting up of one combination the operation of which is required to insure successful operation of the remaining combination or combinations.

A further object of the invention is to provide improved time and combination lock mechanisms, requiring one operation of the combination lock to effect release of the timing mechanism and a subsequent operation of the lock to release the bolt-work or the protecting means therefor after operation of the timing mechanism for a selected period, along with means controlled by the timing mechanism for preventing relocking of the safe without first rewinding or resetting the timing mechanism for a subsequent operation.

A further object of the invention is to provide an improved combination lock mechanism having a series of tumblers and associated devices adapted for controlling or holding in check locking or protecting devices for safes and the like, and in which arrangement one or more of the tumblers may be set according to one combination to release or condition one or more of said devices for operation and subsequent to which a different combination can be operated to further release or condition the same or to control other devices.

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 plan view of a locking device embodying the invention;

Fig. 2 is a horizontal section substantially on line 2—2 of Fig. 17;

Fig. 3 is a sectional elevation of the lock taken on line 3—3 of Fig. 1, and showing the locking parts in normal locking position;

Fig. 4 is a similar view with the bolt dogging element slightly shifted to free the timing mechanism for operation as a result of the successful operation of the first combination;

Fig. 5 is a similar view showing the position assumed by the dogging element after the timing mechanism has run down and the complete combination set up;

Fig. 6 is a fragmentary sectional elevation on line 6—6 of Fig. 4;

Fig. 7 is a similar section taken on line 7—7 of Fig. 5;

Fig. 8 is a diagrammatic view of the device for holding the timing mechanism in check shown at normal operating position at which it is held by the dogging element when the safe is locked as indicated in Fig. 3;

Fig. 9 is a similar view in which said device is held through cooperation of the fence means and dogging element with certain of the tumblers after the first combination has been set up to release the timing mechanism, as indicated in Figs. 4 and 6;

Fig. 10 is a view similar to Fig. 9, but showing the device for holding the timing mechanism in check at the position it will occupy upon setting up the complete combination after the timing mechanism has run down;

Fig. 11 is a fragmentary view in elevation showing the position assumed by the fence and bolt dogging element when the complete combination is set up before the timing mechanism has been released by setting the first combination;

Fig. 12 is a sectional elevation on line 12—12 of Fig. 11;

Fig. 13 is a view in elevation of the device for holding the timing mechanism in check shown in the position it will assume if the main combination is first set up, as indicated in Figs. 11 and 12;

Fig. 14 is a horizontal section illustrating a portion of the timing mechanism and the releaseable holding device therefor shown in Fig. 13;

Fig. 15 is a side elevation showing the bolt dogging element and the parts for preventing operation thereof to re-cast the bolt until the timing mechanism has been reset for operation;

Fig. 16 is a sectional elevation taken substantially on the line 16—16 of Fig. 1, showing the parts for preventing the locking of the safe in advance of the rewinding of the timing mecha-

nism and the means for holding the timing mechanism in check;

Fig. 17 is a similar view showing the timing mechanism released for operation by the setting up of the first combination, and

Fig. 18 is a detailed view of the release bar and parts controlled thereby operated by the timing mechanism when approaching run-down position to effect release of the bolt dogging element.

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

The present invention embodies an improved arrangement of parts by which to control a timing mechanism for protecting locking or securing means for a safe, vault, or the like. The control means is preferably in the form of a combination lock having a single set of tumblers with common operating means, the lock being designed to be set according to different predetermined combinations which must be operated in a predetermined sequence to effect opening of the safe. In other words, the arrangement of the parts is such that the timing mechanism can be released only by the operation of one combination and the safe unlocked only by the operation of another combination, subsequent to the operation of the first combination for releasing the timing mechanism and subsequent to the period of operation for which the timing mechanism is set.

While it is possible with the present construction to first set up either combination, the setting up of the second or main combination, though it will result in the release of certain parts for holding the timing mechanism in check, it will not result in the actual release of the timing mechanism. However, in previous locks of the present type the opposite is true. In such locks the timing mechanism can be released by the setting up of the main combination with the result that no protection is afforded after the timing mechanism has run down, since the safe is then completely unlocked and can be readily opened. However, in the present lock this is made impossible, the safe remaining locked after the timing mechanism has run down or operated for the period intended and it being then necessary to successfully operate the main or one combination before the safe can be opened.

Referring to the drawings, 10 represents a portion of a safe, vault, or the like, and 11 a door or closure therefor, on the inner face of which is secured by any suitable means a frame or casing 12 as best shown in Fig. 2. A bolt 13 is carried by the casing and when in locking position projects into a keeper 14 secured on the wall of the safe 10, as shown in Figs. 1 and 3. The bolt is guided in the end wall of the casing and also by an offset portion 15 resting upon the bottom of the casing as shown in Fig. 4.

The lock is of the combination type and includes the usual knob and dial plate 16 and 17, respectively, located on the outside of the closure for operating the spindle 18 carrying a plurality of tumblers 19 and 19*a* and an operating tumbler or disk 20 having a lug 21 for engaging the end of an arm 22 on the bolt for moving the latter from unlocking to locking position. The disk is provided with a cam surface 23 for raising the bolt dogging and operating element 24 which is pivoted at 25 upon the bolt. The bolt is retracted by engagement of the lug 21 on the disk with a shoulder 26 on the dogging element 24 when rotating the disk in a counterclockwise direction from the position shown in Fig. 4, after the dogging element has moved to the full release position shown in Fig. 5. The dogging element carries a laterally projecting part 27 comprising fence means overlying the peripheral portions of the tumblers, the dogging element being supported by the driving tumbler 20 in position to be held in check by a lug 24*a* on the casing 12 after the combination has been destroyed.

The fence 27 is of the stepped type and has a relatively deep portion 27*a* normally resting on the tumbler 19*a* and moving into the notch 28*a* thereof, as shown in Fig. 6, upon successful operation of the first combination requiring the setting up of less than all of the tumblers. However upon successful operation of another combination, herein termed the main or complete combination, which preferably requires the setting up of all of the tumblers, the fence will assume the position shown in Fig. 7 whereby to release the dogging element for movement to the position shown in Fig. 5 after the timing mechanism has operated for a predetermined period, as described hereinafter.

The casing 12 has a cover plate section 29 removably secured thereon which carries a timing mechanism, comprising the usual spring motor including a drum 30. The motor has a shaft 31 operating to drive the main gear 32 of the timing mechanism which in turn is suitably connected with a train of gears for operating the escapement wheel 33, and pallet 34 for controlling the same.

The timing mechanisms are shown in duplicate and the corresponding parts have therefore been given the same reference characters, it being understood that the two mechanisms operate independently of each other and that if one should for any reason fail to function, the other will serve to control the operations of the bolt or the dogging means therefor.

The escapement wheels 33 are each mounted on an arbor 35, the ends of the arbors being journaled in the front and rear frame plates 36 and 37, respectively, between and by which the timing mechanism is supported, as shown in Figs. 2 and 14. The arbors 35 are each provided with a pinion 38 driven by a gear 32*a* on an arbor 31*a* having a pinion 30*a* driven by a gear 29*a* suitably connected with the main driving gear 32. The pinions 38 are adapted to receive the free ends of the upper and lower U-shaped members 39 and 40, suitably secured upon a vertically disposed slide 41. The slide is guided at its upper end by a U-shaped bracket 42 and also by the upper and lower pins 43 extending within the slots 44 of the slide.

The U-shaped member 40 of the slide, through engagement of its free end portions with the pinions 38 on the arbors 35, serves to hold the timing mechanism in check when wound for operation, provided, of course, that the slide has been moved to its highest position in which the U-shaped member 40 will engage the pinions 38. Movement of the slide to this position is effected by moving the bolt dogging element 24 to the position shown in Fig. 3, by turning the dial of the combination lock to destroy the combination. In this operation the dogging element is raised by the cam 23 of the disk 20 and while being raised lifts the slide through engagement with the laterally projecting portion 41*a* thereof.

To effect release of the timing mechanism for operation, the combination for controlling the same must be successfully operated, as by rotation of the dial to bring the notch 23*a* of the tumbler

19a and that of the tumbler disk 20 into registry with the fence 27 of the dogging element whereby to permit the portion 27a of the fence to move into said notch. At this time the dogging element will have a slight downward movement at the end of which it will be arrested by the contacting of the outer portion of the fence with the two tumblers 19 as shown in Fig. 6. At the same time the spring 45 will positively move the slide 41 downwardly from the operating position shown in Fig. 8 to the release position shown in Fig. 9 at which position the escapement wheels of the timing mechanism are freed for operation. The slide and dogging element are held in this position by contact of the fence with the tumblers 19 during operation of the timing mechanism.

A movable support 46 is pivoted at 47 on the frame or cover plate 36 of the timing mechanism beneath the lug 48 on the dogging element, the lug being spaced from the support when the dogging element is in the release position shown in Figs. 4 and 6, to which it will move upon setting up the first combination. The purpose of maintaining the lug 48 on the dogging element and the support 46 in spaced relation after the dogging element has been released by the setting up of the first combination is to insure protection against the release of the timing mechanism by the setting up of the main or complete combination, which would make it possible to open the safe after the timing mechanism has operated for the period selected, if the present safeguard were not provided.

Movement of the support 46 from holding position with respect to the dogging element is effected by the timing mechanism at the expiration of the period for which it is set for operation, through engagement of the operating pins 49 of the motor driven wheels 32 with a slidably mounted release bar 50, one of the pins moving into engagement with the depending lug 51 of the bar and the other engaging the right hand end portion 52 thereof as shown in Fig. 16. The bar is slotted at 53 to receive a pin or projection 54 on the pivoted support 46 whereby when the timing mechanism approaches the run-down position the support is moved from beneath the lug 48 on the dogging element at which time the latter will continue to be supported in the position shown in Figs. 4 and 6 by engagement of the fence 27 with the tumblers 19. The parts will remain in this position until the dial is turned to operate the second combination, at which time the cam 23 of the disk 20 through engagement with the part 26 of the dogging element will raise the latter to move the fence 27 out of the notch 28 of the tumbler 19a. The complete combination can then be set up by turning the dial to bring the notches of all of the tumblers into alinement to permit the fence 27 to enter the same to allow the dogging member to move to the bolt releasing position shown in Figs. 5 and 7 thus permitting the slide 41 for releasing the timing mechanism to be moved to its lowest position by the spring 45. In this position of the slide as shown in Fig. 10 the free ends of the U-shaped member 39 will engage the pinions 38 on the arbors 35 carrying the escapement wheels to prevent continued operation of the timing mechanism.

The release bar 50 is preferably extended through and is supported and guided by the spaced portions of the U-shaped bracket 42 for guiding the slide 41. The release bar is held in the full release position shown in Fig. 16 by the pins 49 of the motor driven gears 32 until the springs of the motors are rewound, at which time a coiled spring 55 will operate to return the release bar to the normal position shown in Fig. 17, the spring having one end connected with the release bar and the other with the bracket 42.

The return of the release bar by the spring to the normal operating position will effect movement of the support 46 to normal position at which it will again lie beneath the lug 48 of the dogging element in position to receive the lug in case the second or main combination is set up instead of the first combination under which conditions the dogging element and the fence means will assume the position shown in Figs. 11 and 12, and the device for holding the timing mechanism in check to the position shown in Fig. 13.

In Fig. 3 the bolt is shown in normal locking position in which the dogging element is held by the operating tumbler 20 in position to be protected by the lug 24a of the casing 12, as well as in the position it will occupy when serving to maintain the holding device 41 in position to prevent operation of the timing mechanism by engagement of the parts 40 of said device with the pallet wheel-operating pinions 38, as shown in Fig. 8. If in this position of the parts the main or second combination is first operated by setting up all of the tumblers the fence element 27 will then move into the notches of said tumblers to the position indicated in Figs. 11 and 12, the dogging element being then arrested through contact of the lug 48 thereon with the pivoted supporting member 46 as shown in Fig. 11. In this position of the dogging element the parts 39 of the holding device 41 will engage the pinions 38 as shown in Fig. 13 whereby to prevent operation of the timing mechanism.

On the other hand, if the first combination is set up to effect release of the timing mechanism as intended, the offset or relatively deep portion 27a of the fence element which normally rests on the periphery of the tumbler 19a will move into the notch of said tumbler to permit the spring 45 to move the slide 14 downwardly from the position shown in Fig. 8 to that shown in Fig. 9 at which time the parts 40 will disengage the pinions 38 to release the timing mechanism for operation, the outer portion of the fence then resting upon the peripheries of the tumblers 19 to hold the dogging element in the position shown in Fig. 4 in which the lug 48 on the dogging element is spaced from the pivoted support 46. It will be seen therefore that neither the bolt-dogging element nor the timing mechanism can be released by first setting up the main combination, the result being that added protection is afforded by making it necessary to operate a combination lock after the timing mechanism has operated for the period intended, instead of conditioning the safe for opening merely by the setting up of one combination.

The means for preventing relocking of the safe in case the attendant should forget to rewind the timing mechanism is preferably designed to cooperate with the dogging element to hold it against return to normal dogging position, but if desired may be made to operate in direct connection with some other part of the bolt control means to prevent movement of the bolt to locking position.

In the present design means is provided for making it necessary to at least effect a partial rewinding of each of the clock or time devices shown before the bolt can be moved from unlocking to locking position. The means for pro-

tecting or holding the dogging element against return to normal dogging position with respect to the bolt comprises a guard in the form of a bell-crank lever 56 pivoted at 57 upon the front frame plate 36 of the time mechanism, the lever being moved from protecting position with respect to the bolt dogging element shown in Fig. 15 by the rewinding of the timing device shown at the left of Fig. 16 of the drawings. In Fig. 16 it will be noted that the dogging element has moved to full release position with respect to the timing mechanism but has not been moved to withdraw the bolt. However, by rotating the operating disk 20 of the combination lock counter-clockwise from the position shown in Fig. 5, the bolt will be withdrawn and the dogging element moved to the position shown in Fig. 15, at which a lug or abutment 58 projecting from the dogging element lies directly in front of the end portion 59 of the guard lever 56 so that should an attempt be made to rotate the dial and spindle for the purpose of recasting the bolt, the abutment 58 will engage the end portion of the lever and prevent operation of the dial to an extent sufficient to cause the lug 21 of the driving disk 20, through engagement with the arm 22 of the bolt, to move the bolt to locking position.

However, if the timing device is rewound in advance of an attempt to recast the bolt, means controlled by the timing device will be operated to move the lever 56 from the bolt protecting position shown in Fig. 15 to the release position shown in Fig. 17. This means preferably comprises a cam 60 or its equivalent connected with the winding shaft 31 of the spring motor, or if preferred with the driving gear 32, which is rotated by the shaft when rewinding the timing device. The cam may be constructed in any preferred manner suitable for accomplishing the purpose desired, but preferably comprises a circular-shaped member having a depression or opening 61 in its wall for receiving the inner end of a lever 62 pivoted at 63 upon the plate 36 opposite the guard or bell-crank lever 56. The lever 62 has a stud or projection 64 thereon which extends into operative engagement with the outer end of the guard lever for moving the latter to release position upon rewinding or resetting the timing device as shown at the left of Fig. 17. The lever 62 is held in engagement with the cam 60 by means of a spring 65 connected with a bolt 66 or other suitable means for detachably connecting the front and rear frame plates 36 and 37 for supporting the timing devices.

During the operating period of the timing device the guard lever 56 is moved by the lever 62 from the non-protecting position shown in Fig. 17 to the position shown in Fig. 16, the lever 62 being operated by the edge portion 61*b* of the cam 60, and the guard lever being held in the position shown in Fig. 16 by a spring 67 suitably secured upon the front plate 36 of the timing device.

The position of the cam 60 when the timing device has been allowed to run down for the purpose of releasing the bolt is clearly shown in Fig. 16 in which position the lever 62 has moved out of the opening 61 of the cam and rests upon the peripheral portion of the latter to hold the guard lever in position to prevent recasting of the bolt since the inner end portion 59 of the lever lies in the path of the lug 58 on the dogging element, as shown in Fig. 15.

In the position of the parts shown in Fig. 16 if the driving shaft 31 of the timing device is rotated in a clockwise direction, the inner end of the lever 62 will move into the recess 61 of the cam and upon continued winding of the timing device the portion 61*a* of the cam will engage and move the lever from the position shown in Fig. 16 to that shown in Fig. 17.

It will be understood that the position of the operating portion 61*a* of the cam with respect to the inner end of the lever 62 when the timing device is run down or at bolt releasing position, as shown in Fig. 16, determines the minimum period for which the timing device must be reset for operation before the cam will act on the lever to cause it to move the guard 56 to the position at which it will release the dogging element for return to dogging position, or in other words to the position at which the guard is shown in Fig. 17. This period in the present case is fifteen minutes but may be increased or decreased if desired by varying the position of the operating portion of the cam with respect to the lever 62 when the timing device is in full release or run down position.

The guard means shown at the right of Figs. 17 and 16 for preventing return of the dogging means to bolt dogging position is substantially the same as that described above and therefore the corresponding parts have been given the same reference characters. It should be pointed out, however, that the position of the guard operating lever 62 at the right of Figs. 17 and 16 has been reversed but its function and manner of operation, under control of the cam, is the same as in the case of the corresponding left hand lever. However the right hand guard lever 56*a* which is pivoted upon the plate 36 at 57*a* carries a laterally projecting pin 68 which extends through a slot 69 in the plate 36 into position to be engaged by the lever 62 and said lever when operated by the portion 61*a* of the cam 60 will swing the guard lever from the operating position shown in Fig. 16 to release position with respect to the bolt dogging element as shown in Fig. 17.

It will be noted, however, that when the dogging element 24 is in the bolt releasing position shown in Fig. 15 that the lug 48 thereon lies at the rear of the inner end portion 59*a* of the right hand guard lever while the lug 58 lies in front of the end portion 59 of the left hand guard lever 56. With this arrangement, either of the guard levers will prevent recasting of the bolt if the other has been moved to release position by rewinding the timing device corresponding thereto. It will be seen, therefore, that the dogging element can not be operated to return the bolt to locking position until each timing device has been rewound or set for operation.

When the safe is locked the timing devices are held in check by the means provided for that purpose and the cams, and guard levers controlled by the cams, will occupy the positions shown in Fig. 17, in which the guard levers are at release position with respect to the dogging element. If, however, the first combination is successfully operated, the dogging element will drop from the position shown in Fig. 3 to that shown in Fig. 4 at which the U-shaped member 40 of the slide 41 will release the timing devices for operation, and when they have completed their operation the cam portions 61*b* will have operated upon the levers 62 to shift them whereby to permit the springs 67 to return the guard levers to the position shown in Fig. 16 in which they are held by said springs against suit-

able stops 70 on the plate 36. However at this time the dogging lever will have dropped to the position shown in Fig. 5 in which it has not been shifted to effect release of the bolt, so that the lugs 48 and 58 will be at the left side of the portions 59 and 59a of the guard levers shown in Fig. 16. However upon turning the dial in the proper direction the dogging element will be moved to the position shown in Fig. 15 to move the bolt to release or unlocking position. During this movement of the dogging element the lugs 58 and 48 thereon will engage the cam portions 71 and 71a of the guard levers 56 and 56a, respectively, whereby to swing the levers upwardly to permit the lugs to pass thereunder, after which the levers will be returned by the springs 67 to the position shown in Fig. 16.

In this manner the operation of opening the safe is completed, the parts remaining in the position shown in Fig. 16 until it is again desired to move the bolt to locking position. This operation as stated above first requires the rewinding of each timing device to shift the guards for the dogging element to the position shown in Fig. 17, after which the dial knob can be turned to destroy the combination and to shift the bolt to locking position.

The main driving shafts 31 of the timing devices, which are driven by the spring motors, are provided with operating knobs 72 for rewinding the motors and each of the shafts carries a laterally extending member 73 adapted to engage a pin 74 which is threaded to take into any one of a series of holes in the rear wall of the casing 29, not shown. The holes are preferably spaced at distances corresponding to five minute periods of operation of the timing devices and by shifting the pin to one or another of the holes the intervals of operation may be increased or decreased as desired. When the timing devices are in run-down or release position, the arm 73 on the winding shaft 31 will engage a stop 76 suitably secured upon the rear wall of the casing 29.

As previously stated the operating cams 60 are so constructed as to make it necessary for each of the timing devices to be wound for a period of at least fifteen minutes in order to shift the guards 56 and 56a to full release position with respect to the dogging element 24, or in other words, to the position shown in Fig. 17 in which the arm 73 has been moved from the zero point into engagement with the pin 74 located at a position corresponding to the fifteen minute period. By shifting the pins to any of the other positions the period of operation of the timing devices can be increased and by omitting the pins the timing devices can be set to operate for any desired period before releasing the bolt dogging element.

The lock and time mechanism casings 12 and 29 are detachably connected one with another by means of the screws 77. The tumblers and other parts of the lock proper are assembled in the casing 12 and can be applied as a unit to the safe door. The several parts of the two timing devices are first assembled in the casing 29, after which said casing is applied as a unit to the casing 12, from which it can be quickly removed without disturbing the parts of the lock proper upon removal of the screws 77.

It will be noted that when the tumbers 19a and 20 are set up to release the timing mechanism, that the fence and dogging element, normally supported by the tumblers 19a, will move to a position at which they will be supported by the tumblers 19, as shown in Fig. 6. However, in this position, the lug 48 on the dogging element will be spaced from the movable supporting part 46, Fig. 4. On the other hand, if all of the tumblers are set up before releasing the timing mechanism, the dogging element will move downwardly until the lug 48 thereon engages the supporting member 46, as shown in Fig. 11, thus preventing the dogging element from moving to bolt releasing position, since it will still be in position to be held in check by the lug 24a on the casing 12 should an attempt be made to turn the dial with the idea of withdrawing the bolt. It will be seen therefore that under no circumstances can the timing mechanism be released or the bolt withdrawn merely by operating the main combination through the setting up of all of the tumblers in advance of the setting up of the first combination and the release of the timing mechanism.

While the part 24 has been referred to as the bolt dogging element, it will be understood that it may be said, when taken with the part 27 thereon, to constitute the fence means for controlling the operation of the timing mechanism.

I claim:

1. In lock mechanism, a combination lock including tumblers having operating means, fence means associated with the tumblers, timing mechanism, and means controlled by the fence means normally holding the timing mechanism in check and serving to release the timing mechanism upon setting up one combination and to hold the timing mechanism against effective release upon setting up another combination in advance of the setting up of the first combination.

2. In lock mechanism, a combination lock including tumblers having common operating means, fence means associated with the tumblers, timing mechanism, and a movable device connected with the fence means and having two operating positions at each of which it is adapted to hold the timing mechanism in check, the fence means upon first setting up all of the tumblers serving to release said device for movement from one operating position to another without effective release of the timing mechanism and serving upon setting up less than all of the tumblers to release said device for movement to free the timing mechanism for operation.

3. In lock mechanism, a combination lock including tumblers having common operating means, fence means associated with the tumblers, timing mechanism, a movable device connected with the fence means and having two operating positions at each of which it is adapted to hold the timing mechanism in check, the fence means upon first setting up all of the tumblers moving to a predetermined position to release said device for movement from one operating position to another without effective release of the timing mechanism, a movable supporting part for arresting the fence means at said predetermined position, said fence means upon setting up some of the tumblers serving to release said device to free the timing mechanism for operation, and means actuated by the timing mechanism after operation thereof for a predetermined period for moving said part from supporting relation relative to the fence means.

4. In lock mechanism, a combination lock including tumblers having operating means, fence means associated with the tumblers, timing mechanism, a movable device for holding the tim-

ing mechanism in check having two operating positions and an intermediate release position, said device being normally held at one of said operating positions by the fence means, and means whereby when all of the tumblers are operated to first set up the main combination the fence means will release said device for movement from one operating position to another at which it will continue to hold the timing mechanism in check and whereby when some of the tumblers are operated to first set up another combination the fence means will release said device for movement to said intermediate position at which said device will be held by the fence means through engagement of the latter with one of the tumblers.

5. In lock mechanism, a combination lock including tumblers and operating means therefor, timing mechanism, a movable device adapted in a predetermined position to hold the timing mechanism in check, fence means normally engaging one of the tumblers and serving to hold said device in said predetermined position, said fence means upon setting up some of the tumblers moving into engagement with another tumbler and cooperating therewith to hold said device in release position relative to the timing mechanism, the fence means upon first setting up all of the tumblers moving to a predetermined position and releasing said device for movement to a position at which it will hold the timing mechanism in check, and a part for arresting and supporting said fence means at said predetermined position.

6. In lock mechanism, a combination lock including tumblers and operating means therefor, timing mechanism, a movable device adapted in a predetermined position to hold the timing mechanism in check, fence means normally engaging one of the tumblers and serving to hold said device in said predetermined position, said fence means upon setting up some of the tumblers moving into engagement with another tumbler and cooperating therewith to hold said device in release position relative to the timing mechanism, the fence means upon first setting up all of the tumblers moving to a predetermined position and releasing said device for movement to another position at which it will hold the timing mechanism in check, a movable part for arresting and supporting said fence means at said predetermined position to support said device at the last mentioned position, and means actuated by the timing mechanism after operation thereof for a predetermined period for shifting said movable part from supporting position relative to said fence means.

7. In lock mechanism, a combination lock including tumblers having operating means, fence means associated with the tumblers, timing mechanism, and a movable device connected with the fence means for holding the timing mechanism in check when the tumblers are in normal locking position, some of said tumblers when set according to one combination serving to release the fence means to free said device for movement to a position at which to release the timing mechanism and at which position said fence means will be arrested by another of the tumblers, said device upon first setting up all of the tumblers being freed by the fence means for movement to another position at which it will hold the timing mechanism in check.

8. In lock mechanism, a combination lock including tumblers and fence means associated therewith, operating means for the tumblers, a bolt dogging element connected with the fence means and held thereby at dogging position when the tumblers are in normal locking position, timing mechanism, a movable device normally supported by the dogging element in a predetermined position to hold the timing mechanism in check, less than all of said tumblers when set according to one combination serving to release the fence means and the dogging element to free said device for movement to a position at which to release the timing mechanism, said device moving upon freeing the dogging element by first setting up all of the tumblers to engage and hold the timing mechanism in check.

9. In lock mechanism, a combination lock including tumblers having operating means, fence means associated with the tumblers, timing mechanism, and a movable device having spaced parts, one for holding the timing mechanism in check at the normal position of said device and another for holding it in check at a second position thereof, said device when at a third position serving to release the timing mechanism for operation, some of said tumblers when set to one combination serving to release said fence means to free said device for movement to the last mentioned position, said device moving to said second position upon freeing the fence means by first setting up of all of the tumblers.

10. In lock mechanism, a combination lock including tumblers having operating means, timing mechanism, fence means associated with the tumblers, a movable bolt dogging element connected with the fence means, and a device controlled by the dogging element, said fence means normally engaging one of the tumblers and serving to hold the dogging element in a predetermined position at which the timing mechanism is held in check by said device, the fence means upon setting up some of the tumblers moving into engagement with another of said tumblers and cooperating therewith to hold the dogging element in another position at which the timing mechanism is released by said device, the fence means upon first setting up all of the tumblers being released for movement to free the dogging element for movement to a different position at which said device will operate to hold the timing mechanism in check.

11. In lock mechanism, a combination lock including tumblers having operating means, timing mechanism, fence means associated with the tumblers, a movable bolt dogging element connected with the fence means, said fence means normally engaging one of the tumblers and serving to hold the dogging element in a predetermined position, the fence means upon setting up some of the tumblers moving into engagement with another of said tumblers and cooperating therewith to hold the dogging element in another position at which the timing mechanism is released by said device, the fence means upon first setting up all of the tumblers being released for movement to free the dogging element for movement to a different position at which said device will operate to hold the timing mechanism in check, a movable part for supporting the dogging element in the last mentioned position, and means for shifting said part to release the dogging element for movement to a different position, one of the tumblers having means for engaging the dogging element to shift it from the last mentioned position upon rotating said tumbler in one direction,

12. In lock mechanism, a combination lock including tumblers and operating means therefor, fence means associated with the tumblers, timing mechanism, a device under the control of the fence means for normally holding the timing mechanism in check, said fence means upon first setting up all of the tumblers according to one combination moving to a predetermined position and serving to release said device for movement to a position at which it will continue to hold the timing mechanism in check, and means for supporting said device at said last mentioned position, said tumblers including means whereby some of the tumblers when set to a different combination will release the fence means to free said device for movement to a position at which to release the timing mechanism.

13. In lock mechanism, locking means, a dogging element for the locking means, timing mechanism normally held in check by the dogging element, a combination lock including tumblers having operating means, fence means normally engaging one of the tumblers and serving to hold the dogging element at normal dogging position, said fence means and dogging element upon setting up some of the tumblers moving to a predetermined position to release the timing mechanism at which position the fence means will engage another of said tumblers, a part normally in position to receive the dogging element when it is released by first setting up all of the tumblers, the dogging element when in engagement with said part serving to hold the timing mechanism in check, the timing mechanism when released by setting up some of the tumblers serving after operation for a predetermined period to move said part from said receiving position to release the dogging element for movement to non-dogging position.

14. In lock mechanism, locking means, timing mechanism for protecting the locking means to hold it against release, a combination lock including tumblers having operating means, fence means associated with the tumblers and the locking means, a device controlled by the locking means normally holding the timing mechanism in check and serving to release the timing mechanism upon setting up less than all of the tumblers and operating to hold the timing mechanism against release upon first setting up all of the tumblers, the timing mechanism upon operation for a predetermined period serving to free the locking means for movement to non-locking position, and obstructing means for the locking means under the control of the timing mechanism including a movable part for holding the locking means at unlocking position, and a second part cooperating with the timing mechanism to hold the last mentioned part at operating position, said second part being conditioned by the timing mechanism upon resetting the latter to release the first mentioned part.

15. In lock mechanism, locking means, a combination lock including tumblers having operating means, fence means for protecting the locking means, timing mechanism, a movable device controlled by the fence means and having two operating positions at each of which it is adapted to hold the timing mechanism in check and at one of which it is held by the fence means when the latter is at normal position, the fence means upon first setting up all of the tumblers moving to a predetermined position and releasing said device for movement from one operating position to another without effective release of the timing mechanism and serving upon setting up less than all of the tumblers to release said device for movement to free the timing mechanism for operation, a part normally in position to arrest the fence means when it is at said predetermined position, the timing mechanism serving after operation for a predetermined period to move said part from said arresting position, a device for holding the locking means when at unlocking position against return to locking position, and means connected with and actuated by the timing mechanism upon resetting the latter to move said device whereby to free the locking means for return to locking position.

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