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LOW FRICTION PADLOCK MECHANISM

Filed May 29, 1962

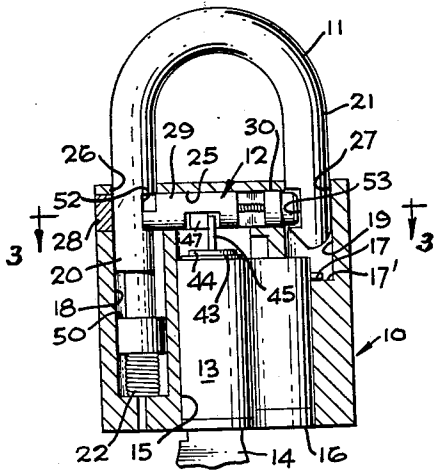


Fig. 1

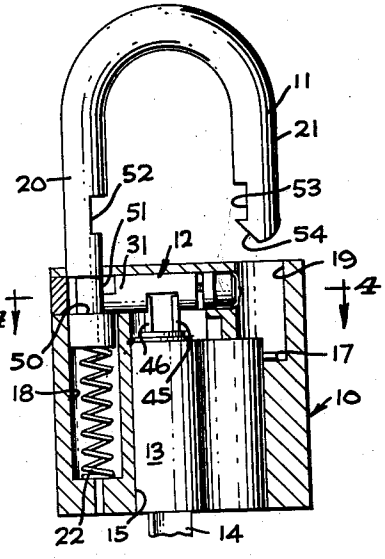


Fig. 2

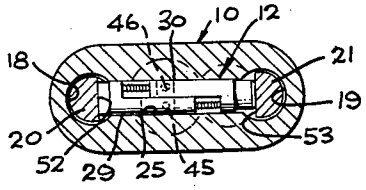


Fig. 3

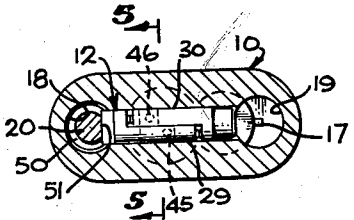


Fig. 4

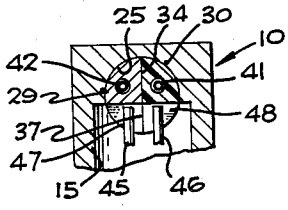


Fig. 5

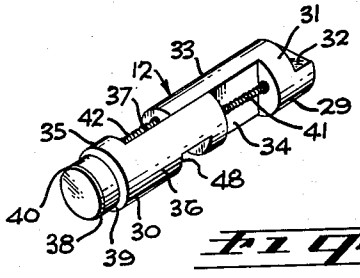


Fig. 6

INVENTORS
FRED J. RUSSELL,
GEORGE B. SOLOVIEFF
BY
Beehler & Shanahan
ATTORNEYS

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LOW FRICTION PADLOCK MECHANISM

Fred J. Russell, 3800 Don Felipe Drive, Los Angeles, and George B. Solovieff, South Gate, Calif.; said Solovieff assignor to Fred J. Russell, Los Angeles, Calif.

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The invention relates to padlocks of a type commonly involving a shackle with one long leg mounted in a casing and capable of being snapped into locked position, the invention being more particularly concerned with the reduction of frictional resistance in some of the working parts.

Although certain limitations have been recognized in locks, and, in particular, padlocks, the trend of manufacture has been to follow conventional patterns as those most readily acceptable to the trade and also as being as inexpensive as dependable locks of this variety can be. In the many years during which locks of this kind have been constructed, development has resulted in considerable simplification of the structure to the extent that in order to further improve these devices, new materials need to be introduced into them.

It is accordingly among the objects of the invention to provide a new and improved padlock construction wherein a new low friction material is introduced in order to improve the ease with which the lock can be locked and unlocked without in any manner diminishing the degree of security.

Another object of the invention is to provide a new and improved padlock construction wherein by the introduction of a low friction non-metallic material into the operating structure, the spring action can be appreciably strengthened, and, accordingly, improve the positiveness of movement of certain working parts.

Still another object of the invention is to provide a new and improved padlock construction which makes possible introduction of low friction non-metallic material into certain portions of the operating structure in an arrangement such that even under circumstances where the low friction material lacks the strength of metallic material in certain respects, the construction is made such that the lack of strength in no way impairs the ruggedness of the structure nor the degree of security which must be relied upon.

Still another object of the invention is the combining of metallic material with low friction non-metallic material so that in operating together, substantially all of the advantages of metallic material are retained and the advantages of employment of low friction non-metallic material are added to the device.

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.

In the drawings:

FIG. 1 is a longitudinal sectional view of a padlock involving the invention showing the shackle in locked position.

FIGURE 2 is a view similar to FIGURE 1 but showing the position of parts, at the moment the lock is unlocked.

FIGURE 3 is a cross-sectional view taken on the line 3—3 of FIGURE 1.

FIGURE 4 is a cross-sectional view taken on the line 4—4 of FIGURE 2.

FIGURE 5 is a fragmentary longitudinal sectional view taken on the line 5—5 of FIGURE 4.

FIGURE 6 is an enlarged perspective view of the blocker assembly which is used for locking the padlock.

In an embodiment of the invention chosen for the purpose of illustration there is shown a padlock comprising a case indicated generally by the reference character 10. Cooperating with the case is a shackle 11 which is locked and unlocked by means of a blocker assembly 12 which is subject to operation by a key-operated mechanism 13 and a key 14.

The case is provided with a chamber 15 having an open end 16 into which the key-operated mechanism is inserted into position within the chamber. A spring pressed detent 17 overlying a shoulder 17' serves to retain the key-operated mechanism in position in the case.

The case is also provided with spaced parallel bores 18 and 19, the bore 18 being a relatively long bore and the bore 19 being a relatively short bore. The shackle has a long leg 20 mounted in the long bore 18 and a short leg 21 which is adapted to be inserted into and withdrawn from the short bore 19. A spring 22 at the bottom of the long bore 18 tends normally to be pressed against the bottom of the long leg 20 tending to force the long leg outwardly from the position of FIGURE 1 to the position of FIGURE 2.

The case is also provided with a transversely extending recess 25 which communicates with the bores 18 and 19 adjacent outer ends 26 and 27, respectively, and also communicates with the inner end of the chamber 15. Normally, the recess is drilled from one side, namely, the left side as viewed in FIGURE 1 after which a plug 28 is employed to close the hole.

The blocker assembly, previously identified by the reference character 12, is mounted in the recess so that it is free to reciprocate longitudinally within the recess. The blocker assembly is constructed of two main parts 29 and 30, the part 29 preferably being made of metallic material and the part 30 being made of a low friction non-metallic material. A suitable material for the part 30 has been found to be a synthetic plastic resinous material, two commercial examples of which are identified as nylon and Delrin. Other comparable materials may be equally acceptable except that those chosen need to be able to provide adequate tensile strength as well as ample resistance to compression and to have the needed low friction surface characteristics.

As shown to good advantage in FIGURE 6, the part 29 has a cylindrical end portion 31 with the outermost end provided with a shoulder 32. A shank 33 is substantially semi-cylindrical in form and presents a flat face 34 extending lengthwise of the shank. Similarly, the part 30 has a cylindrical end portion 35 and a shank 36 likewise substantially semi-cylindrical in form and presenting at one side a flat face 37 which matches the flat face 34. The outermost end of the piece 30 has a reduced portion 38 providing a shoulder 39 and, furthermore, presenting a rounded corner 40. In the chosen embodiment, two springs, 41 and 42, are provided. These springs can be relatively heavy as compared with springs employed by prior art devices. The spring 41 presses at one end against the cylindrical end portion 31 of the part 29 and in an opposite direction against the free end of the shank 36 of the part 30. In a similar fashion, the spring 42 presses in one direction against the cylindrical end 35 of the part 30 and against the free end of the shank 33 of the part 29. Action of the springs tends to separate the parts in a lengthwise or longitudinal direction.

In the key-operated mechanism, is a rotatable plug 43 having a tailpiece 44 from which extend pins 45 and 46. In the shank 33 is a notch 47 which receives the pin 45.

Similarly, in the shank 36 is a notch 48 which receives the pin 46, as shown advantageously in FIGURE 5.

In order that the shackle be retained at all times in engagement with the case, the long leg 20 is provided at its free end with a shoulder 50. In the unlocked position of FIGURE 2, the shoulder 50 engages and is retained by the outermost end of the cylindrical end portion 31, where the outermost end presses against a section 51 of the long leg. The long leg is also provided with a notch 52 into which the outermost end of the piece 29 projects when the shackle is locked as shown in FIGURE 1.

The short leg is provided with a notch 53 adapted to receive the reduced portion 38 of the piece 30 when in the locked position of FIGURE 1. Adjacent the notch 53 is a cam face 54 which is adapted to provide a camming relationship between the short leg and the part 30 of the blocker assembly when the shackle is snapped from unlocked to locked position. It will be understood that although the part 30 is shown withdrawn at the moment of unlocking, as in FIGURE 2, as promptly as the key 14 is released, the springs 41 and 42 return the parts 29 and 30 to extended position, as shown in FIGURE 1, so that the reduced portion 38 actually lies within the bore 19. Consequently, when it comes time to snap the shackle to locked position, the cam face 54 is pressed into frictional camming engagement with the rounded corner 40 forcing the part 30 by this action endwise out of the bore 19 against tension of the springs 41 and 42. When the shackle has been finally pushed far enough so that the notch 53 is in alignment with the reduced portion 38, the springs will then force the part 30 endwise again until the reduced portion is received in the notch in the position as shown in FIGURE 1.

Although the form, construction and operation of parts, as herein described, follow in general the construction, form and operation of the parts in copending application Serial No. 55,528, filed September 12, 1960, it should be borne in mind that because the part 30 is constructed of low friction nonmetallic material, its action will be appreciably different from the action which would apply if the part were made of metal. The low friction surface characteristic of such nonmetallic material has a number of advantageous effects. In the first place, as just described, the camming action between the cam face 54 and the rounder shoulder is a low friction camming action and makes the closing action of the shackle appreciably easier. Secondly, by virtue of the fact that the entire arcuate exterior of the part 30 has a low-friction surface characteristic, action of the part in the recess 25 is a low friction action and this further improves not only the ease of snapping the shackle into locked position, but also the ease of unlocking when the part is withdrawn by action of the pin 46.

Still further, because of the same low-friction surface characteristic, the sliding of the flat face 37 of the part 30 against the flat face 34 of the part 29 is a low friction action and this, accordingly, renders movement of the metal part 29 also a low friction action by virtue of the very presence of the nonmetallic part 30. Accordingly, the smooth action characteristic is imparted to the part 29 without it being necessary to construct that part also of nonmetallic material.

Further still, although there is a limit to the tensile strength of the part 30 due to the fact that it is constructed of nonmetallic material, the security of the lock is not impaired because in locked position, as shown in FIGURE 1, the locking condition is maintained by projection of the outermost portion of the cylindrical end portion 31 into the notch 52 of the long leg. This is a metal-to-metal engagement with all of the strength and dependability inherent in the metal parts. This security applies even though a portion of the locking engagement takes place between the nonmetallic reduced portion 38 of the part 30 and the notch of the short leg 21.

It will be clear from the foregoing résumé of advantages of the low friction material, that virtually all of these advantages can be built into a padlock of the type here under consideration by merely making one part of the blocker assembly of low friction material, but retaining the other part constructed of metallic material. By this unique combination, the security which is built into the lock by constructing critical parts of metal is all retained while at the same time the improved ease of operation of the lock is built in by the presence of the one nonmetallic part without it being necessary to alter the accepted and proven design and without sacrifice of security. Accordingly, the advantage becomes possible without there being experienced any increase in the cost of materials or assembly.

While the invention has herein been shown and described in what is conceived 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 case having spaced parallel end opening bores on respectively opposite sides of the case, said case having a transversely extending recess in communication with said bores, a shackle having a long leg mounted in one of said bores and a short leg adapted to be received in the other of said bores when in locked position, a blocker assembly mounted in said recess, said assembly including two parts of substantially the same length and cross sectional area slidable longitudinally in said recess, one of said parts being of nonmetallic low friction material and the other of said parts being made of metallic material and of greater specific gravity than said non-metallic material, said parts having longitudinally extending faces in sliding relationship with each other, spring means pressing endwardly against said parts in opposite directions, one of said parts having the outer end in engagement with said long leg, the other of said parts having an end extendable into the other of said bores, said short leg having a slot therein adapted to receive said last-identified part in locked position.

2. A padlock comprising a case having spaced parallel end opening bores on respectively opposite sides of the chamber, said case having a transversely extending recess in communication with said bores, a shackle having a long leg longitudinally slidable and rotatably mounted in one of said bores and a short leg adapted to be received in the other of said bores when in locked position, a blocker assembly mounted in said recess, said assembly comprising two parts of substantially the same length and cross sectional area slidable longitudinally in said recess, said parts having longitudinally extending faces in sliding relationship with each other, spring means pressing endwardly against said parts in opposite directions, one of said parts being of metal and having the outer end in engagement with said long leg, the other of said parts being of nonmetallic low friction material and of less specific gravity than said one of said parts, said low friction material being in engagement with the wall of said recess and said last part having an end extendable into the other of said bores, said short leg having a cam face on the end thereof adapted to slidably engage said other part and having a slot therein adapted to receive said last-identified part in locked position.

3. A padlock comprising a case having spaced parallel end opening bores on respectively opposite sides of the case, said case having a transversely extending recess in communication with said bores, a shackle having a long leg mounted in one of said bores and a short leg adapted to be received in the other of said bores when in locked position, a blocker assembly mounted in said recess, said assembly comprising parts slidable longitudinally in said recess, said parts having longitudinally extending faces in

sliding relationship with each other, spring means pressing endwardly against said parts in opposite directions, one of said parts being of metal and having the outer end in engagement with said long leg, the other of said parts being of nonmetallic low friction material and lighter in weight than said one of said parts and having an end extendable into the other of said bores, said short leg having a slot therein adapted to receive said last-identified part in locked position.

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