Fig. 1

Fig. 2

Fig. 3

Fig. 4

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CHANGEABLE COMBINATION PADLOCK

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ABSTRACT OF THE DISCLOSURE

A combination padlock of the exposed shackle type having a polished stainless steel shell and back cover surrounding an inner padlock case and the marked parts of the dial. A combination change key opening in the rear wall of the inner case is covered by a guard plate rotatable on the rear wall within the case and is movable by a rotatable stud portion extending through the rear case wall only when the lock mechanism is in a selected combination change condition. The back cover can only be removed to expose this stud to manipulation when the shackle is unlocked and retracted, but the shackle must be returned to locked condition before the combination change condition can be dialed.

BACKGROUND AND OBJECTS OF THE INVENTION

The present invention relates in general to combination locks, and more particularly to exposed shackle combination padlocks having means to improve the security of the padlock against unauthorized manipulation and against unauthorized access to the combination changing mechanism of the padlock.

It is generally known that locks of the type commonly referred to as combination locks depend for their operation upon the alignment of peripheral recesses or gates in a plurality of rotatable tumblers wheels usually three of which are provided, with a movable fence which permits the bolt or other locking element to be retracted into unlocked position upon limited movement of the fence into the aligned gates. The tumblers are rotatably positioned through lost motion connections with a driving cam driven by the rotatable dial. As generally constructed, the combination of such locks can be reset at any time by inserting a combination change key from externally of the lock casing through an opening usually provided in the rear cover plate and into openings in the tumbler wheels which are aligned with the key opening in the cover plate when the tumblers are in a predetermined position. The insertion of the combination change key into the openings provided therefor in the tumbler wheels effects a release of the outer annular rim portions from their inner hub portions by which the tumbler wheels are driven, so that the positions of the inner hub portions of the tumbler wheels relative to their outer annular rim portions may be reset to any desired combination by turning the dial and driving cam.

Exposed shackle-type padlocks having an exposed U-shaped shackle of hardened steel wherein one shackle leg is slidably and rotatably retained within the padlock casing and the other leg, which is of shorter length, is operatively associated with a complementary socket in the padlock casing to be retained within the socket when in locked condition and to be slidably withdrawn from the padlock casing, have been modified to employ such combination lock operation mechanisms. An example of this is disclosed in U.S. Pat. No. 2,673,457, granted to Harry C. Miller on Mar. 30, 1954, wherein a sliding carrier within the padlock casing which supports a pair of pivoted locking arms normally disposed in locking engagement with oppositely facing notches in legs of the shackle is co-active with the tumbler wheels so as to be normally restricted from sliding movement which would withdraw the locking arms from the shackle notches when the tumbler wheel gates are out of selected alignment with the sliding carrier. When, however, the peripheral gates of the tumbler wheels are aligned in registry with a selected portion of the locking arm carrier, the carrier may be projected into seating engagement with the gates by exerting a withdrawing force on the shackle, the inward movement of the locking arm carrier towards the tumbler wheels serving to withdraw the locking arms from seating engagement with the shackle notches so as to permit withdrawal of one end of the shackle from the padlock casing. Improved security against detection of the combination by sense of touch or by very minute sounds or clicks when the lock is manipulated in a special manner is provided by the special sliding carrier construction disclosed in this patent, as the pivoted locking arms are positively locked against withdrawal from the shackle notches when the tumbler wheel gates are out of alignment with the fence portion of the sliding carrier and withdrawing force is exerted on the shackle.

Such exposed shackle combination padlocks have come into extensive use to lock security closures which do not have built-in combination locks, especially to secure locking bars on file cabinets for storing classified material, as they may be readily applied to hasp staples fixed on doors or file cabinets. However, in such applications, the lock casing is exposed and freely available to inspection by persons seeking unauthorized admission to the enclosure protected by the padlocks. This exposed condition of combination padlocks in use considerably increases the difficulty in protecting the padlock against detection of the combination by unauthorized persons. For example, when the padlock is of the type having a combination change key opening in the rear cover of the lock casing through which the change key is inserted to change the combination, this opening needs to be especially protected to prevent possible observation of the tumbler wheels, or at least the rearmost tumbler wheel, by unauthorized persons and to prevent against insertion of small pieces of material, such as shim stock, through the change key opening to detect the lock combination or manipulate the internal lock mechanism.

Also, the exposed condition of use of exposed shackle padlocks renders the lock components readily subject to corrosive action of climate and weather and to attack by unauthorized persons by drilling and like entrance procedures. When the dial of such exposed shackle combination padlocks are located externally of the padlock casing, persons seeking unauthorized operation of the lock can readily drill through the exposed dial and casing to inspect the interior of the padlock and determine the combination, and then replace the damaged dial with a new matching dial to disguise the fact that the lock has been tampered with. U.S. Pat. No. 2,814,940, issued to Harry C. Miller, illustrates an exposed shackle combination padlock construction designed to improve security in these respects.

An object of the present invention is the provision of a novel exposed shackle combination padlock of improved security characteristics. Another object of the present invention is the provision of an improved exposed shackle combination padlock for resisting unauthorized attack upon the lock and readily disclosing penetration of the lock casing by unauthorized personnel.

Another object of the present invention is the provision of a novel exposed shackle padlock of the type wherein the combination is changed by insertion of a combina-
tion change key into the lock casing, having improved means for protecting the combination key opening from exposure to unauthorized persons.

Another object of the present invention is the provision of an exposed shackle combination padlock of the type in which the combination is changed by insertion of a combination change key into the padlock casing, wherein the lock must be manipulated in a novel manner to effect resetting of the combination.

Other objects, advantages and capabilities of the present invention will become apparent from the following description, taken in conjunction with the accompanying drawings illustrating a preferred embodiment of the invention.

BRIEF DESCRIPTION OF THE FIGURES

FIG. 1 is a front elevation of an exposed shackle padlock embodying the present invention;

FIG. 2 is a rear elevation of the exposed shackle padlock with the steel rear cover in place;

FIG. 3 is a rear elevation of the exposed shackle padlock with the steel rear cover removed;

FIG. 4 is a horizontal section view of the padlock taken from the line 4—4 of FIG. 3;

FIG. 5 is a fragmentary section view taken through the socket which receives the free leg of the shackle, as viewed along the line 5—5 of FIG. 2;

FIG. 6 is a rear elevation view to enlarged scale, of the padlock case and components mounted therein, with the rear case cover plate removed;

FIG. 7 is a vertical section view of the padlock case, taken along the line 7—7 of FIG. 6;

FIGS. 8 and 9 are front elevation views of the rear case cover plate and the components mounted thereon, with the guard plate in closed position and open position, respectively;

FIG. 10 is a section view taken along the line 10—10 of FIG. 9;

FIG. 11 is a fragmentary vertical section view, taken along the line 11—11 of FIG. 6;

FIG. 12 is a perspective view of a combination change key usable with the padlock.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

Referring to the drawings, wherein like reference characters designate corresponding parts throughout the several figures, the exposed shackle padlock embodying the present invention is generally indicated by the reference character 15 and comprises an inner padlock case 16, preferably formed of a body portion of molded metallic material, having a front wall 17, opposite side walls 18 and 19, a curved bottom wall 19 and a top wall 20. The inner case 16 is completed by a rear case plate 21 which is mounted on the back of the casing body by suitable rivets or locking studs indicated at 21 in FIG. 3.

Extending inwardly from the inner case wall 17 into the chamber 22 defined by the front, side, bottom and top walls, is a hollow cylindrical boss or tumbler post 23, on which are arranged in succession progressing from the front to the rear of the lock, three tumbler wheels 24, 25, and 26, between each of which are provided the usual washers 27 and a rotatable fly 28. The tumbler wheels 24, 25, and 26 are of the usual key-changeable type, having an inner hub portion 29 freely rotatable on the boss 23 and an outer rim portion 30 releasably interlocked with the hub 29 against relative rotation by rim locking means which include a combination change cam or rotatable member 30' having an opening therein for receiving a combination change key, such as illustrated in FIG. 12, insertable simultaneously through the cam openings of each of the tumbler wheels when the tumbler wheels occupy selected angular positions to effect release of the hubs 29 from the rims 30. An embodiment in which change tumbler wheels is disclosed in earlier U.S. Pat. No. 1,484,692, granted Feb. 26, 1924, to E. R. Webber, although it will be understood that other changeable tumbler wheel constructions may be employed. A driving cam 31 is disposed immediately to the rear of the rearmost tumbler wheel 26 and is connected to a spindle 32 extending through and rotatably journaled in the cylindrical boss 23. The forwardmost end of the spindle 32 has a dialed assembly 33 fixed thereto and located immediately in front of the front wall 17, the dial assembly including a central knob portion 33' and an outwardly projecting circular dial portion 33" bearing the usual dial markings.

Each of the tumbler wheels 24, 25 and 26 and the driving cam 31 has a peripheral gate or recess, as indicated at 26' and 31', at one angular position thereon, and each of the tumbler wheels has the usual lost-motion connecting means between that tumbler wheel and the next adjacent fly 28 in the direction of the driving cam, while the driving cam 31 and tumbler wheels 25 and 26 have drive pins projecting toward the front wall 17 by which rotation is successively imparted to the tumbler wheels 26, 25 and 24 upon rotation of the driving cam 31 in counterclockwise and clockwise directions, when viewed from the front of the case, through successive revolutions in the conventional manner for combination locks. The exposed shackle 34 is preferably in the form of a U-shaped rod of hardened steel having a longer leg 35 and a shorter leg 36. The longer leg 35 extends through a circular opening 20a through the top wall 20 and is permitted a selected amount of axial and rotatable movement relative to the casing by means of a fixed pin 27 in the casing interfering with a longitudinal slot 35' in the leg 35 terminating at its lower end in a transverse circumferential slot portion. The free end portion of the shorter leg 36 is interferred in a closed bottom socket 26b opening through the top wall 20 when the shackle is in locking position. By this construction, the shorter leg 36 of the shackle can be withdrawn from the casing and swung to an exposed position by rotating the shackle about the axis of the longer leg 35.

Enclosing the front, top, side and bottom walls of the inner case 16 as well as the major portion of the dial portion 33", is a drill resistant, steel shell 38, having front, top, bottom and side walls conforming generally to the configuration of the corresponding walls of the inner case 16 to immediately overlie the same. The front wall 38a of the steel shell 38 includes an outwardly projecting conical shield formation 38b which covers all but a limited arcuate segment of the dial portion 33", leaving a small sight opening 38c through which the dial portion 33" may be viewed by the operator. A central circular opening is provided in the conical shield formation through which the knob portion 33' projects to an accessible position. A substantially flat steel cover 39 conforming substantially to the rear profile of the inner case 16 removably overlies and covers the rear surface of the inner case, the side edges and curved bottom edge of the steel cover 39 being slidably received in channel shaped lip formations 40 provided at the corresponding rear edges of the side and bottom wall portions of the steel shell 38 to permit slidable insertion of the cover 39 into a completely covering relation with the rear surface of the inner case 16. The steel cover 39 has a circular opening 41 therein bounded by an outwardly protruding annular lip 41' rearwardly aligned with the socket 26b, in which the slotted outer cylindrical end portion of a locking screw 42 is nested when the steel cover 39 is in a locking position, registered relation to the inner case 16. The cover plate locking screw 42 is threaded into a suitable threaded bore in the rear case plate 21 and has an inner head 42a which is normally nestled in a cavity 43 disposing the head 42a immediately to one side of the socket 26b out of interfering relation with the shackle leg 36 when the locking screw 42 is in a non locking position, as illustrated in FIG. 5. In this outermost limit position, of the locking screw 42, the locking screw nested in the.
opening 41 of the steel cover 39 holds the cover 39 against removal from normal covering position. However, when the padlock is unlocked and the shorter shackle leg 36 is withdrawn from its associated socket 20, the cover locking screw 42 can be turned in a clockwise direction as viewed in FIG. 2 by a suitable tool inserted in the crosswise slot of the locking screw to shift the screw to its innermost limit position wherein the head 42a lies in the socket 20 and the outer end of the locking screw 42 is withdrawn from the opening 41 to free the steel cover 39 for upward sliding movement out of the channel-shaped lips 40. Both the shell 38 and cover 39 are preferably held in position to readily show evidence of tampering for force used, such as by attempted drilling, punching or the like.

The locking mechanism for the padlock comprises a sliding locking arm carrier assembly 45 similar to that disclosed in U.S. Pat. No. 2,673,457 to Harry C. Miller, and includes a carrier frame 46 slidably mounted for rectilinear movement within the padlock casing toward and away from the tumblers wheels and drive wheels. A pair of locking arms 47 are pivotally mounted on a pivot pin 48 journalled in a frame and are provided with dogging elements 47' at their ends remote from the pivot pin adapted to fit into complementary notches in the legs of the shackle 34 to lock the shackle with the ends of both legs thereof within the padlock casing. The positions of the locking arms 47 for a given location of the carrier frame 46 are controlled by camming pins 49 having their opposite ends located in slideways in the front and rear wall of the casing and biased by springs 49' in such slideways to the positions illustrated in FIG. 6, which are seated in semicircular recesses 47'' in the locking arms 47. The pins 49 are so located that when the carrier frame 46 is in its uppermost position, illustrated in FIG. 7, the locking arms are canted outwardly by the pivot pin 48 and the camming pins 49 into seating engagement with the notches in the shackle legs. However, if extra force is applied to withdraw the shackle when the tumbler wheels and driving cam are not disposed at the unlocking position, the springs 49' allow the pins 49 to shift upwardly and cause the locking arms 47 to jam tightly against the top wall 20 of the lock case so as to require considerable force to break the jamming condition.

The carrier frame 46 has an integral downwardly extending finger 46' disposed rearwardly of the rearmost tumbler 26 to be selectively brought into seating relation within the gate 31' of the driving cam 31. An interlocking member 50 having a lower contact bar 50' is slidably supported for downward movement in a vertical plane in the carrier frame 46, and is resiliently biased to the lowermost limit position illustrated in FIG. 7. A portion of the interlocking member 50 integral with the contact bar portion 50' forms an interlocking key located immediately below the portions of the locking arms surrounding the pivot pin 48 and is designed to be projected into notches in the confronting portions of the locking arms 47 when the carrier frame 46 is moved downwardly toward the tumbler wheel axis and the contact bar engages any portion of the periphery of one of the tumbler wheels. Shoulders are provided on the notches of the locking arm portions surrounding the pivot pin 48 to engage the sides of the key portion of the interlocking member 50 when the interlocking member is projected into the notches and the locking arms 47 occupy the locking position to prevent rotation of the dogging elements 47 toward their normal withdrawn position. An upward movement of the interlocking member 50 and the key thereof into locking relation with the notches and the locking arms 47, and thus the locking arms 47, will be free to pivot to positions freeing the shackle 36 to be moved to its outer limit position withdraw the leg 36 from the socket 20. An anti-vibration spring wedge 51 supported for vertical movement in a guide way in the front wall 17 has an upper flange seated in a slot in the carrier frame 46, as shown in FIG. 7, and has a rearwardly projecting head formation 51a at its lower end to be shifted into engagement with a forwardly projecting circular flange 29a on the hub of the front tumbler wheel 24, when the carrier frame is lowered. This is to urge the tumbler wheels against each other sufficiently to brake them against rotation responsive to vibration when the contact bar 50' lightly engages the peripheries of the tumbler wheels and resist detection of the combination by vibration techniques.

A conventional tumbler scrambler mechanism is provided, comprising a scrambler assembly similar to that illustrated in earlier U.S. Pat. No. 2,625,032, having a slide block 52 supported in a suitable slide way in the front wall 17 from which a catch spring 53 depends. The slide block 52 is resiliently biased to the raised position illustrated in FIG. 6, and has a shoulder engaged by a flange 54' on the upper end of one pivoted leg 54 of the rocker arm assembly 55. The lower leg 54 is pivotally linked to a rocker arm 56 pivoted on a projecting rearmost end of the spindle 32, a second leg 57 being pivotally linked to the diametrically opposite end of the rocker arm 56 and having a bifurcated flange 57a at the upper end thereof interfitted in recesses in the lower end portion of the shackle leg 34. Thus, when the shackle 34 is withdrawn to its outer limit position, the rocker arm 56 is rotated clockwise from the position illustrated in FIG. 6, drawing the rocker arm leg 54 and the slide block 52 downwardly to a position engaging the hooked end portion of the catch spring 53. In all the above stated positions the lock is in condition to receive two adjacent tumbler wheels, such, for example, as the tumbler wheels 24 and 25. Thereafter, when the shackle 34 is returned to the locked or inner limit position, thus releasing the slide block 52 and catch spring 53 to return to its normal upper position, the catch spring 53 is resiliently retracted to its normal upper position, spinning the tumbler wheels with which it is engaged and disarranging the combination.

A suitable openning index mark 59 is provided on the front wall 38c of the shelf 38, for example, at the top center of the sight opening 38c. In order to open the lock, the operation is illustrated in FIG. 33 at location 10, three full revolutions counterclockwise, as viewed in FIG. 1, to position the first dial number of the combination in alignment with the opening index mark 59, then rotates the dial assembly two and a fraction revolutions to align the second dial number of the combination with the index mark 59, then turns the dial assembly counterclockwise for one and a fraction revolutions to align the third dial number of the combination with the index mark 59, and then rotates the dial assembly clockwise a fraction of a revolution to align the zero mark of the dial with the index mark 59. The gates of each of the tumbler wheels and of the driving cam are then aligned properly with the carrier frame 46 so that, upon applying a manual withdrawing force to the shackle 34, the carrier frame slides downwardly to seat the finger 46' and contact bar 50' in the tumbler wheel and driving cam gates, during which the locking arms are prevented from being rotated toward their normal withdrawn position. This assembly comprises a rotatable guard plate 62 having an aperture 63 therein adapted to register with the
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key hole 61 and admit the combination change key into the interior of the inner casing when the guard plate is in the opening position illustrated in FIG. 9. The guard plate 62 is fastened to a pivot stud 64 extending through and journaled for rotation in the rear case plate 21 in alignment with the extended axis of the spindle 32. The exposed end surface of the pivot stud 64 has a transverse slot 64a therein to facilitate turning of the pivot stud and the guard plate 62 secured thereto by a suitable tool, such as the blade or bit formation on the end of the combination change key, or a screwdriver or coin. An inwardly projecting stop post 65 is provided on the rear case plate 21, the stop post 65 being positioned in the closed or opened position of the guard plate 62 to stop the guard plate at the closed and opened limit positions shown in FIGS. 8 and 9, respectively.

A dent lever 66 is located above the guard plate 62 and supported on the case cover plate 21 by pivot stud 67, and is resiliently biased to the position illustrated in FIGS. 8 and 9 by spring 68 supported against suitable shoulder surfaces formed in the inwardly facing surface of the rear plate 21 and having the free leg 68a which biases the dent lever 66 in a clockwise direction to the illustrated position. The leg 66a of the dent lever 66 has a fence member 69 on the end thereof to limit or control the movement of the pivot stud 24, 25, and 26 and the driving cam 31 when the lock combination has been dialed using the changing index mark 69 on the front wall 38a of the shell 38, rather than the opening index mark 59, as the index to which the combination numbers are dialed, and then aligning the zero mark on the dial with the changing index mark 69. The other leg 66c of the dent lever 66 has a specially shaped surface facing the guard plate 62 defining a pair of spaced recess formations 66d and 66e separated by an intervening convex crest 66f adapted to receive the nose portion 62e of the guard plate at the closed and open positions, respectively, of FIGS. 8 and 9. A reciprocator lever 70 is also mounted on the pivot stud 67 forwardly overlying the dent lever 66, having a first leg 70a bearing against the lower surface of a rearwardly projecting flange formation 57a at the top of the rocker arm leg 57 and a second leg 70b which bears against a shoulder on the carrier frame 46. A forwardly offset and upwardly extending projection 62 of the guard plate 62 bears against the concave lower surface of the reciprocator lever 70.

The guard plate 62 normally occupies the closed position illustrated in FIG. 9. When it is desired to change the combination of the padlock, the operator must first determine the existing combination in the manner hereinafore described, aligning the numbers or graduations on the dial corresponding to the combination with the opening index mark 59 and then aligning the zero dial marking with the opening index mark 59. The shackle 34 is then withdrawn to its outer limit position and the locking screw 42 is rotated, for example in a clockwise direction as viewed in FIG. 3, to withdraw the rearmost end portion of the locking screw inwardly from the circular opening 41 therein in the steel cover 39, and the steel cover is removed by sliding it in the direction of the shackle. The locking screw 42 is then turned in the opposite, or counterclockwise, direction to return it rearwardly to its normal position withdrawing the head portion 42a thereof from the socket for the shorter shackle leg 36, and the shackle is returned inwardly to the locked position. The operator then dials the existing combination to the changing index mark 69 and aligns the zero mark on the dial with the changing index mark, to thereby align each of the gates of the tumblers and driving cam with the fence portion 66b of the detent lever 66. The operator then turns the pivot stud 64 from the closed to the open position, for example, by inserting the combination change key or a similarly shaped tool or an inserted change key into the pivot stud, to rotate the guard plate 62 from the FIG. 8 position to the FIG. 9 position. During this angular move-

ment of the guard plate 62, the nose 62c thereof acting on the crest formation 66f of the detent lever 66 oscillates the detent lever counterclockwise and then clockwise, during which movement the fence portion 66b is projected into and then withdrawn from the gates of the tumbler wheels and driving cam. Obviously, if the proper combination has not been dialed to the changing index mark 69, the gates are not aligned with the change index position of the detent lever 66 and the guard plate 62 cannot, therefore, be rotated to the open position. When the guard plate 62 has been properly rotated to the open position, registering the aperture 63 therein with the change key opening, the change key should be inserted through the opening 61 into the change key openings of the tumbler wheels 24, 25 and 26 and rotated through the appropriate arc to decouple the tumbler wheel riors from the hubs. The operator then dials the new combination using the changing index mark 69. During this movement of the dial and the driving cam 31 connected thereto, the hub portions of the tumblers 24, 25, and 26 are driven in the usual manner through the driving pins and flies to properly adjust the tumbler wheel hubs to the appropriate angular positions for the new combination relative to the tumbler wheel riors while the riors are held against movement by the dialed guard plate 62.

The combination change key should then be rotated back to its initial position recoupling the tumbler wheel rors with their hubs, and be withdrawn from the change key opening 61. The new combination should then be dialed several times by the operator on the changing index mark 69, and the pivot stud 64 after each trial dialing of the new combination should be turned to the closed position and then be returned to the open position to be certain that the new combination has been properly established. It will be observed that the pivot stud 64 and the guard plate 62 cannot be turned to the closed position if the new combination has not been properly dialed on the changing index mark, as the gates of the tumblers would then not be properly aligned to receive the fence portion 66b of the detent lever 66 and engagement of this fence portion with one of the tumbler peripheries would prevent sufficient movement of the guard plate 62 to the closed position. After completing the test dialing of the new combination, the guard plate 62 should be returned to the closed position, and the new combination should be dialed to the opening index mark 59. The shackle can then be withdrawn to free the socket for leg 36 to receive the head of the locking screw 42, and the locking screw should then be rotated in the appropriate direction to shift it inwardly out of interferring relation with the steel cover 39, after which the steel cover can be reinserted in the channel-shaped lip formation 40 and the locking screw 42 returned outwardly to the normal cover locking position.

It will be noted that there is built-in protection against accidentally leaving the guard plate 62 in the open position, as the shackle cannot be unlocked when the guard plate is in the open position because the forwardly offset extension 62 of the guard plate in the open position underlies the end portion of leg 70 of the reciprocator lever 70 which, in turn, bears upwardly against a shoulder on the carrier frame 46, thus preventing the carrier frame from moving downwardly to the shackle release position. This reciprocator lever 70 also serves to return the carrier frame 46 to its upper limit position when the shackle 34 is returned to its locked position, as the movement of the rearwardly projecting flange formation 57b of the rocker arm leg 57 as the longer shackle leg 35 moves inwardly of the lock casing rocks the reciprocator lever 70 in a clockwise direction to the FIG. 8 position to lift the carrier frame 46 to its upper limit position.

What is claimed is:

1. A combination padlock, an inner case including a first wall having a combination resetting key opening therein, a combination lock mechanism housed in said
case comprising key changeable rotatable tumbler wheels and a rotatable driving cam for angularly adjusting the tumbler wheels, dial means disposed outwardly of the case and connected to said driving cam for manual adjustment of the driving cam and tumbler wheels, rotatable guard means inwardly adjacent said first wall having guard actuating means at the outer surface of said first wall for manually shifting the guard means between covering and uncovering positions relative to the resetting key opening, a drill resistant shell outwardly encasing said case and forming a protective surround therefor including a cover plate outwardly covering said first wall barring access to said resetting key opening and said guard actuating means and a cup-shaped body portion encasing the remainder of said case with which the cover plate is slidable coupled for movement parallel to said first wall between covering and uncovering positions, said cover plate having an interlock opening therein, and screw means restrained in a projected position extending into said interlock opening in the locked condition of the padlock, to lock said cover plate in said covering position and threaded in said first wall for inward axial movement to a retracted position only when the padlock is unlocked for releasing the cover plate for movement to said uncovering position.

2. A combination padlock as defined in claim 1, wherein said case includes a top wall and a bottom wall means defining a socket opening through said top wall, a reciprocative shackle having a first leg supported in said case for axial and angular movement and a second leg movable between a first position seated in said socket and a second position withdrawn from and out of alignment with said socket, first the means in said case normally restrained at a position releasably latchng said shackle at said first position and movable to a position releasing said shackle for withdrawal to said second position only when the tumbler wheels and driving cam occupy a selected unlocking position, said socket being immediately adjacent said screw means disposing said second leg when at said first position to intercept inward movement of said screw means from said projected position and accommodating movement of said screw means to said retracted position when said second shackle leg is withdrawn from said socket.

3. A combination padlock as defined in claim 2, wherein said screw means when occupying said retracted position has an inner end portion lying in said socket baring movement of said second leg of said shackle to said first position in latched relation to said first fence means.

4. A combination padlock as defined in claim 1, wherein said first wall includes a top wall and means supported on said first wall and a fence member rotatable about a pivot axis for reciprocating movement through a selected stroke only when the tumbler wheels and driving cam occupy a selected combination change position, said guard member and fence member having interengaging surfaces for oscillating the fence member through said stroke when said guard means is manually shifted between said covering and uncovering positions and for preventing movement of the guard member to said uncovering position when said tumbler wheels and driving cam are displaced from said combination change position.

5. A combination padlock as defined in claim 2, wherein said guard means includes a guard member rotatably supported on said first wall and a fence member rotatable about a pivot axis for reciprocating movement through a selected stroke only when the tumbler wheels and driving cam occupy a selected combination change position, said guard member and fence member having interengaging surfaces for oscillating the fence member through said stroke when said guard means is manually shifted between said covering and uncovering positions and for preventing movement of the guard member to said uncovering position when said tumbler wheels and driving cam are displaced from said combination change position.

6. A combination padlock as defined in claim 3, wherein said guard means includes a guard member rotatably supported on said first wall and a fence member rotatably about a pivot axis for reciprocating movement through a selected stroke only when the tumbler wheels and driving cam occupy a selected combination change position, said guard member and fence member having interengaging surfaces for oscillating the fence member through said stroke when said guard means is manually shifted between said covering and uncovering positions and for preventing movement of the guard member to said uncovering position when said tumbler wheels and driving cam are displaced from said combination change position.

7. A combination padlock as defined in claim 1, wherein said case includes a front wall and side, top and bottom walls coactive with said first wall to define an enclosed chamber for the combination lock mechanism, said shell body portion having front, side, top and bottom walls outwardly covering corresponding of said inner case, said dial means having an anular flange portion bearing dial markings interposed between said front walls in covered relation over the major portion thereof by the front shell wall and having a forwardly projecting knob portion, and the front shell wall having an aperture for passage of said knob portion therebetween to a manually accessible position and having a sight opening overlying a limited arcuate zone of said flange portion for observation of the dial markings.

8. A combination padlock as defined in claim 2, wherein said inner case includes a front wall and side, top and bottom walls coactive with said first wall to define an enclosed chamber for the combination lock mechanism, said shell body portion having front, side, top and bottom walls outwardly covering corresponding of said inner case, said dial means having an anular flange portion bearing dial markings interposed between said front walls in covered relation over the major portion thereof by the front shell wall and having an aperture for passage of said knob portion therebetween to a manually accessible position and having a sight opening overlying a limited arcuate zone of said flange portion for observation of the dial markings.

9. A combination padlock as defined in claim 3, wherein said inner case includes a front wall and side, top and bottom walls coactive with said first wall to define an enclosed chamber for the combination lock mechanism, said shell body portion having front, side, top and bottom walls outwardly covering corresponding of said inner case, said dial means having an anular flange portion bearing dial markings interposed between said front walls in covered relation over the major portion thereof by the front shell wall and having an aperture for passage of said knob portion therebetween to a manually accessible position and having a sight opening overlying a limited arcuate zone of said flange portion for observation of the dial markings.
A combination padlock as defined in claim 1, wherein said guard plate means includes a guard plate substantially paralleling and lying immediately inwardly of said first wall and a pivot stud fixed thereto rotatably journaled in and extending through said first wall, said pivot stud including an outwardly facing recess therein for insertion of a tool portion thereof and rotation thereby to rotate said guard plate between said covering and uncovering positions.

A combination padlock as defined in claim 4, wherein said guard member includes a guard plate substantially paralleling and lying immediately inwardly of said first wall and a pivot stud fixed thereto rotatably journaled in and extending through said first wall, said pivot stud including an outwardly facing recess therein for insertion of a tool portion thereof and rotation thereby to rotate said guard plate between said covering and uncovering positions.