Dec. 29, 1936. W. C. MILLER ET AL 2,065,867

DELAYED CONTROL TIME LOCK

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Fig. 1.

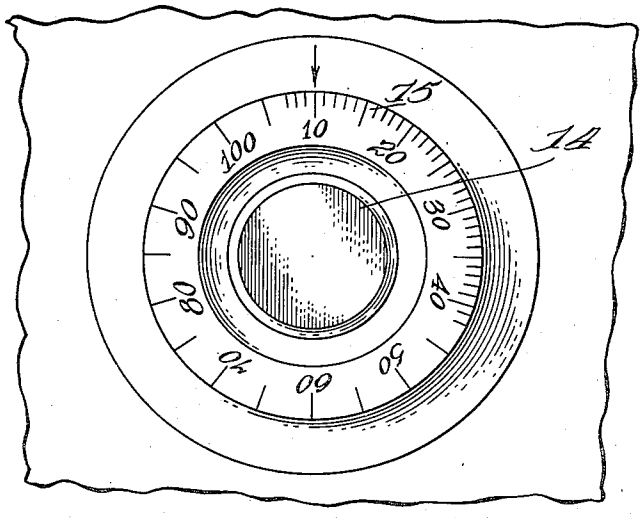


Fig. 2.

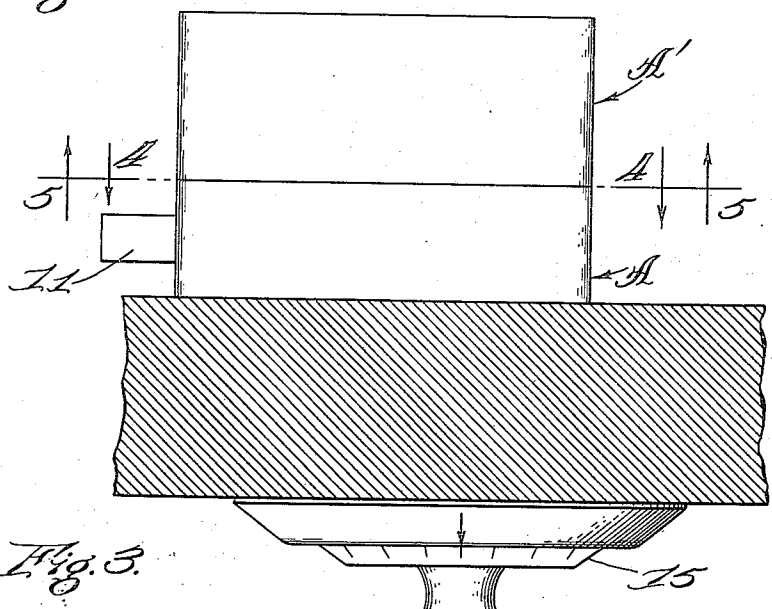
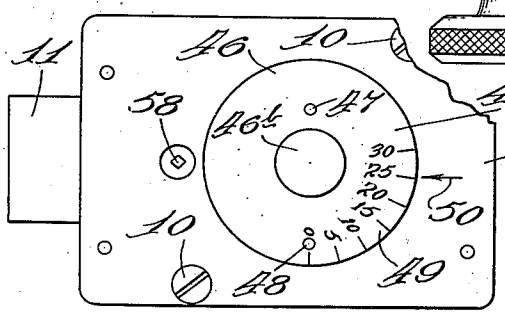


Fig. 3.



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DELAYED CONTROL TIME LOCK

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Fig. 4.

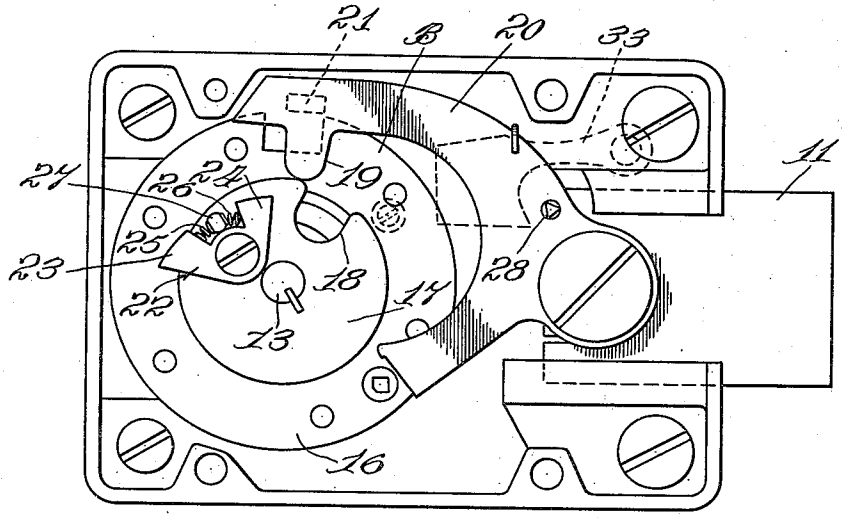
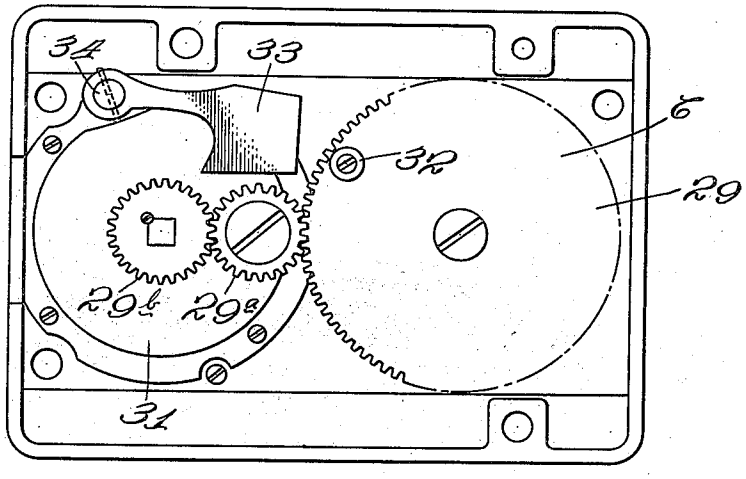


Fig. 5.



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DELAYED CONTROL TIME LOCK

Filed May 27, 1932 4 Sheets-Sheet 3

Fig. 6.

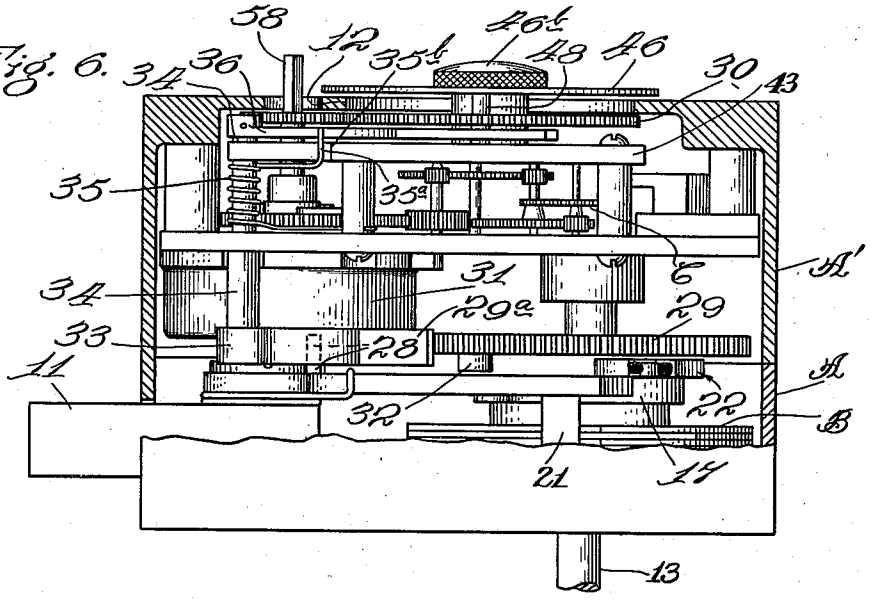


Fig. 7.

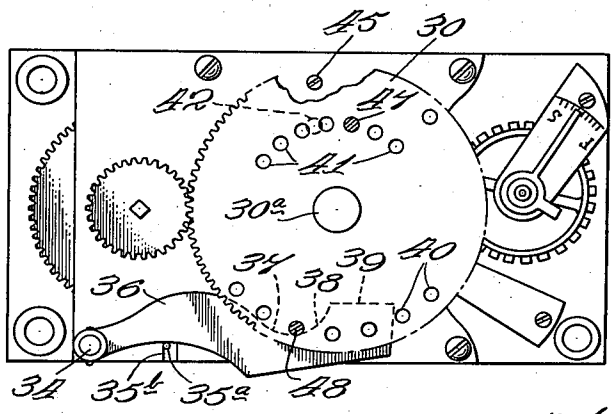


Fig. 8.

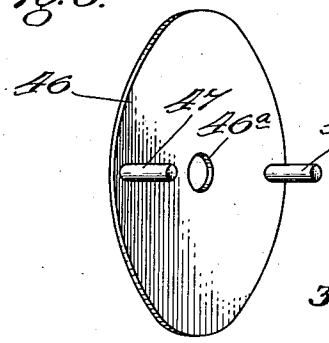


Fig. 9.

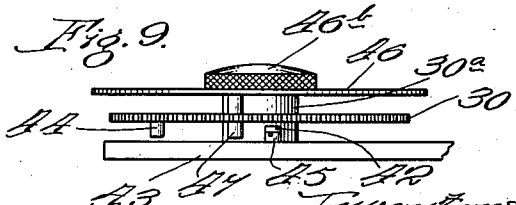
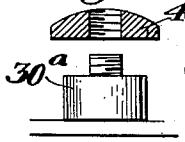


Fig. 9a.



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Dec. 29, 1936. W. C. MILLER ET AL 2,065,867

DELAYED CONTROL TIME LOCK

Filed May 27, 1932 4 Sheets-Sheet 4

Fig. 10.

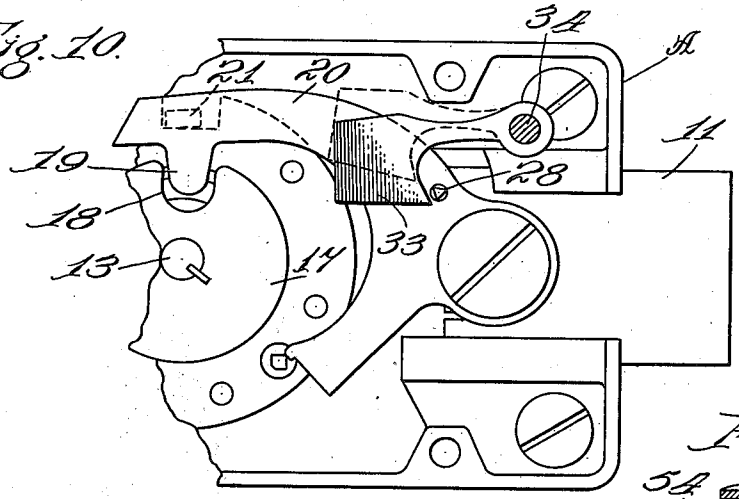


Fig. 14.

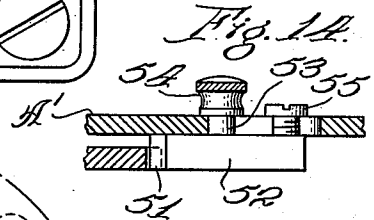


Fig. 11.

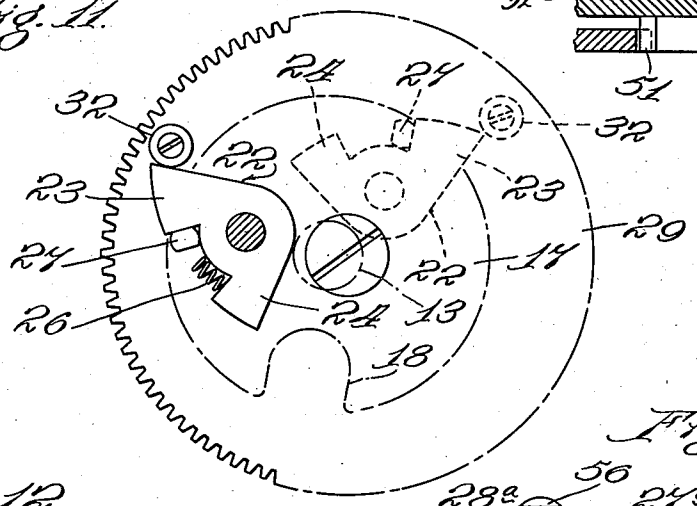


Fig. 13.

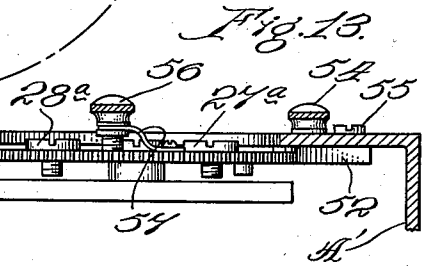
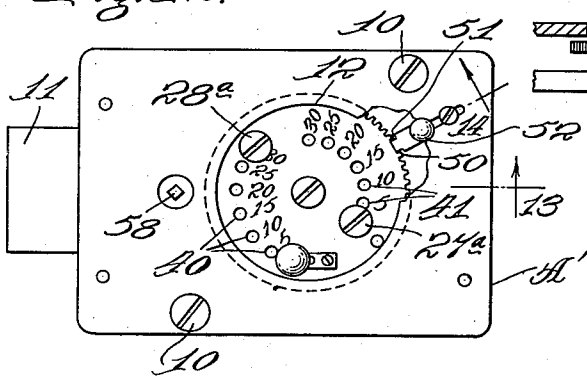


Fig. 12.



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Patented Dec. 29, 1936 2,065,867

UNITED STATES PATENT OFFICE

2,065,867

DELAYED CONTROL TIME LOCK

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Application May 27, 1932, Serial No. 613,954

21 Claims. (Cl. 70—26)

This invention relates particularly to a delayed control timelock which is equipped with means for preventing the opening of a safe-door until a predetermined time has elapsed after the combination has been set for unlocking.

One of the chief disadvantages with timelocks now in use is that the operator may forget to wind the clockwork before locking the safe; also, if the main spring is wound, the movement must be held against operation by a detent or check which might be released by jarring the lock.

A primary object of the present invention is to provide a delayed control timelock which is automatically wound and placed in operation by the setting of the combination for opening the safe. A further object is to provide means for regulating the time which will elapse after setting the combination and before the safe can be opened; and means for disconnecting or rendering inoperative the delayed control mechanism when it is desired to operate the combination lock alone. Other objects will appear as the specification proceeds.

Broadly, the illustrated apparatus consists of a combination lock, which may be of a well known construction and is equipped with a locking bolt, an auxiliary guard for preventing the withdrawal of the bolt, clockwork equipped with means for releasing the guard after a lapse of time, and cooperating means on the combination lock and the clockwork for winding the main spring of the clockwork as the combination is operated for opening the safe. The apparatus also includes regulatable means for controlling the extent of the delayed time movement and means for enabling the lock to be operated as a simple combination lock.

The invention is illustrated, in a preferred embodiment, in the accompanying drawings, in which—

Figure 1 is a front view in elevation, of the operating knob and dial; Fig. 2, a plan view of the lock embodying my invention, the lock being shown applied to a section of a safe-door; Fig. 3, a rear broken view in elevation; Fig. 4, a rear view of the combination lock mechanism, the view being taken as indicated at line 4 of Fig. 2; Fig. 5, a front view in elevation of the clockwork and guard means, the view being taken as indicated at line 5 of Fig. 2; Fig. 6, a plan view of the lock and time mechanism, the top wall of the casing being broken away; Fig. 7, a rear view in elevation of the clockwork, the clockwork being removed from the casing; Fig. 8, a perspective view of the delayed control index plate; Fig. 9, a side view of the delayed control plate as applied to the index gear of the clockwork; Fig. 9a, a view in elevation of a shaft employed and the threaded cap thereof, the cap being shown in section; Fig. 10, a broken view in elevation of the combination lock illustrating the operation of the auxiliary guard; Fig. 11, a front view in elevation of the winding gear as engaged by the cam carried by the operating disk on the lock spindle; Fig. 12, a rear broken view in elevation of a modified form of the invention as applied to the index gear; Fig. 13, a fragmentary side view of the modified form shown in Fig. 12, the view being taken along line 13 of Fig. 12 and a portion of the casing being shown in section; and Fig. 14, an enlarged detail sectional view, the section being taken as indicated at line 14 of Fig. 12.

In the illustration given, A and A' represent the wto-part casing which houses the operating mechanism; B represents a combination lock apparatus which is enclosed by casing A; and C represents the clockwork which is housed within casing A'.

The casing parts A and A' may be of any suitable construction and may be secured together by screws 10 or other desirable means. In the illustration given, the casing A is provided on one side with a slot through which the locking bolt 11 extends, and at its rear side, the casing A' is provided with a circular aperture 12.

The combination lock may also be of any suitable construction. In the drawings, a combination lock of a standard or well known design is illustrated. The lock is provided with the usual operating spindle 13 which extends through the safe-door wall and carries the operating knob 14. The knob is equipped with the usual dial 15. Upon the spindle 13 are mounted, in the usual manner, a series of notched tumblers 16. Keyed to the inner end of spindle 13 is the bolt-operating disk 17. The disk 17 is provided with a notch 18 arranged to receive the lug 19 upon the bolt-slide lever 20, the pin 21 upon the lever 20 being arranged to enter the notches of the safe tumblers when the notches are brought into alignment. In view of the fact that the combination lock illustrated is well known, further detailed description will not be necessary.

The combination lock mechanism B differs from the standard design only in two particulars. The operating disk 17 carries a pivotally mounted cam member 22 which is equipped with a long arm 23 and a relatively short arm 24, the two arms being separated by springs 25 and 26 which abut, on their inner ends, a central fixed post

27. The member 22 is employed for winding the main spring of the clockwork, as will be described more in detail hereinafter. Secured to the bolt-slide lever 20 near the point of its pivotal connection with bolt 11 is a fixed metal post 28. The post 28 cooperates with means hereinafter described for preventing the withdrawal of the bolt until a predetermined time has elapsed after the setting of the combination for unlocking.

The clockwork C may also be of any suitable construction. In view of the fact that the clockwork illustrated is well known, a detailed description will not be needed. It is sufficient to state that the winding gear 29 is connected by an intermediate chain of gears to the index gear 30 and also through gears 29^a and 29^b to a main spring 31. The clockwork is normally in run-down condition, no tension being placed upon the main spring, unless it is desired to maintain a slight tension thereon by the use of stops as will be later described. By means of the interconnecting gears, when the winding gear 29 is rotated clockwise, the index gear 30 is turned in the opposite direction and the main spring 31 is wound. No means are employed for restraining the movement and the clockwork therefore immediately starts to run, the winding gear 29 now turning counter-clockwise and the index gear 30 now turning clockwise. The winding gear 29 is provided near its periphery with a roller 32 which is adapted to be engaged by the cam actuating member 22 on the operating disk 17. As shown more clearly in Figs. 6 and 11, the disk 17 is eccentrically mounted with respect to winding gear 29. With this construction, the member 22, as shown more clearly in Fig. 11, may ratchet over roller 32 when the disk is turned in one direction. When, however, the disk is turned in the opposite direction so as to bring the long arm 23 first into contact with the roller, the actuating member does not slip off of the roller but, instead, turns the winding gear 29 until the roller slips off the point of the long arm 23. The turning of the winding gear through this arc places a tension upon the main spring 31 and also turns the index gear through a corresponding arc in the opposite direction.

Auxiliary guard means are provided for preventing the withdrawal of bolt 11 and means, driven by the clockwork, are employed to release the auxiliary guard after a predetermined period of time. Cooperating with the post 28 upon the bolt-slide lever 20 is a swinging catch 33. The catch is fixed to the rotatably mounted shaft 34 which extends through the clockwork frame. A spring 35 encircles shaft 34 and is housed within the clockwork. One arm 35^a of the spring engages a cam lever 36 which is fixedly secured to the end of shaft 34. The spring arm 35^a extends through a slot 35^b in the clockwork casing and urges the cam lever 36 toward the index gear 30. As the lever 36 moves toward the index gear 30, it swings the catch 33, which is also mounted on shaft 34, forward into a guard relation with the post 28. The cam lever 36, as shown more clearly in Fig. 7, is provided with a curved inner face 37 merging into an inclined cam surface 38 which terminates with a substantially straight surface 39.

The index gear 30 is preferably provided with adjustable means for engaging the cam lever 36 and thus operating the cam lever to withdraw the catch 33 from interlocking engagement with pin 28. As illustrated more clearly in Figs. 7, 8 and 9, the index gear 30 is provided with a series of perforations 40 which are adapted to receive an operating post which will engage the surfaces 37, 38 and 39 of the cam lever. On the opposite side of the index gear 30, that is, diametrically opposite, is a second series of openings 41 adapted to receive a post which will engage a stop 42 carried by the casing plate 43. As shown more clearly in Fig. 9, the index gear is also equipped with a fixed depending lug 44 adapted to engage an auxiliary stop 45 carried by the casing plate 43.

As shown more clearly in Figs. 8 and 9, an index plate 46 is provided with diametrically opposed pins or posts 47 and 48. The pins 47 and 48 extend through the circular opening 12 in the rear plate of the casing A'. While the index plate 46 remains without the casing as shown in Figs. 7 and 9, the pins 47 and 48 extend through the index gear 30 so that pin 48 engages the cam lever 36 and pin 47 engages eventually the stop 42. The index plate 46 is provided with a scale 49 which may be brought into registration with an arrow 50 on the rear plate of the casing A' to indicate the period of time elapsing before the auxiliary guard means will be released. The plate 46 is provided with a central aperture 46^a adapted to receive the reduced threaded end of shaft 30^a upon which the index gear 30 is fixed. A threaded cap 46^b engages the threaded end of shaft 30^a and releasably confines the index plate 46 upon shaft 30^a.

In the operation of the preferred embodiment illustrated in Figs. 1 to 11 inclusive, the index plate 46 is placed in position so that a line on the scale, indicating the desired number of minutes of delayed movement, is brought in registration with the arrow 50. The pins 47 and 48 are passed into the openings 40 and 41. The safe-door may then be closed and locked in the usual manner. To open the safe, the knob 14 is turned to the right and to the left in accordance with the usual dialing operations. As the spindle 13 turns in one direction, say to the left, the pivoted cam member 22 of disk 17 slips over the roller 32 of the winding gear 29. When, however, the knob is operated in the other direction, say to the right, the long arm 23 of member 22 engages the roller 32 of the winding gear and turns it through an arc, as illustrated in Fig. 11, until the point of the arm 23 clears the roller. This movement of the winding gear places the main spring under tension and the clockwork immediately starts. At the same time, the turning of the winding gear causes a corresponding movement of the index gear 30 and of the pins 47 and 48 carried by the index gear. The pin 48 is moved away from the cam 38 of the cam lever 36 so as to release the cam lever. At the same time, the pin 47 is moved away from stop 42. Upon the release of cam lever 36 from engagement with pin 48, the spring 35 urges the catch 33 on shaft 34 into engagement or guarding relation with pin 28.

As already stated, during the winding operation, the gear 29 turns in a clockwise direction, the roller 32 moving to the position shown in dotted lines in Fig. 11, while the index gear 30 moves in the opposite direction, the pin 48 moving away from cam arm 36 and the pin 47 moving away from stop 42. During the ensuing movement of the clockwork, the parts move in the opposite direction, the winding gear 29 moving counter-clockwise so that the roller 32 is restored to its original position where it will be engaged again by the member 22 on operating

disk 17, and the index gear 30 moving in the opposite direction so as to bring the pin 48 gradually toward the cam 38 of cam lever 36 and the pin 47 toward the stop 42. When the pin 48 reaches the cam 38, it raises the cam lever and thereby turns shaft 34 so as to free the pin 28 from the catch 33. Shortly after the lever has been raised, the pin 47 comes in contact with stop 42 and halts the clock movement. At the same time, the catch is held out of engagement with pin 28 by the engagement of pin 48 with the cam surface 38 or the straight line surface 39 of the cam lever 36.

It will be observed that the clockwork is started immediately after the winding gear 29 has been moved. If the operator, after dialing to the right and actuating the winding gear, should be interrupted and should not complete the dialing operation at that time, the movement of the clockwork will in a short while bring the roller 32 of the winding gear back to its original position so that when the operator resumes the dialing, he will rewind the main spring when the operating knob is again turned to the right. The releasing of the auxiliary guard will then be delayed for the full time period.

In Figs. 12, 13 and 14, there is illustrated a modified form of the invention. The index plate 46 is omitted. Instead, the perforations 40 and 41 are threaded to receive screw posts 27^a and 28^a. If desired, scale numbers, indicating the number of minutes of delayed movement, may be placed adjacent the proper openings 40 and 41. This form of index gear is preferable where the customer is likely to make few, if any, changes in the period of time through which the delayed movement is to operate. In such a case, the screws 27^a and 28^a may be set in the proper position when the lock leaves the factory.

If it is desired to use the combination lock as a simple lock and without connection with the time mechanism, means are illustrated in Fig. 12, 13 and 14 by which this may be accomplished. The index gear 30 is provided on its periphery with a slot 50 adapted to receive the tongue 51 of a slidable member 52. As shown more clearly in Fig. 14, an operating shaft 53 extends through a slot in the rear plate of the casing and is equipped with an operating knob 54. An adjusting screw 55 also engages slide 52 and may be used to clamp the slide in locking or unlocking positions.

In order to render inoperative the clockwork and auxiliary guard, the spring is wound so as to permit the roller 32 to clear the cam member 22. This same movement brings the slot 50 in the periphery of index gear 30 in alignment with the slide 52 and the gear may be locked by sliding the member 52 forward until tongue 51 engages the slot 59. The screw 55 may then be tightened to hold the parts in that position. In order to hold the catch 33 out of engagement with pin 28, the post 28^a must be shifted so as to engage the surface 38 or 39 of the cam lever 36. This may be done, of course, prior to the winding operation. In order to avoid the shifting of the post 28^a, a special post 56 may be secured to an opening which will permit the engagement of the post with the cam lever 36 whenever the index gear is locked in the fully wound-up position shown in Fig. 12. Since the post 56 is used only when it is desired to cut out of operation the time mechanism and auxiliary guard device, the post is preferably held in a raised position by the spring clip 57.

If desired, a special winding shank 58, as shown more clearly in Fig. 6, may be employed for winding the main spring directly. Such a shank has, however, no use in the regular operation of the mechanism, its only use being in the repair or adjustment of the clockwork.

The lock is simple and compact in construction and automatic and fool-proof in operation. No requirement is placed upon the operator for winding the mechanism. The clock mechanism is placed under no tension or restraint and therefore can not start into operation as a result of vibrations, jarring, etc. The winding and starting of the clockwork is accomplished automatically during the unlocking operation; and, at the same time, the auxiliary guard is brought into engagement with the post carried by the bolt lever.

While, in the embodiment illustrated, the bolt, after the "setting" of the combination, is ultimately withdrawn (after retraction of the auxiliary guard, or detent) by further operation of the combination lock, it should be understood that the invention is not limited to such specific embodiment, but is applicable to various embodiments, regardless of the specific character of the means employed for effecting the ultimate retraction of the bolt, or bolt-work, which locks the door to the jamb.

The foregoing detailed description has been given for clearness of understanding only, and no unnecessary limitations should be understood therefrom, but the appended claims should be construed as broadly as permissible, in view of the prior art.

We claim:

1. Mechanism of the character set forth comprising a door-locking bolt, main-locking means serving to prevent retraction of said bolt, auxiliary means for preventing withdrawal of the bolt, idle clockwork arranged to operate upon winding and after operation for a time to release said auxiliary means, and means operated by the unlocking of said main locking-means for winding said clockwork.

2. A lock comprising a bolt, auxiliary guard means for preventing withdrawal of the bolt, normally idle clockwork arranged to operate upon winding and after operation for a time to release said guard means, a combination lock mechanism, and means operated by the setting of the combination for unlocking for winding said clockwork.

3. A lock comprising a bolt, auxiliary guard means for preventing withdrawal of the bolt, normally idle clockwork arranged to operate upon winding and after operation for a time to release said guard means, a combination lock mechanism equipped with a bolt-operating disk, and means carried by said clockwork and said operating disk for winding said clockwork when the disk is rotated in one direction.

4. A lock comprising a bolt, auxiliary guard means for preventing withdrawal of the bolt, idle clockwork arranged to operate upon winding and after operation for a predetermined time to release said guard means, a winding gear connected to said clockwork, a combination lock mechanism equipped with a bolt-operating disk, and cooperating means carried by said winding gear and said operating disk for rotating said winding gear when said disk is turned in one direction only.

5. A lock comprising a bolt, auxiliary guard means for preventing the withdrawal of the bolt,

clockwork equipped with a winding gear and an index gear, said gears being directly connected through a chain of intermediate gears, a combination lock mechanism, means operated by the setting of the combination for rotating said winding gear, and means associated with said index gear for releasing said guard means after a predetermined period.

6. A lock comprising a bolt, auxiliary guard means for preventing withdrawal of the bolt, normally idle clockwork arranged to operate upon winding and after operation for a time to release said guard means, a combination lock mechanism, and means operated by the setting of the combination for winding said clockwork, said last-mentioned means comprising a bolt-operating disk carried by said lock mechanism and equipped with a cam actuating member, and a spring-winding gear eccentrically mounted with respect to said disk and equipped with a post adapted to be engaged by the cam member of said disk when said disk is rotated in one direction.

7. A lock including a slidably mounted bolt, a post secured thereto, idle clockwork arranged to operate upon winding a guard member pivotally carried upon a shaft extending through said clockwork, said guard being adapted to engage the post on said bolt, an index gear, a winding gear connected to the main spring of said clockwork and through intermediate gears to said index gear, a cam lever fixed to said guard shaft, a spring urging said cam lever toward said index gear, means carried by said index gear and adapted to engage said cam lever, a combination lock mechanism, and means carried by said combination lock mechanism and said winding gear for winding the spring of said clockwork.

8. A lock comprising a bolt, auxiliary means for preventing withdrawal of the bolt, normally idle clockwork arranged to operate upon winding and after operation for a predetermined time to release said auxiliary means, a combination lock mechanism, adjustable means for regulating the time through which said clockwork will operate before releasing the auxiliary means, and means operated by setting of the combination for unlocking for winding said clockwork.

9. A lock comprising a bolt, auxiliary guard means for preventing withdrawal of the bolt, normally idle clockwork arranged to operate upon winding and after operation for a time to release said guard means, a combination lock mechanism, means operable from outside the lock casing for regulating the time through which said clockwork will operate before releasing the auxiliary means, and means operated by the setting of the combination for winding said clockwork.

10. A lock comprising a bolt, auxiliary means for preventing withdrawal of the bolt, clockwork, means associated with said clockwork for releasing said auxiliary means, said means including a pivotally mounted cam lever, and adjustable means for regulating the time through which said clockwork will operate before releasing the auxiliary means, said last-mentioned means comprising a rotatably mounted disk operated by said clockwork, spaced openings in said disk, and a post adapted to extend through one of said openings and to be brought into engagement by said disk with the cam lever.

11. A lock comprising a bolt, auxiliary means for preventing withdrawal of the bolt, clockwork equipped with a rotatably mounted index disk, a pivotally mounted cam arm adapted to release said auxiliary means, adjustable means carried by said disk for engaging said cam lever, and adjustable stop means carried by said disk and said clockwork for stopping the clockwork after the release of said auxiliary means.

12. A lock comprising a slidably mounted bolt equipped with a locking stud, clockwork, a pivotally mounted shaft extending through said clockwork, a guard catch on one end of said shaft and adapted to swing into engagement with said stud, a cam lever fixed to the other end of said shaft, spring means urging said guard catch toward said stud, an index gear driven by said clockwork, said gear being provided with spaced perforations, a stop lug carried by said clockwork, and removable posts adapted to extend through the openings of said gear to engage said cam lever and said fixed stop lug.

13. In combination, a lock having a bolt, auxiliary guard means for preventing withdrawal of the bolt, normally idle clockwork arranged to operate upon winding and after operation for a time to release said guard means, a combination lock mechanism, means operated by the setting of the combination for unlocking for winding said clockwork, and releasable means for rendering said clockwork winding means inoperative.

14. In means of the character set forth, a door-locking bolt, an auxiliary guard adapted to prevent unlocking thereof, a combination lock serving to prevent withdrawal of said bolt, a normally idle clockwork adapted to free said bolt from said auxiliary guard, and clock-winding means actuated by said combination lock in the setting of the combination thereof.

15. Mechanism as specified in claim 14, having means for rendering said clock-winding means ineffective to wind the clockwork.

16. Mechanism of the character set forth, comprising a door-locking bolt, main locking means serving to prevent retraction of said bolt, auxiliary means for preventing withdrawal of the bolt, a normally idle clockwork adapted to release said bolt from said auxiliary locking means, means operated by the unlocking of said main locking means for winding said clockwork, and means independent of the winding of said clockwork for varying the period through which said clockwork will operate before freeing said bolt from said auxiliary means.

17. Locking mechanism comprising, a door-locking bolt, main locking means serving to prevent retraction of said bolt, auxiliary means for preventing withdrawal of the bolt, normally idle timing mechanism arranged to operate upon being energized and after operation for a time to release said auxiliary guard means, and means operated by the unlocking of said main locking means for energizing said timing mechanism.

18. Locking mechanism comprising: a door-locking bolt, main locking means controlling the movement of said bolt, auxiliary means for preventing withdrawal of the bolt, normally idle timing mechanism arranged to operate and after operation for a time to release said auxiliary means, and means operated by the unlocking of said main locking means for energizing and starting said timing mechanism.

19. Locking mechanism comprising: a door-locking bolt, main locking means controlling the movement of said bolt, auxiliary means for preventing withdrawal of the bolt, timing mechanism adapted to effect release of said auxiliary means, and means actuated in the unlocking of

said main locking means serving to energize said timing mechanism.

20. Locking mechanism comprising: a door-locking bolt; main locking means controlling the movement of said bolt; auxiliary means for preventing withdrawal of the bolt; time mechanism adapted to effect retraction of said auxiliary means; and means actuated in the operation of said main locking means serving to energize said time mechanism.

21. Locking mechanism comprising: a door-locking bolt; main locking means comprising a combination lock controlling actuation of said bolt and equipped with tumblers adapted to be brought to position to permit the unlocking operation by manipulation of the dial; auxiliary means for preventing withdrawal of the bolt; time mechanism adapted to effect release of said auxiliary means after a predetermined period; and means actuated by the combination lock in the operation of dialing and manipulating the tumblers for energizing said time mechanism.

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