July 7, 1931. W. F. DIESEL 1,813,441

LOCKING MECHANISM

Filed Jan. 7, 1928 5 Sheets-Sheet 1

Fig. 3

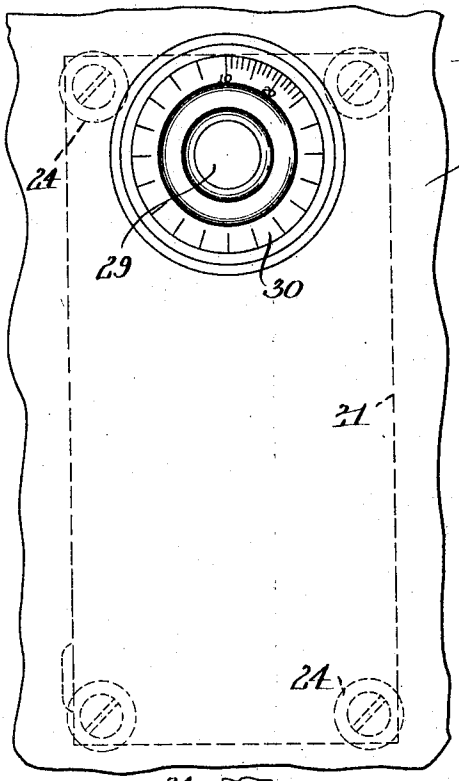
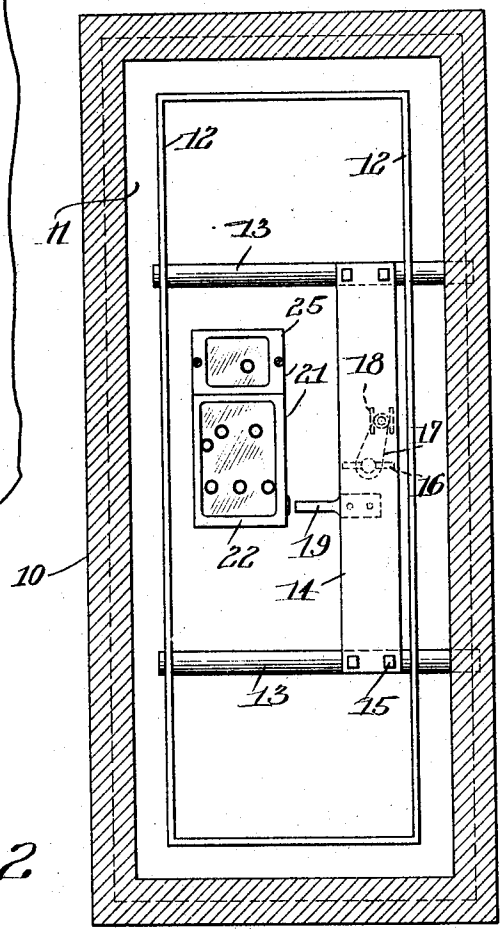


Fig. 1



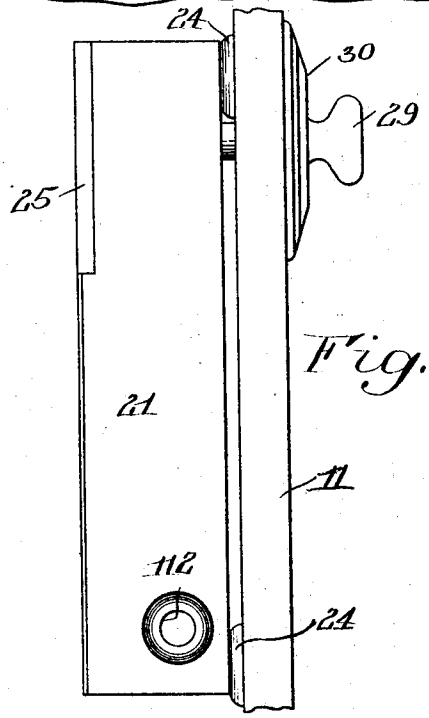


Fig. 2

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LOCKING MECHANISM

Filed Jan. 7, 1928 5 Sheets-Sheet 2

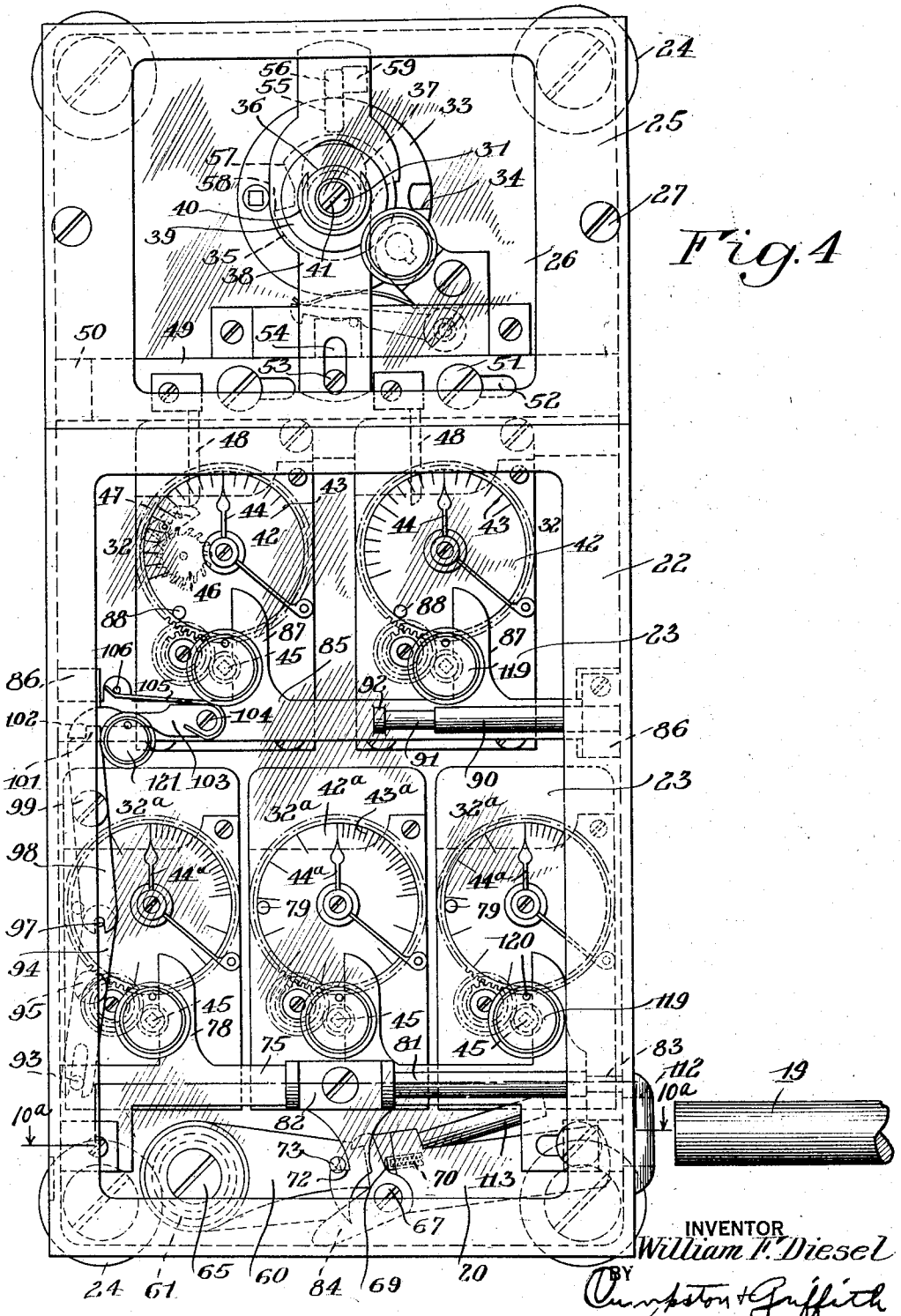


Fig. 4

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LOCKING MECHANISM

Filed Jan. 7, 1928 5 Sheets-Sheet 3

Fig. 5

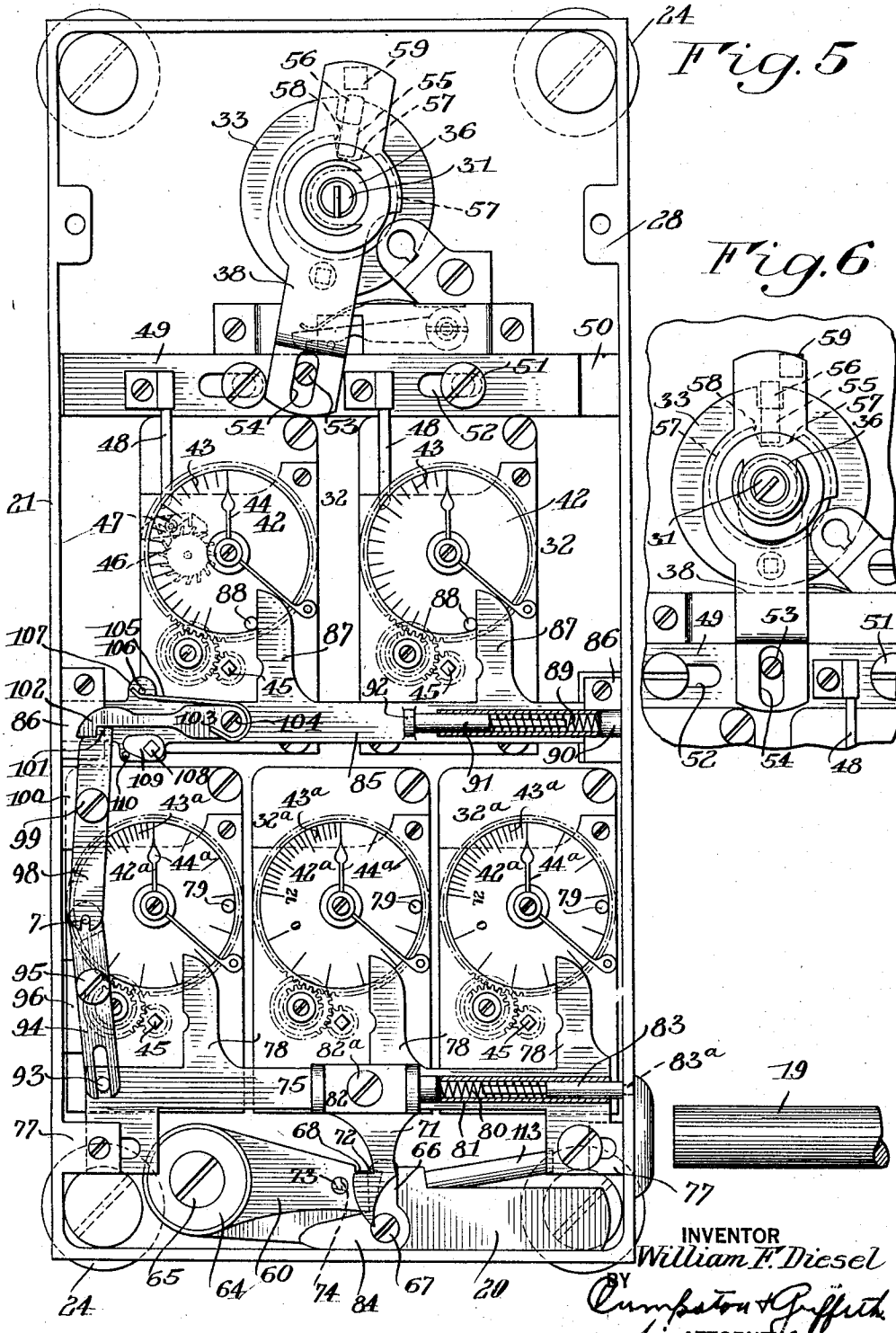


Fig. 6

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July 7, 1931. W. F. DIESEL 1,813,441

LOCKING MECHANISM

Filed Jan. 7, 1928 5 Sheets-Sheet 4

Fig. 7

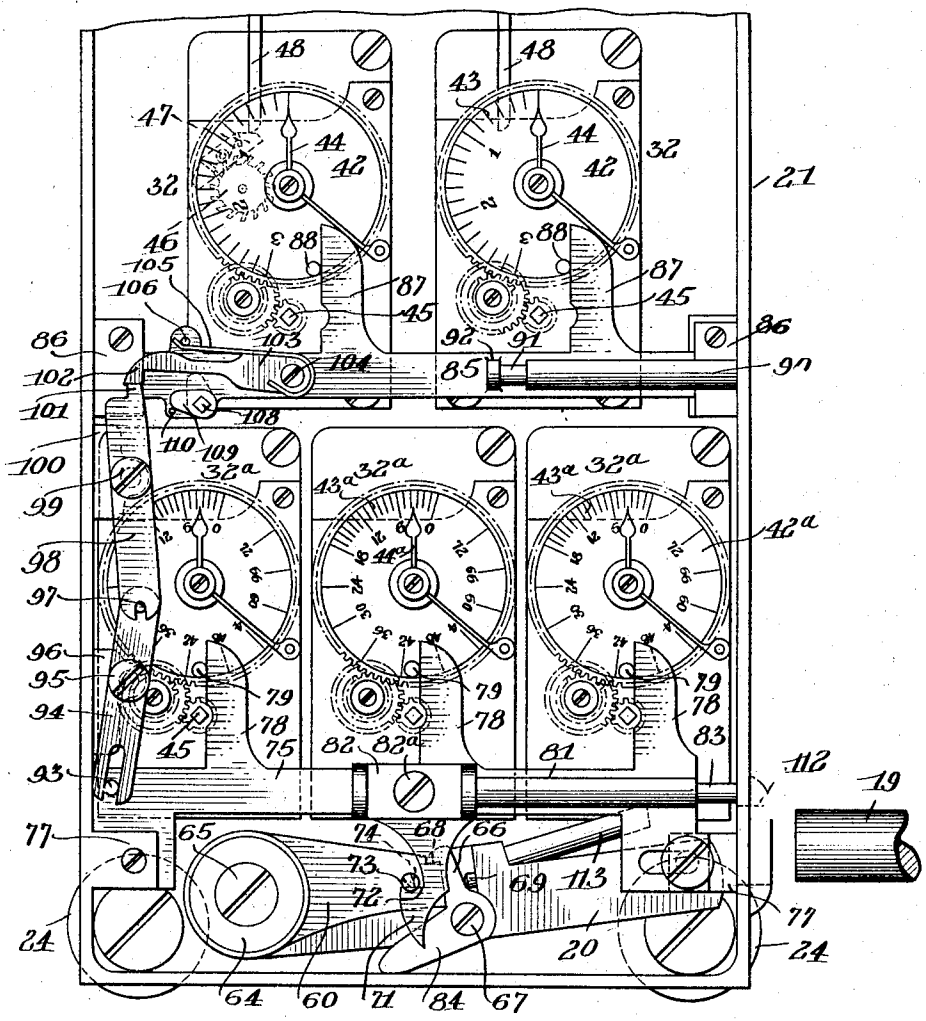
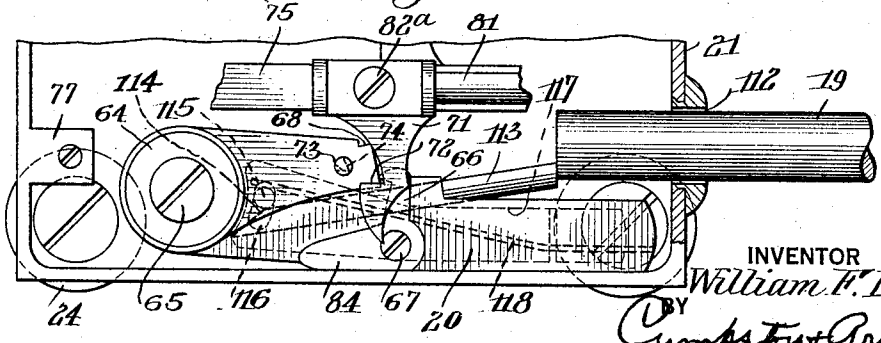


Fig. 8



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LOCKING MECHANISM

Filed Jan. 7, 1928 5 Sheets-Sheet 5

Fig. 9

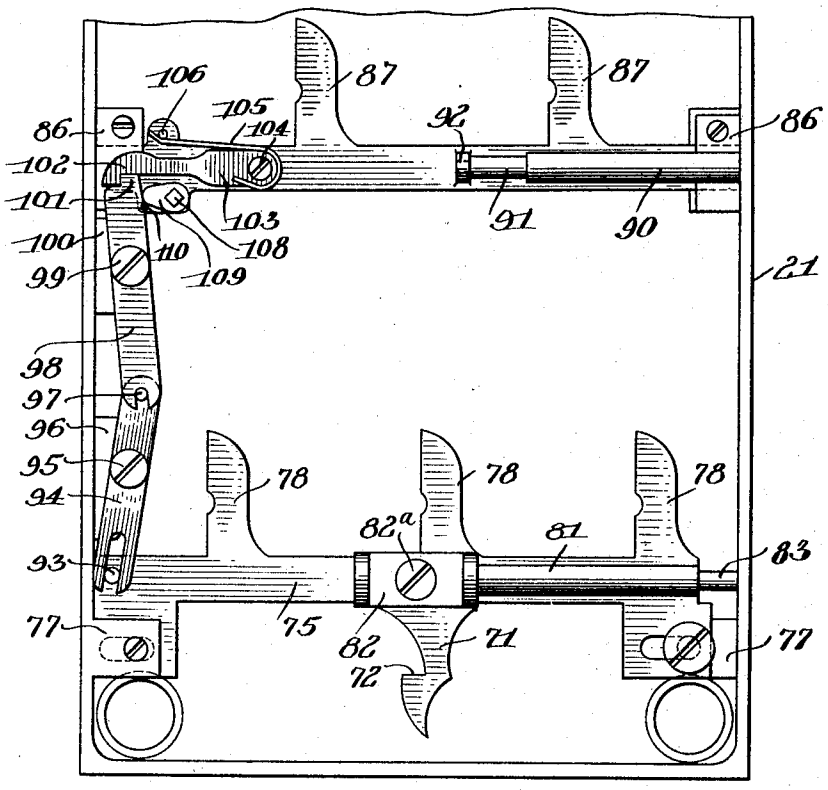
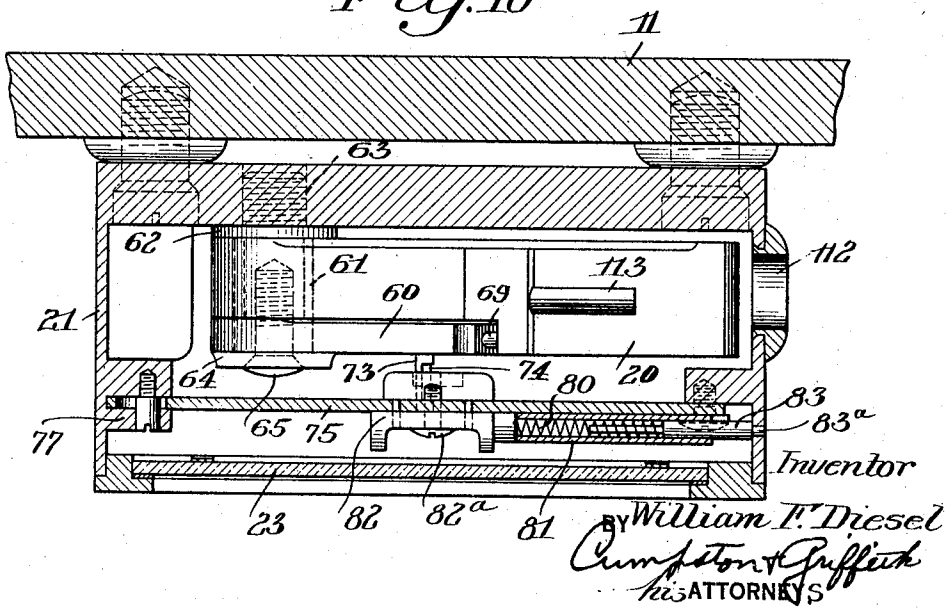


Fig. 10



Patented July 7, 1931 1,813,441

UNITED STATES PATENT OFFICE

WILLIAM F. DIESEL, OF ROCHESTER, NEW YORK, ASSIGNOR TO SARGENT & GREENLEAF, INC., OF ROCHESTER, NEW YORK, A CORPORATION OF NEW YORK

LOCKING MECHANISM

Application filed January 7, 1928. Serial No. 245,215.

The present invention relates to locking mechanisms for guarding the doors or closures of safes, vaults, or other compartments and has for its object to provide an improved mechanism of this class having means whereby selective control is afforded to vary the time periods of delay in opening the safe, so that during holidays or at night it may be fully protected and during business hours opened at relatively short intervals to permit withdrawal of comparatively small sums of money, rather than the full amount required for the day's business, so as to reduce the loss in case of a successful daylight holdup.

A further object of the invention is to provide the safes or vaults with suitable bolt-work or securing means, together with obstructing or guard means therefor, along with release means for the guard means arranged for selective operation by separate timing mechanisms, the operation of one of which is dependent upon its release by suitable control means for normally holding it in check, as for example, a combination lock which must be successfully operated to release said timing mechanism in order that it may operate for a predetermined period before it will operate the guard release means.

A further object of the invention is to provide an improved locking mechanism for the safes or vaults, comprising releasable guard means for the bolt-work of the safe and separate timing mechanisms, together with selective release means for the guard means, whereby either of the timing mechanisms may be employed to delay opening of the safe, one for a relatively long period and the other for a relatively short period and with which arrangement is associated a combination lock or other suitable control device for holding in check the short time mechanism, but which permits the long time mechanism upon being wound up to begin operation and to continue until it moves the guard means to release position.

A further object of the invention is to provide improved locking means for the closures of safes, vaults and the like, embodying suitable bolt-work or its equivalent, together with obstructing means therefor, adapted to be conditioned by the bolt-work for movement automatically to obstructing position with respect thereto when the bolt-work is moved to normal release position in combination with separate timing mechanisms and release means for the obstructing means arranged to be conditioned for selective operation by the timing mechanisms so that either of the same may be made to release the obstructing means by effecting operation of said release means.

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 elevation through a vault or other container looking at the inner face of the closure therefor and showing the manner of applying the present invention thereto;

Fig. 2 is a side elevation illustrating one embodiment of the invention as applied to the door of a safe or vault having a combination lock thereon;

Fig. 3 is a fragmentary view in elevation looking at the front of that portion of the door shown in Fig. 2;

Fig. 4 is a rear elevation illustrating one embodiment of the invention with the parts shown in locking position;

Fig. 5 is a similar view with the obstructing means for the bolt work shown in release position;

Fig. 6 is a fragmentary view in elevation of the lever arrangement controlled by the combination lock, shown released by the successful operation of the latter ready for movement to the position shown in Fig. 5 at which it effects release of the primary timing mechanism;

Fig. 7 is a fragmentary elevation showing the guard release means disconnected from control by the primary timing mechanism;

Fig. 8 is a fragmentary elevation showing the bolt-work in released position in which it has conditioned the obstructing

means for automatic movement to obstructing position following the return of the boltwork to securing position;

Fig. 9 is a view in elevation showing the guard release means as it appears in Fig. 4, but with the timing and guard mechanisms removed; and

Fig. 10 is a sectional plan taken substantially on line 10^a—10^a of Fig. 4.

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

The present invention is designed to afford a safe guard against the unauthorized opening, whether by day or by night of safes, vaults and the like by holding in check the bolt work or securing mechanism therefor during predetermined intervals following the closing and locking of the safe whereby to foil any attempt on the part of bandits or bank robbers in gaining access to the contents of the same.

The bolt work is protected by suitable guard means and separate timing or control mechanisms, one, primary, for short time operation and one secondary for relatively long time operation, both to be set for the desired periods, but the primary mechanism not beginning operation until released by a suitable control device, for example, a combination lock. The advantage of this arrangement is that if after setting the timing mechanism it is desired to open the safe before the secondary timing mechanism operates to release the guard means the control means can be operated to free the primary timing mechanism which will, after operation for the relatively short period for which it is set, effect release of the guard means, thereby permitting the safe to be opened in advance of the movement of the secondary timing mechanism to release position.

The primary or short time mechanism, which as before stated is intended for use during business hours may, for example, be designed to operate for a period of three hours or less, either in the case of banks, stores or other business concerns employing apparatus of the present type for protection against robbery.

The secondary or long time mechanism is intended to protect the safe, vault or other receptacle at night or during holidays or for any relatively long period which it may be desired to keep the safe locked.

The primary timing mechanism is intended especially for use in preventing daylight robberies and is highly advantageous from this standpoint since it permits the one responsible for control of the safe to remove therefrom, at suitable intervals during the day, sufficient funds to satisfy the demands of the business for the short periods determined upon. By setting the primary timing mechanism after each withdrawal of the desired amounts from the safe the closure can not be reopened until the combination lock is first operated to release said timing mechanism and the latter must operate for the chosen period before the closure can be unlocked. Thus the present mechanism is adapted to foil any attempt on the part of bandits or robbers in gaining immediate access to the contents of the safe or vault upon entering the bank or other place of business employing the present system of protection. As quick action on the part of the robbers or bandits in hold-ups of this nature is essential to their success it can readily be seen that to thus delay their operations, means to defeat their scheme of quickly getting away with the funds of the bank which they seek to rob. Likewise the secondary timing mechanism is advantageous as a protecting means where the safe or vault is closed during the night or for any relatively long closing period, since it must run for the full length of time set before the safe can be opened if the guard release means has been disconnected from the primary timing mechanism as intended.

In the present embodiment of the invention, 10 represents conventionally a safe or vault having a door or closure provided on its inner face with rearwardly projecting ribs or plates 12 in which are slidably mounted the bolts 13 shown in locking position in Fig. 1. The bolts are connected by a vertically disposed bar 14 which is adapted to actuate the bolts simultaneously, the bar being moved by any suitable means such as a handle 16 and crank arm 17 having its free end disposed between the lugs 18 of the bar as shown in Fig. 1. The bar is provided with a laterally extending rod or projecting element 19 in the path of which is normally disposed a suitable guard or obstructing element 20 preferably in the form of a pivoted dog mounted within a casing 21 secured on the back of the door 11 and containing the combination lock and the primary and secondary timing mechanisms. The casing is provided with a door 22 hinged thereon, which is provided with a transparent panel or panels 23 through which the timing mechanisms are rendered visible. The casing is spaced slightly from the door, preferably by a plurality of rubber or other yieldable spacing members 24 as shown in Fig. 2, which afford a certain degree of protection to the timing mechanism by partially absorbing the blows to which the door 11 may be subjected from time to time.

The upper part of the casing containing the combination lock or auxiliary control means is preferably provided with a separate closure comprising a frame 25 carrying a transparent panel 26 through which the combination lock is rendered visible, the frame being secured by screws 27 threaded into lugs 28 on the casing.

The usual knob and dial plate for the combination lock are indicated at 29 and 30, respectively, being provided with a spindle 31 projecting through the closure 11 into the container and through a sleeve not shown, secured to the casing and rotatably supporting any desired number of tumblers 33 having notches 34 adapted to be brought into registry, as indicated in Fig. 5, before successful operation of the combination can be effected. A disk 35 is secured upon the spindle 31 to rotate therewith and is provided with an inwardly extending pin or lug (not shown) for operating the tumblers in the usual manner. The disk 35 is provided with a hub 36 adapted to project through a slot 37 in a lever or operating member 38, the purpose of which will presently appear. A washer 39 is carried by the hub to prevent outward displacement of the lever and semi-circular spring 40 is held in a groove formed in the hub whereby the washer and lever are held against displacement longitudinally of the spindle. A key 41 connects the hub of the disk 35 with the spindle whereby rotation of the latter effects rotation of the disk and the tumblers as well. The lever or operating member 38 is provided for the purpose of moving the obstructing means for the primary timing mechanism to and from obstructing position, these positions being shown respectively in Figs. 4 and 5.

The primary timing devices, two of which are shown, generally at 32 and the secondary timing devices, three of which are shown at 32^a, may constitute any suitable clock-driven or other desired mechanism for selectively controlling the release of the dog or pivoted obstructing member 20, provided for guarding the bolt work as will be hereinafter described. The timing devices of each set operate independently of each other and either of them is designed to effect release of the bolt work obstructing means, should the other fail to operate.

Each primary timing device comprises a rotatable dial 42 having graduations 43 representing any divisions of time desired, such for example, as three hours, shown in the present instance as divided each into ten minute periods. Each secondary timing device comprises a dial 42^a having graduations 43^a representing in the present instance a total of seventy-two hours divided into six hour periods. A fixed pointer or index member 44 is arranged to correspond to the zero position of the primary dials when the latter are in rundown position and like pointers 44^a are provided for the secondary dials. Previous to closing and locking the safe or vault the primary and secondary dials are each set for predetermined periods, one for a relatively short period and one for a relatively long period, determined by the officials in charge. The setting is effected through the medium of a suitable key adapted to be inserted upon the motor driven arbors 45 for winding the clock mechanisms, through openings in the door panel, the usual train of gears being provided, as shown, for driving the dials which are adapted to rotate counter-clockwise as shown in Fig. 4.

For the primary timing mechanism the usual escapement wheel is indicated at 46 and the pallet for controlling the same is shown at 47. When the vault door is closed and locked and the combination destroyed, the several timing mechanisms may be set, for example, in the position shown in Fig. 4, in which the secondary timing mechanism will immediately begin operation, but in which the primary timing mechanism is prevented from operation by obstructing the movement of the pallets 47, which is done through the medium of a pair of fingers or rods 48 depending from a slide bar 49 movable upon a pair of spaced members 50 resting upon the inner face of the rear wall of the casing 21. The bar 49 is held in position upon the spaced members and guided thereon by a pair of screws 51 extending through slots 52 of the bar and threaded into the spaced members 50. The slide bar is provided with a laterally projecting pin 53 extending into a slot 54 in the lever 38, the latter constituting the operating means for moving the slide whereby to move the depending fingers 48 into and out of obstructing position with respect to the pallets 47 of the timing mechanism as shown respectively in Figs. 4 and 5.

The lever 38, which is of the floating type, is under the control of the combination lock and cannot be moved to effect release of the timing mechanism until the combination lock has been successfuly operated. On the other hand, when the combination is destroyed, the lever is automatically returned to the central raised position shown in Fig. 4 in which it serves as a guard to prevent release of the timing mechanism through shifting of the slide 49, release of which might otherwise be effected by a burglar in jarring the slide out of securing position or by tipping the safe or container to one side and permitting the slide to shift by gravity to said release position. The lever is provided with a projecting lug 55 above which extends laterally therefrom a finger 56 adapted to drop into the notches 34 of the tumblers, only when they are all brought into registry, as takes place when the combination is successfully operated. The raising of the lever from the release position shown in Fig. 6 is effected by a cam 57 forming one side of a notch 58 in the disk 35, which operates the tumblers and which is operated by the spindle 31. In destroying the combination, the cam 57 will move into

engagement with the bottom of the lug 55 of the lever and raise the latter from the position shown in Fig. 6 to that shown in Fig. 4, and during this operation the finger is moved out of the notches 34 of the tumblers so that continued rotation of the dial plate will destroy the combination by shifting the tumblers one relative to another, to move the notches thereof out of registry. After the lever has been lifted to the position shown in Fig. 4, continued rotation of the disk 35 will move the notch therein out of registry with the lug 55 and although it may be returned to register therewith, the lever will not drop unless all of the notches are again brought into registry. It will be seen, therefore, that the combination must be successfully operated before the lever can be swung from the central raised position shown in Fig. 4 in which it blocks release of the slide 49 and fingers 48 which guard the timing mechanism. The tumblers, therefore, constitute the operating means for the lever, becoming effective for this purpose as soon as the finger 56 drops into the notches, as shown in Fig. 6. From this position, turning of the dial spindle will move all of the tumblers in unison and the lever will be shifted to the release position shown in Fig. 5, from which it may be returned to central position by rotating the spindle in the opposite direction.

When the safe or vault is locked and the combination destroyed, the lever is guarded by a stop lug or abutment 59 projecting from the wall of the casing at the right side of the finger 56, making it impossible to shift the lever to effect release of the timing mechanism. This safety means is provided as a precaution against jarring the lever to release position by any method which may be employed by a burglar, as by dynamiting the safe, in which case the effect of the explosion might cause the lever to shift from the position shown in Fig. 4 if means were not provided to prevent such movement. The notches 34 of the tumblers are deep enough to permit the finger 56 when operating in the notches to move under and clear the lug 59 upon rotation of the tumblers clockwise from the position shown in Fig. 6. Return of the finger 56 from the position shown in Fig. 5 to that shown in Fig. 6 takes place before the cam 57 begins to raise the lever, through engagement with the bottom of the lug 55 thereon.

The guard or obstructing member 20, constituting a portion of the door securing mechanism, has associated therewith an arm 60 provided with a laterally projecting sleeve or tubular portion 61 pivoted upon a stud 62 having a portion 63 threaded into the rear wall of the casing 21 as shown in Fig. 10. The guard 20 is pivoted upon the sleeve 61 of the arm to swing thereon relatively to the arm. A washer 64 serves to prevent displacement of the arm and the guard, the washer being retained by a screw 65 threaded into the end of the stud 62 as indicated in Fig. 10. The arm is adapted to support the guard in the obstructing position indicated in Figs. 4 and 7 through the medium of a latch 66 pivoted upon the guard at 67 and having its upper end held in a notch 68 of the arm by a pin 69 disposed within a recess formed in the guard, the pin being actuated into engagement with the latch by a spring 70 as shown in Fig. 4.

The means for holding the arm 60 in position to maintain the guard in obstructing position comprises a latch member 71 having a tongue or shoulder 72 adapted to extend under a pin 73 projecting outwardly from the arm, the pin being preferably provided with a V-shaped portion 74 to facilitate cooperation between the pin and latch in the holding and releasing of the guard. The latching member 71 is detachably connected with a slide 75 by means of a screw 76. The opposite ends of the slide are guided in suitable lugs 77 on the side walls of the casing 71. The slide is provided with upstanding arms 78 disposed in the path of laterally projecting pins 79 carried by and adapted to be rotated with the dials 42^a of the secondary timing mechanism. The latch member 71 is normally held in position to support the arm 60 and guard 20 by a spring 80 in a tubular member 81 on a head 82 secured to the slide 75 by a screw 82^a. The outer end of the spring engages a piston-like member 83 extending into the tubular member and having a reduced portion 83^a projecting into an aperture in the side wall of the casing 21, Fig. 5. The spring serves to urge the slide in the direction of the pins 79 projecting from the dials 42^a. The latch member 71 is thereby held in supporting relation with respect to the arm 60 and guard 20 until moved to release position by the pins 79 revolving with the dials when the latter are rotated counter-clockwise from the set position shown in Fig. 4 to the release position shown in Fig. 5, in which the guard and its supporting arm are shown in their lowest position and to which they fall by gravity when released to clear the bolt work element 19. The bolt work is thus freed from obstruction and may be operated to unlock the door by turning the handle 16 on the outside thereof.

When the guard 20 is released by the latching member 71 so that it is free to drop by gravity, the latch 66 for connecting the guard with the arm is automatically moved to release position through engagement of the angular portion 84 of the latch with the bottom wall of the casing, whereby the latch is swung upon its pivot to clear the arm as indicated in Figs. 5 and 8.

The primary timing mechanism, as before stated, is also adapted to release the guard when operated to the zero position shown in Fig. 5. For this purpose, a slide member 85 is provided, the ends of which are suitably guided by lugs or brackets 86 on the side walls of the casing, (Fig. 5). The slide is provided with upstanding arms 87 disposed in the path of projecting pins 88 on the dials 42. The slide is normally held in the position shown in Fig. 4 by a spring 89 in a sleeve 90 suitably connected with and carried by a portion of the right hand bracket 86 for guiding the slide. The inner end of the spring engages a plunger 91 having one end projecting into the sleeve and the other supported by a lug 92 on the slide.

The upper slide 85 is adapted to effect movement of the lower slide to release the guard 20 when the dials of the primary timing mechanism reach zero position as shown in Fig. 5. This operation is effected preferably through a suitable lever arrangement, which does not interfere with independent operation of the lower slide by the dials of the secondary timing mechanism when the latter are run down or driven to the zero position. The lower slide is provided with a laterally projecting pin 93 engaging in the slotted end of a vertically disposed lever 94, which is pivoted at 95 upon a lug or bracket 96 secured to the side wall of the casing 21 in any suitable manner. The upper end of the lever carries a pin 97 engaging in the lower slotted end of a second lever 98 pivoted at 99 upon a lug or bracket 100, which is also suitably secured to the inner wall of the casing 21. The upper end of lever 98 is provided with a reduced portion 101 behind which engages the shouldered end 102 of a detent or operating member 103 pivoted at 104 upon the slide 85. A spring 105 serves to hold the detent in operating position upon the lever 101, the spring having its outer end held by a pin 106 projecting laterally from a lug 107 on the slide. The opposite end of the spring is curved around the pivoted end of the detent and projects into a slot formed therein, the spring being tensioned in a manner to swing the free end of the detent downwardly to hold it in locking engagement with the lever 98.

In Fig. 4 the upper and lower slides are shown in the position they occupy when both the primary and secondary timing mechanisms are set for operation, as is done before closing the door of the safe or vault to lock the same. Since the primary or short time mechanism is adapted for operation principally during business hours and for relatively short intervals between opening and closing time, the dial pins 88, each time they are moved to zero position, will operate to shift the slide 85 from the position shown in Fig. 4 to that shown in Fig. 5, whereby the levers 94 and 98 will move the slide 75 and latch 71 thereon to release the guard 20 so that it can drop by gravity to permit the element 19 of the bolt work to move to the release position shown in Fig. 8 at which the bolt work is positioned to permit the safe door to be opened. The operations afforded by the primary timing mechanism in the manner just described take place independently of the operation of the secondary timing mechanism, which latter is preferably set for a continuous period of operation during business hours so as not to run down before closing time whereby to avoid having said timing mechanism release the guard 20 in advance of its release by the primary timing mechanism.

When closing the safe at the end of the day, or at the end of any period during which business is carried on, the secondary or long time mechanism will be set to effect release of the guard or bolt work obstructing means at such time as it may be decided to reopen the safe, as for example, shortly after the opening time for the next day on which business is to be transacted, which may follow a holiday or the usual week-end closing period, or the regular night closing periods at the end of each day's business. During such relatively long periods, the primary or short time mechanism will be rendered ineffective as a means for releasing the guard by lifting the detent 103 and setting it with respect to the lever 98 as shown in Fig. 7. This is done preferably by inserting a key in the squared opening 108 of a pivoted gravity actuated button 109 carried by the slide 85 and shifting it from the normal position shown in Fig. 5 to that shown by dotted lines in Fig. 7, the button being held in normal position by a pin 110 projecting laterally from the slide. Upon releasing the detent in the manner stated, the spring 80 of the slide 75 will automatically move the latter to its extreme left hand position as viewed in Fig. 7, during which time the slide will operate the lower lever 94 which will swing the upper lever 98 so that the end portion 101 thereof will move to the left of the shouldered portion 102 of the detent, the latter coming to rest upon the lever under the action of the spring 105 where it will remain until the lever is swung back to the position shown in Fig. 5.

It will be understood that in performing the selective operation of positioning the detent as shown in Fig. 7 that the primary or short time mechanism will be in run down or zero position and that when the slide 75 is moved to guard-release position, it will shift the lower lever 94, which will in turn swing the upper lever 98 from the position shown in Fig. 7 to that shown in Fig. 5,

whereby the detent 103 will be automatically returned to normal position upon said lever, thus avoiding having to rely on the memory of the attendant in charge to reset the same. It will be seen, therefore, that either timing mechanism is adapted to effect release of the guard means for holding in check the bolt work and that they operate independently of each other to effect such release when run down.

If, for any reason, the secondary timing mechanism should be set for a shorter period of operation than the primary timing mechanism, the former will effect release of the guard means without interference by the detent 103, since there is nothing to prevent the upper end of lever 98 from swinging to the right as viewed in Fig. 4 upon shifting of the lower slide 75 to the right by the pins 79 of the dial plates 42a.

It will be readily seen from the above description that the guard-release means may be selectively operated by the different sets of timing mechanisms provided, depending on whether or not it is desired to have relatively long or short time control over the bolt work. The advantages of short time control have been pointed out above and this mechanism is, of course, under the direct control of the combination lock, which must be successfully operated before the bar 49 and fingers 48 depending therefrom can be moved to release the pallets 47 to permit operation of the motor drive for the dials 42 and pins 88 carried thereby. The secondary timing mechanism is, in the present instance, free from control by the combination lock provided for controlling the primary timing mechanism.

As previously stated, means is provided whereby the bolt work is moved to release position to condition the guard for movement automatically to obstructing position as soon as the bolt work is returned to locking position. In moving the bolt work to release position the member 19 is projected through an opening 112 in the casing 21 to the extreme position indicated in Fig. 8. In moving to this position said member is adapted to strike a rod 113 which is guided by the dog and which, at its opposite end, is provided with a bevelled or cam surface 114, which is forced under a pin 115 projecting from the arm 60, whereby the pin is raised to move the arm to the position shown in Fig. 8. The pin projects through a slot 116 in the arm and into a recessed portion 117 of the latter in which is disposed a spring 118 preferably of the leaf type as shown in Fig. 8. The outer end of the spring is anchored in a slot formed in the guard and its opposite end rests upon the pin 115 so that when the rod is driven beneath the pin by the member 19, the spring becomes tensioned in the raising of the arm. The purpose of thus raising the arm when moving the bolt work to release position is to elevate the outwardly projecting pin 73 of the arm so that upon setting the dials by movement from the position shown in Fig. 5 to that shown in Fig. 4, the slide 75 is freed for movement to the left by the spring 80 whereby the shoulder 72 of the latching member 71 is moved under the pin 73 of the arm to hold the latter in elevated position. This is the position to which the arm is automatically moved when the element 19 of the bolt work is moved to the position shown in Fig. 8. As long as the element 19 remains in this position, the guard 20 will occupy the position shown in this figure. However, immediately upon casting the bolt work and withdrawing the element 19, the spring 118 will automatically move the guard from said position to that shown in Fig. 4, and thereafter the bolt work cannot be released until one or the other of the timing mechanisms operates to release the guard in the manner described above.

The glass door 23 of the casing is provided with an opening opposite each of the stems 45 for winding the timing mechanisms and the openings are protected by disc-like closures 119 which swing upon pins 120 and are gravity closed when released. A similar closure 121 protects an opening in the glass through which the key is inserted for moving the button 108 to the dotted line position shown in Fig. 7.

In the operation of the locking mechanisms, assuming that the vault or safe door is open and that it is desired to close and keep the same locked during business hours, except for the relatively brief periods for withdrawing the required funds, the operator will set the primary timing mechanism to operate for the desired period after the combination lock is released, such period or periods being varied as circumstances may require, but preferably not exceeding three hours. Then at the proper time in advance of the opening time, the combination lock will be operated to release the primary timing mechanism and the latter must then operate for the selected period before the safe can be opened.

On the other hand, at night or during holidays, the secondary timing mechanism will, of course, be set for the relatively long periods required, care being taken to move the detent 103 to the selective position shown in Fig. 7, which is done with the primary timing mechanism at zero position as before stated. Then upon closing the door and casting the bolt work, the guard will be automatically moved from the position shown in Fig. 8 to that shown in Fig. 7. Under these conditions, the safe cannot be opened until the secondary timing mechanism operates for the full time selected, at

the expiration of which the pins 79 of the dials 42ª will engage the arms 78 of the slide 75 and the latter will be moved far enough to cause the shoulder 72 on the latch 71 to disengage the pin 73 of arm 60, at which time the guard 20 is freed to drop by gravity so that it will no longer obstruct movement of the bolt work to release position.

It will be understood, as stated above, that when the bolt work is moved to release position, the arm 60 will be raised by the rod 113 through movement thereof by the bolt work element 19 to the position shown in Fig. 8, which raises the pin 73 to permit the tongue of the latch member 71 to move under the pin, this operation taking place simultaneously through the action of spring 80 upon rotating the dials counter-clockwise from the zero position to the desired "set" position. The door of the safe or vault is then closed and the bolt work cast and as the element 19 moving with the bolt work clears the end of the guard 20, the previously tensioned spring 118 will automatically raise the guard to the obstructing position shown in Fig. 4. The safe thus becomes locked and guarded by the obstructing guard under the control of the secondary timing mechanism.

With the primary timing mechanism set for operation, the safe cannot be opened until the combination lock is brought to release position, following which the lever 38 will drop from the protecting position shown in Fig. 4 to that shown in Fig. 6 after which the knob 29 of the dial plate will be turned to move the lever to the position shown in Fig. 5. The lever in turn moves the slide 49 and depending fingers 48 to clear the pallets 47 whereby the previously wound primary timing mechanism immediately begins operation. In approaching the zero position or the end of the predetermined period for which the time devices were previously set, the pins 88 on the rotating dials 42 will engage the upstanding arms 87 of the slide 85 and begin movement of the levers 98 and 94 to effect movement of the slide 75 to the right as viewed in Fig. 4. As soon as the tongue or shoulder 72 of the latch member clears the pin 73, the guard 20 and parts associated therewith will drop by gravity to release position and permit the bolt work to be retracted so that the door or closure of the safe can be opened.

I claim as my invention:

1. In a locking mechanism for the closures of safes and the like having releasable securing means, the combination with releasable guard means for the securing means, of primary and secondary timing mechanisms one of which is normally inactive and selective control devices whereby either of said timing mechanisms may be made to effect release of said guard means, said control means including a part operable from the exterior of the safe when closed to effect release of said normally inactive timing mechanism.

2. In a locking mechanism for the closures of safes and the like having releasable securing means, the combination with releasable guard means for the securing means, of primary and secondary timing mechanisms, selective control devices whereby either of said timing mechanisms may be made to effect release of said guard means, and means including a part on the exterior of the safe for controlling the operation of the primary timing mechanism whereby the latter may be held inoperative or released for operation when the safe is closed.

3. In a locking mechanism for the closures of safes and the like having releasable securing means, the combination with releasable guard means for the securing means, of primary and secondary timing mechanisms, selective control devices whereby either of said timing mechanisms may be made to effect release of said guard means, said devices including parts independent of the securing means arranged to be separately actuated by each timing mechanism and to be coupled and uncoupled one with another, a control device associated with one of the timing mechanisms and means under the control of said device for holding the last mentioned timing mechanism inoperative, said means being automatically moved to release said timing mechanism upon operation of said device.

4. In a locking mechanism for the closures of safes and the like having releasable securing means, the combination with guard means for the securing means, of primary and secondary timing mechanisms, selective control devices whereby either of said timing mechanisms may be made to effect release of said guard means, a combination lock associated with the primary timing mechanism and means for holding said primary timing mechanism in check, said means being normally guarded by the combination lock and released thereby when the latter is successfully operated.

5. In a locking mechanism for the closures of safes and the like having releasable securing means, the combination with releasable guard means for the securing means, of separate timing mechanisms, a device adapted when one of the timing mechanisms is run down to be set for operation by the other whereby the latter will effect release of said guard means, means including a part accessible from the exterior of the safe when closed arranged to hold one of the timing mechanisms against operating and movable to release the same and means arranged to be operatively connected with said device and to be actuated by the

first mentioned timing mechanism when the latter approaches run down position.

6. In a locking mechanism for the closures of safes and the like having releasable securing means, the combination with releasable guard means for the securing means, of primary and secondary timing mechanisms, a device for effecting release of the guard means adapted to be operated by the secondary timing mechanism independently of the primary timing mechanism, and means arranged to be selectively connected with said device and to be actuated by the primary timing mechanism whereby to effect release of the guard means independently of the secondary timing mechanism.

7. In a locking mechanism for the closures of safes and the like having releasable securing means, the combination with releasable guard means for the securing means, means operable from the exterior of the safe when closed to both obstruct and release one of said timing mechanisms of primary and secondary timing mechanisms, and control means for releasing the guard means including parts arranged to be set for operation by one of said timing mechanisms and certain of which are adapted to have a selective position whereby they will be operated by only one of the timing mechanisms and arranged when operated by the latter to be automatically reset for operation by the other timing mechanism.

8. In a locking mechanism for the closures of safes and the like having releasable securing means, the combination with releasable guard means for the securing means, of primary and secondary timing mechanisms and devices for releasing the guard means comprising a member adapted to be actuated by the secondary timing mechanism for effecting such release, a second member arranged to be actuated by the primary timing mechanism and selective coupling means between said members whereby the second mentioned member may be coupled with the first to effect operation thereof or disconnected during operation of the secondary timing mechanism.

9. The combination with a safe having a closure, securing means therefore and guard means for the securing means, of primary and secondary timing mechanisms and release mechanism for the guard means including independently adjustable devices arranged to be selectively conditioned for operation by said timing mechanisms, and one of which is adapted to operate the other and means operable from the exterior of the safe when the closure is locked arranged to hold one of said timing mechanisms in check and adapted to release the same.

10. The combination with a safe having a closure, securing means therefor and guard means for the securing means, of primary and secondary timing mechanisms and release mechanism for the guard means comprising relatively movable parts arranged to be coupled and uncoupled and adapted when in coupled relation to be actuated by the primary timing mechanism, one of the parts when in uncoupled relation being arranged for independent operation by the secondary timing mechanism.

11. The combination with a safe having a closure, securing means therefor and guard means for the securing means, of primary and secondary timing mechanisms, release mechanism for the guard means comprising relatively movable parts arranged to be coupled and uncoupled and adapted when in coupled relation to be actuated by the primary timing mechanism, one of the parts when in uncoupled relation being arranged for independent operation by the secondary timing mechanism, the last mentioned part when moving to release the guard means also serving to automatically reestablish connection between the uncoupled parts whereby to recondition the same for subsequent operation by the primary mechanism.

12. The combination with a safe having a closure, securing means therefor and guard means for the securing means, of primary and secondary timing mechanisms and release mechanism for the guard means comprising separate parts each arranged for operation by one of said timing mechanisms and having means for selectively connecting the same whereby one of the timing mechanisms is adapted to operate both of said parts.

13. The combination with a safe having a closure, securing means therefor and guard means for the securing means, of primary and secondary timing mechanisms and release mechanism for the guard means comprising separate parts each arranged for operation by one of said timing mechanisms and selectively controlled connections between said parts whereby when coupled together one is arranged to actuate the other and adapted when uncoupled to be automatically recoupled upon movement of one of the parts by the timing mechanism for actuating the same.

14. The combination with a safe having a closure, securing means therefor and guard means for the securing means, of primary and secondary timing mechanisms and release mechanism for the guard means comprising separate parts each arranged for operation by one of said timing mechanisms and having a plurality of levers therebetween with an operating element for one of the levers arranged to be actuated by one of the parts to effect operation of the other, said element when uncoupled being auto-

matically recoupled through movement of the levers by one of said parts when the latter is operated by one of the timing mechanisms to effect release of the guard means.

15. The combination with a safe having a closure, securing means therefor and guard means for the securing means, of primary and secondary timing mechanisms and release mechanism for the guard means comprising separate parts each arranged for operation by one of said timing mechanisms, said parts having a plurality of levers therebetween arranged to be actuated by the part operated by the primary timing mechanism to effect operation of the other part, the latter being arranged for direct operation by the secondary timing mechanism.

16. The combination with a safe having a closure, securing means therefor and guard means for the securing means, of primary and secondary timing mechanisms, a release mechanism for the guard means comprising relatively movable parts, certain of which are arranged to be actuated by the secondary timing mechanism to effect release of the guard means and all of which are arranged to be actuated by the primary timing mechanism whereby to effect independent release of the guard means.

17. The combination with a safe having a closure, securing means therefor and guard means for the securing means, of primary and secondary timing mechanisms, and release means for the guard means comprising relatively movable parts arranged to be actuated by the primary timing mechanism and adapted to be uncoupled whereby to permit certain of the parts to be actuated only by the secondary timing mechanism to effect release of the guard means, said parts being automatically recoupled on operation of the secondary timing mechanism to effect release of the guard means.

18. The combination with a safe having a closure, of protecting mechanism for the closure comprising relatively movable devices, one of which forms securing means therefor and the other comprising releasable guard means for the securing means arranged to be conditioned by the latter upon its release for automatic operation to obstructing position when the securing means is moved to protecting position, separate timing mechanisms and actuating means for releasing the obstructing means arranged to be selectively operated by said timing mechanisms.

19. The combination with a safe having a closure, of protecting mechanism for the closure comprising relatively movable devices, one of which forms securing means therefor and the other comprising releasable guard means for the securing means arranged to be conditioned by the latter upon its release for automatic operation to obstructing position when the securing means is moved to protecting position, separate timing mechanisms, a releasable device for maintaining the guard means in obstructing position arranged to be actuated by one of the timing mechanisms and means arranged to be actuated by the other timing mechanism and adapted to effect operation of said releasable device whereby to release the guard means.

20. The combination of a safe having a closure, securing means therefor, releasable guard means for the securing means, a device normally preventing release of said guard means, separate timing mechanisms for effecting movement of said device to release position, one of said timing mechanisms including parts permitting it to be selectively coupled and uncoupled with said device and the other operating independently of said parts to effect release of said device and restraining means for one of said timing mechanisms operable from the exterior of the safe when closed to release said timing mechanisms.

21. The combination of a safe having a closure, securing means therefor, releasable guard means for the securing means, a device normally preventing release of said guard means and separate operating mechanisms for effecting movement of said device to release position, one of said operating mechanisms including means permitting it to be selectively coupled and uncoupled with said device, and a combination lock normally preventing movement of the last mentioned operating means and movable to release the same with the closure in locked position and when the combination is successfully operated.

22. The combination of a safe having a closure, securing means therefor, releasable guard means for the securing means and selectively controlled timing mechanisms for independently effecting release of said guard means, one of which is arranged to be released for operation from the exterior of the safe when the latter is closed.

23. The combination with a safe having a closure, of securing means therefor, releasable guard means for the securing means, selectively controlled timing mechanisms for independently effecting release of said guard means, a combination lock and means normally holding one of the timing mechanisms against operation adapted to be released by said combination lock upon operation of the same.

24. The combination with a safe having a closure, of securing means therefor, releasable guard means for the securing means adapted to be conditioned by the latter for automatic movement to obstructing position with respect thereto when the securing means is moved to release position, separate

timing mechanisms and means by which said timing mechanisms are selectively employed to effect release of said guard means.

25. The combination with a safe having a closure, of securing means therefor, releasable guard means for the securing means adapted to be conditioned by the latter for automatic movement to obstructing position with respect thereto when the securing means is moved to release position, releasable holding means for the guard means, separate timing mechanisms arranged to independently effect operation of said holding means, a combination lock and means normally holding one of the timing mechanisms against operation adapted to be released by said combination lock upon successful operation of the same.

26. In a locking mechanism for the closures of safes and the like having a releasable securing means, the combination of releasable guard means for the securing means, primary and secondary timing mechanisms, means normally holding one of said mechanisms in check, means for effecting release of the last mentioned means, and control means for releasing the guard means including relatively movable devices, one of which is adjustable to and from operating position with respect to the other, the latter being arranged for operation by one of the timing mechanisms and the former by the other timing mechanism.

27. In a locking mechanism for the closures of safes and the like having releasable securing means, the combination of primary and secondary timing mechanisms, releasable guard means for controlling the securing means including cooperating devices, one arranged to be operated by the secondary timing mechanism and the other by the primary timing mechanism, each to effect release of the securing means, and means operable from the exterior of the safe when closed for controlling one of said timing mechanisms.

28. In a locking mechanism for the closures of safes and the like having releasable securing means, the combination of releasable guard means for the securing means, primary and secondary timing mechanisms, control means for releasing the guard means arranged to be set for operation by either of said timing mechanisms and adapted to have a selective position in which it will be operated by only one of the timing mechanisms, one of said timing mechanisms being normally held in check, and means for releasing the same for operation, said means being located for operation from the exterior of the safe when the latter is closed.

29. In a locking mechanism for the closures of safes and the like having releasable securing means, the combination of primary and secondary timing mechanisms, and means for guarding the securing means arranged for release by either of the timing mechanisms and adjustable for release by only one of the timing mechanisms and adapted when operated by the latter to be automatically reset for operation by the other timing mechanism.

30. In a locking mechanism for the closures of safes and the like having releasable securing means, the combination of primary and secondary timing mechanisms, and means for guarding the securing means including an obstructing part therefor and control devices for releasing the latter arranged to be operated by the primary timing mechanism, one of said devices being arranged for independent operation by the secondary timing mechanism and adapted when operated by the latter to be conditioned for operation by the other device when it is next operated by the primary timing mechanism.

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