The invention relates to padlocks particularly which employ a shackle and has particular reference to the mechanism by means of which the shackle is locked and unlocked.

In the conventional padlock, the construction is such that when the shackle is to be unlocked the key is inserted and turned to unlock position after which the shackle can be withdrawn far enough so that one leg clear to permit the shackle to be turned out of a staple, eye bolt, or other fastener hardware with which it is engaged. When the padlock is to be relocked, usually no key is needed in that merely by pressing the shackle back into position the locking mechanism snaps into place and holds it there until it is again unlocked.

On those rare occasions where devices of this nature have been built so that they are locked with a key rather than being snap-locked, the interior construction tends to follow conventional unlocking techniques rather than the simple and inexpensive techniques which have found favor in padlock constructions.

Because of the tendency to keep padlock mechanisms simplified, they have been for the most part relatively easy to pick by experienced persons, and the mechanisms herefore resorted to have not been capable of being dead-locked to be proof against tampering. Among the objects of the invention, therefore, is to provide a new and improved padlock which adheres to the relatively simple and inexpensive construction inherent in padlocks, but which is especially secure in that dead-locking is provided.

Also included among the objects of the invention is to provide such a padlock which is dead-locked with respect to both legs of the shackle when locked.

Another object of the invention is to provide a new and improved padlock which employs two blockers, one for each leg of the shackle, having initially the function of retaining the shackle in place when locked, but wherein one of the blockers serves a double purpose in that it acts to retain the shackle within the padlock after the shackle has been moved to unlock position.

Another object of the invention is to provide a new and improved padlock which is of such construction that it cannot be locked unless the key is turned to locked position, thereby making it impossible to merely snap the lock shut, the device further being so constructed that the key cannot be removed from the lock until it is rotated to locked position.

Still further among the objects of the invention is to provide a new and improved but relatively inexpensive secure padlock wherein the locking mechanism is considerably simplified by constructing the parts in a fashion enabling them to perform in a dual service, and at the same time providing a padlock of rugged construction useful in a greater variety of circumstances than conventional padlocks.

With these and other objects in view, the invention consists in the construction, arrangement, and combination of the various parts of the device, whereby the objects contemplated are attained as hereinafter set forth, pointed out in the appended claims and illustrated in the accompanying drawings.

Figure 1 is a longitudinal, sectional view showing one form of the invention in locked position of adjustment;
location of the retaining shoulder 35 as shown in FIGURES 1 and 2. To accomplish locking and unlocking operations there is provided a blocker assembly 40 which is shown in various positions and attitudes in all of FIGURES 1, 2, and 3. The blocker assembly in this form of the device consists of two elements 41 and 42. The element 41 is adapted to engage the short leg 13 and the element 42 is adapted to engage the long leg 12. More particularly, the element 41 is provided with an inner section 43 of substantially the form of a half circle adapted to overlie and intersecion 44 of the element 42 so that a flat face 45 of the inner section 43 slides upon a corresponding flat face 46 of the inner section 44. Further still, the inner section 43 has a slot 47 formed therein substantially wider than the thickness of the tail piece 15 in order to provide ample clearance when the tail piece is rotated. A similar slot 48 is formed in the inner section 44 and these slots are in alignment transversely with respect to the longitudinal axis of the blocker assembly when the blocker assembly is in the locked position of FIGURES 1 and 3.

In the operation of this form of the device, it may be assumed that the shackle initially is in the locked position of FIGURES 1 and 3. In this position the elements 41 and 42 are extended outwardly through the transverse recess 23 so that outer ends engage respectively with the locking shoulders 33 and 31. In this position the key 16 can be withdrawn if desired. It will be noted further that there are clearances 49 and 50 at inner ends of the inner sections 43 and 44. When the padlock is to be unlocked, the key 16 is rotated customarily about forty-five degrees which rotation also causes the tail piece 15 to be rotated through a similar angular distance. Rotation in this fashion as shown causes the tail piece to act upon the sides of the slots 47 and 48 in a direction such as to withdraw the elements 41 and 42 inwardly closing the clearances 49 and 50 a substantial degree, the withdrawal being sufficiently great to have the elements 41 and 42 clear the shoulders 33 and 31. When the shoulders are cleared energy stored in the spring 26 pressing against the bottom of the long leg 12 will extend the shackle 11 outwardly to the position of FIGURE 2. By making use of conventional construction commonly available for key operated mechanisms of the type illustrated by the reference character 14, it can be provided that the key 16 cannot be removed when rotated to the forty-five degree unlocking position of FIGURE 2. Hence, as long as the lock is in unlocked position the key cannot be withdrawn. Further by reason of the fact that the end of the element 42 cannot be moved outwardly because of engagement with the bottom of the annular recess 34, the key cannot be turned to locked position as long as the shackle is extended, in order that it may be withdrawn.

When the padlock is to be locked, the shackle is pressed back into the casing to the location illustrated in FIGURE 1. The key 16 is then rotated to the initial position shown in FIGURE 1 thereby to engage the elements 41 and 42 into engagement with the respective locking shoulders after which the key 16 can then be withdrawn.

Further still, in the extended position, or unlocked position, of FIGURE 2, it will be noted that the end of the element 42 is in engagement with the annular retaining shoulder 35. As the long leg has passed from the position of FIGURE 1 to the position of FIGURE 2, it has come through a flat area 34 across the end of the element until the element is in engagement with the retaining shoulder. In this position the shackle 11 can be freely rotated about that portion of the long leg 12 which remains in the bore 21 of the casing retained against removal by engagement with the blocker assembly in the manner shown and described.

In the form of device illustrated in FIGURES 5 through 11 inclusive, the casing 10, the shackle 11, and key operated mechanism 14 and associated parts and the form thereof is substantially the same as in the form of invention of FIGURES 1, 2, 3, and 4, and hence the corresponding reference characters apply. In this form of device, however, there is provided a blocker assembly 55 of some form, in a different form from the main body of the element 56. A second element 59 has an end portion 60 the outer circumference of which is substantially the same radius of curvature as the overall radius of curvature of the element. The element 56 has an inner section 61 cut out to form a flat face 62. Similarly, the element 59 has an inner section 63 cut out to form a similar flat face 64 which is adapted to coincide with and slide axially upon the face 62. In this form of device, there is provided a spring 65 acting between the free end of the inner section 63 and the element 56. A similar spring 66 is positioned so as to act between the free end of the inner section 59 and the element 56. It should be noted particularly in this instance that the notches 67 and 68 are substantially wider than the thickness of the tail piece 15 to provide a materially greater clearance than is shown in the preferred form of FIGURES 1 through 4 inclusive. In this form of the device also, a lip 69 is formed from the material of the casing so as to project slightly into the transverse recess 23 and to engage against the shoulder 58 of the element 56 whereby to limit outward extension of that element into the bore 22 under impact of the springs 65 and 66.

In the operation of this form of the device, it may be assumed that the padlock is initially locked as shown in FIGURES 5 and 6. In this position the elements 56 and 59 are extended by the springs 65 and 66 so that the reduced end portion 57 is projected into the bore 22 where it overlies and engages with the locking shoulder 33. At the same time the end portion 60 of the element 59 is projected into the bore 21 and into the notch 30 so that it overlies the locking shoulder 31. Hence, both legs 12 and 13 of the shackle 11 are retained in locked position by operation of the blocker assembly 55. When the padlock is to be unlocked by manipulation of a key 16 of the same type and operation previously defined, the tail piece 15 is rotated through an angular distance of approximately forty-five degrees to the position of FIGURES 9 and 10. During this operation, the tail piece presses against appropriate walls of the notches 67 and 68 causing a shifting of the corresponding elements 56 and 59 inwardly against tension in the springs 65 and 66 until the elements are contracted far enough to clear the shoulders 31 and 33. When this occurs, tension built up in the spring 26 extends the shackle 11 in the same manner as described in connection with FIGURES 1 through 4 inclusive until the short leg 13 of the shackle clears the casing as shown in the position of FIGURE 7. During this movement the outermost end of the end portion 60 slides over the face 36 until the retaining shoulder 35 is moved into engagement with the end portion 69 as shown in FIGURE 7. In this position, the shackle is retained rotatably within the casing so that it is free to move about to any degree of rotation as the lock is locked.

When this form of the lock is to be locked, it is necessary only to align the short leg 13 with the bore 22 and press the shackle inwardly into the casing. As the shackle is moved inwardly, a beveled edge 70 impinges upon a
corner of the end portion 57 camming the corresponding element 56 in a direction from right to left as viewed in FIGURES 9 and 10 against tension in the springs 65 and 66. As soon as the leg 13 moves far enough inwardly so that the notch 32 falls out of engagement with the end portion 57 the notch 30 will at the same time fall opposite the end portion 63. The springs 65 and 66 will then act automatically to bring the blocker assembly into engagement with the shoulders and accordingly lock the shackle in position, without key manipulation being necessary. The same movement will rotate the tail piece 15 into its respective direction until it again assumes the position of FIGURE 5 in which position the key 16 can be removed.

It will be understood from the description and drawings that the padlock herein disclosed is of extremely simple construction in that the blocker assembly which is in essence the locking mechanism, operated as described by the key operated mechanism is of particularly simple design, but that constructed in the manner shown, it performs a multiple function. The blocker assembly not only simultaneously locks both legs of the shackle but also serves as a means of retaining the shackle in position in unlocked adjustment of the padlock. Further still, in the form of device of FIGURE 1, the blocker assembly deadlocks both legs of the shackle thereby to render the padlock virtually tamper-proof.

While the invention has herein been shown and described what is considered to be the most practical and preferred embodiment, it is recognized that departures may be made therefrom within the scope of the invention, which is not to be limited to the details disclosed herein but is to be accorded the full scope of the claims so as to embrace any and all equivalent devices.

Having described the invention, what is claimed as new in support of Letters Patent is:

1. A padlock comprising a casing, a shackle having a long leg and a short leg, and a removable key operated mechanism including a rotatable tailpiece forming part of said removable mechanism, said casing having spaced parallel bores on respectively opposite sides receptive of said legs and having an opening intermediate said bores receptive of said key operated mechanism in operative position in the casing, said casing having a transverse recess therein having a substantially cylindrical form from end to end intersecting respectively the opening and both bores, and a blocker assembly reciprocally mounted in said transverse recess, said blocker assembly comprising complementary mutually slidable elements having sections of relatively smaller size in overlying sliding relationship in a plane parallel to the axes of said legs, a free end of each element extendible into the respective bore when in locked position and wherein one of said free ends remains partly extended into its respective bore when in unlocked position, said sections being in abutting relationship with each other, said inner sections having portions in alignment with each other and with the tailpiece and having said tailpiece engageable therewith, said legs in locked condition having locking shoulders in positions of engagement with respective free ends of said blocker assembly, said long leg of the shackle having a retaining shoulder thereon nearer the end thereof than the locking shoulder and engageable with the respective end of the blocker assembly in unlocked position of the shackle whereby to retain the shackle in engagement with the casing.

2. A padlock comprising a casing, a shackle having a long leg and a short leg, a key-operated mechanism including a rotatable tailpiece and a key for said mechanism having a removable engagement with the mechanism in locked adjustment and a non-removable engagement with said mechanism in unlocked adjustment, said casing having spaced parallel bores on respectively opposite sides receptive of said legs and having an opening intermediate said bores having said key-operated mechanism therein, said casing having a transverse recess therein intersecting respectively the opening and both bores, and a blocker assembly reciprocally mounted in the transverse recess, said blocker assembly comprising complementary mutually slidably elements having inner sections in overlying sliding relationship and a free end of each element extendible into a respective bore, said inner sections having slots therein in alignment with each other and with the tail-piece said slots having a width only slightly greater than the thickness of said tail-piece and having the tail-piece engageable therewith with a relatively small clearance on both sides of the tail-piece, said legs having locking shoulders in alignment with each other and adapted to engage respective free ends of said blocker assembly in locked adjustment, said tail-piece being rotatable into engagement with said sections in an unlocking and locking direction whereby to unlock said shackle and to lock said shackle by engagement with both legs, a substantially annular retaining shoulder on said long leg nearer the end thereof than the locking shoulder, said blocker assembly having a minimum contracted length wherein one free end remains extend into the respective bore and engageable with the respective end of the retaining shoulder in unlocked adjustment of the shackle in various positions of rotation whereby to retain the shackle in engagement with the casing, said retaining shoulder having a breadth less than the locking shoulder on the long leg whereby to limit movement of the blocker assembly in unlocked adjustment and inhibit rotation of said tail-piece an amount sufficient to permit removal of said key.

3. A padlock comprising a casing, a shackle having a long leg and a short leg, and a self-contained removable key operated mechanism including a rotatable tailpiece forming part of said removable mechanism, said casing having a transverse recess therein of substantially cylindrical form from end to end intersecting respectively the opening and said bores, and a blocker assembly reciprocally mounted in said transverse recess having elements smaller than the diameter of said transverse recess, said elements having an overlapping sliding relationship with each other in a plane parallel to the axes of said legs, one of said slidably elements of the blocker assembly having a free end extendible into one of said bores, said elements of the blocker assembly having a slot means therein in alignment with the tailpiece and having said tailpiece engageable therein, the long leg having a locking shoulder adapted to engage a respective free end of said blocker assembly in locked position, said long leg having a substantially annular retaining shoulder thereon nearer the end thereof than the locking shoulder, said retaining shoulder in unlocked position being in alignment simultaneously with said blocker assembly and said tailpiece and engageable with the respective end of the blocker assembly in unlocked position of the shackle at various positions of rotation whereby the blocker assembly retains the shackle in engagement with the casing.

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