PADLOCKS WITH DUAL LOCKING LEVER MECHANISMS

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ABSTRACT OF THE DISCLOSURE

A padlock with a laminated case or body is provided with a pair of spring loaded locking levers movable in opposite directions and disposed in different planes so as to enter and engage notches or cuts in the padlock shackle legs on different levels to provide so-called "heel and toe" locking. The structure includes novel mechanism to move both of said locking levers simultaneously and the specified features are adaptable to relatively large padlocks to increase their safety and strength factors.

BACKGROUND OF THE INVENTION

Field of the invention

While most padlocks offer good protection, burglars and thieves have gained more knowledge and experience in their attempts to tamper with or force padlocks to gain quick entry. This has been done by the use of crew bars or screw drivers inserted between the legs of the padlock shackles or by shimming, rapping or pounding the padlock cases. This has resulted in a demand for heavier and stronger padlocks having shackles of better alloy materials and also for larger padlocks having wider cases to hold such heavier shackles, together with stronger and larger levers to retain the shackles in the cases. Such padlocks would possess greater strength and better pull test qualities. Demands have arisen from users of padlocks on vending machines, store fronts, gates or doors, warehouses, commissaries and supply rooms, among others, for padlocks which meet these requirements. Many padlock manufacturers have been making padlocks which are held at both legs of the shackle, which in the industry is known as "heel and toe" locking. However, in respect to padlocks having laminated cases a problem is presented since in the manufacture of laminated padlocks it was difficult to so construct the lock that there would be some effective mechanism to move both locking levers simultaneously for entry into cuts or notches in both legs of the shackle. In certain padlocks now available for "heel and toe" shackle locking, both levers move in the same plane and operate together so that one lever moves in one direction to enter the notch in the shackle leg while the other lever moves simultaneously in the same plane in the opposite direction to enter the notch in the other shackle leg. There are objections to the aforesaid arrangement which the present invention overcomes by staggering the levers in different planes whereby one lever moves in one direction on a high plane and the other lever moves in the opposite direction on a lower plane. Thus, in the present invention the levers are not aligned and unauthorized force applied to one lever will not be transmitted to the other lever.

Description of the prior art

There have heretofore been attempts to provide "heel and toe" locking wherein both legs of a padlock shackle were engaged by reciprocating levers. In the prior "heel and toe" shackle locking arrangement, however, the levers for engaging the two legs of a padlock shackle operated in the same plane and were of relatively light material. This has been found to be objectionable because, should a burglar or tamperer insert a shim in the case opening which receives one of the shackle legs he could by manipulating the shim release the shackle leg and the movement imparted to the light lever therewith adjacent would easily transmit movement to the other lever, in the same plane and thus obtain release of the padlock shackle. Applicant is not aware of any prior patents wherein dual locking levers for "heel and toe" shackle locking, are held under spring tension in different planes whereby the two levers in a given padlock are staggered and enter cuts or notches in the shackle legs on different levels. With the levers, in the instant invention, being independent of each other and in different planes, even if a burglar inserts a shim or tool into one of the case openings for a leg of the padlock shackle he would be unable to move or release the other or lower locking lever with the result that the shackle will remain secured and thus thwart unauthorized entry.

SUMMARY OF THE INVENTION

In addition to providing for "heel and toe" locking in a padlock wherein a pair of spring loaded locking levers are arranged in the padlock case at different elevations, the mechanism includes novel cylinder plug extension and cam mechanism for moving both of the locking levers simultaneously for entry into or disengagement from cuts or notches in both legs of the shackle at different elevations. The dual locking levers of metal are blanked and laminated and are interlocked for additional strength and are heat treated. The extra strength imparted to these laminated locking levers makes it difficult for a burglar to shear or break off the same in applying force or tension to the padlock shackle.

A still further object of the invention is to provide for a padlock, a dual locking lever mechanism and lever operating means which does not affect the appearance or functioning of the padlock, which is strong and durable, is simple to manipulate, which greatly enhances the safety factors of the padlock to which it is applied, and which is otherwise particularly well suited for the purposes described.

BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawings, wherein the same reference characters designate the same or similar parts in all of the views:

FIG. 1 is a vertical sectional view of a padlock equipped with the improved dual locking lever mechanism;

FIG. 2 is a bottom view of the padlock;

FIG. 3 is a horizontal sectional view taken approximately along the line 3—3 in FIG. 1 with a fragmentary showing of an upper body plate or laminating;

FIG. 4 is an exploded longitudinal sectional view of a pair of laminations which, in joined, superimposed condition, form a locking lever;

FIG. 5 is a fragmentary plan view of one of the case plates having a recess therein which is reciprocally mounted a laminated, spring-loaded locking lever for the shackle toe;

FIG. 6 is a side view of an operating cam disc with an integral, up-standing plug extension;

FIG. 7 is a front view of the showing in FIG. 6; and

FIG. 8 is a plan view of the cam disc and plug extension showing in cross-section the cylinder plug extension which extends through an eccentric opening therefor in the cam disc.
DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now more particularly to the drawings, it will appear that the body or case of a padlock is indicated generally by the numeral 10. Said case is of laminated construction and is built up of a plurality of superimposed plates or laminations 11 secured together by rivets 12. Various openings in the plates 11 form cavities or recesses for certain of the lock mechanism.

The padlock case is provided with a pair of spaced-apart, longitudinally extending shackle leg receiving openings 13 and 14 which open through the top plate of the padlock case, and which longitudinally movably receive, respectively, the short leg or toe 15 and the long leg or heel 16 of the padlock shackle 17. Housed within a cavity within the case 10 is a key-operated cylinder 18 having a multiultraded inner end portion or plug 19 which extends through an eccentric opening 20 therefor in an oscillatable cam disc 20. The lower angled end portion of an upstanding plug extension 21 is affixed to the disc 20. The angled or offset lower end portion 21 of said plug extension insures smooth and proper joint operation of a pair of dual locking levers to be described hereinafter. The lower end portion of the cylinder 18 is accessible through an opening therefor in the bottom plate of the case 10 to permit the insertion of a proper operating key into the cylinder keyway 22.

One of the dual locking levers or bars (that is, which is adapted to engage the notch or cut 23 in the shackle toe 15) is indicated generally by the numeral 24. The oppositely directed locking lever or bar on a lower plane for engagement with the notch 25 in the shackle heel 16 is indicated generally by the numeral 26. As both locking levers are of identical construction, only one will be described in detail, with particular reference to the showing in FIGS. 4 and 5. A locking lever (24 or 26) is of laminated construction and includes a pair of superimposed, frame-like plates 27 and 27'. The outer end portions of the plates are of reduced rectangular form and the outer transverse margin of each top plate 27 is rounded downwardly, as at 28 to facilitate its movement into and out of a shackle notch 23 or 25. FIG. 4 shows a pair of plates 27 and 27' separated and the reduced rectangular outer end portion of the top plate is formed with a depended boss 29 to enter a socket 30 therefor in the under plate 27', and the latter, laterally of its socket has an upstanding boss 31 to enter a socket therefor in the upper plate 27. The bosses 29 and 31 are pressed into the accommodating sockets. Thus, each lever is of blanked laminated metal and the laminations thereof are press-fitted together, as well as being heat treated. The rear or inner end portion of a laminated locking lever is recessed, as at 32, to receive one end portion of a coiled spring 33. The other end portion of said spring surrounds a protuberance 34 projecting into an end portion of an opening 35 in the particular case plates or laminations 11 in which the laminated lever is mounted for reciprocatory movement. The plate openings 35 are shaped to conform to the outlines of the levers and the springs 33 normally urge the outer ends of said levers into shackle leg notch-engaging position. As will be seen in FIG. 5 opposite angled side marginal portions of a laminated locking lever 24 are recessed, as at 36, to receive fins 37 projecting from opposite marginal portions of a case plate 11 in which the locking lever is lodged, said arrangement preventing dislodgment of the lever thereof. The levers, being of interlocking laminate construction, resist shearing and breaking, should a burglar apply force or tension on the shackle.

The position within the case body 10 of the various components of the improved dual locking lever mechanism is best shown in FIG. 1. It will appear that the cam disc 20 operatively carried by the cylinder plug is accommodated by a suitable cavity within a case lamination 11 thereadjacent. The plug extension 21 extends vertically upwardly through the openings 38 in the frame-like locking levers 24 and 26 against the rear transverse ends thereof in a manner so as to bear against and simultaneously reciprocate both locking levers 24 and 26. The upper reduced end portion 40 of the plug extension is free to turn within an opening 41 therefor in certain upper plates 11 of the case body.

The operation of the padlock dual locking lever mechanism should be obvious from the preceding description. In the locked condition of the padlock, as shown in FIG. 1, the shackle legs are fully pushed in and seated in their case openings 13 and 14. The expansive force of the locking lever springs 33 will urge and hold both of the levers 24 and 26 in their projected positions so that the outer ends of both levers will lockingly engage the staggered notches 23 and 25 in the shackle legs 15 and 16. To unlock the padlock and release the shackle a proper key is inserted into the keyway 22 in the cylinder 18. When the key is turned the cylinder will be turned thereby through an arc, as will the plug 18'. This will turn the cam disc 20 and the plug extension 21 carried thereby. This movement of the extension 21, through the latter's engagement with the levers 24 and 26, retracts the latter against the pressure of the springs 33 to withdraw the outer ends of both locking levers from the shackle leg notches and thus release the shackle so it can be projected outwardly to an unlocked position.

From the foregoing it will be obvious that, pursuant to the present invention, there is provided in a laminated padlock, a novel and effective dual locking lever mechanism which is adaptable to various sizes and types of padlocks and in particular to relatively large and heavy padlocks to contribute to the strength and safety characteristics thereof. Through the incorporation of a pair of oppositely directed spring loaded locking levers disposed in different planes effective 'heel and toe' shackle locking is provided of a nature which will repel tamperers. The locking levers are simultaneously operated by a novel plug extension and cam disc mechanism which is connected to and operated by a standard key-controlled cylinder.

The improved dual locking lever mechanism for laminated padlocks is free of manufacturing and operational complications, is of simple, strong and tamperproof construction, and is well adapted for the purposes set forth. What I claim is:

1. A padlock comprising: a case; a shackle movably extending into the case and having a pair of laterally spaced-apart legs, one of which is reciprocably free of the case and whose end portion is formed with a locking lever-receiving notch, a housed portion of the other leg of the shackle having a locking lever receiving notch therein in staggered relation to the notch in the first-mentioned leg; a turnable cylinder within the padlock case and having an integral plug; a cam disc operatively carried by said plug; a plug extension affixed at one end to said cam disc and positioned within the case perpendicular to the plane of the cam disc; a pair of locking levers reciprocally movably mounted in said case in different planes between the shackle legs with the outer end of one locking lever being registrable with the notch in one of the shackle legs and the outer end of the other locking lever being registrable with the notch in the other shackle leg; and means for normally yieldingly urging the locking levers toward their shackle leg notch-engaging positions, the plug extension engaging both of the locking levers to retract the same when turning movement is imparted to the plug extension through said cylinder, plug and cam disc.

2. The padlock recited in claim 1 wherein the locking levers are oppositely directed and the plug extension ex-
tension extends through openings in both of the locking levers.

3. The padlock recited in claim 1 wherein the cylinder is key-operated.

4. The padlock recited in claim 1 wherein the portion of the plug extension which engages the locking levers is rectilinear and the portion thereof which is affixed to the cam disc is off-set relative to the first-mentioned portion.

5. The padlock recited in claim 1 wherein the means for normally yieldingly urging the locking levers toward their shackle leg notch-engaging positions are confined coiled springs exerting forces against the inner end portions of the locking levers.

6. The padlock recited in claim 1 wherein the case is of laminated construction and includes a plurality of superimposed, secured together metallic plates with suitable registering openings therein to provide mechanism housing cavities, and the locking levers are of superimposed metallic, frame-like plates.

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