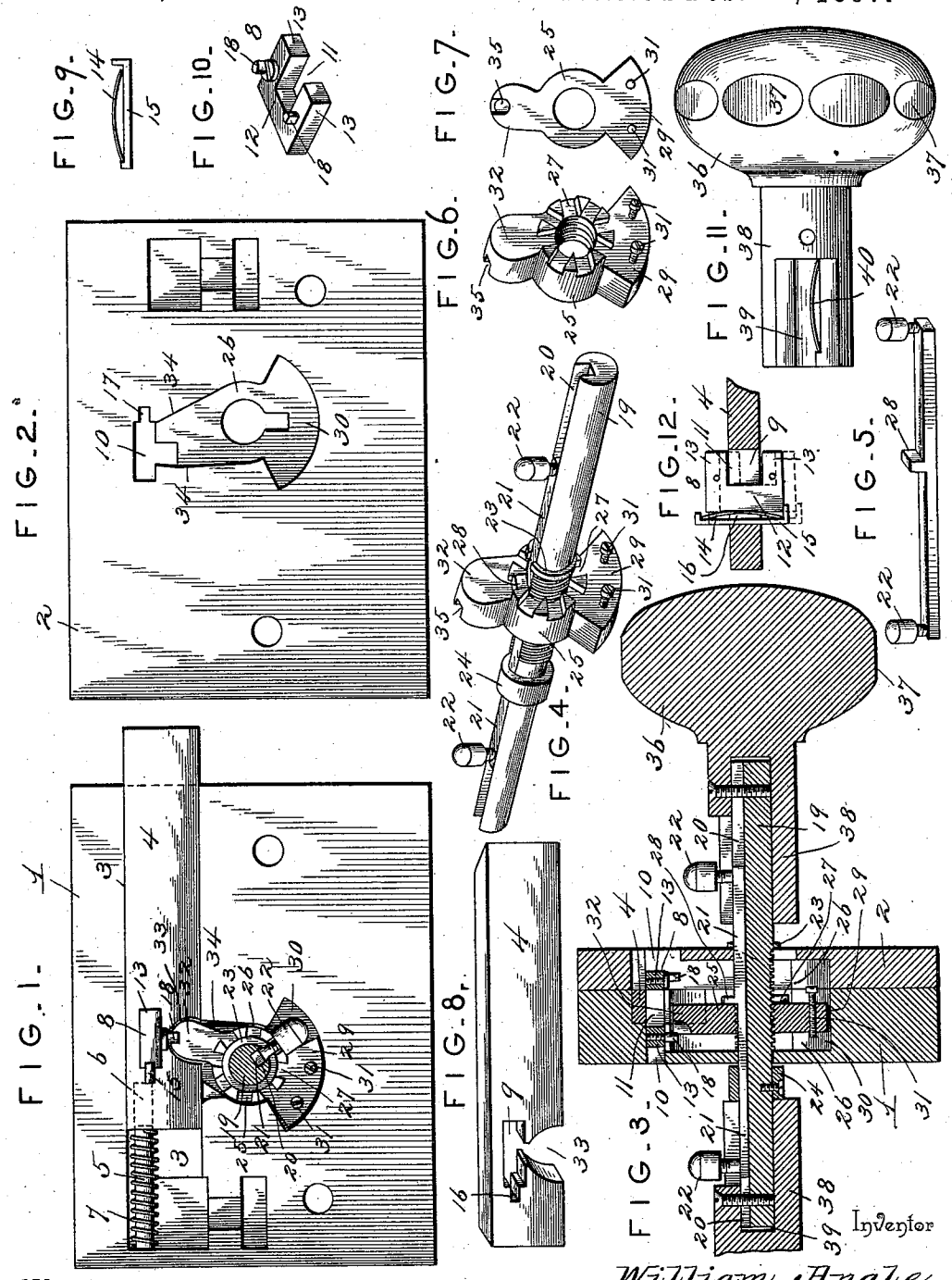
(No Model.)

W. ANGLE.

PERMUTATION LOCK.

No. 577,341. Patented Feb. 16, 1897.



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UNITED STATES PATENT OFFICE.

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PERMUTATION-LOCK.

SPECIFICATION forming part of Letters Patent No. 577,341, dated February 16, 1897.

Application filed April 9, 1896. Serial No. 586,872. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM ANGLE, a citizen of the United States, residing at Tiffin, in the county of Seneca and State of Ohio, have invented a new and useful Permutation-Lock, of which the following is a specification.

This invention relates to permutation-locks; and the object in view is to provide a simple and inexpensive lock of the character described which is operated entirely by the knob-spindle and which may be readily manipulated in the dark by a person familiar with the combination. The lock is also capable of quick and easy adjustment for the purpose of changing the combination which must be worked to effect the shooting of the bolt, and is especially reliable in that the bolt is simultaneously locked by two independent devices.

Other objects and advantages of the invention will appear in the course of the subjoined description.

The invention consists in certain novel features and details of construction and arrangement of parts, as hereinafter fully described, illustrated in the drawings, and finally incorporated in the claims hereto appended.

In the accompanying drawings, Figure 1 is an inside face view of one portion of the lock-case with the locking mechanism attached. Fig. 2 is a similar view of the opposite portion of the case. Fig. 3 is a vertical transverse section through the lock-case, taken in line with and showing the knob-spindle in longitudinal section. Fig. 4 is a detail perspective view of the knob-spindle and the adjustable collar thereon. Fig. 5 is a similar view of the slide. Fig. 6 is a similar view of the adjustable collar. Fig. 7 is an elevation of the same, taken from the reverse side. Fig. 8 is a detail perspective view of the bolt. Fig. 9 is a plan view of the tumbler spring and holder. Fig. 10 is a detail perspective view of the tumbler. Fig. 11 is a view in elevation of one of the knobs. Fig. 12 is a detail horizontal section through the bolt, showing the laterally-movable tumbler in plan.

Similar numerals of reference designate corresponding parts in the several figures of the drawings.

The lock-case comprises the opposing contiguous plates 1 and 2, the same being respectively mortised or recessed upon their inner faces to receive the operative parts of the locking mechanism. The plate 1 is provided with a longitudinal recess 3, in which slides the reciprocating bolt 4, which bolt is guided by means of a pin 5, arranged in the recess 3 in rear of the bolt and entering a bore 6 in the bolt. A spring 7 is disposed around the pin 5 and operates by its tension to shoot the bolt into engagement with its keeper and to hold the same normally extended.

The tumbler 8 is in the form of a block, as shown in Fig. 10, and is adapted to slide laterally through an opening 9 in and near the rear end of the bolt. In the lateral reciprocation of the tumbler its ends are received in openings or recesses 10 in the plates 1 and 2 of the lock-case. The tumbler is provided with a central open slot or notch 11, the width of which is slightly greater than the thickness of the bolt and the depth of which is sufficient to allow of the necessary inward movement of the bolt. The central portion or cross-bar 12 of the tumbler rests within and works through the opening 9 of the bolt, and when the tumbler is in position to allow the reciprocation of the bolt the lateral portions or stumps 13 of the tumbler lie at each side of the bolt. When the lateral portions or stumps are, either of them, moved into the opening 9 of the bolt, it is obvious that the bolt can no longer be slid. The tumbler is held against too free lateral movement by means of a bow-shaped spring 14, arranged in a holder 15, and introduced in a notch 16, forming an extension of the opening 9 in the bolt, the tumbler being thus retained at the point to which it is moved. The holder 15 rests at its ends in notches 17 in the plates 1 and 2 of the lock-case, while the spring 14 bears constantly against the tumbler. The tumbler is also provided with stops 18, having eccentrically-arranged threaded shanks which enter the lateral portions or stumps 13 of the tumbler. By turning these stops 18 upon their shanks the distance between them may be regulated for correspondingly adjusting the amount of lateral throw of the tumbler, as will hereinafter appear.

19 designates the knob-spindle, which is

provided with a longitudinal groove 20, in which moves a slide 21, having end knobs or projections 22 by which it may be manipulated from either side of the lock-case. The knob-spindle 19 and slide 21 both extend through the lock-case, the spindle being held against longitudinal movement by means of fixed and detachable collars 23 and 24, respectively. The central portion of the spindle 19 within the lock-case is screw-threaded and has mounted thereon a collar 25, which, having a threaded engagement with the spindle, is adjustable laterally within the lock-case, the same being movable into recesses 26 in the inner adjacent surfaces of the plates 1 and 2. This collar is provided at one side with an annular hub having formed therein a series of notches 27, and the slide 21 is provided with a fixed stud or projection 28, which may be moved into engagement with any one of said notches for locking the collar 25 to the spindle, so as to rotate therewith when the spindle is turned.

The collar 25 is provided upon one side of the spindle 19 with a segmental stop 29, working in a segmental recess 30 in each of the plates 1 and 2. The rotation of the collar is thus limited and its lateral movement in each direction is limited by means of adjusting-screws 31, passing through the stop 29, and adapted to abut at their heads or ends against the inner walls of the casing-plates 1 and 2. The collar 25 is provided upon the opposite side of the spindle 19 with a bit or lug 32, which enters and works in a notch or way 33 in the adjacent surface of the bolt, as shown in Fig. 1, for reciprocating said bolt when the collar is turned by the knob-spindle. The collar 25, with its stop 29 and bit or lug 32, corresponds in thickness to the bolt 4 and occupies a position intermediate the stops 18 of the tumbler. When the bit or lug 32 is exactly in alinement with the bolt, the collar 25 may be turned so as to move the bolt, providing the tumbler is properly adjusted, but when said bit or lug is moved out of alinement with the bolt even to a slight extent it will strike against the shoulders 34 of the plates 1 and 2 and prevent any movement of said bolt. The collar 25 is adjusted into or out of alinement with the bolt by disengaging the stud 28 of the slide 21 from the notches in said collar and turning said spindle. As the knob is turned and the collar 25 fed along in the lateral movement of the collar 25 the bit or stud 32 coöperates with the stops 18 on the tumbler to move the tumbler to one side or the other for bringing its central slot or notch 11 into alinement with the bolt. Now as the distance between the stops 18 is greater than the thickness of the bit 32, there will be a certain amount of lateral movement of said bit before it strikes against one or the other of the stops 18. After adjusting the collar 25, with its bit 32, to the predetermined distance, however, the tumbler will be brought into the proper position for allowing the bolt to be moved. Now, however, the bit 32 will be out of alinement with the bolt. It is therefore necessary to reverse the direction of rotation of the knob-spindle and move the bit 32 back again until it alines with the bolt, whereupon the bit 32 and the slot 11 of the tumbler both being alined with the bolt the latter may be reciprocated by locking the collar 25 to the knob-spindle, which may be accomplished by shifting the slide 21 so as to bring its stud into the proper notch 27 of the collar. A person acquainted with the combination can bring the parts into position to permit the movement of the bolt by turning the knob the required and predetermined distance in each direction.

As above stated, the distance between the stops 18 of the tumbler may be adjusted. The thickness of the bit 32 may also be varied by forming a notch 35 therein in which one of the stops 18 will be received as said bit is moved laterally. The depth of this notch will regulate the amount of lateral movement of the bit necessary to effect the shifting of the tumbler. By adjusting the screws 31 the lateral throw of the collar 25 and bit 32 may be limited. By reason of these several adjustments and means for governing the lateral movements of the bit 32 and tumbler 8 it is easy to change the extent to which the knob-spindle must be moved in either direction to bring the parts into position for moving the bolt. The necessary amount of rotation to the spindle 19 is effected by means of the knobs 36 at each side of the lock, each of said knobs being provided with a number of flat surfaces 37, corresponding to the notches 27 in the collar 25. Eight of these flattened surfaces are illustrated in the drawings, and a corresponding number of notches 27 are shown in the collar 25. The sleeve 38 of the knob is slotted, as indicated at 39, and upon one side of the slot is arranged a spring 40, which bears against the knob or projection 22 or its shank as the slide 21 is drawn in either direction for holding the slide against longitudinal movement and retaining the stud 28 in or out of engagement with the collar 25.

In operation the slide 21 is drawn so as to move the stud 28 out of engagement with the collar 25. The knob is now turned as far as it can be in one direction or until the heads or ends of the screws 31 strike against the inner wall of one of the casing-plates. The direction of rotation of the knob is now reversed until the tumbler is brought into position for allowing the bolt to slide. The amount of such rotation is ascertained by observing the number of flat surfaces on the knob which pass a given point, the said surfaces being counted until the predetermined number is reached, when, owing to the particular adjustment of the interior parts of the lock, the tumbler will be in position for unlocking. The knob is now again reversed until a certain number of its flat surfaces have passed a given point. When the predetermined number is

reached, the bit 32 will be in alinement with the bolt. By now shifting the slide 21 and locking the collar 25 on the knob-spindle and turning the spindle the bolt will be withdrawn. By reason of the several adjustments described it will thus be seen that it is possible to change the combination and lock almost *ad infinitum*.

Owing to the simplicity of the locking mechanism, the lock may be taken apart by a novice, and the combination may be readily changed by simply adjusting the screws 31 or the stops 18.

After the desired adjustments of the parts of the lock have been attained to change the combination the amount of rotary movement in opposite directions which it is necessary to impart to the knob-spindle to secure the opening position of the tumbler and collar may be readily discovered by experiment, as, for instance, by placing the parts in the opening position, closing the lock, and then turning the knob to throw the parts out of operative position. The flat surfaces of the knob serve as indicators to show to the operator the amount which the spindle is turned.

Changes in the form, proportion, and minor details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of this invention.

Having thus described the invention, what is claimed as new is—

1. In a lock, the combination with the bolt, of a tumbler movable across the plane in which the bolt moves, a threaded operating-spindle, a threaded collar mounted on and operated by said spindle and movable in the same direction with the tumbler, said collar being operatively engaged with the tumbler during a portion only of its movement, substantially as described.

2. In a lock, the combination with the bolt, of a tumbler movable across the plane in which the bolt moves, a threaded operating-spindle, a threaded collar mounted on and operated by said spindle and movable in the same direction with the tumbler, said collar being operatively engaged with the tumbler during a portion only of its movement, and means whereby the relative degree of independent movement between said collar and tumbler may be regulated and changed, substantially as described.

3. In a lock, the combination with a bolt having a longitudinal slot, of a tumbler adapted to slide transversely through said slot and having a reduced center adapted to be arranged in the plane of the bolt to allow the sliding thereof and also having terminal stumps to fit snugly in the slot and lock the bolt against movement, means for holding the tumbler yieldingly in its adjusted positions, and devices connected with the spindle for adjusting the tumbler and reciprocating the bolt, substantially as specified.

4. In a lock, the combination with the bolt, of a tumbler movable across the plane in which the bolt moves, the operating-spindle, and a collar mounted on the spindle and movable in a plane parallel to the plane of the movement of the tumbler, the said collar being provided with a bit or lug coöperating with the tumbler and adapted to be moved a certain distance without affecting the tumbler, substantially as described.

5. In a lock, the combination with the sliding bolt, of the tumbler movable across the plane of the bolt, the operating-spindle, the collar having a threaded engagement with the spindle and adapted to be moved thereby when the spindle is turned, said collar having a bit or lug which coöperates with the tumbler during a portion only of the movement of said collar, substantially as and for the purpose described.

6. In a lock, the combination with the bolt, of the operating-spindle, the collar adjustable longitudinally on the spindle and notched or provided with shoulders as described, the slide working in a longitudinal groove in the spindle for engaging said notches or shoulders on the collar and locking the same to the spindle, and the bit or lug on the collar engaging the bolt, substantially as described.

7. In a lock, the combination with a bolt, of an operating-spindle, a collar having a bit for engaging the bolt and adjustable longitudinally on the spindle, and adjustable stops mounted on the collar for movement parallel with the path thereof and adapted to engage a fixed object to limit the said longitudinal movement of the collar, substantially as specified.

8. In a lock, the combination with the bolt, of the operating-spindle, the sleeve adjustable longitudinally on the spindle and having provision whereby it engages the bolt, a stop-lug on the collar working in a recess in the lock-case for limiting the rotation of the collar, and the set-screws for adjusting and limiting the movement of the collar longitudinally of the spindle, substantially as described.

9. In a lock, the combination with the bolt, of the operating-spindle, the collar adjustable longitudinally on the spindle, the bit or lug on the collar for operating the bolt, the tumbler movable across the plane of the bolt, and the opposing stops on the tumbler coöperating with said bit or lug, substantially as described.

10. In a lock, the combination with the bolt, of the tumbler movable across the plane of the bolt, the opposing stops on the tumbler made adjustable for varying the distance between them, the operating-spindle, the collar adjustable thereon, means for adjusting the collar, and the bit or lug on the collar interposed between the stops on the tumbler, substantially as and for the purpose described.

11. In a lock, the combination with the knob-spindle, and the collar adjustable lon-

gitudinally thereon and engaging the bolt, of the slide movable longitudinally of the spindle for locking the collar thereto or unlocking it, and the knob slotted to receive the operating projection on the slide, said knob carrying a spring for engaging the slide, substantially as and for the purpose described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

WM. ANGLE.

Witnesses:
NELSON B. LUTES,
B. B. GOOD.