Dec. 11, 1934. A. GAHAGAN 1,983,747

PADLOCK

Filed Nov. 6, 1923 2 Sheets-Sheet 1

Fig. 1.

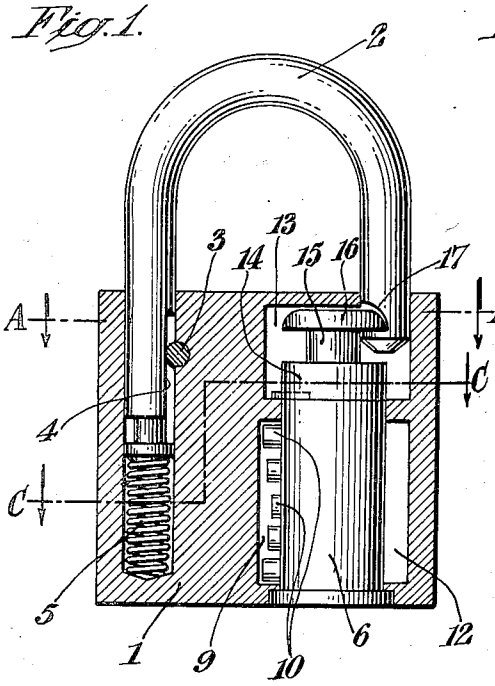


Fig. 2.

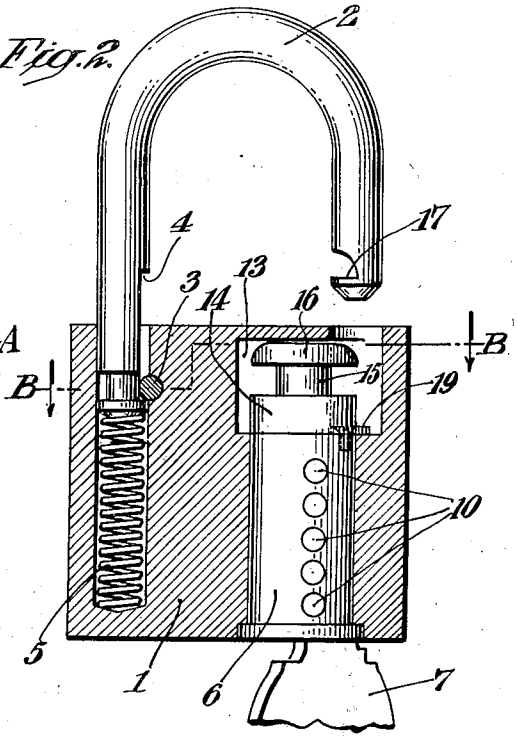


Fig. 3.

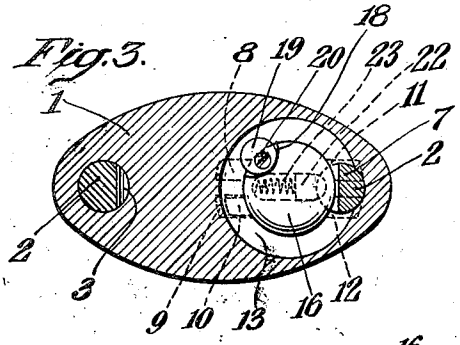


Fig. 4.

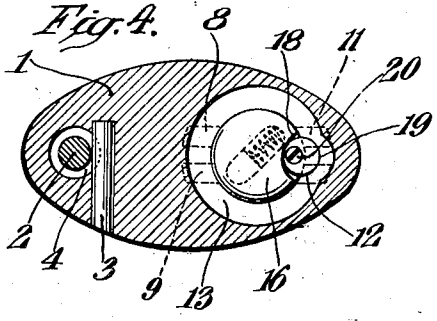


Fig. 5.

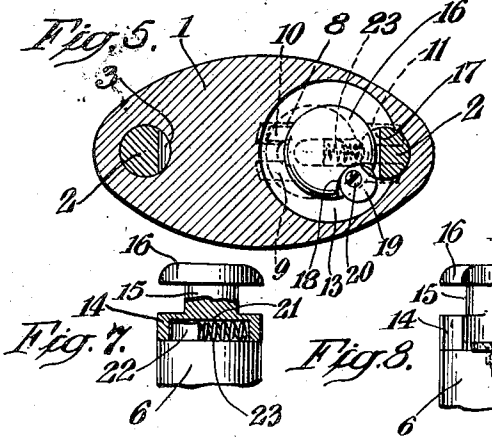


Fig. 7.

Fig. 8.

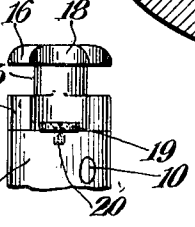
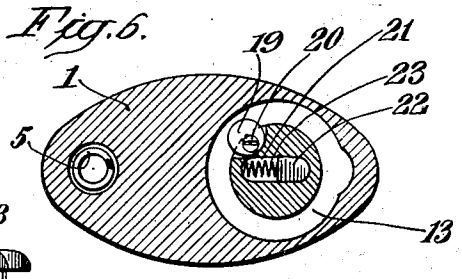


Fig. 6.



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Fig. 9.

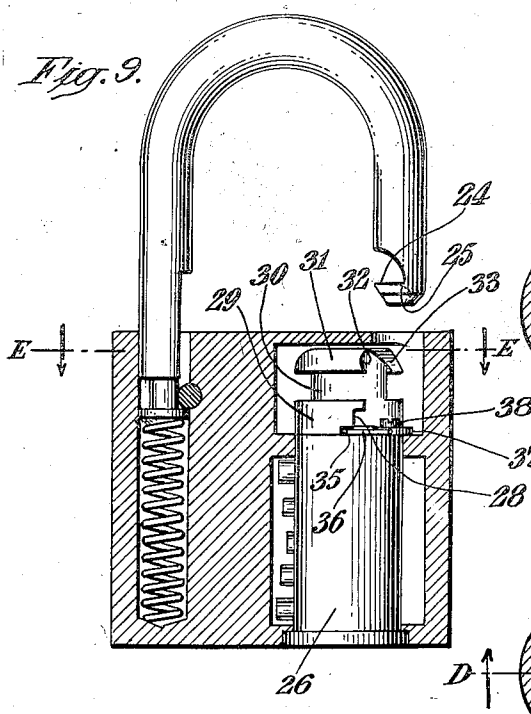


Fig. 11.

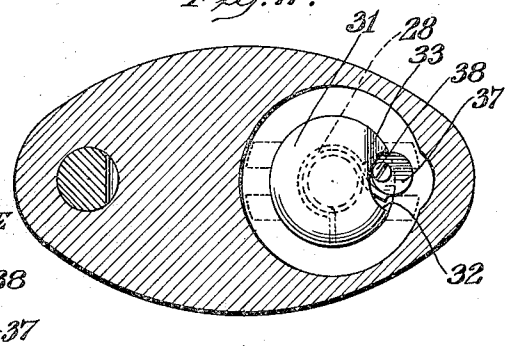
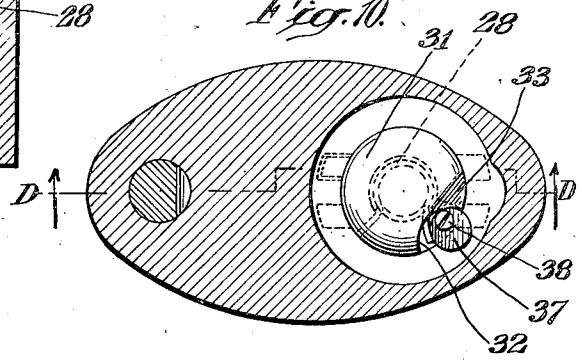


Fig. 10.



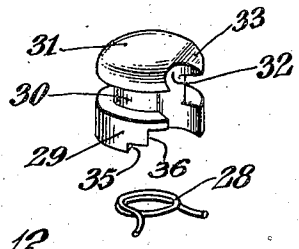


Fig. 12.

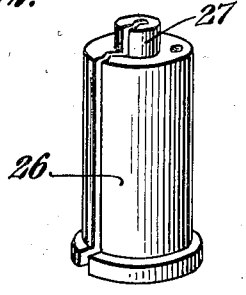


Fig. 13.

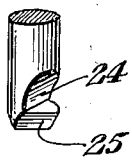
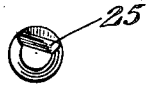


Fig. 14.



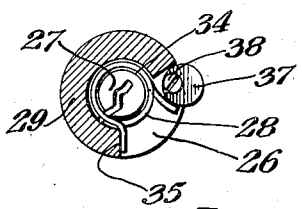


Fig. 15.

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UNITED STATES PATENT OFFICE

1,983,747

PADLOCK

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Application November 6, 1928, Serial No. 317,639

14 Claims. (Cl. 70—108)

My invention relates to locks and more particularly to a padlock having an easily removable cylinder, a minimum of moving parts and novel features of strength and safety against illicit opening.

Heretofore it has been possible to open padlocks from the locked position without the use of a key by striking sharp blows on the body to jar the bolt out of engagement with the shackle and so open the lock. In my construction, this is impossible for the reason that, in the locked position the bolt is immovable and no amount of jarring or striking will release the shackle from engagement with the bolt.

A further advantage is found in the body construction in that it is stronger and free from plugged holes or large interior openings which tend to weaken the body walls. Only three openings are necessary; two for the shackle and one for the cylinder and beyond this no material is taken from inside the body except the small amount necessary to provide clearance for the bolt travel and this is taken from a portion in which no weakening effect can possibly occur.

Another feature is the simplicity of the means for holding the cylinder in place and the ease with which it may be removed for replacement, repair or servicing. The cylinder at all times is securely retained and it is only in the unlocked position when the shackle is free that the cylinder can be taken out and then by the simple operation of receiving a screw through the shackle opening.

Other and further advantages will appear in the following description and drawings which illustrate my invention in one of its preferred forms.

In the drawings:

Fig. 1 is a sectional elevation in the locked position.

Fig. 2 is a sectional elevation at the time of unlocking.

Fig. 3 is a section through A—A of Fig. 1.

Fig. 4 is a section through B—B of Fig. 2.

Fig. 5 is a section showing the rectilinear motion of the bolt in the unlocked position.

Fig. 6 is a section through C—C of Fig. 1.

Fig. 7 shows the assembly of the bolt and spring on the cylinder.

Fig. 8 shows the bolt and cylinder and cylinder retaining means.

Fig. 9 is a sectional elevation through D—D of Fig. 10 showing a modification of my invention.

Fig. 10 is a section through E—E of Fig. 9.

Fig. 11 is the same as Fig. 10 with the bolt in the unlocking position.

Fig. 12 is an extended view of the assembly of cylinder, spring and bolt.

Figs. 13 and 14 show the beveled surfaces on the shackle end.

Fig. 15 is a section through the bolt showing the cylinder retaining means and spring.

In Fig. 1 is indicated a padlock having a body or housing 1 in which is held a shackle 2 by any of the usual means such as a pin 3 projecting into a recessed portion 4 of the shackle. A compression spring 5 forces the shackle out in the unlocking position of Fig. 2. Seated in the body 1 is a lock cylinder 6 which may be of the type disclosed in Patent 1,514,659 dated November 11, 1924, with a keyway for the key; the key being shown at 7 in Fig. 2. This cylinder is a close fit within the body as indicated in Fig. 2 and has slots 8 and 9 (Fig. 3) which receive the tumblers 10. Opposite slots 11 and 12 are provided to take care of the reverse movement of some or all of the tumblers during insertion or withdrawal of the key.

Seated upon the end of the cylinder 6 and in the opening 13 of the body, is a bolt having a base 14 with a diameter substantially equal to that of the cylinder. This bolt is mushroom shaped with a neck 15 and hood 16, the latter of which engages with cut 17 of the shackle in the locking operation. Also, this hood has an opening as at 18 in order that the cut 17 of the shackle may be released and the shackle moved upward by spring 5 in the unlocking position. This opening 18 extends through the base 14 and provides room on the end of cylinder 6 for the disc or retaining member 19 to be attached by suitable means such as the screw 20. The inner end of the cylinder is substantially flush with the bottom surface of the opening 13 in the body so that disc 19 will rest on this surface and overhang it. Being prevented from turning about screw 20 by opening 18 in base 14, the disc 19 always remains in position and effectually prevents cylinder 6 from being removed due to the interference of this disc with the bottom of opening 13.

In the bottom of base 14 is a recess 21 into which projects the cylinder cam 22 and which also carries a compression spring 23 (Fig. 7) to act between the wall of the recess and the cam. Therefore the bolt as a whole can move against the spring but cannot move against the cam. This is an important safety feature in my lock.

The whole assembly is held together on the cylinder by the small amount of clearance between the top of the hood 16 and the upper surface of opening 13 in the body. (Figs. 1 and 2.)

To remove the cylinder 6, the key is inserted to retract the tumblers and to turn the whole to the unlocking position of Fig. 2. A screwdriver is then entered through the shackle opening and screw 20 removed to free disc 19. The cylinder can then be taken out and as base 14 and hood 16 of the bolt have no larger diameter than the cylinder, the bolt and spring 23 can follow the cylinder. The small number of parts and the extreme simplicity of cylinder removal make this lock easily serviced or accessible for interchange or removal of parts. It will be seen that the screw 20 cannot be reached in the locked position of Fig. 1 because the shackle fills the opening and a screwdriver cannot enter. The whole lock is therefore safe from attack in the locked position. To assemble the cylinder and bolt, the key is inserted in the cylinder, the bolt and spring placed on the cylinder end and the whole placed in the body. Disc 20 is then attached by means of its screw and the lock is ready for service.

In operation, the unlocked position would have the parts as in Fig. 5 where it will be seen that spring 23 in the bolt lies between the wall of the base 14 and cylinder cam 22 and in line with the shackle on the major axis of the body 1. The cut 18 in the bolt is to one side. Therefore, by pressing down the shackle, its beveled point will act on the hood 16 to force the bolt off center against spring 23. As soon as this downward motion of the shackle brings cut 17 under the hood 16, the spring 23 forces the bolt back to its normal position and locks the shackle. Then by turning the cylinder by its key, the bolt rotates with it to the position of Fig. 3 which is approximately 180° from the position of Fig. 5 and tumblers 10 will be in groove 9. In Fig. 3 it is to be noted that cam 22 is now nearest the shackle and that it abuts the wall of cut 21 in the bolt. Consequently, no straightline motion of the bolt can take place and it cannot move off center because of the stopping action of cam 22 against the bolt and no amount of hammering or jarring of the body will release the shackle; it is held safely from attack. To open the padlock, the cylinder is rotated and as the position of Fig. 4 is reached, cut 18 in the bolt comes opposite the shackle to free cut 17 from the hood 16 and the shackle is moved upward by spring 5. Further rotation brings the parts to the position of Fig. 5 at which point the tumblers 10 enter their groove 8 which completes the unlocking operation.

In Fig. 9 is illustrated a structural modification of my invention wherein the changes are confined to the cylinder, the bolt, the spring acting between the two and the locking end of the shackle. This shackle has the usual cut 24 but the end below this cut is beveled as at 25 (Figs. 13 and 14) for a purpose to be explained later. The cylinder 26 is as previously described except that instead of a cam there is a hub 27 (Fig. 12) over which fits a spring 28. As before, the bolt consists of a base 29, a neck 30 and a hood 31. The cut 32 extends the full height of the bolt and where it passes through the hood 31, one edge is beveled as at 33. The bolt also has a concentric central opening 34 into which the hub 27 fits (Fig. 15) so that, when in place, the bolt forms an extension of the cylinder and is of the same diameter as shown in Fig. 1. In the base 29 are offsets 35 and 36; the former of which acts as a stop for one end of spring 28, the other stop being the disc 37 attached to the cylinder by screw 38. This disc serves to retain the cylinder as already described. The upper offset 36 provides clearance for the bolt to pass over the screw and disc as will appear later. This assembly of cylinder, bolt and spring, as in the prior instance, are held in place due to the small amount of clearance over the hood 31 (Fig. 9).

The cylinder and its associated parts are removed and assembled in a manner similar to that in the first form of lock described.

The unlocked positions are shown in Figs. 9 and 10 and to close the lock, the shackle is pressed down and in so doing, the beveled surface 25 of the shackle bears against the beveled surface 33 of the bolt. This cam action will rotate the bolt against the spring 28 until cut 32 comes under the shackle and allows it to slip down until cut 24 is under the edge of hood 31 and in this action the offset 36 gives clearance for screw 38 and prevents interference. As soon as this action is complete, spring 28 will force the bolt around so that cut 32 moves away from the shackle which is then held by hood 31 in cut 24. The key being inserted, the cylinder and the bolt are then both rotated to the locked position; approximately 180° from the position of Fig. 10. To unlock, the cylinder is turned by the key and as the bolt also turns, the cut 32 will come opposite the shackle as in Fig. 11 and cut 24 in the shackle will disengage from the bolt, allowing the shackle to rise. Further turning of the cylinder brings it to the unlocked position of Fig. 10 where the tumblers enter their groove and the key can be withdrawn.

From the foregoing it will be seen that my invention possesses many advantages and benefits. The construction is simple, rugged and easy to manufacture. The body is a solid unit without openings or weakened portions so that there is safety from attack by jarring or hammering the body to free the shackle, removing the cylinder or any other way short of cutting through the shackle. The number of moving parts is a minimum and by the removal of one screw, they may all be taken out and the assembly and insertion may be done as quickly.

While I have illustrated my invention in a preferred form, I am not limited thereto but include in my claims all the modifications and variations to which the invention is susceptible.

I claim:

1. In a padlock, the combination with a body and a shackle, of a cylinder, a bolt, of circular shape, seated upon and concentric with the cylinder upon which is a cam projecting into a recess in the bolt, a spring in said recess acting between said cam and bolt and means to retain said cylinder in the body.

2. In a padlock, a body, a shackle, a cylinder within the body, a bolt seated upon the cylinder, said bolt being concentric with the cylinder and normally lying within the outline thereof, and co-acting means on the cylinder and bolt to permit the latter to move off center away from the shackle.

3. In a padlock, a body, a shackle, a cylinder within the body, a bolt seated upon the cylinder, said bolt being concentric with the cylinder and normally lying within the outline thereof, and co-acting means on the cylinder and bolt to permit the latter to move off center away from the shackle when in one position, and to prevent the

bolt moving away from the shackle when in another position.

4. In a padlock, the combination with a body and a shackle, of a cylinder, a shackle engaging bolt having a releasing notch therein seated upon and rotatable with the cylinder, the axis of the bolt being concentric with the axis of the cylinder, means to permit the bolt to move off center in the locking operation, co-acting means upon said cylinder and bolt to prevent such movement in the locked position, and means to retain the cylinder in the body.

5. In a padlock, the combination with a body and a shackle, of a cylinder, a bolt of circular shape seated upon and concentric with the cylinder, said bolt having a recess facing the cylinder a member secured to the cylinder and disposed in said recess to effect rotation of the bolt by the cylinder, said bolt also having a limited movement independently of the cylinder, and a spring acting between said member and the bolt to maintain the latter in a predetermined position, and said bolt and shackle having interengaging parts to move said bolt out of the path of the shackle when the latter is inserted in the body.

6. In a padlock, the combination of a body, a shackle received in openings in the body, a lock cylinder mounted in the body, a bolt of circular shape seated upon the cylinder, said bolt having its axis concentric with the axis of the cylinder and normally lying within the outline of the cylinder, means interconnecting the bolt and cylinder for rotation together and for limited movement of the bolt independently of the cylinder to engage the bolt with the shackle, said means comprising a recess provided in the bolt, means upon the cylinder extending into said recess, and a spring acting between said last named means and the bolt to resist movement of the bolt independently of the cylinder.

7. A padlock comprising a body and a shackle, a key plug rotatably mounted in the body, a bolt of circular shape concentrically seated on the key plug and having a limited movement with respect thereto, said bolt having means to engage said shackle, and one of said members having a cam to effect movement of the bolt independently of the plug to remove the bolt from the path of the shackle in its closing movement.

8. In a padlock, the combination with a body and a shackle, of a cylinder, and a bolt of circular shape seated upon and concentric with the cylinder there being a recess provided between the bolt and the cylinder, a member secured to the cylinder and engaged with the bolt to effect rotation of the latter by the cylinder, said bolt also having a limited movement independently of the cylinder, and a spring in said recess acting upon said cylinder and bolt to maintain the latter in a predetermined position, and said bolt and shackle having interengaging parts to move said bolt out of the path of the shackle when the latter is inserted in the body.

9. In a padlock, the combination with a body, a shackle received in openings in the body, a lock cylinder mounted in the body, a bolt of circular shape seated upon the cylinder, said bolt having its axis concentric with the axis of the cylinder and normally lying within the outline of the cylinder, means interconnecting the bolt and cylinder for rotation together and for limited movement of the bolt independently of the cylinder to engage the bolt with the shackle, said means comprising a recess provided in the bolt, means upon the cylinder extending into said recess, and a spring acting between said bolt and cylinder to resist movement of the bolt independently of the cylinder.

10. A padlock including a case, a shackle mounted in the case, a key plug rotatably mounted in the case in an opening cutting into the opening for the free end of the shackle toward one edge of the case and spaced by solid metal from the opening for the opposite end of the shackle at the opposite edge of the case, and a locking bolt rotatably mounted on the end of said plug and having a cam shaped to effect rotation of said bolt by engagement with the end of the shackle in its closing movement, said cam terminating in a lip to engage said shackle to lock it in its closed position.

11. A padlock including a case, a shackle mounted in the case, a key plug rotatably mounted in the case in an opening cutting into the opening for the free end of the shackle toward one edge of the case and spaced by solid metal from the opening for the opposite end of the shackle at the opposite edge of the case, a locking bolt mounted on the end of said plug and rotatable thereon, and a lip projecting from the locking bolt to engage with the shackle arm, one of said members having a cam shaped to cause rotation of said bolt independently of the plug to remove said bolt from the path of the shackle in its closing movement.

12. In a padlock, a body and a shackle, a cylinder lock within said body, a bolt mounted on and rotating with said cylinder lock, said bolt having a cut away portion to receive and release the shackle, retaining means secured to the cylinder to hold said cylinder in the body, and said retaining means normally lying below said cut away portion of the bolt to permit access to said retaining means.

13. A padlock comprising a body and a shackle, a lock cylinder mounted in the body, means secured to the cylinder to retain said cylinder in place, and a bolt mounted on the cylinder, said retaining means also acting as an abutment to effect rotation of the bolt with the cylinder.

14. In a padlock, the combination with a body, of a shackle received in openings in the body, a lock cylinder mounted in the body, a bolt of circular shape seated upon the cylinder, said bolt having its axis concentric with the axis of the cylinder and normally lying within the outline of the cylinder, means interconnecting the bolt and cylinder for rotation together and for limited movement of the bolt independently of the cylinder to engage the bolt with the shackle, said means comprising a recess provided in the bolt, and means within said recess and acting between said bolt and cylinder to resist movement of the bolt independently of the cylinder.

ANDREW GAHAGAN.