MANIPULATION RESISTIVE COMBINATION LOCK

Fig. 1

Fig. 2

Fig. 3

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The invention relates to combination locks of the general type disclosed in Abbott and Miller Patent No. 1,956,304, dated April 24, 1934, and more particularly to over-center spring means for preventing detection of the lock by manipulation of the same. My copending application discloses and claims such over-center spring means for preventing detection of the combination locks of the type shown in said Patent No. 1,956,304, in which the lock is enclosed within a rectangular casing and a reciprocating bolt is adapted to be directly connected by an operating lever with the tumblers of the lock for retracting and projecting the bolt. Combination locks of the general type disclosed in said patent comprise a housing with a plurality of coaxial cylindrical tumblers of equal diameters rotatably mounted within the housing. A spindle extends into the housing and has a knob on its outer end, rotatable within a dial ring and a cylindrical driver cam, with an operating notch or gate in its periphery, is fixed upon the spindle beyond the tumblers. Usual pin, lever and circular segment means coast between the driver cam and the innermost tumbler, and between each tumbler and the next outer tumbler, as disclosed in detail in said Abbott and Miller patent, whereby by manipulation of the dial and setting the combination, the gates or notches of the tumblers are aligned with each other and with the operating notch of the driver cam for unlocking the lock. Some locks further include bolt means and an operating lever pivotally connected thereto at one end, the lever having a driver lug or tongue depending from its outer end and a fence extending from the inner side thereof parallel with the axis of the tumblers. When the tumbler gates are aligned with each other and with the fence, and the operating notch of the driver cam is located in aligned position below the driver lug or tongue, the fence is permitted to drop into the tumbler gates or notches and the cam follower tongue is permitted to drop into the operating notch of the driver cam, whereby the bolt means may be withdrawn from its extended locking position, and whereby the bolt means may also be extended to locking position, by suitable rotation of the spindle. After the bolt means is extended into locking position, the spindle may then be spun in reverse direction to scramble the combination by turning the tumblers so that the gates are out of alignment with each other. Combination locks of the above character are widely used today and have become standardized to a point where all common types of such locks operated on substantially the same broad principle. Through such standardization these locks are now relatively inexpensive to produce, and are kept on such low cost basis through elimination of high precision in the manufacture thereof. Accordingly, as far as I am aware, there is no combination lock upon the market today that cannot be operated by those familiar with the broad principles thereof, even though the particular combination is not known to them. Manifestly, such locks could be manufactured with high accuracy of all of the complicated parts thereof to render the operation thereof difficult when the combination is not known, but the expense of manufacture would be so great as to be commercially impractical in this highly competitive field. Furthermore, even though a combination lock were made with care and precision, the same would soon become worn to a point where the expert could easily determine the combination and thereby operate the lock. As a matter of fact, it is common practice for pick-locks to rapidly rotate the spindle of a lock, by means of an electric drill or the like, in order to quickly wear down the parts so that the combination may be easily determined. It is appreciated that there have heretofore been developed means intended to accomplish the same broad purpose of the present invention, but such prior devices have been impractical for many reasons, including the necessity of rebuilding the combination lock in its entirety; an excessive expense of manufacture; complicated formation and assembly of parts, continued operational difficulties and complicated operation of the combination lock itself. It is, therefore, a primary object of the present invention to provide a combination lock of the rectangular case type which is positively pick-proof through the provision of over-center spring means, pressing the fence away from the tumblers to prevent the feel and sound effects inherent in the usual lock, which serves to aid in the unauthorized manipulation thereof. It is known that an attempt has been made to provide an over-center spring mechanism for preventing detection of the combination of such locks. However, the over-center spring means in such devices is so arranged that it normally presses the fence toward the tumblers and the fence is only held away from the tumblers during a part of each revolution thereof by means of lever and link mechanism having a stud riding in a cam groove. If such locks are run rapidly to wear down, this stud will be worn away and the spring will hold the fence continually in contact with the tumblers so that the lock may be manipulated. Another important object of the invention is the provision of over-center spring mechanism in a rectangular case type of combination lock, for holding the fence away from the tumblers excepting momentarily at one point during each revolution, whereby if the lock is run rapidly to wear down the parts, the spring mechanism will hold the fence out at all times so that the lock cannot be operated. A further object of the invention is the provision of such a device in a rectangular case type of combination lock in which an over-center spring mechanism normally holds the fence away from the tumblers and simultaneously holds a trigger in position to be tripped by a cam nut, once in each revolution of the tumblers, to move the fence momentarily toward the tumblers, the over-center spring mechanism then immediately moving the fence away from the tumblers and resetting the trigger. A still further object of the invention is to provide a pivoted, spring-loaded trigger operated by a cam nut upon the driver cam of the lock for positively locking the bolt in the extended or locked position so as to prevent the bolt from being driven in by force. The above and other objects, apparent from the drawings and following description, may be attained, the above described difficulties overcome and the advantages and results obtained, by the apparatus, construction, arrangement and combinatos, subcombinations and parts which
comprise the present invention, a preferred embodiment of which, illustrative of the best mode in which applicant has contemplated applying the principle, being set forth in detail in the following description and illustrated in the accompanying drawings.

In general terms, the invention may be stated as comprising a combination lock of the rectangular case type provided with a series of rotatable tumblers having gates therein and an axially aligned driver cam having an operating notch therein, a reciprocable bolt, an operating lever pivotally connected at one end to the bolt and having at its other end a fence adapted to drop into the gates of the tumblers when they are aligned with each other and with the fence, and a driving lug or tongue adapted to drop into an operating notch of the driver cam so that further rotation of the driver cam in proper direction will withdraw or retract the locking bolt.

A lever actuator is pivoted at one end within the lock case, the other end thereof being bifurcated for pivotal connection to the free end of the operating lever. A trigger is pivotally mounted at one end within the lock case and a spring connects the free end of the trigger to the free end of the lever actuator for normally holding the fence away from the tumblers.

The driver cam is provided with a cam nub or high point for engaging a shoe upon the trigger, once during each revolution of the driver cam, to momentarily move the fence toward the tumblers, the spring immediately pulling the fence away from the tumblers and resetting the trigger at the instant the trigger shoe is released by the cam nub.

A shoulder upon the trigger is adapted to normally engage a stud upon the locking lever when the bolt is in the extended or locked position in order to provide positive means for preventing the bolt from being driven inward.

Having thus briefly described the invention, reference is now made to the accompanying drawings showing a preferred embodiment of the invention in which;

FIG. 1 is an elevation of the lock with the cover plate removed, showing the bolt in the extended or locked position and the over-center spring operated lever actuator holding the fence away from the tumblers;

FIG. 2 is a view similar to FIG. 1, showing the parts in the position when the trigger is tripped by the cam nub on the driver cam so as to draw the spring over center pulling the lever actuator down and moving the operating lever downward therewith so that the driving lug thereon partially enters the operating notch in the driver cam and the fence momentarily touches the peripheries of the tumblers;

FIG. 3 is a top plan view of the lock with a portion of the top of the case broken away;

FIG. 4 is a view similar to FIG. 2, showing the gates in the tumblers lined with each other and with the fence, showing the fence in the gates of the tumblers and the driving lug located in the operating notch of the driver cam;

FIG. 5 is a view similar to FIG. 4, showing the tumblers rotated to position to withdraw the bolt to unlocked position;

FIG. 6 is a plan sectional view of the lock;

FIG. 7 is a detached, perspective view of the lever actuator forming a part of the over-center spring mechanism;

FIG. 8 is a detached, perspective view of the trigger of the over-center spring mechanism.

The improved manipulation resistive combination lock as shown in FIGS. 1–6 comprises a rectangular case, indicated generally at 1, mounted on the inner face of a door 2, which may be the door of a safe or the like. The lock construction per se is of conventional construction, such as shown in said Abbott and Miller Patent No. 1,956,304.

The improvements comprising the present invention, namely, the over-center spring mechanism for preventing manipulation are incorporated in this conventional construction of rectangular case type combination lock, and such improvements are hereinbelow described in detail.

The front wall 3 of the lock case is provided with an aperture 4 formed therethrough and providing a hollow cylindrical portion 5, and the case 1 is provided with the door 2 so that the aperture 4 is in axial alignment with a somewhat smaller diameter aperture 6 in the door.

A dial ring 7 is mounted on the outer face of the door. A knob 8, with dial 9 thereon, is rotatable within the dial ring 7 in usual manner and is mounted upon the spindle 10, which is journaled through the door and has a threaded end extending into the lock case.

The driver cam, indicated generally at 11, is threaded upon the spindle 10 and a key 12 may be provided for locking the cam upon the spindle. The usual operating notch 13 is formed in the periphery of the driver cam to receive the driving lug as will later be described.

An annular boss 14 is formed on one side of the driver cam and provided with a cam nub or projection 15 upon its periphery. As in usual practice, the tumblers 16 are rotatably mounted upon the tumbler sleeve 17 which surrounds them and is spaced from the spindle.

A shouldered end portion 18 upon the tumbler sleeve 17 is fitted within the aperture 4 in the front wall of the case. The tumblers are of conventional construction and, together with the driver cam, form a series of tumblers as disclosed in detail in said Patent No. 1,956,304, and the usual pin, lever and circular segment means disclosed in detail in said patent, or equivalent means, coat between the driver cam and the innermost tumbler, and between each tumbler and the next outer tumbler, as described in detail in said patent, whereby by manipulation of the dial and setting of the combination, the gates 19 of the tumblers 16 are aligned with each other and with the operating notch 13 of the driver cam for unlocking the lock.

A conventionally laterally extending bolt 20 is slidably received through the side wall 21 of the case 1 and is mounted for lateral reciprocation in the conventional slides or guideways 22.

The operating lever 23, of conventional form, is pivotally connected to the bolt 20 by the pivot screw 24. This operating lever includes the operating arm 25 having the downwardly extending driving lug or tongue 26 at its free end. The fence 27 is mounted upon the free end portion of the operating lever and extends forwardly overlying and spaced from the tumblers 16 as best shown in FIG. 1.

As disclosed in said Patent No. 1,956,304, key apertures 28 are formed in eccentrics 29 in the tumblers, for engagement by the usual key (not shown) for changing the combination of the lock when the key apertures of the several tumblers are aligned.

Also, as disclosed in said patent, the lever 23 is provided with the downwardly extending elevating arm 30 which terminates in a tongue 31 adapted to be engaged by a radial wing upon said key during the changing of the combination of the lock.

With the exception of the annular boss 14 with cam nub 15 on the driver cam, all of the structure above described may be of conventional construction as generally comprising rectangular case type combination locks of the general type shown in said Abbott and Miller patent.

The manipulation restrictive mechanism to which the invention pertains comprises over-center spring mechanism for normally holding the fence away from the tumblers and for permitting the fence to move toward the tumblers only momentarily during each revolution of the driving lug or the like.

This over-center spring mechanism includes a trigger, indicated generally at 32, pivotally mounted at one end within the case, as by the pivot screw 33 attached to the lug 34 within the case.
A shoe 35 is formed upon the trigger 32 for engagement by the cam nub 15 of the driver cam once during each revolution of the driver cam. In order to permit the usual key (not shown) to be inserted into the aligned key aperture 25, to change the combination of the lock, one side of the trigger 32 may be cut away as shown at 36.

At the free end of the trigger, one end of a spring 37 is attached, as indicated at 38, for urging the trigger toward the driver cam and normally holding the trigger shoe 35 in the path of the cam nub 15 on the annular boss 14 of the driver cam.

A pivot 39 is pivoted at one end upon a boss 40 formed upon the front wall of the case, as by the pivot screw 41. The other end of the lever actuator 42 is bifurcated to form the straight upper arm 42 and the downwardly inclined lower arm 43, between which a stud 44 on the operating arm 25 of the lever 23 is normally received when the bolt 20 is in locked or extended position. A pivotal connection is thus provided between the lever actuator 39 and the operating lever 23 through the stud 44 and bifurcation 42—43.

As above described, one end of the spring 37 is connected to the upper end of the trigger 32 and the other end of the spring is connected to the lever actuator 39 near the bifurcated end thereof as indicated at 45. With the parts in the position shown in FIG. 1, the spring 37 is located above the pivotal center 41 of the lever actuator, thus pulling the free end thereof upward, the lower arm 43 of the bifurcation contacting the stud 44 on the operating lever and holding the same upward so that the fence 27 is held spaced outwardly away from the peripheries of the tumblers 16 and the driving lug 26 of the operating lever is held out of the operating notch 13 of the driving cam.

With each complete revolution of the driver cam 11, as the operating notch 13 thereof is aligned with the driving lug 26 of the operating lever, the cam nub 15 thereof will engage the shoe 35 of the trigger 32, momentarily moving the trigger to the position shown in FIG. 2.

As shown in FIG. 2, the spring is thus moved below the pivotal center 41 of the lever actuator, pulling the free end of the lever actuator down, the upper arm 42 of the bifurcated end of the lever actuator contacting the stud 44 on the operating arm and swinging said operating lever downward upon its pivot 24 causing the fence 27 to momentarily move toward the tumblers 16.

Then that the cam nub 15 passes out of engagement with the trigger shoe 35, the spring 37 will pull the parts back to the position shown in FIG. 1, again pressing the fence 27 away from the tumblers and holding it away from the tumblers until the cam nub 15 engages the trigger shoe 35 on the next revolution of the driver cam.

It will thus be obvious that the fence is held away from the tumblers at all times excepting for the momentary movement thereof toward the tumblers once during each revolution of the driver cam.

In the operation of the device, each time that the driver cam 11 rotates to the position shown in FIG. 2, the fence 27 is thus momentarily moved toward the tumblers 16.

If the tumbler gates 19 are not aligned, as shown in FIG. 2, the fence is immediately moved away from the tumblers and the lock remains locked.

It is not possible to obtain a sense of feel, because the line is thus only moved toward the tumblers once during each revolution of the driver cam, and is held away from the tumblers by the over-center spring mechanism throughout the entire remainder of each revolution thereof.

Thus, this momentary movement of the fence towards the tumblers once during each revolution of the driver cam is of no aid in the determination surreptitiously of the locations of the tumbler gates.

If at the time the driver cam reaches the position shown in FIG. 4, all of the tumblers 16 have moved into positions where their gates are in alignment with each other, and with the fence 27, with the parts in these relative positions, the cam nub 15 of the driver cam contacts the trigger shoe 35 and moves the trigger to the position shown in FIG. 4, the fence 27 will enter the several tumbler gates 19.

By further rotation of the driver cam 11 in counterclockwise direction, as viewed in the drawings, the bolt 20 being then connected to the driver cam through the driving lug 26 upon the operating lever 23 engaging the operating notch 13 in the driver cam, the bolt 20 will be withdrawn or retracted as shown in FIG. 5.

As the driver cam is thus rotated in counterclockwise direction, pulling the operating lever 23 toward the left, as viewed in the drawings, the stud 44 on the operating lever will move out of the bifurcated end 42—43 of the lever actuator, and said lever actuator will contact the stop stud 46, which may be mounted on the cover plate 47.

Then, the stud 46 will prevent the spring 37 from pulling the lever actuator 39 downward out of the path of the stud 44 while the cam nub 15 on the driver 14 is in contact with the shoe 35 on the trigger 32, and will hold the lever actuator in position so that when the cam nub moves out of contact with the shoe on the trigger, the lever actuator will be swung upward by influence of the spring 37, as shown in FIG. 5, so that the bifurcated end 42—43 thereof will be positioned to again receive the stud 44 when the bolt is returned to locked or extended position.

By rotating the driver cam 11 in reverse direction, that is in clockwise direction as viewed in the drawings, the bolt 20, through the operating lever 23, will be again projected outward to locked position, and the stud 44 on the operating lever will again be received in the bifurcated end 42—43 of the lever actuator. The dial may then be spun to disperse the combination in usual manner.

For the purpose of preventing the lock bolt 29 from being driven inward when the parts are in the locked position, as shown in FIG. 1, a stud 48 is provided on the operating lever 23 for contact with a shoulder 49 upon the trigger. This stud 48 provides a stop against which the stud 48 will strike in the event an attempt is made to force the bolt 20 inward to unlocked position.

It should be understood that this means for preventing the bolt from being forced inward may be applied to any combination lock of this general type even though the lever actuator 39 is not provided for preventing manipulation of the lock.

From the above it will be obvious that the over-center spring mechanism prevents surreptitious detection of the combination by pressing the fence away from the tumblers at all times excepting momentarily during each rotation of the driver cam, at which time the cam nub 15 through contact with the trigger shoe 35 moves the trigger to the position of FIG. 2, momentarily moving the fence toward the tumblers, after which it is instantaneously moved away from the tumblers by the action of the spring 37 and lever actuator 39, the instant the cam nub is disengaged from the shoe of the trigger.

It will also be seen that the dial, or any added vernier device or extension thereto, cannot indicate to the picklock the distance between the surface of the fence in contact with the tumbler peripheries and the center axial line of the tumblers.

Furthermore, it will be seen that this lock cannot be manipulated by being run rapidly to wear down. If the lock is run rapidly until the cam nub 15 or the trigger shoe 35, or both, are worn off so that the trigger cannot be operated thereby, the spring 37 will permanently hold the lever actuator 39 up, holding the fence away from the tumblers as shown in FIG. 1, so that the lock cannot be operated.
In the foregoing description, certain terms have been used for brevity, clearness and understanding, but no unnecessary limitations are to be implied therefrom beyond the requirements of the prior art, because such words are used for descriptive purposes herein and are intended to be broadly construed.

Having now described the invention or discovery, the construction, the operation, and use of preferred embodiments, and the advantageous new and useful results obtained thereby; the new and useful construction, and reasonable mechanical equivalents thereof obvious to those skilled in the art, are set forth in the appended claims.

I claim:

1. In a combination lock, a case, lock mechanism within the case comprising a reciprocable bolt, a fence, a series of rotatable tumblers having gates into which said fence enters upon alignment of said gates and said fence, a cam nub upon one of said tumblers, an operating lever pivotable at one end upon said bolt, said fence being fixed upon the other end of said operating lever, a trigger pivoted at one end to said case, a lever actuator pivotable at one end to said case, and said operating lever, a spring connected to said other end of the lever actuator and to the other end of said trigger, and normally located at one side of the pivotal center of the lever actuator for holding a portion of the trigger, in the path of said cam nub and for normally swinging said lever actuator outward upon its pivot on the case and swinging said operating lever outward through said pivotal connection between the lever actuator and the operating lever for pressing said fence away from said tumblers, said cam nub being arranged to engage said trigger once during each revolution of said one tumbler for momentarily overcoming the spring means by further tensioning the spring and throwing it over the pivotal center of the lever actuator for momentarily swinging said lever actuator inward and thereby swinging the operating lever inward through said pivotal connection with the lever actuator for moving said fence toward said tumblers, said spring immediately swinging said lever actuator outward and swinging the operating lever outward through said pivotal connection for pressing said fence away from said tumblers when said trigger is released from said cam nub.

2. In a combination lock, a case, lock mechanism within the case comprising a reciprocable bolt, a fence, a series of rotatable tumblers having gates into which said fence enters upon alignment of said gates and said fence, a cam nub upon one of said tumblers, an operating lever pivotable at one end upon said bolt, said fence being fixed upon the other end of said operating lever, a trigger pivoted at one end to said case, a lever actuator pivotable at one end to said case, a V-shaped bifurcation at the other end of said lever actuator, a stud upon said operating lever engaged by said bifurcation and providing a detachable pivotal connection between said lever actuator and said operating lever, a spring connected to said other end of the lever actuator and to the other end of said trigger and normally located at one side of the pivotal center of the lever actuator for holding a portion of the trigger, in the path of said cam nub and for normally swinging said lever actuator outward upon its pivot on the case and swinging said operating lever outward through said pivotal connection between the lever actuator and the operating lever for pressing said fence away from said tumblers, said cam nub being arranged to engage said trigger once during each revolution of said one tumbler for momentarily overcoming the spring means by further tensioning the spring and throwing it over the pivotal center of the lever actuator for momentarily swinging said lever actuator inward and thereby swinging the operating lever inward through said pivotal connection with the lever actuator for moving said fence toward said tumblers, said spring immediately swinging said lever actuator outward and swinging the operating lever outward through said pivotal connection for pressing said fence away from said tumblers when said trigger is released from said cam nub.

3. In a combination lock, a case, lock mechanism within the case comprising a reciprocable bolt, a fence, a series of rotatable tumblers having gates into which said fence enters upon alignment of said gates and said fence, a cam nub upon one of said tumblers, an operating lever pivoted at one end upon said bolt, said fence being fixed upon the other end of said operating lever, a trigger pivoted at one end to said case, a shoe on said trigger, a lever actuator pivotized at one end to said case, a bifurcation at the other end of said lever actuator, a stud upon said operating lever engaged by said bifurcation and providing a loose pivotal connection between said lever actuator and said operating lever, a spring connected to said other end of the lever actuator and to the other end of said trigger and normally located at one side of the pivotal center of the lever actuator for holding the shoe on the trigger in the path of said cam nub and for normally swinging said lever actuator outward upon its pivot on the case and swinging said operating lever outward through said pivotal connection between the lever actuator and the operating lever for pressing said fence away from said tumblers, said cam nub being arranged to engage the shoe on said trigger once during each revolution of said one tumbler for momentarily overcoming the spring means by further tensioning the spring and throwing it over the pivotal center of the lever actuator for momentarily swinging said lever actuator inward and thereby swinging the operating lever inward through said pivotal connection with the lever actuator for moving said fence toward said tumblers, said spring immediately swinging said lever actuator outward and swinging the operating lever outward through said pivotal connection for pressing said fence away from said tumblers when said trigger is released from said cam nub.

4. In a combination lock, a case, lock mechanism within the case comprising a reciprocable bolt, a fence, a series of rotatable tumblers having gates into which said fence enters upon alignment of said gates and said fence, a cam nub upon one of said tumblers, an operating lever pivoted at one end upon said bolt, said fence being fixed upon the other end of said operating lever, a trigger pivoted at one end to said case, a lever actuator pivotized at one end to said case, a V-shaped bifurcation at the other end of said lever actuator, a stud upon said operating lever engaged by said bifurcation and providing a detachable pivotal connection between said lever actuator and said operating lever, a spring connected to said other end of the lever actuator and to the other end of said trigger, and normally located at one side of the pivotal center of the lever actuator for holding a portion of the trigger, in the path of said cam nub and for normally swinging said lever actuator outward upon its pivot on the case and swinging said operating lever outward through said pivotal connection between the lever actuator and the operating lever for pressing said fence away from said tumblers, said cam nub being arranged to engage said trigger once during each revolution of said one tumbler for momentarily overcoming the spring means by further tensioning the spring and throwing it over the pivotal center of the lever actuator for momentarily swinging said lever actuator inward and thereby swinging the operating lever inward through said pivotal connection with the lever actuator for moving said fence toward said tumblers, said spring immediately swinging said lever actuator outward and swinging the operating lever outward through said pivotal connection for pressing said fence away from said tumblers when said trigger is released from said cam nub.
said tumblers, said spring immediately swinging said lever actuator outward and swinging the operating lever outward through said pivotal connection for pressing said fence away from said tumblers when said trigger is released from said cam nub, said fence being movable incidental to rotation of said tumblers after said fence enters the gate thereof, means whereby said movement of said fence by rotation of said tumblers in one direction reacts said bolt and moves said stud out of said bifurcation, and means positioning said bifurcation to receive said stud when the tumblers are rotated in the other direction to extend said bolt. 5. In a combination lock, a case, lock mechanism within the case comprising a reciprocable bolt, a fence, a series of tumblers mounted for rotation upon a single axis and having gates into which the fence enters upon alignment of said gates and said fence, a dial rotating in said axis, means whereby said dial sets said tumblers, an operating lever pivoted at one end upon said bolt, said fence being fixed upon the other end of said operating lever, a trigger pivoted at one end to said case, a lever actuator pivoted at one end to said case, a bifurcation at the other end of said lever actuator, a stud upon said operating lever engaged by said bifurcation and providing a loose pivotal connection between said lever actuator and said operating lever, a cam nub rotatable by said dial, a spring connected to said other end of the lever actuator and to the other end of said trigger and normally located at one side of the pivotal center of the lever actuator for moving said fence toward said in the path of said cam nub for normally swinging said lever actuator outward upon its pivot on the case and swinging said operating lever outward through said pivotal connection between the lever actuator and the operating lever for pressing said fence away from said tumblers, said cam nub being arranged to engage the shoe on said trigger once during each revolution of said dial for momentarily overcoming the spring means by further tensioning the spring and throwing it over the pivotal center of the lever actuator for momentarily swinging lever actuator inward and thereby swinging the operating lever inward through said pivotal connection with the lever actuator for moving said fence toward said tumblers, said spring immediately swinging said lever actuator outward and swinging the operating lever outward through said pivotal connection for pressing said fence away from said tumblers when said trigger is released from said cam nub.

6. In a combination lock, a case, lock mechanism within the case comprising a reciprocable bolt, a fence, a series of tumblers mounted for rotation upon a single axis and having gates into which the fence enters upon alignment of said gates and said fence, a dial rotating in said axis, means whereby said dial sets said tumblers, an operating lever pivoted at one end upon said bolt, said fence being fixed upon the other end of said operating lever, a trigger pivoted at one end to said case, a lever actuator pivoted at one end to said case, a bifurcation at the other end of said lever actuator, a stud upon said operating lever engaged by said bifurcation and providing a loose pivotal connection between said lever actuator and said operating lever, a cam nub rotatable by said dial, a spring connected to said other end of the lever actuator and to the other end of said trigger and normally located at one side of the pivotal center of the lever actuator for holding a portion of the trigger in the path of said cam nub and for normally swinging lever actuator outward and swinging the operating lever outward through said pivotal connection between the lever actuator and the operating lever for pressing said fence away from said tumblers, said cam nub being arranged to engage the shoe on said trigger once during each revolution of said dial for momentarily overcoming the spring means by further tensioning the spring and throwing it over the pivotal center of the lever actuator for momentarily swinging said lever actuator inward and thereby swinging the operating lever inward through said pivotal connection with the lever actuator for moving said fence toward said tumblers, said spring immediately swinging said lever actuator outward and swinging the operating lever outward through said pivotal connection for pressing said fence away from said tumblers when said trigger is released from said cam nub, said fence being movable incidental to rotation of said tumblers after said fence enters the gate thereof, means whereby said movement of said fence by rotation of said tumblers in one direction reacts said bolt and moves said stud out of said bifurcation, and means positioning said bifurcation to receive said stud when the tumblers are rotated in the other direction to extend said bolt.
said fence away from said tumblers, said cam nub being
arranged to engage the shoe on said trigger once during
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the spring means by further tensioning the spring and
throwing it over the pivotal center of the lever actuator
for momentarily swinging said lever actuator inward and
thereby swinging the operating lever inward through said
pivotal connection with the lever actuator for moving
said fence toward said tumblers, said spring immediate-
ly swinging said lever actuator outward and swinging the
operating lever outward through said pivotal connection
for pressing said fence away from said tumblers when
said trigger is released from said cam nub, said fence be-
ing movable incidental to rotation of said tumblers after
said fence enters the gates thereof, and means whereby

said movement of said fence by rotation of said tumblers
in one direction retracts said bolt and moves said stud
out of said bifurcation, and means positioning said bi-
furcation to receive said stud when the tumblers are ro-
tated in the other direction to extend said bolt.

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