

A. MURAWSKI.

LOCK.

APPLICATION FILED JUNE 22, 1910.

991,796.

Patented May 9, 1911.

3 SHEETS-SHEET 1.

FIG. 1.

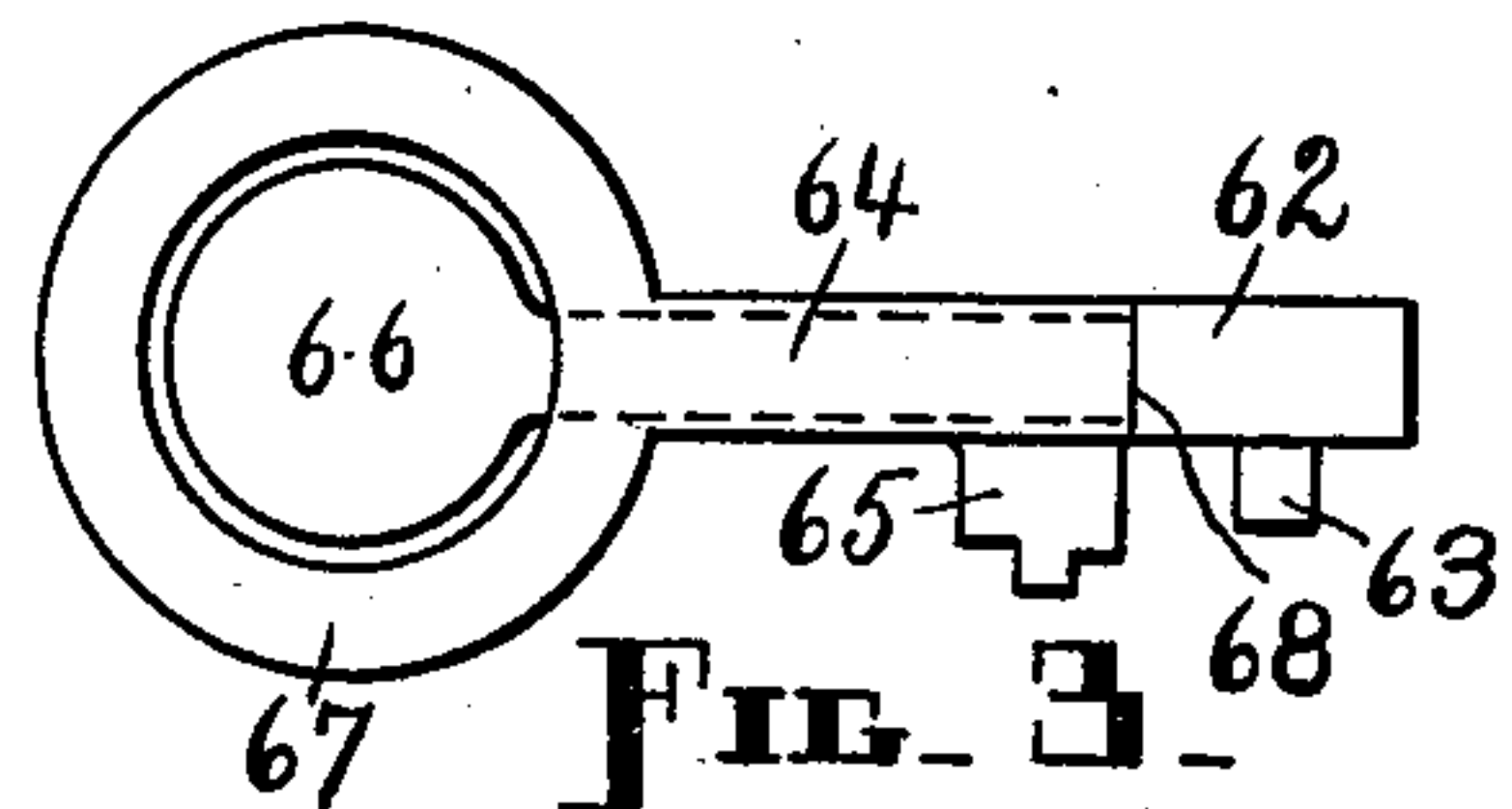
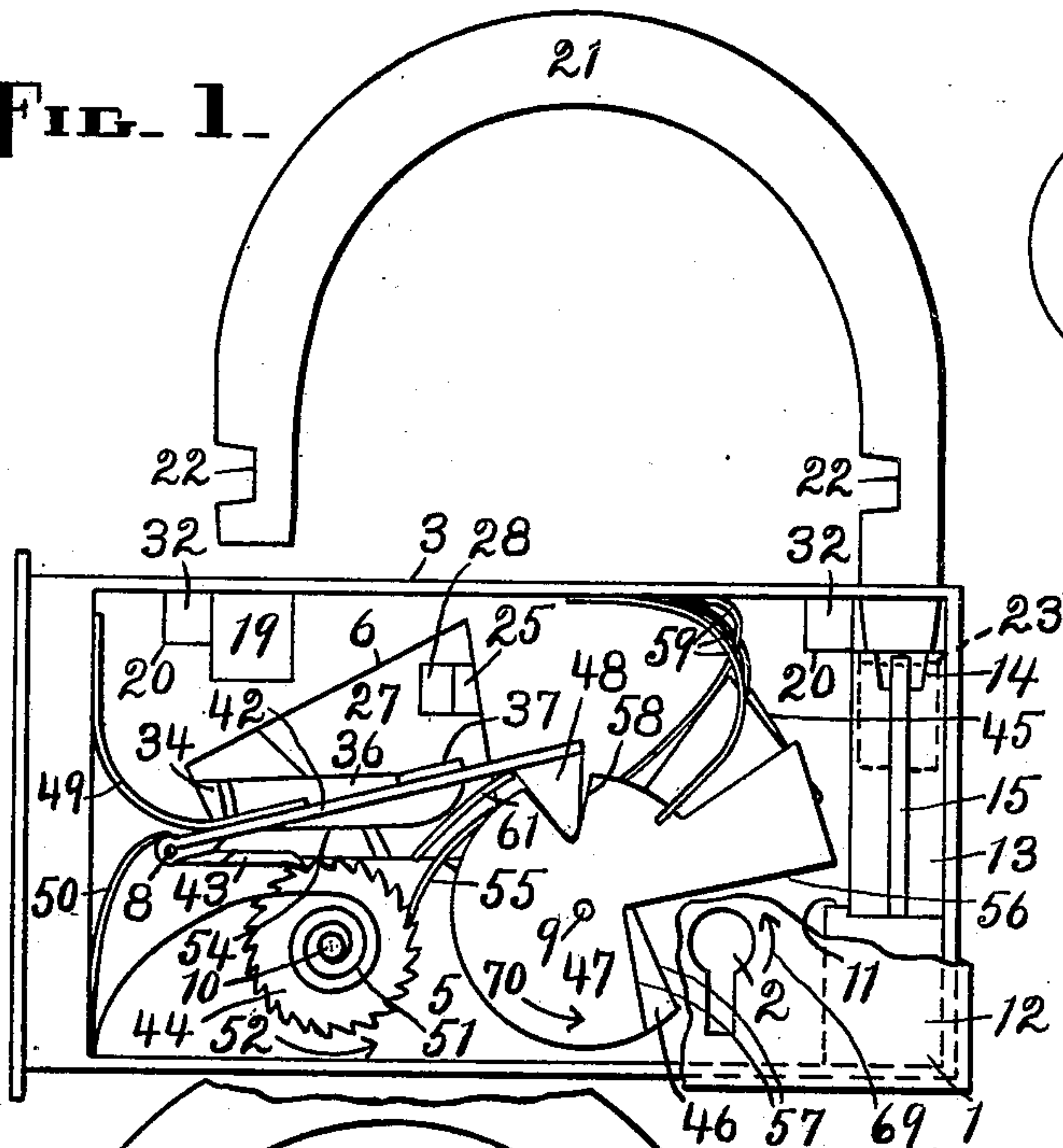


FIG. 3.

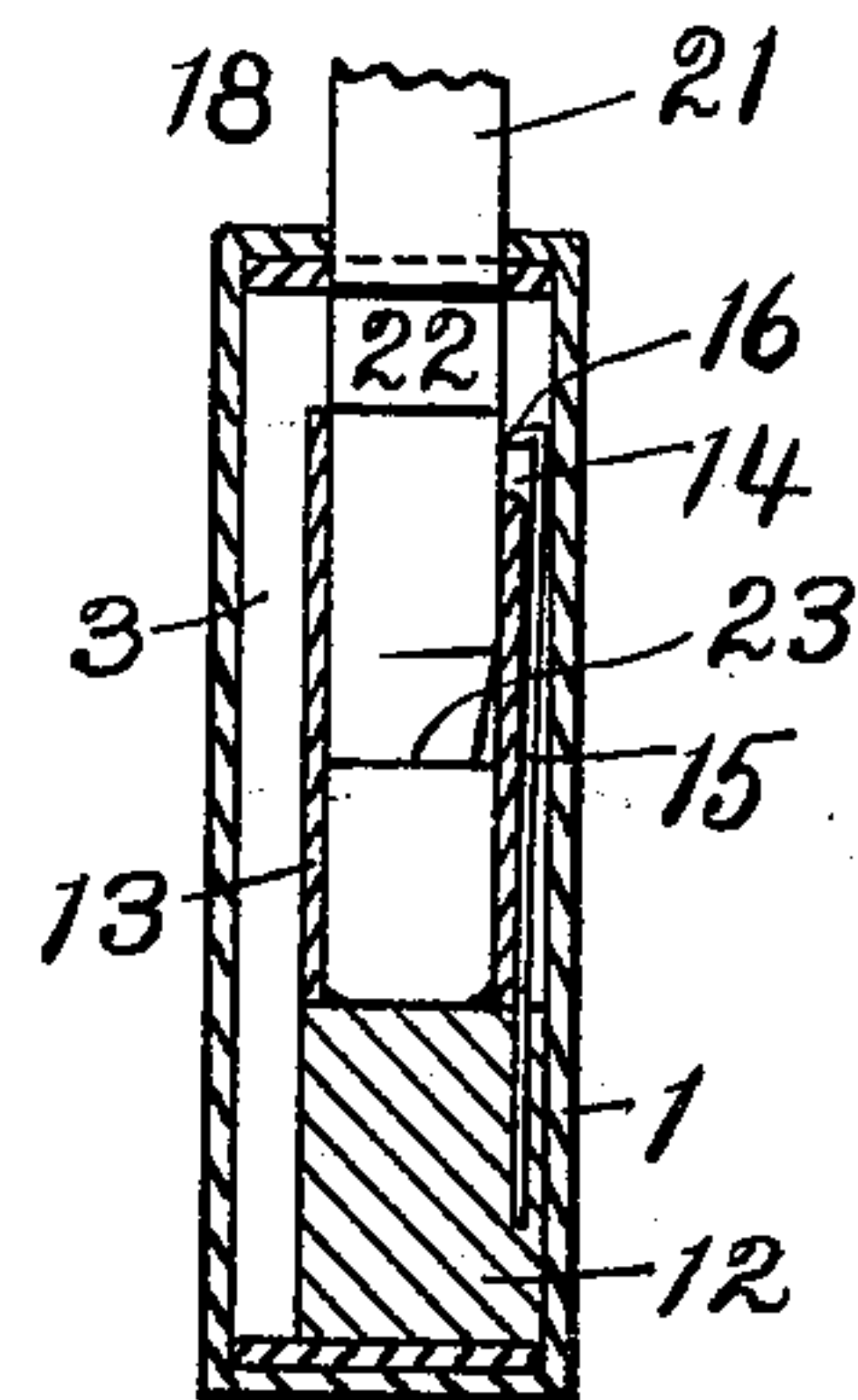


FIG. 4.

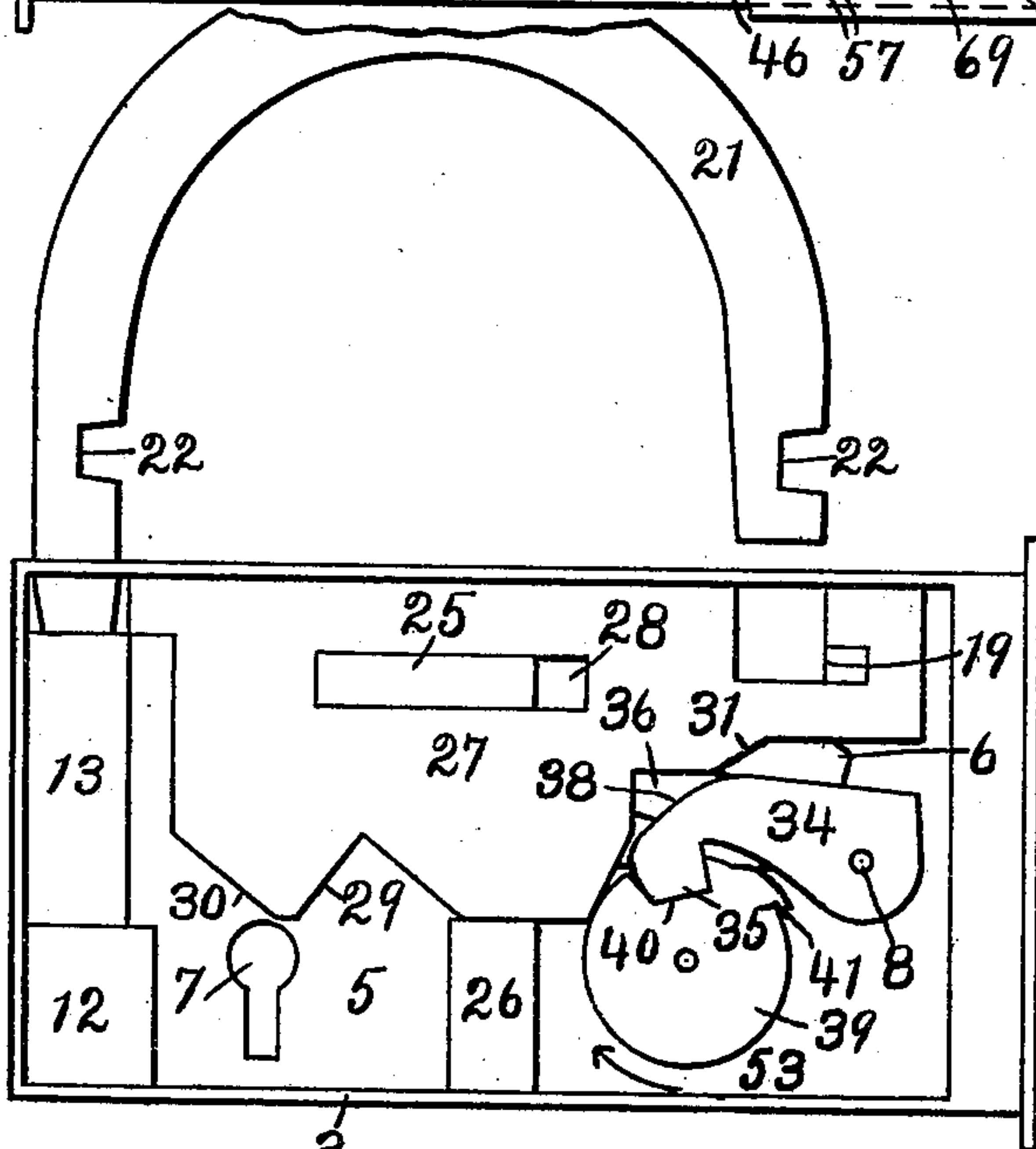


FIG. 2.

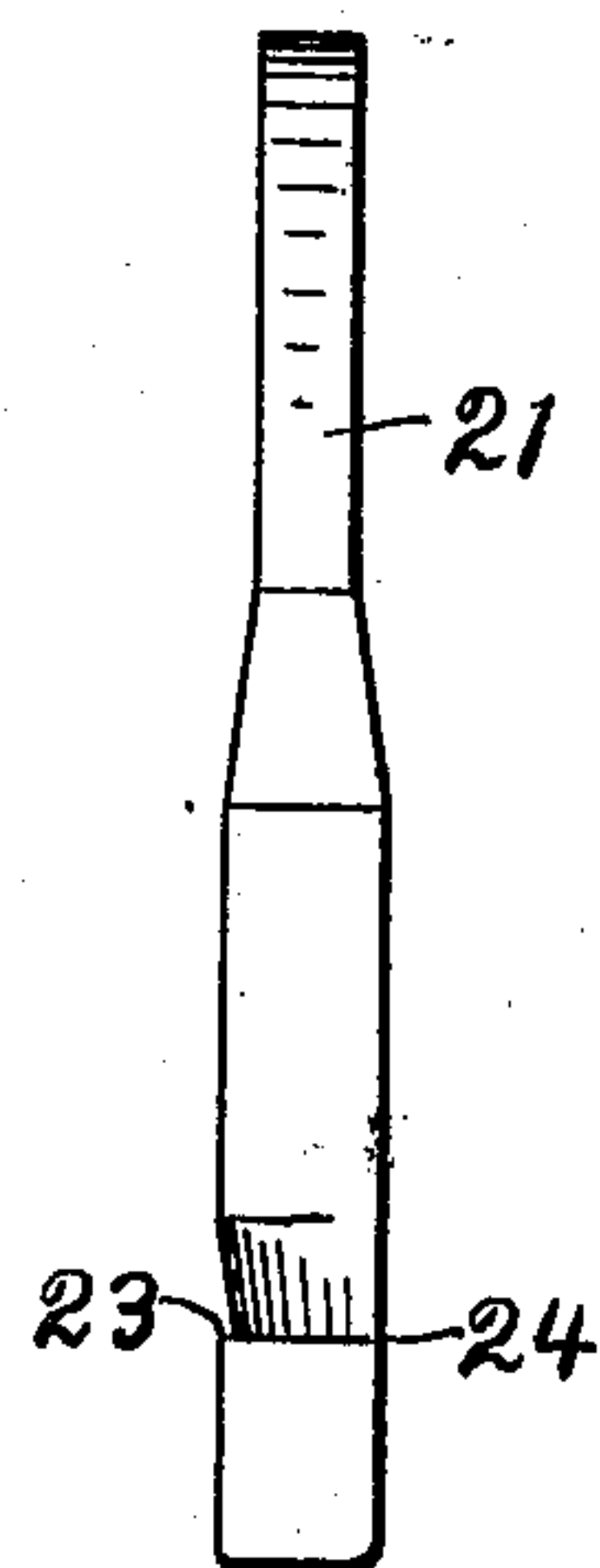


FIG. 5.

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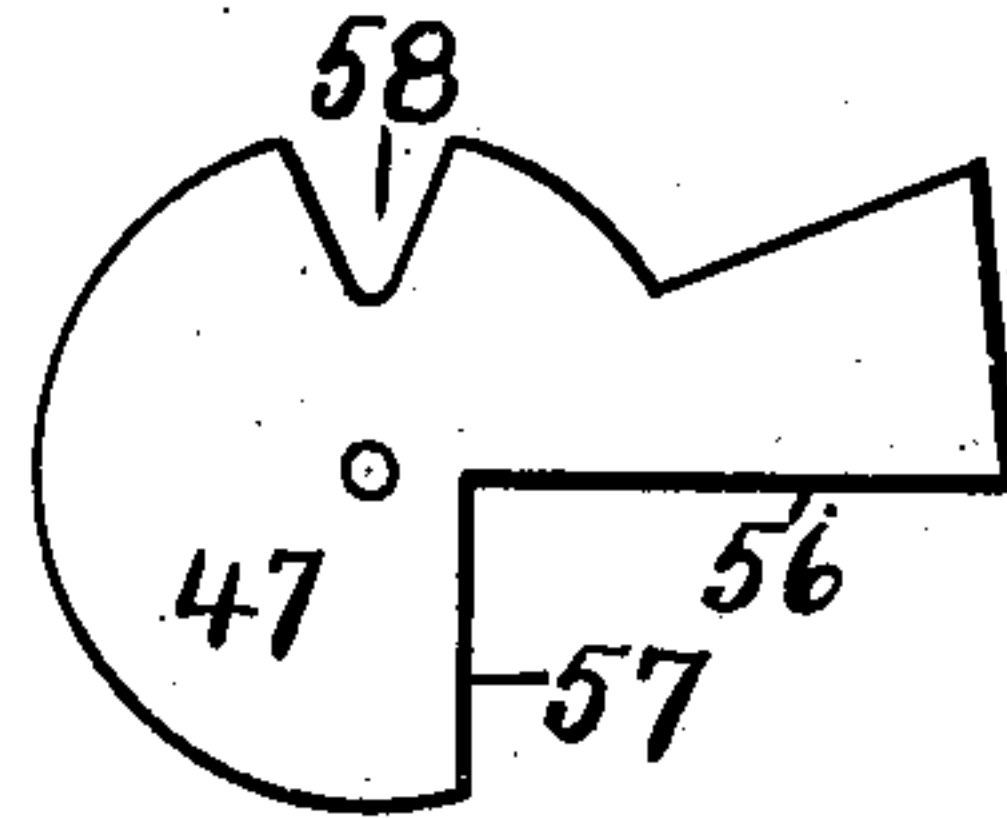
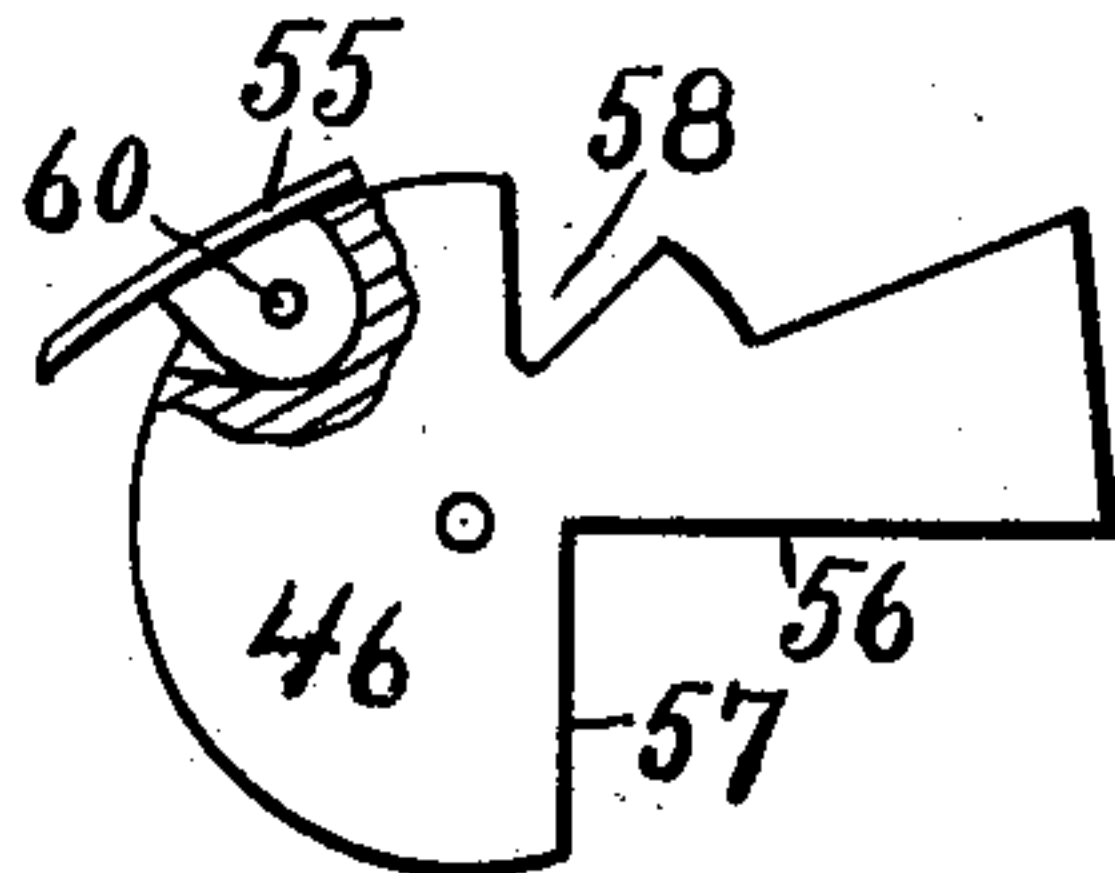
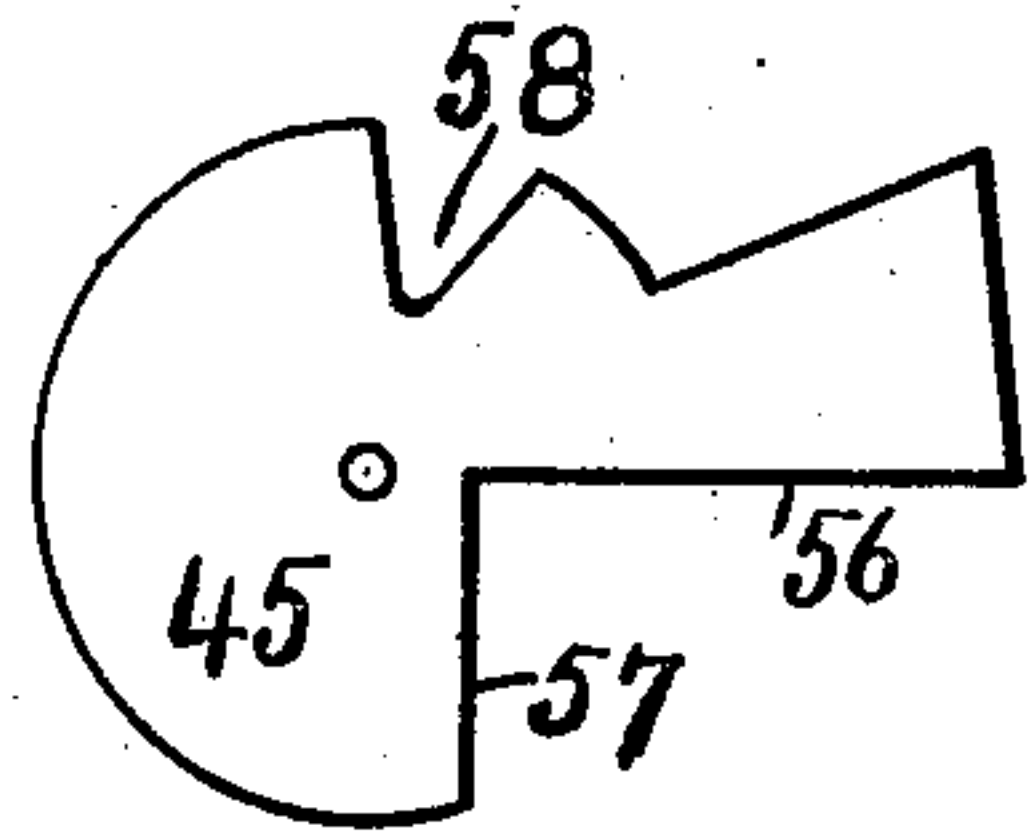
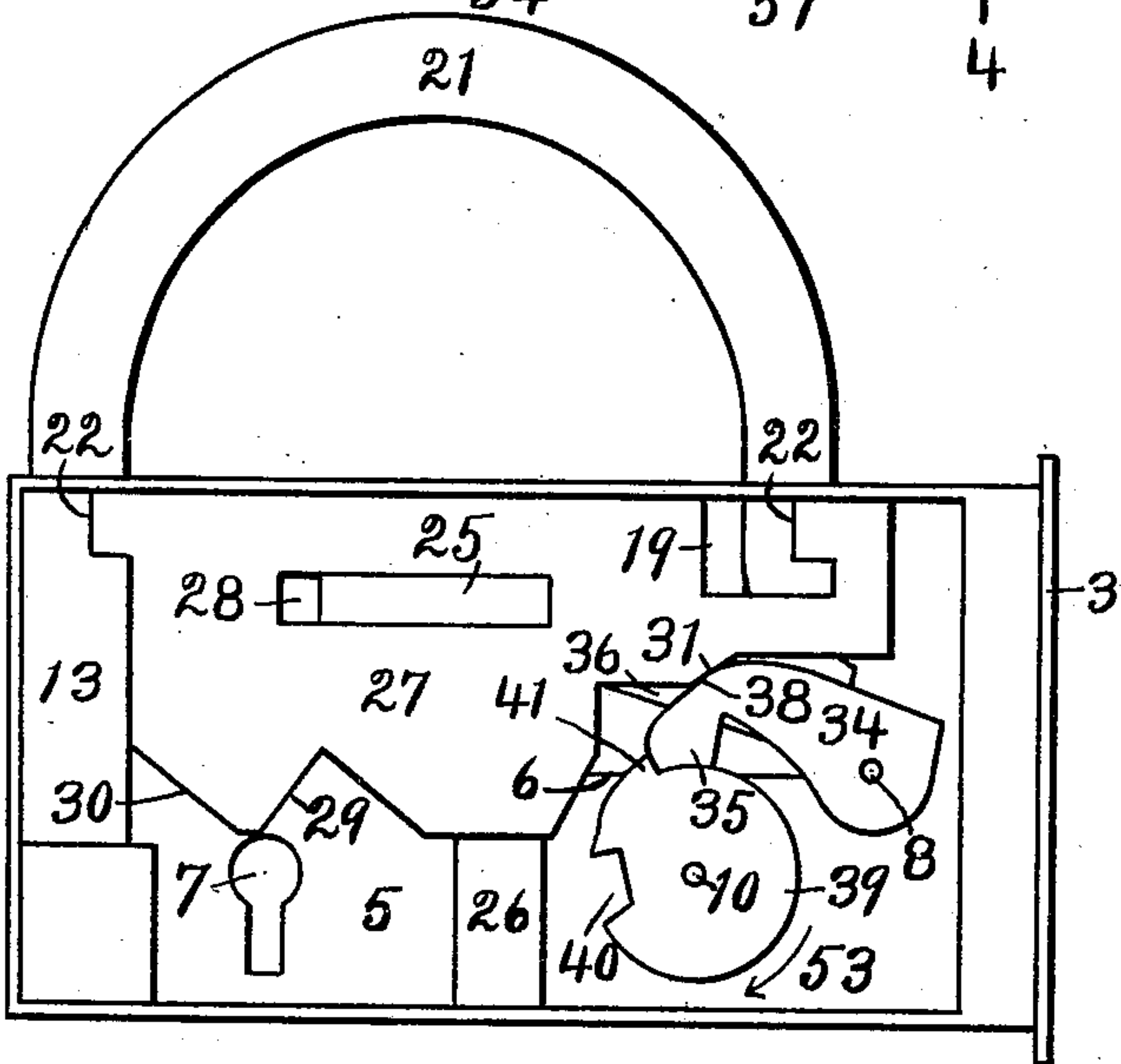
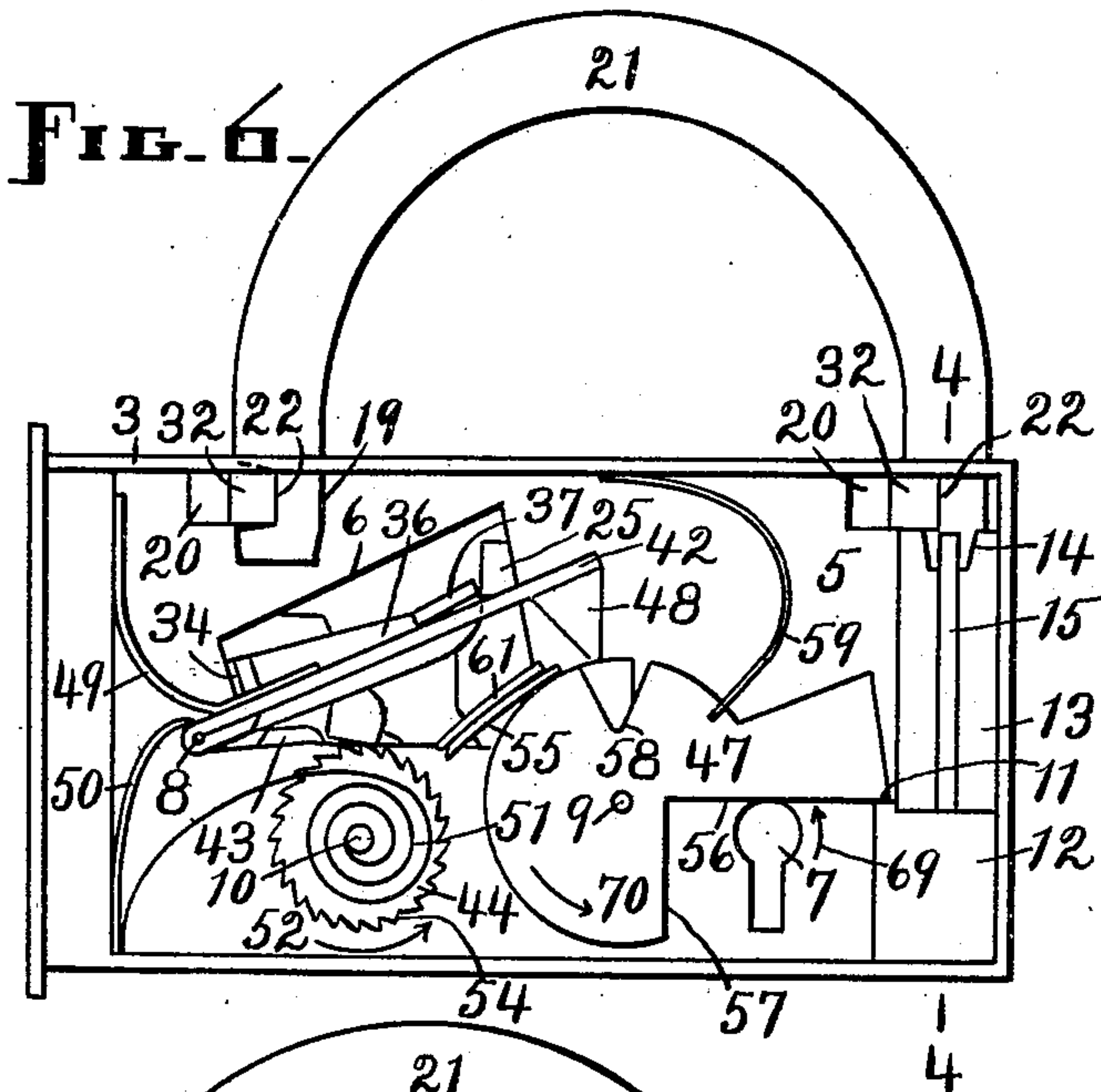
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3 SHEETS-SHEET 2.



WITNESSES:

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ADOLF MURAWSKI, OF SPRINGFIELD, MASSACHUSETTS.

LOCK.

991,796.

Specification of Letters Patent.

Patented May 9, 1911.

Application filed June 22, 1910. Serial No. 568,288.

To all whom it may concern:

Be it known that I, ADOLF MURAWSKI, a subject of the Czar of Russia, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented a new and useful Lock, of which the following is a specification.

My invention relates to improvements in key-operated locks, either of the padlock or simple bolt variety, in which certain peculiar bolt-holding and releasing mechanism and certain peculiar operating mechanism for such bolt-holding and -releasing mechanism are employed and with which a double key of particular construction is required, all as hereinafter set forth.

The object of my invention is to provide a strong, durable and secure lock, which embodies many of the advantages of both a key-operated and a so-called combination lock, and which is susceptible of innumerable changes so that no two locks can be successfully operated with the same key. Incident to the combination feature of this lock, it is important to note that the lock cannot be opened with the proper key even, unless the holder of such key be in possession of the secret necessary to the manipulation of the mechanism, by means of which the bolt is held and released, in the only manner in which can be effected the release of said bolt.

A further object is to provide mechanism combining the two features mentioned above that is adaptable to a great variety of locks in which sliding bolts are employed. In lock construction, a sliding bolt of simple design but made heavy and strong is always to be preferred, provided adequately safe means be furnished for securing it when in locking position, and this mechanism is particularly well adapted for this purpose.

Other objects will appear in the course of the following description.

I attain these objects by the means illustrated in the accompanying drawings, in which—

Figure 1 is a front elevation of a padlock, unlocked, which embodies a practical form of my invention, all but a fragment of the outer case having been removed so that an unobstructed view of the operating mechanism for the bolt-holding and -releasing mechanism is had; Fig. 2, a rear elevation of said padlock, unlocked, the entire outer

case having been removed to show said bolt-holding and -releasing mechanism, Fig. 3, a side elevation of the double key by means of which the lock is operated; Fig. 4, a vertical section on lines 4—4, looking toward the right, in Fig. 6, the outer case being present and the hasp broken off above the casing; Fig. 5, an elevation of the hasp detached and as viewed from the left of its position in Fig. 2; Fig. 6, a front elevation of the padlock without the outer case and locked; Fig. 7, a rear elevation of the padlock without the outer case and locked; Fig. 8, a front elevation of the rear or inner guard tumbler; Fig. 9, a front elevation of the middle or operating tumbler, a portion of the same being broken away to show in full the pawl carried thereby; Fig. 10, a front elevation of the front or outer guard tumbler; Fig. 11, an isometric view showing the interior of the inner case with the operating mechanism for the bolt-holding and -releasing mechanism disposed as in Fig. 6, the hasp having been omitted, however; Fig. 12, an isometric view of the bolt; Fig. 13, a rear elevation, without the outer case, of a mortise lock which embodies said invention in a practical form, and, Fig. 14, a side elevation of a one-step keeper.

Similar figures refer to similar parts throughout the several views.

A suitable outer case for the lock is represented at 1, in the front of which is a key-hole 2. An inner case, which fits into the outer case and is superficially coextensive with the interior thereof and which constitutes an important part of my invention, is represented at 3. The inner case 3 is open at the front and back and is divided by a partition 5 into front and back compartments. The partition 5 is parallel with the front and rear plates of the outer casing. There is an opening 6 through the partition 5, also a key-hole 7 therein. Set into the partition 5 are two studs 8 and 9, and mounted to rotate in said partition is a spindle 10. In front of the partition 5 in the case 3 is a stop 11, the same being adjacent to one end of the front compartment.

In the padlock case 3, between the stop 11 and the adjacent end of said case, is a block 12, and rising from this block is a tubular receiver 13 notched at its upper terminal in front, as shown at 14. The re-

ceiver 13 is situated in the transverse center of the case 3, the contiguous end portion of the partition 5 abutting said receiver, but the receiver does not extend to the top of said case. A resilient keeper 15 has its base set in the block 12 and is provided at the top with a hook 16 which projects into the notch 14 in the receiver 13, since said keeper extends upwardly in front of said receiver.

There are two holes 17 and 18 in the top of the case 3, the latter being directly over the receiver 13, and corresponding alining holes in the case 1. The partition 5 is cut away directly below the hole 17, at 19, and said partition is notched at 20—20, one of the notches 20 opening into the cut-away place or recess 19 and the other notch 20 being taken out of the upper corner of said partition adjacent to the top of the receiver 13.

The elements and features just described are for use in connection with a hasp 21 and with the direct securing means for such hasp, as will presently be made plain, and all are omitted from a mortise or equivalent lock, such as that shown in Fig. 14.

The hasp 21 has a long leg which is adapted to enter the receiver 13 through the hole 18 and a short leg which is adapted to pass through the hole 17 into the recess 19.

Each of these legs has a notch 22 so located that it comes opposite or in line with the partition notches 20 when the hasp is situated with its long leg resting on the top of the block 12 which is in reality the bottom of the receiver 13. A shoulder 23 is formed on the aforesaid long leg of the hasp 21 at such a distance above the base thereof that it will be engaged by the hook 16 of the keeper 15, when said hasp is raised far enough to enable the aforesaid short leg to clear the casing, as shown in Figs. 1 and 2. While in this raised position the hasp can be swung in either direction relative to the casing, or vice-versa, without becoming detached, owing to the engagement of the keeper hook 16 with the shoulder 23. Provision is made, however, for entirely detaching or removing the hasp from the casing, should occasion require, by omitting the shoulder 23 from the outer side of the long leg, as shown at 24, in Fig. 5, so that by turning the hasp, when held by the keeper 15, half way around in either direction, the unbroken surface at 24 receives the thrust of the hook 16, the latter being forced forward out of engagement with said shoulder by reason of the shape of the shoulder and the surrounding parts, and the hasp can be drawn up out of said casing. The hasp is replaced by simply thrusting its long leg down into the receiver, the keeper being forced forward by the descending base of said leg without difficulty.

On the back side of the partition 5 is a lug 25 and a post 26. These are in the rear

compartment of the case 3 and are associated with the partition and the top of said compartment in supporting and guiding a bolt 27, a slot 28 longer than the lug 25 being formed in said bolt to receive said lug. The bottom edge of said bolt intermediate of its ends rests on the post 26. The bolt 27 is thus arranged to slide in the rear compartment of the case 3, and it is provided near one end adjacent to the key-hole 7 with two shoulders 29 and 30, and near the other end with a shoulder 31. The shoulders 29 and 30 are inclined in opposite directions from below upwardly and outwardly and the shoulder 31 is inclined in a similar direction to that of the shoulder 29.

The bolt 27 for the padlock is provided at the top with two forwardly-extending lugs 32 which are so shaped and situated that, as said bolt is actuated, they move in and out of the position notches 20, and in and out of the hasp notches 22 when the hasp is in position to be locked. When the lugs 32 are in locking engagement with the hasp 21, said hasp is secured against any attempt to withdraw it from the casing, as will be readily seen.

The bolt 27 for the other kind of lock is provided with an ordinary lug or extension 33 at its front end, in place of the lugs 32 at the top.

Mounted at one end loose on the stud 8, behind the partition 5, is a latch 34 which is provided at its opposite end with a downwardly-directed hook 35, and is provided on its front side with an extension 36 which projects toward the rear end of the lock. The extension 36 operates in the opening 6 in the partition 5, and has a forwardly-extending lip 37 at its free end. The latch 34 is designed to be thrown up into the path of travel of the bolt shoulder 31, after the bolt 27 has been moved into locking position, for the purpose of securing said bolt in such position, and to this end said latch has a shoulder 38 for engagement with said shoulder 31. In the absence of any support beneath the free terminal of the latch, the latter will naturally swing downward on the stud 8 by reason of its own weight and that of the attached parts, but such downward movement is made positive when the bolt 27 is actuated against said latch owing to the shape and arrangement of the parts and to the fact that the shoulder 38 is oblique as well as the shoulder 31, the angles of the two shoulders corresponding. Secured on the spindle 10, behind the partition 5, is a rotary disk or keeper 39. The keeper 39 is beneath the latch hook 35 which bears and rides on the periphery of said keeper when it is not in a recess 40 in the keeper. When the hook 35 is in the recess 40, the latch is out of the way of the bolt shoulder 31, as shown in Fig. 2, but while said hook is on

the periphery of the keeper said latch is in locking engagement with the bolt, as shown in Fig. 7. The keeper 39 is provided on its periphery with a stop 41 which is adapted to contact with the latch hook 35 and so limit the rotation in one direction of said keeper. It is the amount of separation between the stop 41 and the recess 40, or the distance apart on the periphery of the keeper 39 of said stop and recess, that determines the number of pulsations required to release the bolt 27 from the latch 34. Approximately eleven and one-half pulsations are necessary in order to rotate the keeper 39 shown in Figs. 2 and 7 sufficiently to carry the recess 40 from the position that it occupies in Fig. 7, such position being fixed by the stop 41 while in contact with the latch 34, to that which it occupies in Fig. 2, but only approximately one-half of a pulsation would be necessary if the keeper illustrated in Fig. 14, wherein the stop and recess are close together, were substituted for that illustrated in the first-mentioned views. Thus it appears that the greater the distance on the periphery of the keeper between the face of the stop 41 and the recess 40 the larger the number of pulsations needed to operate said keeper into releasing position, and the less such distance is the fewer the number of such pulsations. This will all be made clear in due course. Passing next to the front of the lock again, it will be observed that an arm 42 above and a ratchet detent 43 below are each mounted at one end loose on the stud 8, a ratchet-wheel 44 is mounted securely on the spindle 10, and three tumblers 45, 46 and 47 are mounted loose on the stud 9.

The arm 42 is below the lip 37 on the detent extension 36, and has a wedge-shaped tooth 48 adjacent to its free end on the underside. A spring 49 is fastened at one end to the arm 42 and bears with its free terminal on the end of the front compartment which is adjacent to the stud 8 in such a way as normally to force said arm downward. The detent 43 is fitted so snugly with the arm 42 on the stud 8 that when free it moves with said arm, although being capable of independent movement or rather of remaining stationary while the arm moves. In order to retard the action of this detent somewhat and steady the same, a spring 50 may be arranged to bear against the heel of said detent, the lower end of said spring being fastened to the aforesaid end of the front compartment.

Having one end fastened to the adjacent end of the case 3 and the other end fastened to the spindle 10 is a spiral spring 51. In expanding or unwinding the spring 51 rotates the spindle 10 and with it the ratchet-wheel or ratchet 44 and the keeper 39 in the direction indicated by the arrows 52 and 53.

The ratchet 44 has a mutilated tooth 54, and said ratchet is so mounted on the spindle 10 that said tooth is behind, in the direction of rotation of said ratchet by the spring 51, the free end of the detent 43 when the keeper notch 40 is directly beneath the latch hook 35. The detent 43 and a pawl 55 carried by the tumbler 46 cooperate, at certain times and under certain conditions presently to be more explicitly set forth, to rotate the ratchet 44, with an intermittent or step-by-step motion in the usual manner, in the direction opposite to that indicated by the arrow 52. The mutilated tooth 54 permits the detent 43 to be taken out of engaging relation with the ratchet at the proper time, as will also be presently more fully explained.

The tumblers 45, 46 and 47 are mounted in the order named, with the tumbler 45 behind the other two, on the stud 9. Each of said tumblers has a portion of its lower right-hand quadrant cut out, substantially as shown, and has an arm extension which is adapted to bear on the stop 11 and so limit the oscillating movement of the tumbler in one direction. The tumblers are provided by thus cutting them out with approximately horizontal and approximately vertical key-engaging edges 56 and 57, respectively, such edges being adjacent to the key-holes 2 and 7. There is a notch 58 in the upper part of each tumbler, of such shape, size and location as to be capable of receiving the arm-tooth 48, but this notch is in a different position relative to the associated edges 56 and 57 in each case, so that a key having a particular bit must be employed to aline the notches in the three tumblers and thus permit said tooth to enter and the free end of the arm 42 to swing down. It is by changing the relative positions of the notches 58 that the combination of the lock is changed so as to adapt it to different keys or different keys to it. Three springs 59 are arranged between the tumblers and the top of the front compartment in such a manner that normally the arm extensions of the tumblers are caused to bear on the stop 11, the notches 58 then being out of alinement and the periphery of the middle tumbler and the periphery or peripheries of one or both of the other tumblers being beneath the tooth 48. The pawl 55 is pivoted at 60 to the tumbler 46—see Fig. 9. When the pawl 55 is actuated into engagement with the ratchet 44 the engaging end thereof is swung away from the periphery of the tumbler 46, and in order to cause it to rock back again ready for the next thrust on said pawl I provide a fin 61. The fin 61 is fastened to the partition 5 and projects forward in position to present a contacting surface for the pawl 55 when it is moved upward by the tumbler 46 on the return of the latter

to normal position, and to cause said pawl to rock on its pivot 60 in such a way as to bring the engaging end of the pawl nearer to the adjacent periphery of said tumbler.

5 The key which I prefer to use for this lock consists of a shank 62 provided with a plain bit 63 and a hollow shank 64 provided with a stepped bit 65, as shown in Fig. 3. The shank 62 has a disk-like head 66 at one end
10 and the bit 63 is a short distance from the other end. The hollow shank 64 has an annular head 67 at one end and the bit 65 at the other end, and is mounted to rotate on the shank 62 against a shoulder 68 with
15 the head 66 in said head 67. The bit 63 is situated between the shoulder 68 and the adjacent end of the shank 62. The bit 65 has three steps to correspond with the tumblers 45, 46 and 47 which said bit is designed to
20 operate, and said steps are of such lengths that each can act on the edges 56 and 57 of the corresponding tumbler without disturbing the other tumblers. The depth of each of the aforesaid steps must correspond with
25 the amount of throw which that step is to give to its tumbler, as is obvious. As the tumbler combinations are changed for different locks, so also will the depths of the steps be altered.

30 Having, now, described in detail the construction of my lock, I will proceed to explain the complete operation of the padlock, starting with the parts unlocked as in the first two views. First, push the hasp 21
35 down as far as it will go, and insert the key in the lock with that part of the shank 62 which is between the shoulder 68 and the bit 63 in the key-hole 7 and the shank 64 in the key-hole 2, thus bringing said bit 63 behind
40 the partition 5 in position to act on the bolt 27 and the bit 65 in front of said partition in position to act on the tumblers 45, 46 and 47. Then turn the shank 62, by means of the head 66, in the proper direction to bring
45 the bit 63 into contact with the inclined bolt shoulder 29 and keep on turning in the same direction until the bolt 27 is actuated into engagement with the hasp 21 through the medium of the lugs 32 which now enter
50 the notches 22. Next turn the shank 64 to wipe the bit 65 against the edges 57 of the tumblers, preferably turning said shank in the opposite direction to that in which the shank 62 was turned, because a better wiping
55 contact is thus had with said edges, and, moreover, in some cases there might be difficulty in getting said bit past the lowermost corner of the tumbler 46. The action thus produced on the tumblers causes their
60 notches 58 to be thrown out of alinement and the tooth 48 to be raised onto the periphery of one or more of said tumblers, the left-hand corner or corners of one or more of the notches 58 bearing against the corresponding inclined side of said tooth and

thrusting said tooth upward with the arm 42 against the resiliency of the spring 49. When the arm 42 swings upwardly on the stud 8, being so moved by the tooth 48, it carries the latch 34 with it, through the medium of the lip 37 and extension 36, said latch also swinging on said stud, and so brings about the withdrawal of the hook 35 from the recess 40 and the consequent release of the keeper 39; and at the same time said
75 arm takes the detent 43 out of the way of the ratchet 44, since the mutilated ratchet-tooth 54 interposes no obstruction to this movement on the part of said detent and the latter is always in frictional engagement with said
80 arm. Instantly the spring 51 acts to rotate the ratchet 44 in the direction indicated by the arrow 52, and said ratchet and the spindle 10 simultaneously impart a partial revolution to the keeper 39, rotating it until the
85 stop 41 encounters the latch hook 35 which rides on the periphery of said keeper at this time. When this encounter occurs, further movement of the members which are subject to the spring 51 ceases. The bolt 27 is now
90 held against longitudinal movement between one end of the rear compartment and the latch, in other words, said bolt is immovably secured in locking relation to the hasp. The tumbler arms are pressed down
95 on the stop 11 by the springs 59, and when the tumbler 46 is made to assume the position incident to the bearing of its arm on said stop said tumbler withdraws the pawl 55 from engaging relation with the ratchet 44 and brushes it against the fin 61, so that said pawl is actuated into position ready to be thrust into engagement with said ratchet again. The locking operation being finished, nothing more remains to be done except to withdraw the key from the casing, the shanks 62 and 64 being manipulated to whatever extent is necessary to aline the bits 65 and 66 for that purpose. The parts now stand as shown in Figs. 6 and 7.
100

Before the bolt 27 can be actuated to release the hasp 21, it is necessary to rotate the keeper 39 back again until its recess 40 is once more beneath the latch hook 35, and this can only be done with the help of the mechanism which intervenes between said
115 keeper and the key and by a step-by-step motion. In the following will clearly appear a full account of the manner in which such release takes place and the unlocking of the lock is effected. The key is again inserted in the casing, and the shank 64 revolves the number of times required to position the recess 40 beneath the latch hook 35, approximately eleven and one-half being
120 the correct number in this example, and then the shank 62 is rotated in the proper direction to have its bit 63 act against the inclined shoulder 30 of the bolt 27 and throw said bolt out of engagement with the
130

hasp 21, which latter can now be raised as far as the spring keeper 15 will permit, turned in either direction, and withdrawn altogether if desired and as hereinbefore explained.

What takes place when the shank 64 is revolved the first time, as above noted, is this, the revolution being in the direction of the arrow 69: The bit 65 first wipes past the edges 56 of the tumblers and rocks said tumblers in the direction of the arrow 70, against the resiliency of the springs 59. Owing to the fact that the depths of the steps of the bit 65 compensate for the relative differences in position of the notches 58 when the tumblers are normally disposed in contact with the stop 11, the thrust imparted to said tumblers causes said notches to aline, when the tooth 48 drops into said notches, the arm 42 swinging down under the influence of its spring 49, but leaving behind, of course, the lip 37, extension 36 and latch 34, because said latch is supported by the periphery of the keeper 39. This rocking of the tumbler 46 with the other tumblers plunges the pawl 55 into contact with the ratchet 44 and forces said ratchet, against the resiliency of the spring 51, in the opposite direction to that indicated by the arrow 52 for a distance equal to the space between two of the ratchet teeth. Downward movement of the arm 42 introduces the free end of the detent 43 in front of one of the ratchet teeth in readiness to hold the ratchet against the force of the spring 51 when said ratchet is released by the pawl 55. The bit 65 next wipes past the edges 57 of the tumblers and rocks them in the manner previously explained in connection with the locking operation, with the result that the tooth 48 is again forced out of the notches 58 onto the periphery or peripheries of one or more of the tumblers and the arm 42 leaves the detent 43 in engagement with the ratchet which is now held by said detent (see Fig. 11), since the tumbler 46 has removed the pawl 55 from engagement with said ratchet. At the second revolution of the bit 65 occurs a repetition of the operations described in the preceding paragraph, the same operations take place at the third revolution of said bit, and so on, the stop 41 receding from and the recess 40 approaching the hook 35 step by step, until finally at the twelfth revolution, as soon as said bit is turned under the edges 56, said recess arrives beneath said hook and the latch 34 swings down when and as the arm 42 thrusts its tooth 48 into the notches 58, or is pushed down by the bolt.

When the bolt is thrown back into inoperative position it blocks the latch, the latch holds the keeper 39 with the directly associated parts, the arm 42 is prevented from swinging up by the lip 37, and the tooth 48

locks the tumblers with the notches in alignment and the pawl 55 in engagement with the ratchet, all as illustrated in Figs. 1 and 2.

It is upon the completion of the twelfth revolution of the bit 65 and in consequence of that act that the operating mechanism is released and the bolt unlocked. This has already been fully explained.

To remove the key at the end of the unlocking operation, the shank 64 must be turned in the direction opposite to that indicated by the arrow 69 until the bit 65 is in line with the key-hole 2, since further rotation in the direction of said arrow is impossible on account of the fixed condition of the parts, including the tumblers with their edges 57 or some of them in the way of said bit.

As has been noted, while the latch hook 35 is supported by the periphery of the keeper 39, the latch lip 37 is held up out of the way of the arm 42, so that the latter is free to oscillate between the tumblers and said lip, or to be oscillated by said tumblers, but when said arm swings down the last time in the unlocking operation or after it swings down, as the case may be, the latch lip follows it.

A false key would fail from many causes to successfully operate this lock, as will be readily seen, and even though such key were faulty only in the stepping of the bit 65 it would fail to aline the tumbler notches or to aline them at the proper time and place, if it did not otherwise have a wrong influence on the lock mechanism to the extent of rendering abortive any attempt so to operate such mechanism as to effect the release of the bolt with the false key.

It will be observed in Fig. 14 that the recess 40 is close to the shoulder formed by the stop 41 on the periphery of the keeper 39 there shown, therefore if this keeper were substituted for the keeper shown in the other general views the unlocking would be accomplished by approximately one-half of a revolution of the bit 65, and the locking by the remainder of such revolution, so that the lock thus equipped would be a one-step lock instead of a twelve-step lock.

The lock shown in Fig. 13 is operated in the same way as the padlock, barring the movements incident to the presence of the hasp. In this view a spring 71 is shown interposed between the upper edge of the latch and the adjacent end of the rear compartment and arranged and adapted to depress the free end of said latch. This spring may be used whenever gravity cannot be depended upon to carry down the hooked end of the latch or to hold it down, and when it is not desired to depend for this upon the action of the bolt. The spring 71 insures prompt action on the part of the latch, but

it must not be stiff enough to interfere with the operation by which the tooth 48 is forced out of the tumbler notches.

Since numerous changes in the size, shape and construction of some or all of the parts of my lock may be made without departing from the spirit of my invention, I do not intend to be unduly limited by what is herein shown and described, but seek to claim broadly the parts and combinations of parts which enter into the construction of said lock.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a lock, a movable bolt, a holding and releasing member for such bolt, a holding and releasing member for said bolt-holding and -releasing member, and key- and spring-operated mechanism for actuating said first-mentioned member into locking engagement with said bolt and said second-mentioned member into locking engagement with the first.

2. In combination with a lock comprising a movable bolt, holding and releasing mechanism for such bolt, and key-operated mechanism for said bolt-holding and -releasing mechanism, of a key comprising a shank provided with a bit and a second shank also provided with a bit, one of such shanks being mounted to rotate on the other and one of such bits being capable of operating said bolt and the other of said bits being capable of operating said key-operated mechanism.

3. The combination, in a lock, with a movable bolt, a recessed rotatable keeper, means to limit the rotation of said keeper in one direction, a member adapted to ride on said keeper and to enter the recess therein for the purpose of releasing said bolt, of key- and spring-operated mechanism for actuating said keeper and removing said member from said recess.

4. The combination, in a lock, with a reciprocating key-operated bolt, a recessed rotatable keeper provided with a stop, and a latch adapted to ride at one end on said keeper in the path of said stop and to enter the recess in said keeper for the purpose of holding and releasing said bolt, of key- and spring-operated mechanism for actuating said keeper and latch.

5. The combination, in a lock, with a movable bolt, a recessed rotatable keeper provided with a stop, ratchet mechanism for such keeper, and a latch adapted to ride at one end on said keeper in the path of said stop and to enter the recess in said keeper for the purpose of holding and releasing said bolt, of key-operated mechanism for controlling said ratchet mechanism and actuating said latch out of said recess.

6. The combination, in a lock, with a movable bolt; a suitably mounted spindle spring-actuated in one direction, a recessed keeper

provided with a stop and a ratchet-wheel both secured on said spindle, and a latch adapted to ride at one end on said keeper in the path of said stop and to enter the recess in the keeper for the purpose of holding and releasing said bolt, of key-operated mechanism for controlling said ratchet-wheel and actuating said latch out of said recess.

7. The combination, in a lock, with a movable bolt, and holding and releasing mechanism for such bolt, of key-operated ratchet mechanism and actuating mechanism for said bolt-holding and -releasing mechanism.

8. The combination, in a lock, with a ratchet-wheel spring-actuated in one direction, a key-operated notched tumbler provided with a pawl engaging said ratchet-wheel, and an oscillatory arm provided with a detent for said ratchet-wheel and having a projecting member adapted to ride on said tumbler and to enter the notch therein and to be forced out of such notch as said tumbler is oscillated, of bolt-holding and -releasing mechanism connected with said ratchet-wheel and having a part which extends into the path of said arm.

9. The combination, in a lock, with a ratchet-wheel spring-actuated in one direction, a key-operated notched tumbler provided with a pawl engaging said ratchet-wheel, a fin in the path of said pawl to restore it to initial position, and an oscillatory arm provided with a detent for said ratchet-wheel and having a projecting member adapted to ride on said tumbler and to enter the notch therein and to be forced out of such notch as said tumbler is oscillated, of bolt-holding and -releasing mechanism connected with said ratchet-wheel and having a part which extends into the path of said arm.

10. The combination, in a lock, with a ratchet-wheel spring-actuated in one direction, a key-operated notched tumbler provided with a pawl engaging said ratchet-wheel and spring-pressed in one direction, a stop for said tumbler, and an oscillatory arm provided with a detent for said ratchet-wheel and having a projecting member adapted to ride on said tumbler and to enter the notch therein and to be forced out of such notch as said tumbler is oscillated, of bolt-holding and -releasing mechanism connected with said ratchet-wheel and having a part which extends into the path of said arm.

11. The combination, in a lock, with a ratchet-wheel spring-actuated in one direction and having a mutilated tooth, a key-operated notched tumbler provided with a pawl engaging said ratchet-wheel, means to limit the movement of such tumbler in one direction, and an oscillatory arm provided with a detent for said ratchet-wheel and

having a projecting member adapted to ride on said tumbler and to enter the notch therein and to be forced out of such notch as said tumbler is oscillated, the arrangement of parts being such that the aforesaid mutilated tooth is always contiguous to said detent at a certain predetermined time, of bolt-holding and -releasing mechanism connected with said ratchet-wheel and having a part which extends into the path of said arm.

12. The combination, in a lock, with a ratchet-wheel spring-actuated in one direction, a series of suitably-mounted key-operated notched tumblers one of which is provided with a pawl engaging said ratchet-wheel, means to retain said tumblers with their notches normally out of alinement, and an oscillatory arm provided with a detent for said ratchet-wheel and having a projecting member adapted to ride on said tumblers and to enter the notches therein when said notches are in alinement and further adapted to be forced out of such notches as said tumblers are oscillated, of bolt-holding and -releasing mechanism connected with said ratchet-wheel and having a part extending into the path of said arm.

13. The combination, in a lock, with a ratchet-wheel spring-actuated in one direction, a series of key-operated notched and spring-pressed tumblers one of which is provided with a pawl engaging said ratchet-wheel, means to limit the movement of said tumblers in one direction, and an oscillatory arm provided with a detent for said ratchet-wheel and having a projecting member adapted to ride on said tumblers and to enter the notches therein when said notches are in alinement and further adapted to be forced out of such notches as said tumblers are oscillated, of bolt-holding and -releasing mechanism connected with said ratchet-wheel and having a part which extends into the path of said arm.

14. The combination, in a lock, with a movable bolt, a suitably-mounted spindle spring-actuated in one direction, a recessed keeper and a ratchet-wheel both secured on said spindle, said ratchet-wheel having a mutilated tooth, means to limit the movement of said revoluble members in one direction, a latch adapted to ride at one end on said keeper and to enter the notch therein for the purpose of releasing said bolt, and key-operated mechanism for actuating said ratchet-wheel and keeper and removing said latch from said recess, such mechanism consisting in part of a detent for said ratchet-

wheel, and the arrangement of parts being such that when said latch is in engagement with the notched portion of the keeper the aforesaid mutilated tooth is contiguous to said detent.

15. The combination, in a lock, with a suitable bit-provided key, of a suitably-mounted oscillatory tumbler spring-pressed in one direction and having engaging edges in angular relationship to each other for the key bit, ratchet mechanism, including an oscillatory arm, in operative relation to said tumbler, and bolt-holding and -releasing mechanism controlled and operated by said ratchet mechanism.

16. The combination, in a lock, with a key having a stepped bit, of a series of suitably-mounted oscillatory tumblers spring-pressed in one direction and having engaging edges in angular relationship to each other for said bit, ratchet mechanism, including an oscillatory arm, in operative relation to said tumblers, and bolt-holding and -releasing mechanism controlled and operated by said ratchet mechanism.

17. The combination, in a lock, with a suitable casing, and a receiver, a hooked keeper, a bolt having hasp-engaging lugs thereon, and locking and releasing mechanism for such bolt, all in said casing, of a hasp having one leg longer than the other and adapted to have both legs inserted in the casing and to be engaged and released by said lugs, the long leg entering said receiver and having a shoulder for engagement by said keeper when said hasp is partially withdrawn from the casing.

18. The combination, in a lock, with a suitable casing, and a receiver, a hooked keeper, a bolt having hasp-engaging lugs thereon, and locking and releasing mechanism for said bolt, all in said casing, of a hasp having one leg longer than the other and provided with a shoulder which only partially surrounds said long leg, such hasp being designed to have both legs inserted in said casing with the long leg in said receiver with said shoulder below the keeper hook, the arrangement being such that said hasp can be partially withdrawn from the casing before said shoulder encounters said keeper, and can be wholly withdrawn upon turning the hasp to bring the part unbroken by the shoulder into juxtaposition with said hook.

ADOLF MURAWSKI.

Witnesses:

F. A. CUTTER,
A. C. FAIRBANKS.