

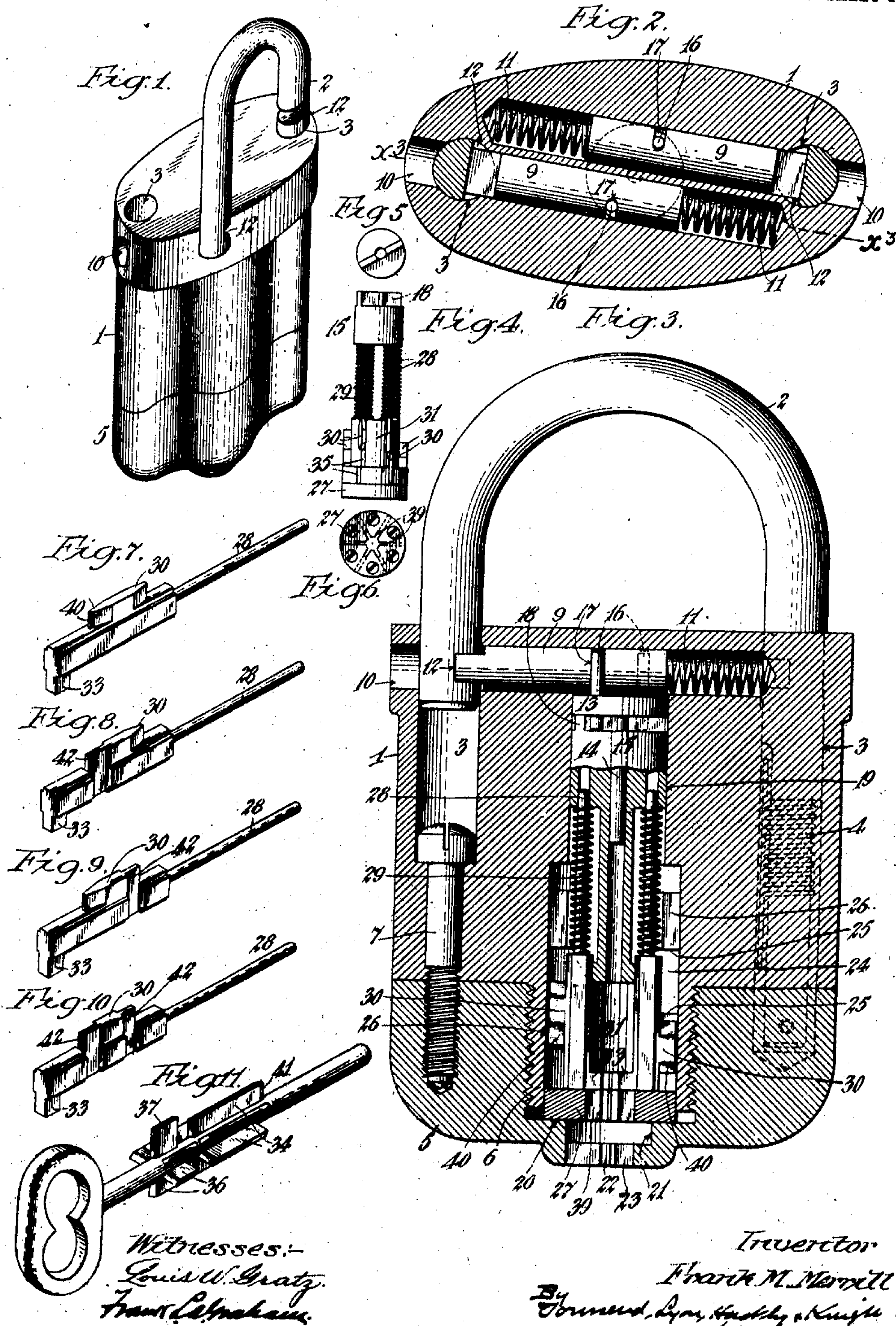
No. 883,414.

PATENTED MAR. 31, 1908.

F. M. MERRILL.  
PADLOCK.

APPLICATION FILED MAY 13, 1907.

2 SHEETS—SHEET 1.



Witnesses:-  
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Frank C. Mahoney.

Inventor  
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his attorneys

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2 SHEETS—SHEET 2.

Fig. 12.

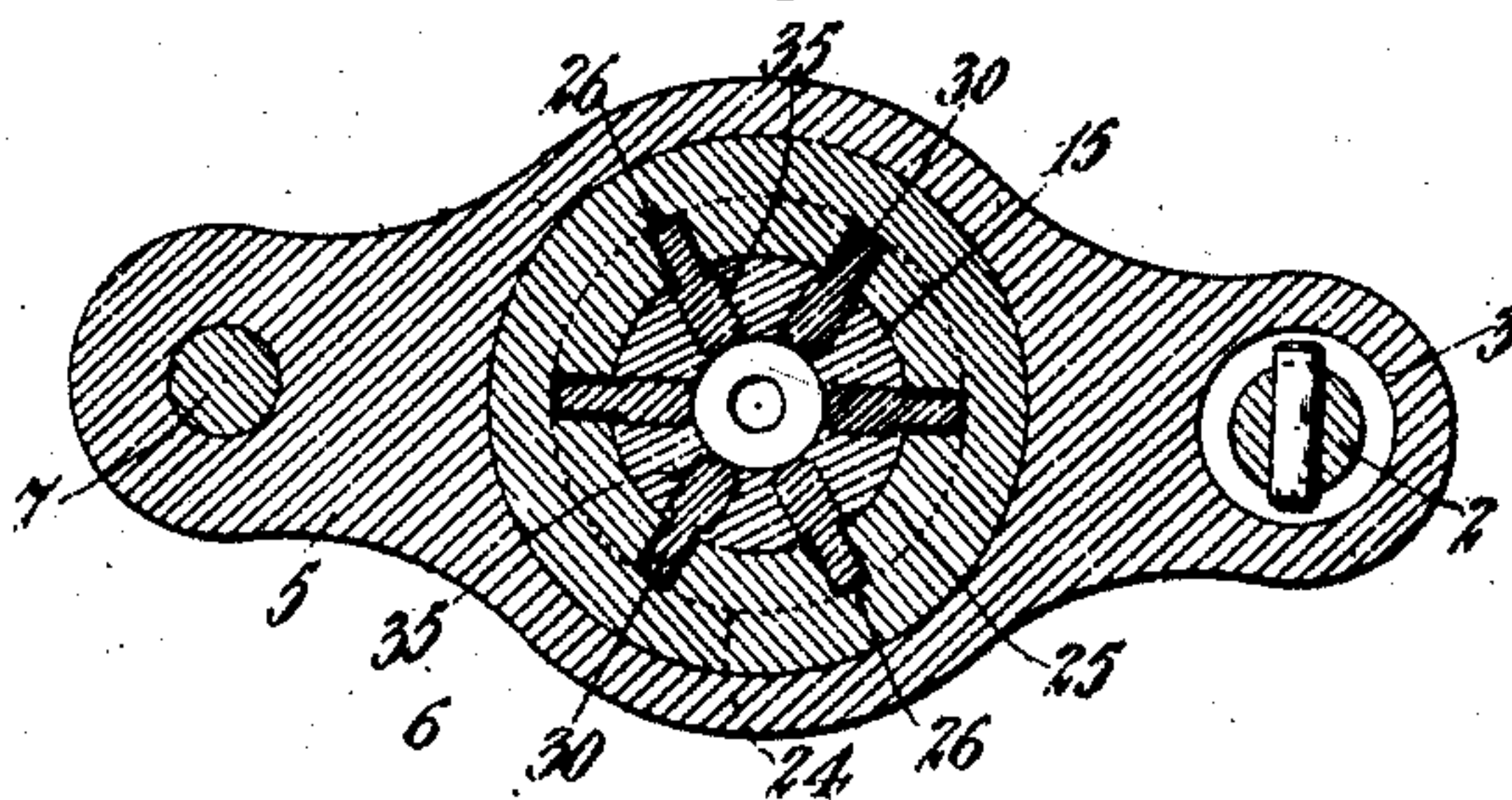


Fig. 13.

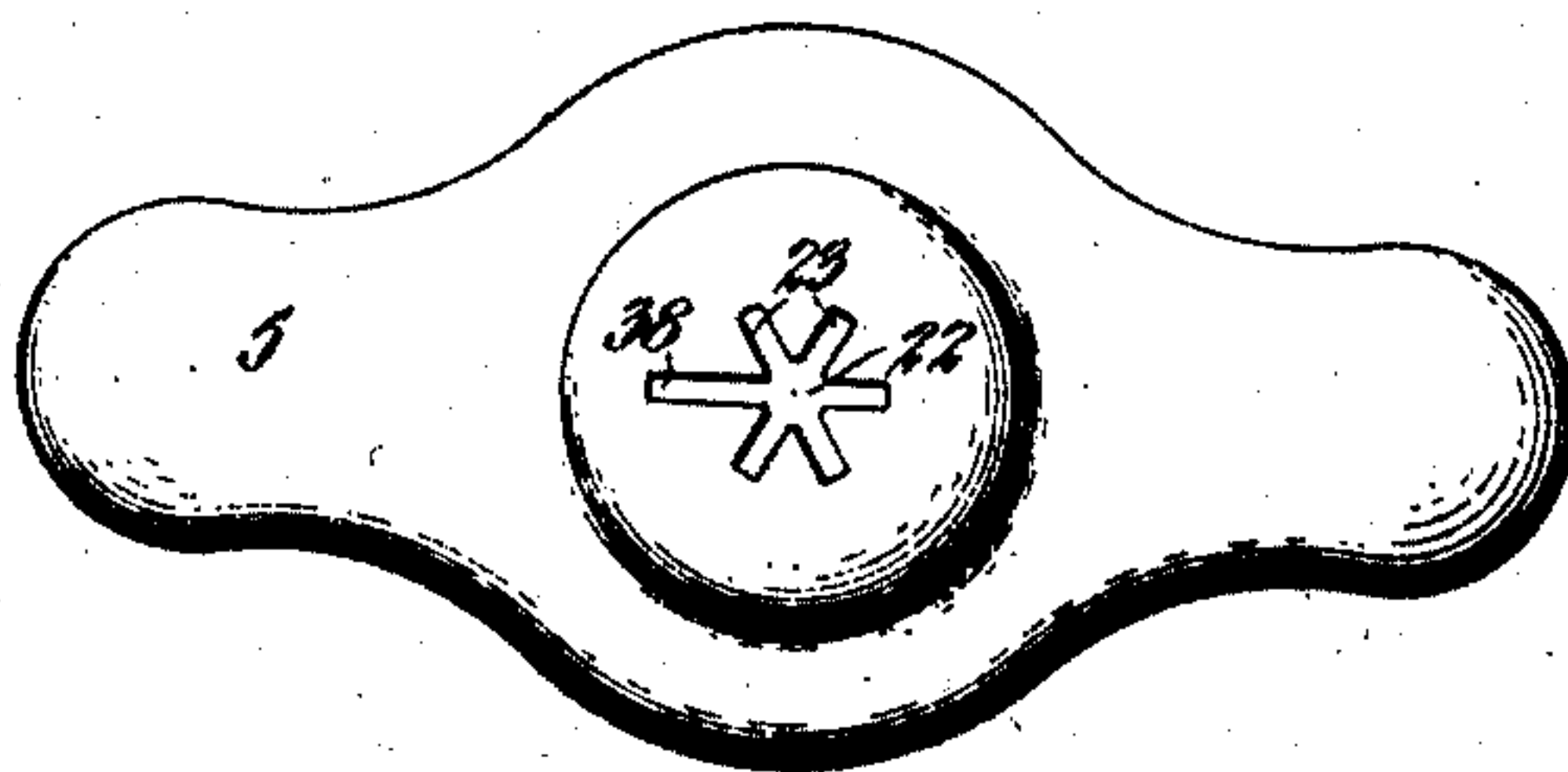


Fig. 14.

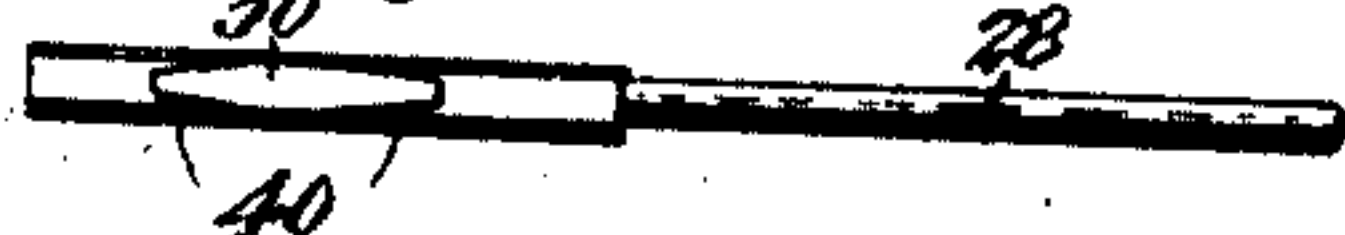
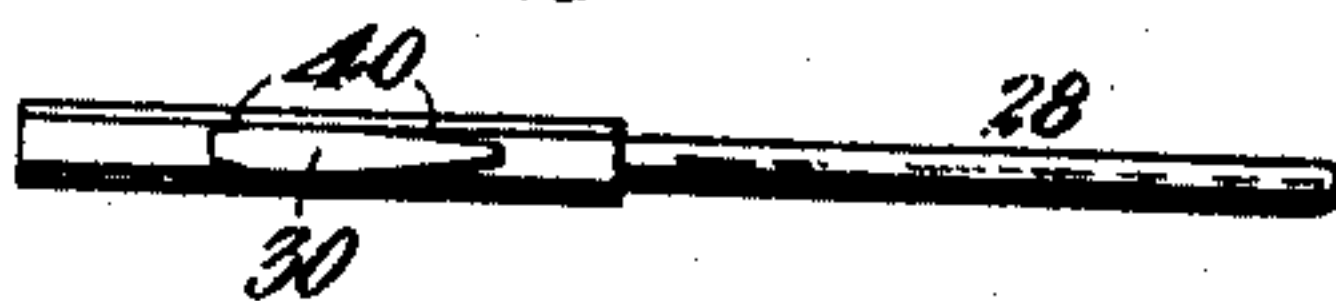


Fig. 15.



Fig. 16.



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# UNITED STATES PATENT OFFICE.

FRANK M. MERRILL, OF LOS ANGELES, CALIFORNIA.

## PADLOCK.

No. 883,414.

Specification of Letters Patent.

Patented March 31, 1908.

Application filed May 13, 1907. Serial No. 373,512.

*To all whom it may concern:*

Be it known that I, FRANK M. MERRILL, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Padlock, of which the following is a specification.

The main object of the present invention is to provide a lock wherein a large number of differentiating locks can be made at relatively small cost.

A further object of the invention is to prevent, as far as possible, the possibility of picking the lock.

The invention is herein shown as applied to a padlock, but is capable of general use.

In the accompanying drawings:—Figure 1 is a perspective of the lock. Fig. 2 is a sectional view of the lock. Fig. 3 is a section on the line  $x^3-x^3$  in Fig. 2. Fig. 4 is a side elevation of the tumbler barrel of the lock. Fig. 5 is a top view and Fig. 6 a bottom view thereof. Fig. 7 is a perspective of one form of tumbler of the lock. Figs. 8, 9 and 10 show other forms of the tumbler. Fig. 11 is a perspective of the key. Fig. 12 is a transverse section of the lock through one of the wards. Fig. 13 is a view of the lower end of the lock. Figs. 14 to 16 are plans of different tumbler slides.

The lock comprises a case 1 and a staple or U-shaped bolt 2, whose end portions slide in bores 3 in the case, one end portion being pressed by a spring 4 so as to tend to eject the free end of the bolt from the case. The case 1 is provided with a head or cap member 5 which screws onto a nipple 6 at the lower end of the lock case and is fastened in position by a screw 7 which is inserted through the bore 3 that receives the free end of the bolt, this being done when such free end of the bolt is turned away from such bore.

When the free end of the bolt is inserted in the bore and pressed in, it is held in such position by spring pins or dogs 9 which slide in transverse bores 10 in the case and are pressed by springs 11 to force their ends into engagement with notches 12 in the respective end portions of the bolt. To release these dogs from the bolt, a plate 13 is provided having a stem 14 whereby it is pivoted in the upper end of a barrel 15, said plate being provided with two pins 16 whose upper ends engage respectively with notches 17 in the respective dogs 9, and the lower ends of said pins on the plate extending in the path of motion of

two lugs 18 on the barrel 15 aforesaid. The barrel is mounted in an axial chamber 19 of the case so as to turn freely therein, and its lower end engages with an internal annular flange 20 on the cap member 5 aforesaid, which thereby holds the barrel member in place. Below this annular flange the said cap member 5 is turned in to form a guard 21 which closes the lower end of the lock case except for a central opening 22 in said guard, said opening having radial slots or notches 23 corresponding to the key to be used in the lock. Around the barrel 15 the case 1 is formed with an enlarged cylindrical chamber 24, from the wall of which extend inwardly two annular flanges 25 which are slotted or notched as at 26 to serve as wards for control of the tumblers in the barrel. In the present case six such notches are shown in each annular flange, the notches being in alinement in both flanges. The barrel 15 is formed to receive and guide a plurality of tumbler devices, for example, six, corresponding in number to the number of slots in the ward flanges, a removable cap plate 27 being fastened on the lower end of the barrel to retain the tumblers in the barrel. Each tumbler is provided with a stem 28 on which is arranged a spring 29 to press the tumbler downwardly, and each tumbler is further provided with a fin 30 which extends outwardly beyond the cylindrical portion 31 of the barrel in which the tumbler slides, so as to enable said fins to engage in the slots 26 of the ward flanges. These fins are of equal length, namely, a little less than the distance between the ward flanges and are of variant longitudinal position, and by such variation is determined the differentiation in the different locks of the series. Normally, the said fins are at the lower end of their stroke and are in engagement by some portion of the fin with the corresponding slot in the lower ward flange. To unlock the lock it is necessary to move each of the tumblers upwardly a sufficient distance to remove its fin 30 from the slot 26 in the lower ward flange into the free annular space above said lower ward flange. The slots 26 in the upper ward flange being directly in line with those of the lower ward flange will receive the fins in their upward movement, if such movement is excessive, and will thereby prevent the tumbler barrel from turning. It is, therefore, also necessary in unlocking the lock to raise the tumblers only to such extent as to free them from



the lower ward flange without bringing the free ends into engagement with the upper ward flange. Owing to the variant position of the fins on the respective tumblers, it is requisite that the tumblers be raised to different extents in the unlocking operation, and this is performed by means of a key of the type shown in Fig. 11, said key having a plurality of fins 34 adapted to engage respectively with lugs 33 in the lower ends of the respective tumblers, and said key fins being of variant length so as to raise all of the tumblers to the proper amount when the key is pushed in a definite distance. There being a plurality of slots 35 in the barrel through which the key fins 34 can be inserted to engage the tumblers, it is desirable to provide means for insuring that the key will be inserted in the correct angular position, and for this purpose said key has a further series of fins 36, one of which, indicated at 37, is longer than the others, the guard 21 on the cap member having radial slots 23 to receive these fins, one of said radial slots indicated at 38 being longer than the others to receive the elongated fin and thereby insure that the key is inserted in the proper position.

The fins 30 are cut away at each side and at each end, preferably by chamfering as shown in Figs. 7, 14, 15, 16. These cut away portions or chamfers 40 are of different length in the different fins, not only at the two ends of each fin and in different tumblers in the same lock, but in different locks of the series, so that it is impossible for a person to ascertain the combination by feeling the points at which the tumbler fins slip off the ward flanges, and therefrom estimating the position of the fins. Owing to the variant position of the terminations of the cut away portions, the point at which the fin begins to slip off the ward bears no ascertainable relation to the point of actual relation of the tumbler from the ward, and it is therefore not possible for a person to pick the lock. The chamfering also has the advantage of facilitating entrance of the wards by the fins, so that in attempting to work any one tumbler to proper position, the other tumblers are liable to slip back into the wards. The variant positions of the chamfers on the fins are shown in Figs. 14 to 16, the chamfers being shown as of nearly but not quite the same length in Fig. 14, longer at one end in Fig. 15, and longer at the other end in Fig. 16. In any one lock, tumbler slides with such variant chamfers will be used.

In operation of the lock with the proper key, the key, on being inserted in the lock, pushes back the tumblers until the fins on all the tumblers have been withdrawn from the first ward and occupy the free space between the two wards, without entering the second ward. The key can then be turned, rotating the tumbler barrel and, through the

intermediate member 13, withdrawing the spring dogs from the bolt, allowing the bolt to be projected by the spring. To withdraw the key it must be turned back to locking position, on account of the guard device, and the plate 13 allows of the motion without disturbing the dogs, which are still held in unlocking position by the engagement of the end of one dog with the unnotched part of the shank of the bolt, the other dog being held open through the intermediate member 13, until the bolt is pressed back to locking position, when the dogs enter the notches and the bolt is automatically locked.

The slots 23 in the guard plate 21 and those in the end of the barrel fit the key fins closely, and the larger key fins are tapered at their ends as shown at 41, but the slots 26 in the wards are somewhat wider than the said fins, so that as the key is pushed in the fins will find their way into the barrel and will center it, or bring it to absolutely correct angular position for starting. Then when the key pushes the tumbler slides along the barrel, the fins in the barrel work through the slots in the wards without actual contact, said slots being a little wider than the tumbler fins. The distance between the two sets of ward devices or ward flanges is also somewhat greater than the length of the fins, so that when the key is entered to proper distance, as determined by the long key fin 34 striking the end of the barrel, the tumbler fins will revolve free of the wards, so that there is no wear on the tumbler fins, either at the sides or ends, in the usual working of the device. This long fin 34 is preferably chamfered as shown at 41.

While chamfering of the ends of the tumbler slide fins is advantageous, said fins may be cut away as shown at 42 in Figs. 8, 9 and 10, forming more or less square shoulders at one or both ends, the differentiation of the position of these shoulders giving a protective or non-pickable quality.

What I claim is:—

1. A lock comprising a case having a chamber with two slotted ward flanges, a barrel rotatable in said chamber, a plurality of tumbler slides longitudinally movable in said barrel and having fins to enter the ward slots, the fins being of a length nearly equal to the distance between the ward flanges and being in different longitudinal positions on the different tumblers, and a guard member closing the end of the case and having slots, the wards having slots which are slightly wider than said slots in the guard, for the purpose set forth.

2. A lock comprising a case having a chamber with two slotted ward flanges, a barrel rotatable in said chamber, a plurality of tumbler slides longitudinally movable in said barrel and having fins to enter the ward slots, the fins being of a length nearly equal to the



distance between the ward flanges and being in different longitudinal positions on the different tumblers, and a guard member closing the end of the case and having slots, one of  
5 said slots being longer than the others.

3. A lock comprising a case having a chamber with two slotted ward flanges, a barrel rotatable in said chamber, and a plurality of  
10 tumbler slides longitudinally movable in said barrel and having fins to enter the ward slots, the fins being of a length nearly equal to the distance between the ward flanges, and being in different longitudinal positions on the different tumblers, said fins being chamfered  
15 near each end.

4. A lock comprising a case having a chamber with two slotted ward flanges, a barrel rotatable in said chamber, a plurality of tumbler slides longitudinally movable in said barrel, and having fins to enter the ward slots,  
20 said fins being chamfered near each end, the longitudinal length of the chamfered portions being different in the different tumbler slides.

5. In a lock, the combination of the bolt, a  
25 spring for moving the bolt to unlocking position, dogs for holding the bolt in locked position, a rotatable barrel provided with key controlled means, a plate having projections engaging the dog and the barrel, said plate  
30 being adapted to turn freely with respect to both the dog and the barrel through a limited angle, and means for preventing withdrawal of the key except when the barrel is in locking position.

35 6. In a padlock, a case having two longitudinal bores, a U shaped bolt movable in

said bores and having two notches, said case having two transverse bores drilled from opposite sides of the case, each transverse bore intersecting a longitudinal bore, a spring for  
40 moving the bolt to unlocked position, spring actuated dogs in the transverse bores to engage the notches in the bolt, and key controlled means for releasing said dogs from the bolt.

7. In a lock, the combination with the case having two longitudinal bores, a U shaped bolt movable in said bores and adapted to disengage from one of the bores, key operated means within the case, a cap screwed on the  
50 end of the case and forming a continuation of the body of the case, said case having a deep socket, the cap being drilled and threaded in alinement with the socket, and a screw bolt in the bottom of the socket threaded in the  
55 cap.

8. In a lock, wards, and tumblers formed with releasing edges having inclined faces, the angle of inclination and length of inclination being variant in the respective tumblers,  
60 whereby apparent release of the tumblers from the wards before actual position for release, is caused in attempting to pick the lock.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 6th  
65 day of May 1907.

FRANK M. MERRILL.

Witnesses:

ARTHUR P. KNIGHT,  
FRANK L. A. GRAHAM.