

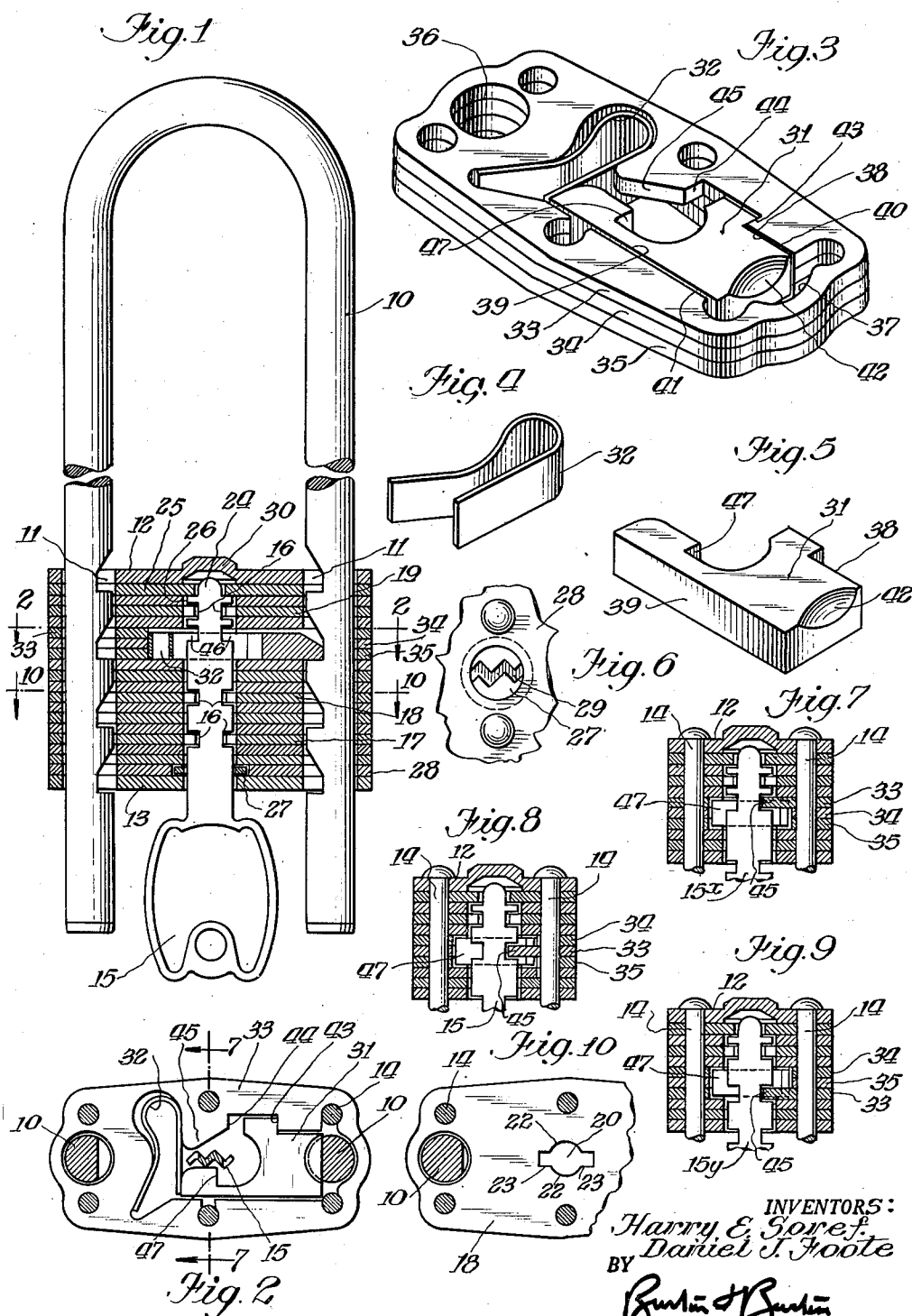
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PADLOCK

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PADLOCK

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This invention relates to padlocks, and it is particularly concerned with the type of padlock in which a portion, at least, of the casing is of laminated construction, consisting of a plurality of superimposed plates with apertures therein forming spaces for the shackle legs and for the key.

One object of the invention is to provide a laminated casing structure adapted to be included in a lock casing and providing a guideway for a locking lever, together with a fixed tumbler for a notched key, all so related that the position of the fixed tumbler may be varied in the assembly of the lock so that different locks of this type will require different keys to actuate them.

Another object of the invention is to provide a relatively simple construction for a padlock involving a limited number of parts which are easily constructed and assembled.

It is also an object of the invention to provide a laminated lock construction adapted for use with a removable shackle and including a fixed tumbler feature which may be variously positioned in the assembly of the lock so as to produce a series of locks operable only by a corresponding series of different keys.

Other objects and advantages of the invention will appear from the following description taken in connection with the drawing, in which:

Fig. 1 is a vertical sectional view of a padlock embodying this invention, showing a key inserted therein at operative position.

Fig. 2 is a transverse or plan section taken substantially as indicated at line 2—2 on Fig. 1 to show the contour of one of the special plates with which the locking lever is associated.

Fig. 3 is a perspective view showing an assembly of three special plates, forming the group in which the locking lever is guided for movement.

Fig. 4 is a perspective view of a spring for the locking lever.

Fig. 5 is a perspective view of the locking lever.

Fig. 6 is a fragmentary view of the lower end of the lock showing the rotatable ward plate through which the key is inserted.

Fig. 7 is a fragmentary transverse section taken as indicated at the line 7—7 on Fig. 2, with the key turned 90 degrees.

Fig. 8 is a fragmentary section similar to Fig. 7, but showing the fixed tumbler plate at a different

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location, and showing a fragment of the key required with this assembly.

Fig. 9 is another sectional view similar to Fig. 7, showing still another position for the fixed tumbler plate and indicating the contour of the key required with this arrangement.

Fig. 10 is a detail plan view taken as indicated at the line 10—10 on Fig. 1.

The drawings illustrate the invention as embodied in a lock having a removable shackle 10 with a plurality of notches 11 in each leg of the shackle, thereby adapting the lock for use as a bicycle lock, particularly when the shackle 10 is made to form an elongated loop dimensioned to fit over and embrace various elements of a bicycle frame and drive mechanism. It may be understood, however, that the principles of the present invention are not limited to padlocks of this particular type, and may be readily applied to padlocks in which the shackle is permanently secured in the casing so as to pivot around the axis of one leg when the other leg is released from the casing.

The casing, as shown, is wholly of laminated construction, but it may be understood that the present invention is applicable to a casing in which only a portion is of laminated form. As shown, the casing comprises a top plate 12, a bottom plate 13, and a plurality of intermediate plates, all similar in external contour to the plates 12 and 13, and secured together in superimposed relation by means of rivets, such as those shown at 14 in Fig. 7. A lock of this type is intended to be operated by means of a key, such as that shown at 15, having notches 16 disposed in pairs in its opposite edges for registration with wards or fixed tumblers in certain of the plates, which are the plates indicated at 17, 18 and 19 in Fig. 1. The contour of each of these plates may be that shown in Fig. 10, in which the keyway 20 is of buttonhole form, including arcuate outlines 22 at opposite sides and notches 23 at opposite ends to permit insertion of the key, with its edges extending into the notches 23. The arcuate portions 22 define a space only slightly larger than the reduced width of the key between notches 16, 16, so that the key can be turned only if the notches 16, 16 register with these arcuate portions 22, 22 of each plate of this type included in the casing.

The upper end of the key is reduced at 24 and fits into an opening in a stop plate 25, disposed next to the end plate 12, so that the shoulders 26 formed on the key adjacent its reduced end portion 24 abut and stop against the portions of the plate 25 adjacent its central opening. Near the other end of the casing a circular ward disk 27 is rotatively carried in the plate 28 which is next to the bottom plate 13, and this disk has a slot 29 of substantially the same cross-section as the shank of the key; the disk thus serves to center one end of the key when it is inserted in the lock at the position shown in Fig. 1, in which its opposite and reduced end portion 24 is rotatably guided in the aperture of the plate 25. Clearance for the reduced end 24 of the key is provided by forming a dome-shaped boss or blister 30 on the top plate 12 in registration with the axis of the keyway, as seen in Fig. 1.

All the plates of the casing are formed with openings near their ends, and such openings, when registered in the assembly of the plates, provide guideways to receive the two legs of the shackle 10, as shown in Fig. 1. Both legs of the shackle are notched so that either of them may cooperate with a locking member or "lever" 31 which is normally projected into locking position by means of a spring 32 disposed inside the casing and bearing against the inner end of the lever 31. Preferably, the lever is equal in thickness to a plurality of the plates, and, as shown, it is nearly as thick as the three plates 33, 34 and 35 which constitute a special assembly associated with the lever 31. The plates of this group have openings 36 and 37 near their ends to receive the legs of the shackle 10, and they are also formed with relatively large registered openings in which the locking lever 31 is slidably accommodated. Said lever has parallel sides 38 and 39 which fit between parallel walls 40 and 41 of the openings in the plates 33, 34 and 35, and said lever has a beveled surface 42 at one end for engagement with the end of the leg of the shackle 10 when the latter is inserted and forced past the lever into position for locking engagement of the lever 31 with one of the notches 11 in the shackle leg.

Sliding movement of the locking lever 31 is limited by stop shoulders 43 and 44. The shoulders 43 are formed in all three plates 33, 34 and 35, and are aligned vertically, but, if desired, the stop shoulder 44 may be formed in only one of the plates, and, as shown, is formed only in the top plate 33. This plate, as shown in Fig. 3, also includes a fixed projection or tumbler 45 so that when a key is inserted in the lock, in the position shown in Fig. 1, the key cannot be turned about its own axis unless it has a notch registering with the tumbler or projection 45, as will be readily appreciated from a consideration of Fig. 2, in which the key is shown in section. A key designed to cooperate with this particular lock will therefore have such a notch 46, and, preferably, has a pair of similar notches 46 disposed at opposite edges, as shown in Fig. 1.

When this key 15 is inserted in the position shown in Fig. 1 it will be disposed as indicated in Fig. 2, and upon being rotated about 90 degrees, one side of the key will engage the shoulder 47 of the lever 31, for forcing the lever 31 out of locking engagement with the leg of the shackle 10 in opposition to the spring 32. Such rotation of the key will be permitted by registration of one of its notches 46 with the projecting tumbler por-

tion 45 of the plate 33, and, due to the fact that the lever 31 is considerably thicker than any one of the plates of the laminated structure, a portion of the key adjacent the opposite notch 46 will afford sufficient area for engagement with the shoulder 47 of the lever.

Fig. 7 illustrates the same relation between the key and the lock casing as that shown in Fig. 1, in which the uppermost plate 33 of the special group is the plate which includes the projection or fixed tumbler portion 45.

Figs. 8 and 9 indicate that the plate 33 may be assembled between the plates 34 and 35, or as the lowest plate of the group, if desired, and that these different arrangements will require the use of different keys 15^x and 15^y, respectively, in which the clearance notches are properly located to register with the projecting tumbler portion 45. It will also be evident that the special group of interchangeable plates in which the locking lever 31 is housed need not be limited to three plates, as shown, but may comprise more than this number, if desired, in which event the lever 31 will preferably be increased in thickness to approximate the thickness of the combined group of plates.

It will be understood that in a laminated lock of the type shown in Fig. 1 the individual locks will be differentiated from each other by changing the relative locations of the plates 17, 18 and 19, thus requiring the keys for the several locks to have their clearance notches 16 differently located. But by the use of a group of plates, such as the plates 33, 34 and 35, the number of possible changes is tripled, since each arrangement of the plates 17, 18 and 19 can be employed first with the tumbler plate 33 at the top of the group, then with this plate at the middle of the group, as shown in Fig. 8, and again with the plate 33 as the lowest plate of the group, as shown in Fig. 9. If the group consists of four or five plates, the number of changes will be correspondingly increased. Thus a large number of locks each differing slightly from the other, and each requiring a different key, may be assembled from similar groups of parts merely by rearranging the order in which certain of the plates of the body or casing are placed in each assembly.

In any padlock, and particularly in a bicycle lock, it is desirable to provide a maximum space between the two legs of the shackle. It will be noted that in the lock illustrated herein the outlines at the opposite ends of each plate or lamination are bulged outwardly at the middle portion and concentrically with the axes of the adjacent legs of the shackle 10. This provides a casing or body which accommodates a shackle of maximum width without making the casing itself appear unduly wide, since the visual estimate of width will be determined by the length of either of the longer sides of the plate or lamination, the bulged portion at each end appearing as an additional and ornamental feature, although it actually does increase the width available for accommodating the shackle.

While there is shown and described herein certain structure embodying the invention and illustrative thereof, it is to be understood that the invention is not limited thereto or thereby, but includes all modifications, variations, and equivalents which may come within the scope of the appended claims.

We claim as our invention:

1. In combination, a padlock which includes a casing having a laminated portion composed of a

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plurality of superimposed plates formed with registered openings, a locking lever approximating in thickness the combined thickness of said plates and movable in said opening toward and from locking position, said lever having an opening to admit a key and having a shoulder adjacent said opening, one of said plates having a fixed tumbler portion projecting into the opening of said plate, said plate which has the fixed tumbler portion being adapted to be transposed with any other plate of said group in the process of assembling the lock to produce a lock requiring a different key.

2. In combination, a padlock which includes a shackle having a notched leg, a body having a laminated portion composed of a plurality of superimposed plates formed with registered openings which provide a guideway for said notched leg of the shackle, a locking lever approximating in thickness the combined thickness of said plates, said plates having registered openings in which said lever is movable transversely into and out of the guideway, said body providing a keyway extending through said last mentioned openings, said lever having an opening registered with said keyway and a shoulder adjacent said opening, one of the plates having a fixed tumbler portion projecting into said keyway, said lock being adapted to receive a notched key rotatable in the keyway when positioned with its notch in registration with said tumbler portion, a part of the key adjacent said notch being engageable with the shoulder of the lever for actuating the lever when the key is turned.

3. In combination, a padlock which includes a casing having a laminated portion composed of a plurality of superimposed plates formed with registered openings, a locking lever approximating in thickness the combined thickness of said plates and movable in said opening toward and from locking position, said lever having an opening to admit a key and having a shoulder adjacent said opening, one of said plates having a fixed tumbler portion projecting into the opening of said plate, said registered openings of the plates having sides with straight parallel portions, and said lever having parallel sides fitting slidably between said parallel sides of the openings, the opening in at least one of said plates having an outline which includes stop shoulders facing in opposite directions respectively, and said lever having stop shoulders to cooperate therewith for limiting the sliding movement of the lever, said lock being adapted to receive and to be operated by a key formed with a notch in its edge slightly wider than said tumbler portion to clear the tumbler when the key is operated, while an adjacent portion of the key engages with the shoulder of the lever for actuating said lever.

4. In the combination defined in claim 1, said registered openings including portions which

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form a recess, and a spring pocketed in said recess and positioned to urge the lever yieldingly into locking position.

5. In combination, a padlock which includes a casing having a laminated portion composed of a group of interchangeable superimposed plates formed with registered openings which constitute a portion of a keyway in said casing, and a locking lever movable in said registered openings toward and from locking position, said lever having a shoulder engageable by a key for actuation of the lever, said shoulder extending substantially throughout the combined thickness of said group of plates, one of said plates having a fixed tumbler portion projecting into the said keyway for registration with a notch in the edge of a key to actuate the lever, said casing including at least one other fixed projection for registration with another notch in the key to determine the operative position of the key in the lock, said plate which has the fixed tumbler portion being adapted to be transposed with any other plate of said group in the process of assembling the lock to produce a lock requiring a different key.

6. In combination, a padlock which includes a casing having a laminated portion composed of a group of interchangeable superimposed plates formed with registered openings which constitute a portion of a keyway in said casing, a locking lever movable in said registered openings toward and from locking position, said lever having a shoulder engageable by a key for actuation of the lever, said shoulder extending substantially throughout the combined thickness of said group of plates, one of said plates having a fixed tumbler portion projecting into the said keyway for registration with a notch in the edge of a key to actuate the lever, said casing including at least one other fixed projection for registration with another notch in the key to determine the operative position of the key in the lock, said lock being adapted to be operated by a key formed with a pair of aligned notches in its opposite edges, each slightly wider than the thickness of said tumbler portion so that one of said notches will clear the tumbler when the key is operated while the portion of the key adjacent the other notch engages with said shoulder of the lever for actuating it.

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