

Dec. 10, 1935.

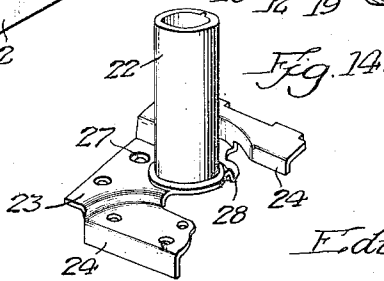
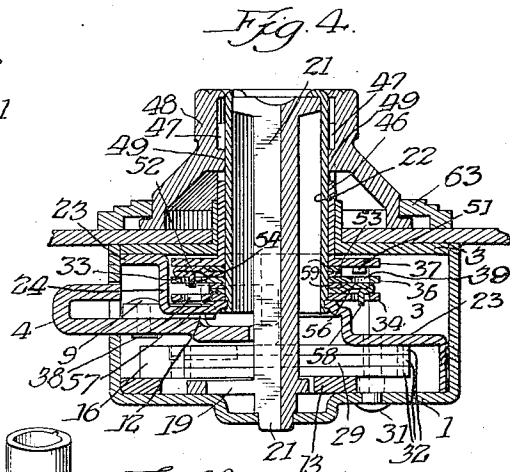
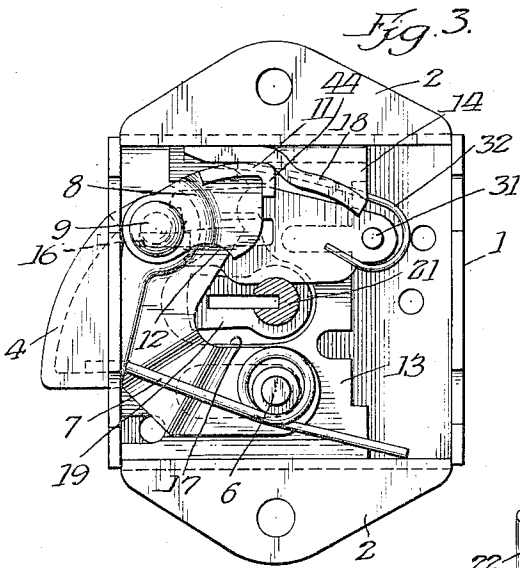
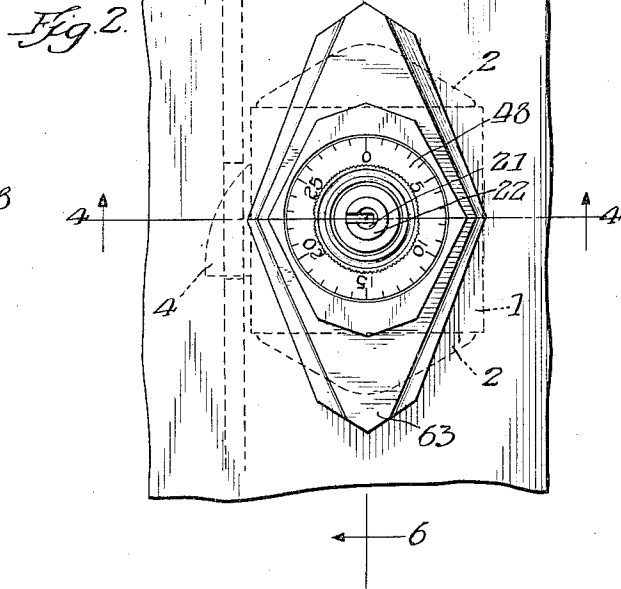
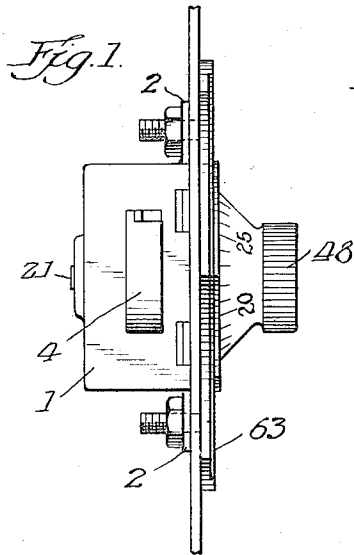
E. W. NORTH

2,023,742

COMBINATION LOCKER LOCK

Filed Aug. 15, 1931

3 Sheets-Sheet 1



Witness:

Ab. Davison.

Inventor:
Edwin W. North.

By: *Wilson, Dowell, McEannet & Rehm*

Attys

Dec. 10, 1935.

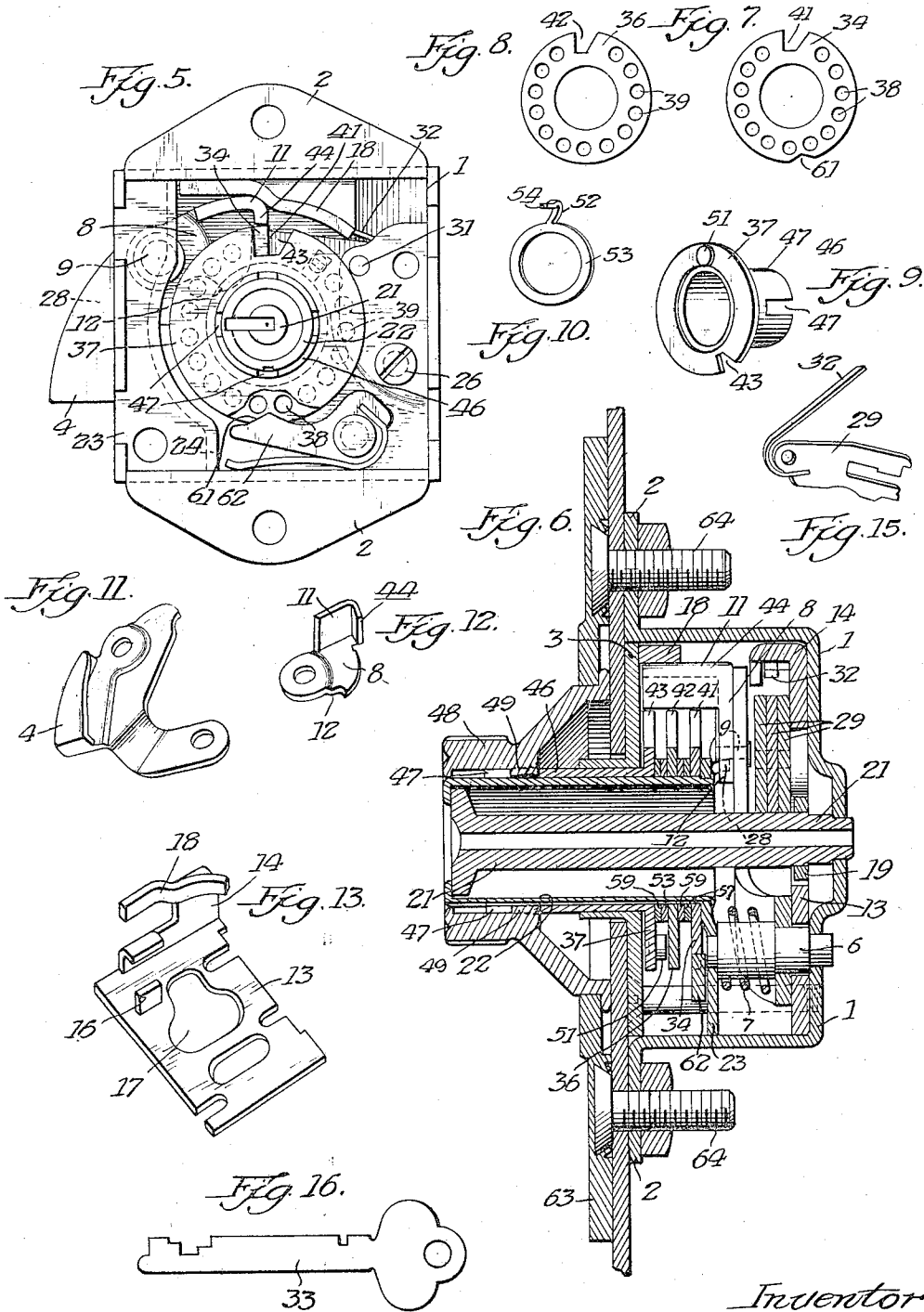
E. W. NORTH

2,023,742

COMBINATION LOCKER LOCK

Filed Aug. 15, 1931

3 Sheets-Sheet 2



Witness:
A. B. Davison.

Inventor:
Edwin W. North.
By: Wilson, Duwell, McLanna & Rehm
Attys

Dec. 10, 1935.

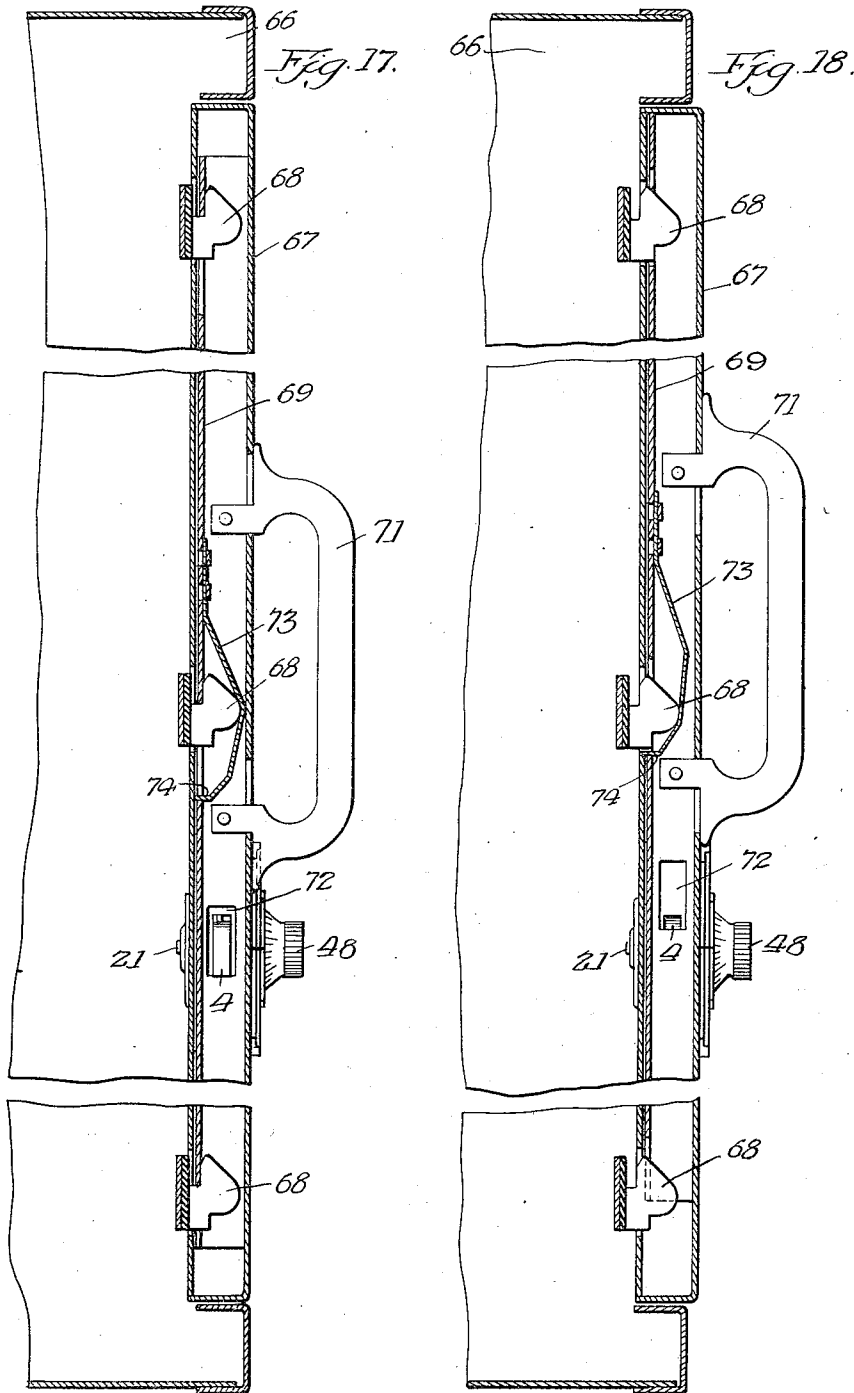
E. W. NORTH

2,023,742

COMBINATION LOCKER LOCK

Filed Aug. 15, 1931

3 Sheets-Sheet 3



Witness:
R. B. Davison.

Inventor:
E. W. North.
By: Wilson, Dawell, McManis & Rehm
Attys

UNITED STATES PATENT OFFICE

2,023,742

COMBINATION LOCKER LOCK

Edwin W. North, Rockford, Ill., assignor to National Lock Co., Rockford, Ill., a corporation of Delaware

Application August 15, 1931, Serial No. 557,299

8 Claims. (Cl. 70—53)

This invention relates to locks of a type controllable by both permutation means and by a master key.

In schools, institutions, or the like, it is usually desired that a single individual have access to only one locker but an authorized person have access to a series of lockers or all lockers. It is also desirable in locker installations to use a self locking lock and to provide for an automatic mechanism which will upset the combination when the locker or door is closed and yet to provide for means which will retain the combination and retain the lock in open position when the locker door is open and as long as the locker door is open.

Among other objects of this invention it is the purpose thereof to provide a compact, easily operable, self locking combination lock that may be master keyed and may be cheaply manufactured and is particularly suitable for use in conjunction with lockers in such a manner as to prevent unintentional upsetting of the combination.

In the present invention, the foregoing desired features are accomplished by the provision of a novel self locking lock mechanism operable selectively by either permutation means or a key in combination with a door latch bar arranged to remain in unlatched position until tripped.

A better understanding of my invention will be obtained from the following description given in connection with the drawings which illustrate one mechanical embodiment of this invention and in which,

Fig. 1 is an end elevation of a combination lock embodying the features of this arrangement;

Fig. 2 is a front elevation of the lock shown in Fig. 1;

Fig. 3 is an interior view of the lock with the key post cylinder and permutation discs removed;

Fig. 4 is a transverse section taken on line 4—4 of Fig. 2;

Fig. 5 is a rear elevation with the rear plate and dial removed;

Fig. 6 is an enlarged transverse section on line 6—6 of Fig. 2;

Fig. 7 is a plan view of one end permutation disc;

Fig. 8 is a plan view of an intermediate permutation disc;

Fig. 9 is a perspective of the front end permutation disc;

Fig. 10 is an end elevation of an adjustable abutment washer used with each of the intermediate and inner end permutation discs;

Fig. 11 is a perspective of the locking bolt;

Fig. 12 is a perspective of the index finger;

Fig. 13 is a perspective of the key slide plate;

Fig. 14 is a perspective of the supporting plate and attached key post cylinder;

Fig. 15 is a perspective of a key tumbler;

Fig. 16 is an elevation of a key for actuating the lock;

Fig. 17 is a vertical section through a locker and door illustrating the installation of a lock and latch bar and showing the latch bar in locked position; and

Fig. 18 is a similar section illustrating the latch bar in open position.

Referring more particularly to Figs. 1 to 15 which illustrate the combination lock per se, the entire lock mechanism is housed within a casing or shell 1 having out-turned wings 2 by means of which the lock housing may be secured to a door or other supporting structure. In the illustrated embodiment, the casing 1 is formed with a rectangular recess within which the entire lock mechanism may be housed and enclosed by a plate or cover 3. A rocking lock bolt 4 is pivoted upon a pin 6 secured to the rear wall of the housing preferably below the upper portion of the bolt and projects through one side wall of the housing which is provided with a suitable aperture for that purpose. The bolt is urged into locked position by spring 7 (Figs. 3 and 6). An index finger 8 is pivoted by a pin 9 to the upper part of the lock bolt at a point removed from the bolt pivot. The index finger is provided with an upper lateral flanged projection 11 constituting a cam surface, and a lower curved cam ledge 12 for purposes later to be described.

For key operation a floating bolt or a key slide plate 13 is disposed upon the inner surface of the rear wall of the shell for sliding movements thereon between the wall and the bolt. The slide is formed with a lateral projecting flange 14 upon one end and a fence 16 projecting in the same direction from one surface thereof near the flange 14, and has a centrally disposed T shaped aperture 17. The end of flange 14 is provided with a cam ledge a track 18 arranged to engage the projecting cam surface 11 upon the index finger to cam the index finger downwardly when the slide is in one position and to be clear of the projection 11 when the slide is in retracted position to the left as viewed in Figs. 3 and 5.

The slide 13 is arranged to be moved into its two positions by an arm 19 carried upon one end of a slotted key post 21 which is journaled at one end in the rear wall of the shell, and at its other end in a cylinder 22 carried by a supporting plate 23, secured to housing 1 in spaced relation to the rear wall thereof and overlying the bolt, the plate having inturned flanges 24 to space the main portion thereof from the rear wall of the housing. The plate may be rigidly held in place by a single screw 26 (Fig. 5). The supporting plate is apertured as at 27 to receive and support the upper end of bolt pivot 6, and is also provided with an inturned lug 28 (Figs. 6

and 14) positioned to engage the under cam surface 12 of the index finger 8 to rotate or cam the latter counter-clockwise into its upper position when the bolt is in locked position.

5 A set of key tumblers 29 are disposed upon a pin 31 supported at its opposite ends in the rear wall of the housing and the supporting plate respectively, the tumblers being urged into locking position by the usual springs 32. The tumblers are arranged and slotted to engage the fence 16 upon the other slide in order to prevent or permit sliding movement of the key slide and the integral cam track 18. Accordingly upon insertion of a proper key 33 (Fig. 16) and rotation thereof slide 13 will be moved to one or the other of its extreme positions, moving with it cam track 18, to permit the bolt to be rotated independently of the permutation means or restricted from rotation except as determined by the permutation discs as will now be described. The end of the cylinder 22 is spun over to retain the key post in position and is preferably provided with only one entrance slot whereby the key may be withdrawn only when the bolt is locked.

In order that the rocking of the lock bolt may be controlled by a combination mechanism, a series of permutation discs are mounted for rotation upon cylinder 22. In the present instance, three discs are employed; an inner end disc 34, an intermediate disc 36, and an outer end disc 37. Each of the discs 34 and 36 are provided with a series of apertures 38 and 39 respectively arranged in a concentric circle about the discs. All three discs are provided with radial slots 41, 42, and 43 respectively which extend inwardly a short distance from the outer edge of the discs. The slots, when aligned by proper manipulation of the permutation discs, are arranged to receive the inwardly turned end 44 of the flange 11 to permit pivotal movement of bolt 4 as will hereinafter be more fully explained.

It will be understood that the permutation discs are adapted to pick up one another when rotated in opposite directions, as required to set the combination for which the lock is adjusted to operate, that is, the discs may be adjusted to a predetermined relationship whereby their peripheral notches will be in registration and in position to receive the inturned end 44 of the index finger.

The outer disc 37 is provided with an integral sleeve 46 of proper diameter to rotate upon cylinder 22. The outer end of sleeve 46 is slotted at four diametrically opposite points as at 47 to adjustably receive the setting dial and knob 48, formed integrally in one piece and the interior bore of which is of a proper diameter to fit over sleeve 47 and which is provided with interior lugs 49 positioned to engage in slots 47 whereby rotation of the knob will rotate sleeve 47 and disc 37. The dial portion of the combined dial and knob terminates in a flat annular rim 50 which seats under the escutcheon plate as will be later described. It will be understood that the number of slots and lugs may be varied to permit of a greater number of possible relative settings between the knob and sleeve.

The inner face of disc 37 is provided with the projection 51 (Figs. 6 and 9) positioned to engage an adjustable abutment tongue 52 formed on an adjustable ring 53. The abutment 52 projects laterally beyond one side surface of the ring and continues in a tongue 54 which projects laterally beyond the opposite face of the

ring and engages one of the apertures 39 in disc 36. It will be understood that ring 53 may be rotated relatively to the disc 33 to bring tongue 54 into any selected aperture 39 to vary the combination. Tongue 54 is of sufficient length to project through disc 36 and engage and coast with an abutment 56 of a similar adjustable ring 57 overlying permutation disc 34. The abutment 56 terminates in a tongue 58 which engages a selected aperture 38 in disc 34. The several permutation discs and their associated abutment rings are separated from each other by spacing washers 59 which are keyed to cylinder 22 to prevent rotation thereof and to prevent one disc from rotating the adjacent disc except through engagement of the abutments.

It will be apparent from the foregoing that upon rotation in one direction of knob 48, permutation disc 37 will be rotated and engage disc 36 which in turn will engage disc 34 through the associated adjustable abutment rings. Upon reverse rotation of knob 48, disc 34 will remain stationary and disc 37 will then rotate only disc 36. Upon another reverse rotation of knob 48, disc 36 will remain stationary and disc 37 only will be moved. By rotating knob 48 the prescribed number of turns, stopping at the proper place at each turn, the permutation discs may be properly set so that slots 41, 42, and 43 will be in alignment.

When the permutation discs are properly set to bring their respective peripheral slots in alignment at the proper positions bolt 4 may be swung in a clockwise direction about its pivot 6 as viewed in Figs. 3 and 5. Rotation of bolt 4 about its pivot will carry index finger 8 in a clockwise direction. If the peripheral slots have been aligned, as was assumed, the projection 11 and the inturned end 44 will be cammed downwardly at the start by the cam track 18 and the inturned end 44 will enter the aligned slots 41, 42, and 43. Further pivotal movement of bolt 4 will merely carry index finger 8 in a further clockwise direction and rotate the three permutation discs about the cylinder and thereby prevent anyone from observing the last number of the combination. If the peripheral slots of the permutation discs are not in alignment, the index finger cannot rotate about its own pivot because projection 11 of index finger 8 will lock against the downwardly curved cam track 18 and will accordingly prevent pivotal movement of bolt 4.

As previously stated, the bolt is also adapted to be unlocked by a key. It will now be apparent that when the key post is turned through the medium of a key and slide 13 moved to the right as viewed in Figs. 3 and 5, thus moving cam track 18 to the right, there will be no camming of the index finger and no locking thereof, i. e. index finger 8 will merely slide about the peripheries of the permutation discs and accordingly bolt 4 may be swung about its pivot.

In order to destroy the setting of the combination, means are provided for preventing the return of one or more discs upon return of the bolt. In the illustrated form of this invention the inner disc 34 only is provided with a peripheral notch 61 arranged to be engaged by a spring pressed pawl or detent 62 although it will be apparent that any number of discs may be so provided. The position of the notch 61 and of the pawl are so arranged that when notch 61 is engaged by pawl 62, disc 34 is so held that slot 41 is not engageable by the inturned end 44. Upon return movement of bolt 4 in a counter-clockwise direc-

tion about its pivot, the inturned end 44 still being in engagement with the aligned slots will rotate the three discs backwardly in a counter-clockwise direction, and pawl 62 will engage notch 61 and prevent disc 34 from returning to its full original position. Disc 34 will on the contrary be stopped just short of its original position in which its slot 41 was aligned with the slots of the other discs. Simultaneously, at the end of the return stroke of bolt 4, index finger 8 will engage lug 28 to cam the finger upwardly. This position in which the index finger is held in its upward position and in which permutation disc 34 is in upset position is clearly illustrated in Fig. 5.

The knob and dial may be conveniently locked in place by an escutcheon plate 63 which engages the annular rim and in which may be concealed and embedded the heads of screws 64 which serve to hold the escutcheon plate and the entire lock in position.

The lock just described is particularly adaptable for use in combination with a locker to securely lock the latch bolt of the locker because the combination is automatically upset upon movement of the lock bolt and yet may be held against upsetting. The lock bolt is also well suited to be actuated when released upon setting of the combination or actuation of the key by movement of the latch bar. In order that the combination may not be upset when the locker is open and before closing the same, it is desirable that means be provided which will retain the bar in raised or open position in order to prevent return movement of lock bolt 4 which would upset the combination.

With particular reference to Figs. 17 and 18, the combination lock previously described is shown as applied to a locker 66 (a portion only of which is shown) provided with a hinged door 67. The locker is provided with three keepers 68 arranged to be engaged by a vertically sliding latch bar 69. The latch bar is a channel shaped bar member slidable vertically within the marginal edge of the door and secured therein by any suitable means, not shown and is operable through the medium of a handle 71 in the usual manner.

The bar and door are also provided with aligned apertures 72 through which bolt 4 projects. The aperture 72 and the bolt 4 are so arranged that with the bolt 4 locked in its lowermost position it will retain or lock the latch bar in its lower position in which position it interlocks with keepers 68. On the other hand the bolt will be readily raised about its pivot upon raising of the locker latch bar when the bolt is unlocked due to the fact that the engaging portion of the bolt moves practically in a path parallel to the movement of the latch bar when the latter is moved to open position. To retain the latch bar in raised or open position, a spring 73 is provided and is secured at its upper end to the latch bar. The spring has its lower end 74 bent outwardly and of such length so as to project through the aperture formed in the bar and door to receive the keeper and to engage the lower edge of the aperture to retain the bolt in upper or raised position. The spring is also so shaped as to be engaged by the keeper when the door is closed to push the spring toward the door front to disengage the lower end from the door and permit the bar to slide downwardly. The bar is shown with the spring engaged to retain the bar in upper position in Fig. 18 and with the spring in retracted position in Fig. 17.

It is apparent from the foregoing description

that the arrangement with a self locking lock constructed so as to destroy the set combination and with the locker latch bar arranged to retain the bar and lock in open position, is an ideal combination for locker use, and that the lock is not only particularly suitable for locker use, being operable in the manner set forth and being operable by a master key, but is very simple and compact in construction, susceptible to many changes in combination and substantially free from all possible structural difficulties.

It is obvious that many changes may be made in the details of construction in the illustrated embodiment of this invention without departing from the spirit and scope of the invention disclosed thereby.

I claim:

1. A combination lock having combination mechanism including a plurality of permutation discs manipulatable to a predetermined relationship, a bolt arranged to be secured in locked position and releasable therefrom when said relationship is established by said combination mechanism, means for rotating one of said discs upon movement of said bolt and means for engaging said latter permutation disc upon movement of said bolt to prevent rotation of said disc to upset said combination mechanism after it has been set to open position.

2. A combination lock having combination mechanism including a plurality of permutation discs manipulatable to a predetermined relationship, a bolt arranged to be secured in locked position and releasable therefrom when said relationship is established by said combination mechanism, said discs being movable with said bolt, and means for engaging one of said permutation discs to prevent movement of said disc upon return movement of said bolt from unlocked to locked position to upset said combination mechanism after it has been set to open position.

3. A combination lock having combination mechanism including a plurality of permutation discs manipulatable to a predetermined relationship, a bolt having an index finger pivoted thereto and arranged to lock said bolt against movement and release said bolt for movement when said relationship is established by said combination mechanism, rigid cam means for forcing said index finger into engagement with said permutation discs when said relationship is established and a second cam means for forcing said index finger out of engagement with said discs when said bolt is in locked position.

4. A combination lock having combination mechanism including a plurality of permutation discs manipulatable to a predetermined relationship, a bolt having an index finger pivoted thereto and arranged to lock said bolt against movement and release said bolt for movement when said relationship is established by said combination mechanism, rigid cam means for forcing said index finger into engagement with said permutation discs when said relationship is established and a second cam means for forcing said index finger out of engagement with said discs when said bolt is in locked position, and means for engaging one of said permutation discs upon movement of said bolt to upset said combination mechanism after it has been set to open position.

5. A combination lock having combination mechanism including a plurality of permutation discs manipulatable to a predetermined relationship, a bolt having an index finger pivoted thereto and arranged to lock said bolt against move-

ment and release said bolt for movement when said relationship is established by said combination mechanism, rigid cam means for forcing said index finger into engagement with said permutation discs when said relationship is established to cause rotation of said discs upon movement of said bolt and index finger, and a second cam means for forcing said index finger out of engagement with said discs when said bolt is in locked position.

6. In combination, a locker having a door, a sliding latch bar for securing said door in closed position, a lock arranged to secure said latch bar in locked position, said lock including a spring pressed rocking bolt in engagement with said bar and selectively releasable by combination means and by key means and being further constructed and arranged to automatically upset the combination thereof upon return movement of the bolt from open to locked position and means for securing said latch bar and bolt in unlocked position until said locker door is closed.

7. In a lock, a casing, locking mechanism with-

in said casing and manipulatable to a predetermined relationship, a bolt arranged to be engaged by said locking mechanism to permit or restrict movement of said bolt, said casing terminating in a pair of laterally extending wings, an escutcheon plate having a pair of wings adapted to overlie the wings of said casing, and screws for securing said escutcheon plate to said casing, the heads of said screws being embedded in one of said pair of wings.

8. In a lock, a casing, locking mechanism with in said casing and manipulatable to a predetermined relationship, a bolt arranged to be engaged by said locking mechanism to permit or restrict movement of said bolt, said casing terminating in a pair of laterally extending wings, an escutcheon plate having a pair of wings adapted to overlie the wings of said casing, and screws for securing said escutcheon plate to said casing, the heads of said screws being embedded in said escutcheon plate and the shanks thereof extending rearwardly through said casing.

EDWIN W. NORTH.