SAFETY LOCKING LEVER AND LATCH ASSEMBLY FOR A PERMUTATION PADLOCK

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This invention relates to improvements in safety locking lever and latch assemblies for permutation padlocks, and relates more particularly to a permutation padlock wherein the locking lever and latch assemblage is constructed so as to render unlawful any attempt by a tamperer to release the padlock shackle by unnatural pressures exerted on the locking latch or by the insertion of a shim or the like around the padlock shackle in an attempt to unauthorizedly open the padlock without resort to the dialing of the padlock combination or other normal procedures.

The locking member or latch in a padlock of the type under consideration must project somewhat into the shouldered recess in the shackle leg to an extent to cause engagement between the end of the latch and the shouldered recess in the shackle leg. Consequently, if the last-mentioned projecting end portion of the locking latch can be unauthorizedly forced or jarred inwardly or retracted by foreign pressures applied while the padlock is closed and locked, then the effect of the engagement between the shackle and the locking latch becomes nullified with the consequent release and unauthorized opening of the padlock shackle. The aforesaid unauthorized release of the shackle can, in conventional structures, be sometimes accomplished by a burglar or tamperer through applying blows or pressures to the padlock body or shackle or by normally jarring the same, which actions set up vibrations within the padlock body whereby the locking latch may shift its position or retract slightly within the shouldered recess of the engaged shackle leg to an extent sufficient to clear or disengage the shackle recess shoulder, permitting unauthorized release of the padlock shackle.

In other instances, due to the fact that the shackle receiving openings in the padlock body are necessarily of slightly greater diameter than the legs of the padlock shackle, and also due to the fact that these openings, due to wear and usage may enlarge slightly, burglars, thieves, and tamperers have developed the art of surreptitiously opening such padlocks by the use of thin metal tools, bits or shims (hereafter referred to as "shims") which are inserted into a portion of a shackle opening in the padlock body and about a shackle leg. By force and pressure such tools or shims are manually moved accurately in either direction to contact and retract the locking latch or lever to produce an unauthorized release and opening of the padlock without the owner's knowledge and consent, and such unauthorized opening of the padlock can be thereby accomplished by the thief or tamperer without knowing the correct combination and without dialing the padlock.

With the foregoing in mind it is, therefore, a general object of the present invention to provide a permutation padlock having a safety locking lever and latch assemblage of special construction designed to prevent the unauthorized release of the locking latch or lever from the engaged padlock shackle through an application of blows or pressure applied to portions of the padlock, the construction also being such as will prevent the unauthorized release of the locking latch or lever through the insertion of a shim in the padlock body hole about a shackle leg.

A more specific object of the invention is to provide, in a permutation padlock, a locking lever and latch assemblage wherein the locking latch is peculiarly constructed with a shouldered portion and a tapered frusto-conical body or shank portion, which shape permits the latch, when pressure is applied thereto, to oscillate or move within the bore thereof in the locking lever and to engage the shouldered portion of the locking latch with an inclined face portion of the locking lever surrounding the bore in the latter so as to hook the latch on the lever in a nonretractable shackle-engaging position and to have the projected end of the latch engage the locking lever and the shackle shouldered recess at separated points on a bias to effect a jamming action, which prevents the shackle from being unauthorizedly released, notwithstanding the application of unnatural blows, jarring or tension to the padlock or parts thereof, by persons attempting to unauthorizedly open the padlock; the specially formed locking latch also having a shouldered recess or notch therein which receives a shim unauthorizedly inserted into the padlock body opening around the engaged shackle in a manner so as to prevent such movement of the shim and application of pressure therefrom which would be effective to retract the locking latch and cause the release of the shackle.

A further, more specific object of the invention, is to provide in a permutation padlock, a locking lever and latch assemblage in which the special formation of the latch element or pin permits it to oscillate or move laterally under unnatural pressures or tension without releasing the padlock shackle, but to permit the latch pin to move in a straight line or rectilinear path for withdrawal from the shackle shouldered recess when the lock mechanism is operated in its normal manner.

A locking latch is always included in a permutation padlock of the type wherein the shackle is closed and locked by disarraying the tumblers or discs by a dialing operation or by a movement of the shackle, and the closing and locking of the shackle is sometimes accomplished by friction or a blocking action of certain internal parts, or by a stop plate, peg, or pin in or on the longer leg of the shackle. The locking latch, in such structures, engages a shouldered notch or recess in a shackle leg to retain the shackle in its locked position. In the present invention the improved locking latch has its body or shank portion tapered or of frusto-conical formation, has an annular shouldered portion, with a projecting shackle engaging extremity which is nosed or hooked shaped, with the end face portion of the locking lever in which the latch is reciprocatably mounted being angled or on a bias relative to the normal plane of the shouldered portion of the latch. All of the aforementioned structural features improve the security of the permutation padlock and render it more difficult for an unauthorized tamperer to disengage the shackle of the padlock body through the application of unnatural pressures or tensions to the padlock parts while the shackle is in an engaged, locked position, and such structure applies to combination padlocks of the regular or key controlled types.

A further object of the invention is to provide, in a permutation padlock, a safety locking lever and latch assemblage having means for preventing or deterring surreptitious release of the shackle from the padlock body, which construction does not complicate the ordinary manufacture and assembly of the padlock, nor add ma-
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A further object of the invention is to provide a safety locking lever and latch assembly for permutation padlocks, which is of very simple construction, which increases the utility, performance and safety of the padlock, and which is well adapted for the purposes described.

With the above and other objects in view, the invention consists of the improved safety locking lever and latch assembly for permutation padlocks, and its parts and combinations as set forth in the claims, and all equivalents thereof.

In the accompanying drawing in which the same reference characters indicate the same parts in all of the views:

Fig. 1 is a vertical sectional view through the body or case of a permutation padlock showing the improved locking lever and latch assembly in relation to the padlock shackle with the latter in its locked position;

Fig. 2 is a transverse sectional view through the padlock case and the shackle legs;

Fig. 3 is a front end view of the locking lever with the improved locking latch reciprocably mounted within a bore in the locking lever and concentric therewith;

Fig. 4 is a side view of the locking lever and latch assembly with a portion broken away and in section to show structural details and showing the latch shifted or oscillated within the bore of the locking lever to in section to show structural details and showing the latch shifted or oscillated within the bore of the locking lever to simulate a jamming action as between the inclined end face of the locking lever and the notched recess of a shackle leg engaged by the nose portion of the latch;

Fig. 5 is a front view of the showing in Fig. 4 only with the shackle leg omitted;

Fig. 6 is a top view of the locking latch;

Fig. 7 is a side view thereof;

Fig. 8 is an end view of the locking latch; and

Fig. 9 is a fragmentary vertical sectional view through a portion of the padlock case showing the manner in which the improved locking latch functions to prevent unauthorized retraction of the latch by a shim extended into the padlock body shackle opening around the shackle leg.

Although the invention is not to be restricted thereto, for purposes of illustration the padlock shown in the drawing is of the permutation type and includes a hollow body or case 12 of circular formation. There is operatively housed within the body or case 12 certain lock mechanisms. In the drawing only so much of the mechanism has been illustrated as pertains to the improved locking lever and latch assembly. A lever post 13 is mounted in the case 12 and movably mounted thereon is an eccentrically shaped locking lever 14 which is adapted to rock or oscillate on the post 13, and which is formed with a cylindrical bore 15 reciprocably housing the shank or stem portion of a latch pin designated generally by the numeral 16 and of special formation, as will be described in detail hereinafter. Retraction of the latch pin 16 within the bore 15 of the locking lever is against the force of a confined coil spring 17. The numeral 18 designates a rotatably mounted tumbler or disc and in practice there may be a plurality of the latter which are turned, for lock operating purposes, by an external knob 19 carrying a dial 20 which, through a shaft 21, turns the tumbler or tumblers 18. The circular peripheral portion of the tumbler 18 is engaged by the inwardly directed finger portion 22 on the locking lever 14 and this engagement normally prevents the locking lever 14 from rotating or rocking in a counterclockwise direction relative to Figs. 1 and 9. In the position illustrated, the locking lever 14 is retained in a position which holds the outer end of the latch pin 16 in shackle engaging position. However, when the tumbler or disc 18 is manually turned so as to register the groove or recess 23 therein with the finger portion 22 of the locking lever, the locking lever will then be free to oscillate or rock in a counterclockwise direction relative to the drawing, to release the outer end of the latch pin from the engaged leg 24 of the shackle 25.

As will appear from the drawing, the side wall of the lock case 12 is provided with a pair of spaced apart shackle leg receiving plates 26 and 27 which are dimly movably receivable, respectively, the long leg 24 of the shackle 25 and the short leg 24 of the shackle. The latter, at its inner end, is provided with a shoulder notch 27 which may be engaged by the hooked or nose end of the latch pin 16 for shackle locking purposes.

The latch pin 16 which is of special formation and which is illustrated in detail in Figs. 6, 7 and 8, will now be described. The shank or stem portion 28 of the latch pin is of tapered or frusto-conical formation with the larger portion thereof being at its inner end and of a diameter corresponding substantially to the diameter of the bore 15 of the locking lever 14. Consequently, there is some play applied to the outer reduced end of the stem portion 28 of the latch pin and the outer end of the bore 15 of the locking lever and said reduced end portion of the shank 28 of the latch pin is integral with a shoulder head 29 of enlarged diameter and which in the normal projected position of the latch pin 16 as shown in Fig. 1, lies adjacent the outer end of the locking pin bore 15, and which shouldered head 29 may pass concentrically into the bore 15 of the locking lever 14 when the latch pin is retracted in a straight rectilinear path. It will further be observed that the underside of the shank portion 28 of the latch pin 16 is formed with a U-shaped recess or groove 30 which accommodates the lever post 13 and permits, under abnormal conditions, the latch pin 16 to rock on the lever post so as to oscillate the locking lever in the bore 15 from the normal position of Fig. 1 to the position of Figs. 4 and 5 wherein the shouldered head 29 of the latch pin is eccentric to the locking lever bore 15 and engages the stock of the front face of the locking lever above the bore in the manner shown in Fig. 4. It will also be observed that the front face of the locking lever 14 is cut on an angle or bias, as at 31, so that when the latch pin 16 is in the normal position of Fig. 1 the plane of the shouldered head 29 forms an acute angle with the plane of the end 31 of the locking lever, but when the latch pin is oscillated or shifted to the position of Fig. 4, the plane of the shouldered head 29 of the latch pin coincides with the plane of the biased end 31 of the locking lever and binds thereagainst. This forms a hooking engagement as shown in Fig. 4 and, in fact, the latch pin 16, which is made of hardened steel, may slightly dig into the softer stock of the locking lever 14, which is brass, in the neighborhood of the point a in Fig. 4. This forms an effective stop and hooking engagement to prevent retraction of the latch pin 16 when the latch pin is oscillated or otherwise moved to the eccentric position of Fig. 4, as by abnormal pressure or tension applied to the shackle. Outwardly of the shouldered head 29, the latch pin 16 is formed with a downturned and tapered nose portion 32 which is adapted to engage within the shouldered recess 27 of the shackle 25 in the manner shown in Figs. 1 and 9 for shackle locking purposes. Should there be any upward or outward pull on the shackle, or blows or vibration imparted to the padlock case, the latch pin 16, instead of retracting into the bore 15 of the locking plate will assume the position of Fig. 4 wherein there is a hooking engagement between the upper projection of the shoulder head 29 of the latch pin and the inclined face 31 of the locking plate which will prevent upward retraction of the latch pin and disengagement of the same from the shackle leg 24. Actually, in this condition, the headed portion 29 of the latch pin hookingly engages the locking pin at the point a in Fig. 4, and the downturned end of the hooking nose 32 of the latch pin bears against a surface portion of the shackle within the
shouldered recess, and as such points of engagement are angularly related, a strong wedging action will be imposed between the latch pin and the shackles leg 24 to prevent unauthorized release and withdrawal of the shackles leg.

The outer end of the latch pin forwardly of the upper portion of the shouldered head 29 is formed with a transverse shouldered recess 33 which is of importance in thwarting another mode of unauthorized tampering with the lock wherein a tamperer may insert a shim into the case opening 26 around the shackles leg 24. This contingency is illustrated in Fig. 9 wherein the inserted shim, shown in broken lines, is designated by the numeral 34. The usual practice for the tampering in attempting to release the latch pin from the shackle by a shim 34 inserted in the manner shown in Fig. 9 is to manipulate the shim ar nearly in either direction in an attempt to forcibly engage a substantial portion of the pin and through this movement imparted to the shich which reacts against the latch pin, the latch pin is unauthorizedly retracted from the shouldered recess of the shackles leg. However, with the construction of the latch pin shown, with the top shouldered recess 33, the inserted shim enters the latch pin recess 33 and is thereby prevented from contacting with force such portion of the latch pin as would permit the shim to move the latch pin rearwardly in a rectilinear path to disengage it from the shackle leg mounted within the body and having a shouldered movement of the shich in a full circular course so as to move between the engaging end of the latch pin and the shackles leg.

From the foregoing description it will be apparent that the improved latch pin with the headed shank or stem of tapered or frusto-conical form permits the forward end of the latch pin to have play within the cylindrical bore 15 of the locking lever so that under abnormal conditions set up by vibrations caused by unusual blows or rapping or jarring applied to the padlock case, the latch pin may oscillate up and down within the locking plate bore and thus become engaged in the nonrectangular position of Fig. 4 to prevent unauthorized release of the latch pin from the shackles leg 24. The shouldered portion 29 of the latch pin provides for the hooking engagement with the locking lever at the point a in Fig. 4. The downturned or hook-shaped reduced nose portion 32 of the locking lever movably received by said body opening, a locking lever movably mounted within the body and having a uniform cylindrical bore therein, the outer end of said locking lever bore to shift the circular head of the latch pin out of registration with the locking lever bore and engage it with a portion of the inclined face of the locking lever in the plane thereof to thereby prevent rectilinear retraction of the latch pin within the locking lever bore and disengagement of the latch pin nose from the shackles leg.

2. In a lock having a body formed with an inwardly extending opening, a shackles leg having a lug thereof movably received by said body opening, a locking lever movably mounted within the body and having a uniform cylindrical bore therein, the outer end of said locking lever through which the bore opens having an inclined face, manually operated means for controlling movement of said locking lever, and a latch pin reciprocatably mounted in said locking lever for normal movement therein in a rectilinear path, the shank portion of the latch pin being outwardly tapered and having a shouldered head adjacent the reduced end of the shouldered head of the lock thereon projecting shackles leg engaged nose portion, the locking lever being of softer metal than the latch pin, force transmitted to the latch pin at an angle to its axis causing the reduced portion of its shank to oscillate within the locking lever opening to bitingly engage the shouldered head of the latch pin with an external wall portion of the locking lever adjacent the outer end of its bore to thereby prevent unauthorized retraction of the latch pin within the locking lever bore and disengagement of the latch pin nose from the shackles leg.

In a padlock having a body formed with an inwardly extending opening, a shackles leg having a lug thereof movably received by said body opening, a locking lever movably mounted within the body and having a uniform cylindrical bore therein, the outer end of said locking lever through which the bore opens having an inclined face, manually operated means for controlling movement of said locking lever, and a latch pin reciprocatably mounted in said locking lever for normal movement therein in a rectilinear path, the shank portion of the latch pin being outwardly tapered and having a shouldered head adjacent the reduced end of the shouldered head of the lock thereon projecting shackles leg engaged nose portion, the locking lever being of softer metal than the latch pin, force transmitted to the latch pin at an angle to its axis causing the reduced portion of its shank to oscillate within the locking lever opening to bitingly engage the shouldered head of the latch pin with an external wall portion of the locking lever adjacent the outer end of its bore to thereby prevent unauthorized retraction of the latch pin within the locking lever bore and disengagement of the latch pin nose from the shackles leg.

3. In a lock having a body formed with an inwardly extending opening, a shackles leg having a lug thereof movably received by said body opening, a locking lever movably mounted within the body and having a uniform cylindrical bore therein, the outer end of the indicated face of the locking lever in the plane thereof to thereby prevent rectilinear retraction of the latch pin within the locking lever bore and disengagement of the latch pin nose from the shackles leg.

4. As a new article of manufacture, a padlock latch pin having a shank portion of frusto-conical form with the reduced outer end portion of the shank having a shouldered head with a down-turned hooking nose pro-
jecting therebeyond, the outer end portion of the shank, outwardly of the upper portion of the shouldered head thereon, being formed with a transverse shouldered recess.

5. A locking lever and latch pin assemblage for a 5 permutation padlock comprising, a transverse post, a locking lever rockingly mounted on said post, said locking lever having a uniform cylindrical bore therein at right angles to the axis of the post, the outer end of said locking lever through which the bore opens having an inclined face, a latch pin reciprocatably mounted within the bore of said locking lever for normal movement therein in a rectilinear path, the shank portion of the latch pin being outwardly reduced and having a shouldered head and an outwardly downwardly directed nose, the underside of the shank of the latch pin being grooved to accommodate the post whereby the reduced outer end portion of the latch pin may rock on the post eccentric to its normal rectilinear path to engage the shouldered head of the latch pin with a portion of the inclined face of the locking lever.

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