

(No Model.)

S. C. HOUGHTON.  
PERMUTATION LOCK.

No. 567,900.

Patented Sept. 15, 1896.

Fig. 1.

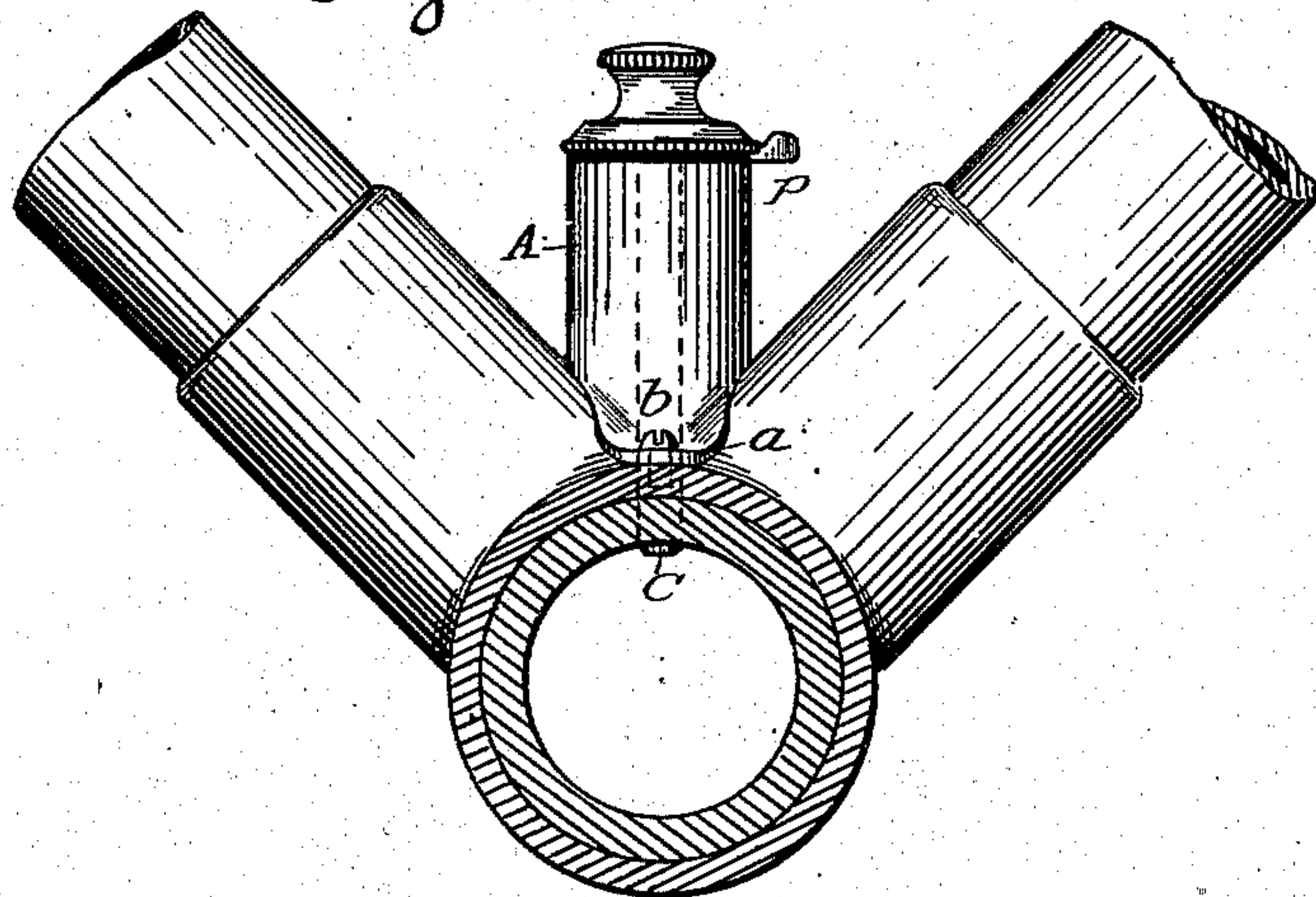


Fig. 2.

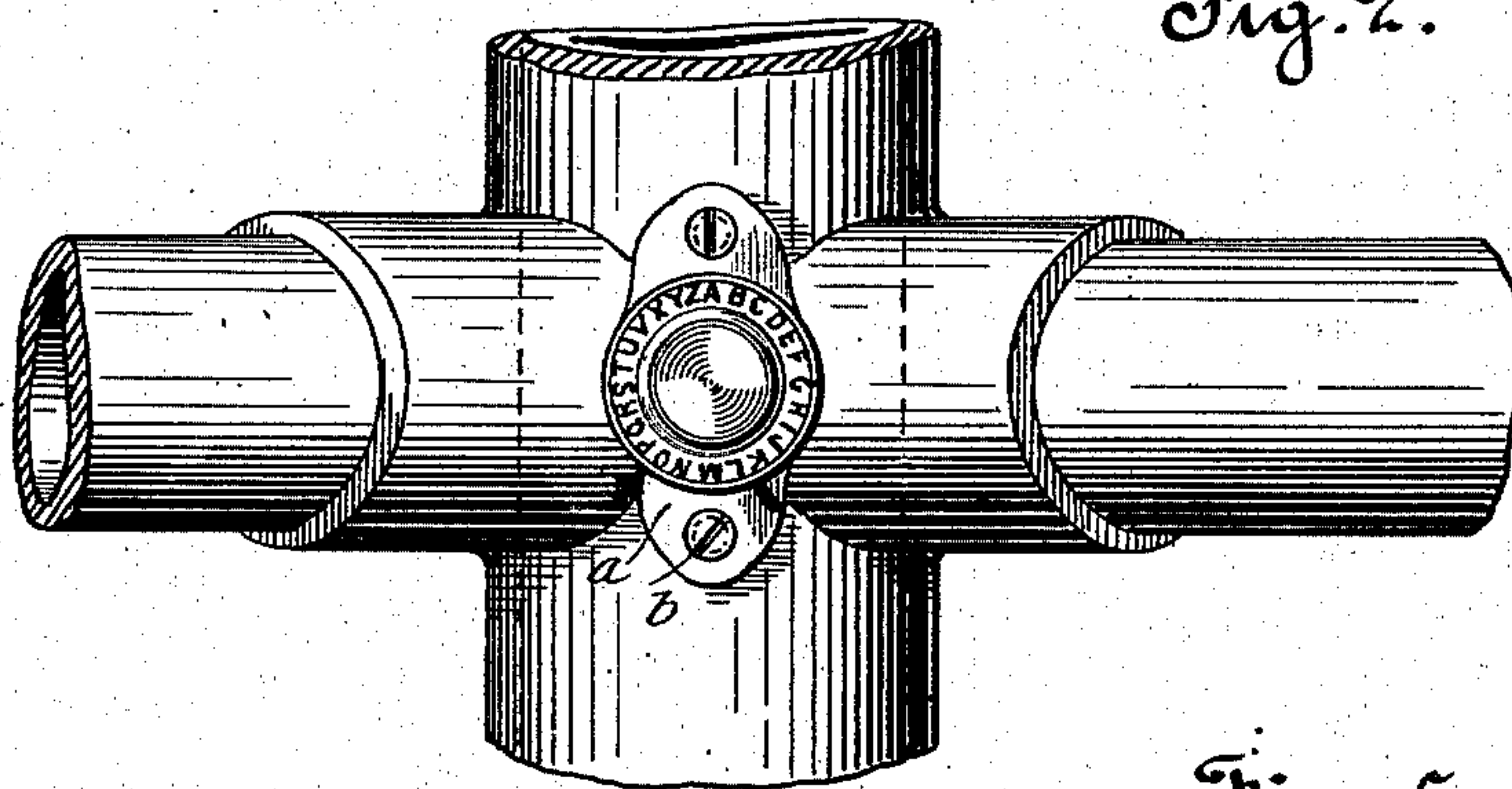


Fig. 3.

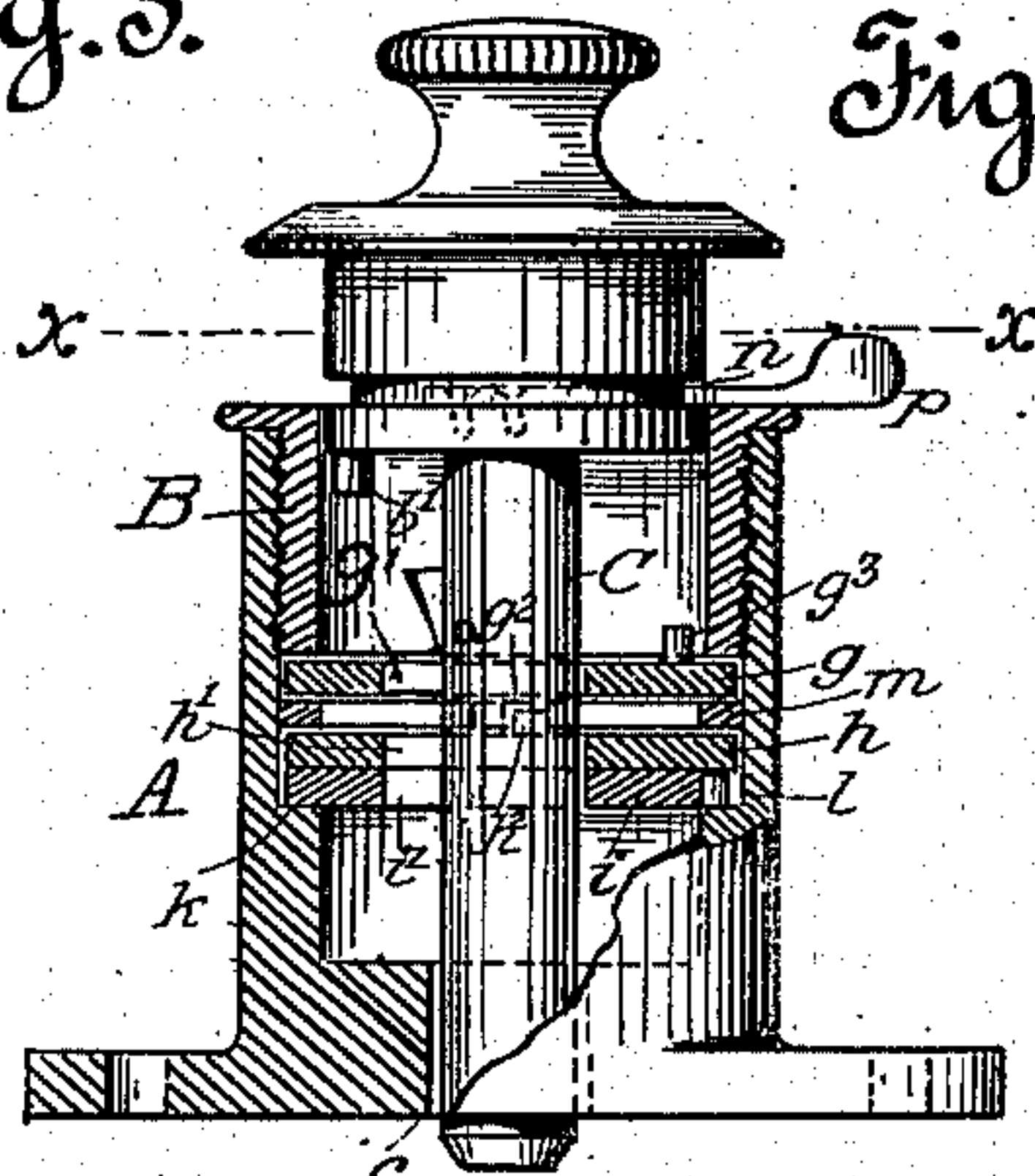


Fig. 4.

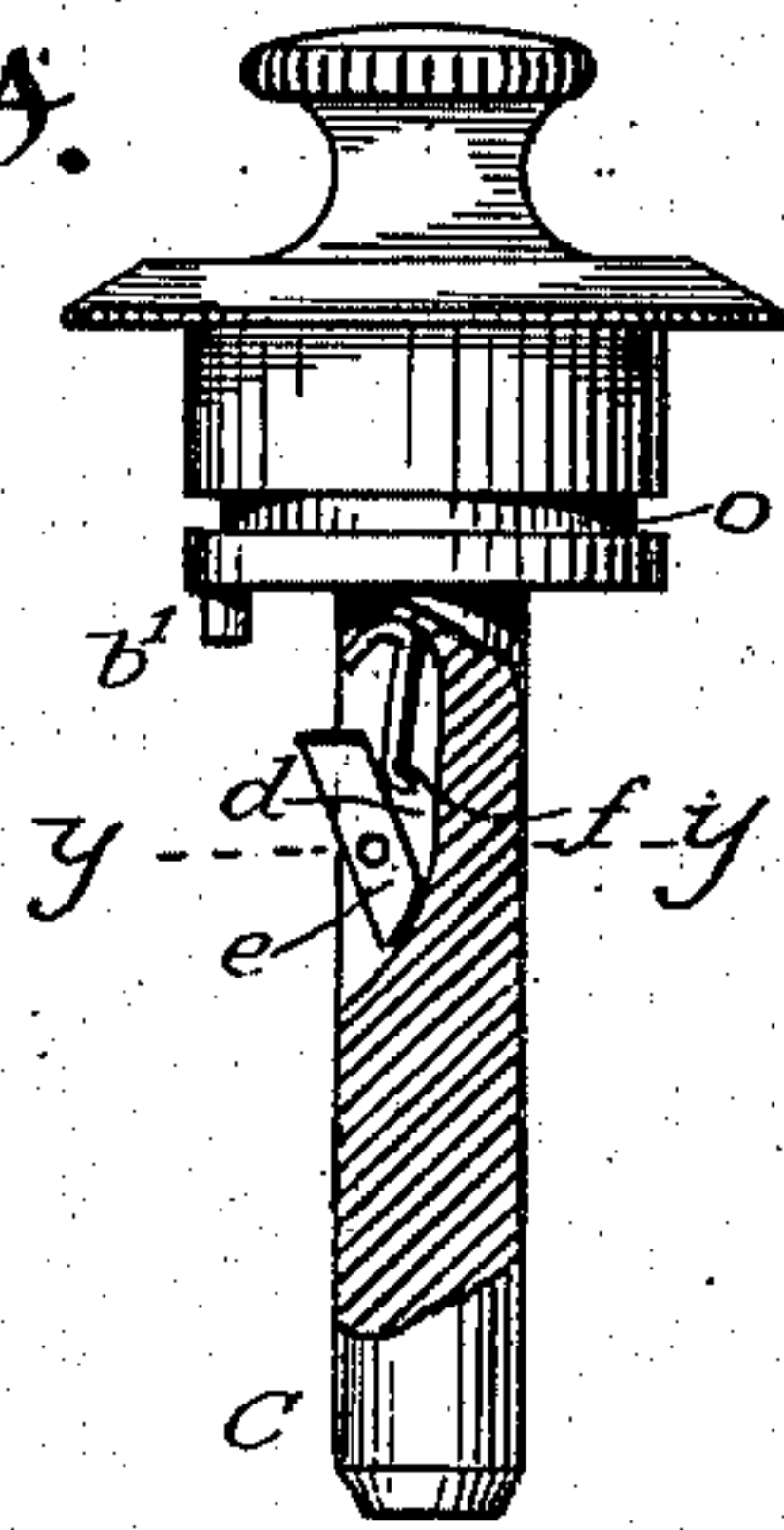


Fig. 5.

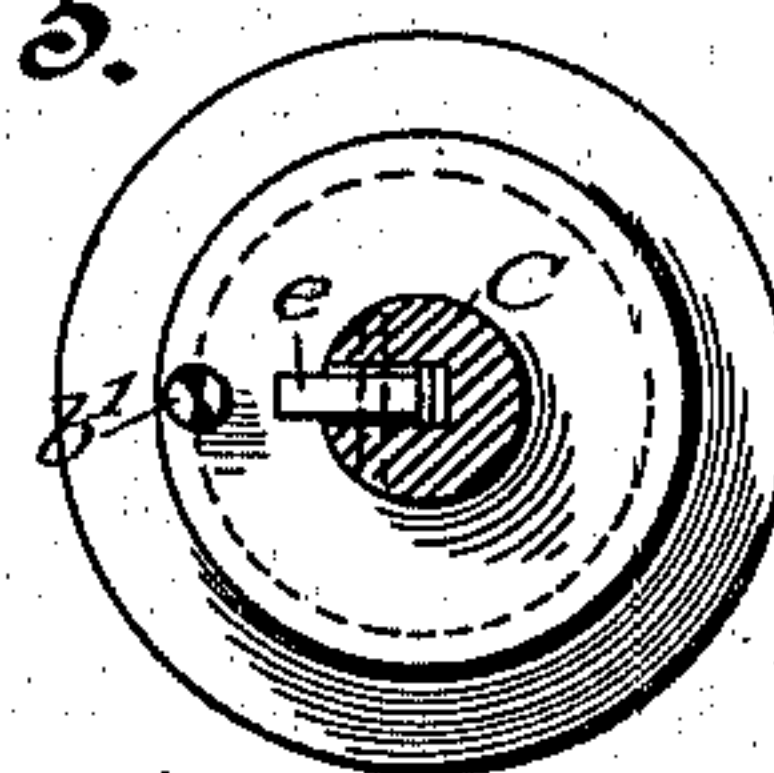
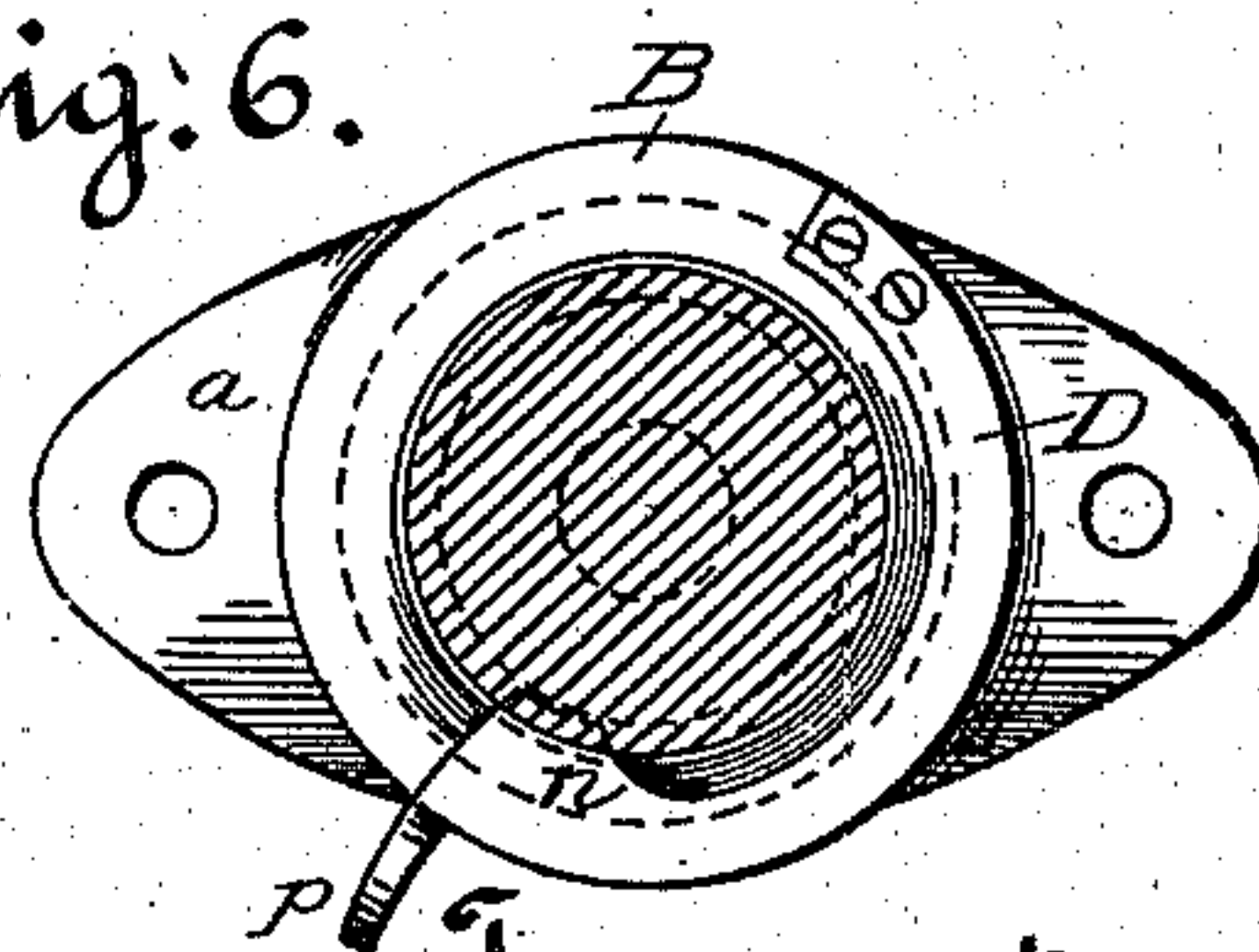


Fig. 6.



Witnesses.

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# UNITED STATES PATENT OFFICE.

STEPHEN C. HOUGHTON, OF SAN FRANCISCO, CALIFORNIA.

## PERMUTATION-LOCK.

SPECIFICATION forming part of Letters Patent No. 567,900, dated September 15, 1896.

Application filed May 28, 1895. Serial No. 550,909. (No model.)

*To all whom it may concern:*

Be it known that I, STEPHEN C. HOUGHTON, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Permutation-Locks; and I do hereby declare that the following is a full, clear, and exact description thereof.

10 My invention relates to permutation-locks; and its object is to provide a simple and cheap, but effective, keyless lock having changeable combinations and adapted to be used for locking doors, drawers, &c.

15 My invention is also particularly adapted to lock the driving-wheel of a bicycle. This forms an effective prevention of theft and at the same time does away with the inconvenience of separate chains and padlocks now commonly used.

20 In any situation, whether on a door, drawer, bicycle, or elsewhere, my lock is a permanent, although removable, attachment, and from its exceedingly small size and light weight it forms an almost unnoticeable addition to the structure upon which it is an attachment.

25 In order that a clear understanding of my invention may be obtained, I describe it hereinafter in detail, and refer in my description to the accompanying drawings, which, in the detail views, show my lock enlarged beyond its actual size for the purpose of clearness.

30 In the drawings the lock is shown, as a matter of convenient illustration, as applied to the frame and crank-shaft of a safety-bicycle of the diamond-frame type, and Figure 1 is an elevation of the lock, in locked position, as applied at the junction of two tubes of the frame, a part of the coupling and the crank-shaft being shown in cross-section. Fig. 2 is a top plan of the same. Fig. 3 is a central longitudinal section of the lock. Fig. 4 is a similar section of the lock-bolt. Fig. 5 is a cross-section on  $y y$  of Fig. 4, and Fig. 6 is a cross-section on  $x x$  of Fig. 3.

45 A represents an external cylindrical casing having a base-flange  $a$ , by which it is secured to the door, drawer, bicycle-frame, or other structure to which it is fitted. In the drawings two screws  $b$  are shown for attaching it to the coupling at the junction of two tubes of a bicycle-frame and at a point just above

the crank-shaft. In this position it is entirely out of the way and need never be removed from the machine, and as it can be made less than an inch and a half in length and can weigh less than two ounces it forms no appreciable addition to the machine either in size or weight.

50 The open end of the casing receives a hollow sleeve B, which forms a guide for the head of the sliding bolt C, the casing and sleeve being preferably threaded to make the latter easily removable. The bolt C passes entirely through the casing, a hole  $c$  being formed in the bottom of the latter to permit the beveled or rounded end of the bolt to protrude. In a recess  $d$  in the bolt is pivoted a yielding latch  $e$ , which is pressed constantly outward by a spring  $f$ , so that it normally assumes the inclined position shown in Fig. 4. The bolt can thus be always pushed inward until the latch has passed the permutation rings or tumblers  $g h i$ , but cannot be withdrawn until the slots  $g' h' i'$  in the said tumblers are brought into line, as shown in Fig. 3. This yielding latch forming a part of the locking-bolt forms a special feature of my invention and greatly adds to its convenience and efficiency, because at any time and by a single inward pressure the bolt is automatically locked without regard to the position of the permutation rings or tumblers. Of these tumblers the lower one  $j$  is a stationary ring which rests upon a shoulder or ledge  $k$  of the lock-casing and is held in position in any suitable way, as by a pin  $l$ , rising from said ledge and entering a small slot  $i''$  in the edge of the ring. The second tumbler  $h$  is operated by the first tumbler  $g$  by means of the pins  $h^2 g^2$ , projecting from the respective tumblers, as indicated in dotted lines in Fig. 3. A spacing-ring  $m$  is inserted between the tumblers  $g$  and  $h$  to give sufficient room for operating these pins. The ring or tumbler  $g$  has a pin  $g^3$  projecting from its upper surface, which is struck and directly moved by the turning of the bolt-head when pushed inwardly, the bolt-head having a corresponding pin  $h'$ . The tumblers are held in place and prevented from moving upward by the sleeve B. As many of these rings or tumblers can be used as desired, and I show in illustration three, of which two are movable.



Upon the bolt-head are a series of symbols, preferably letters or figures, to indicate the proper combination at which the slots in the tumbler-rings register and permit the bolt to  
5 be drawn outward to the position shown in Fig. 3.

In applying my lock to a bicycle I prefer to attach it at the junction of two tubes of the frame above the crank-shaft, where it is en-  
10 tirely out of the way. A small hole is drilled in the tube-coupling and a corresponding hole or holes in the crank-shaft, as indicated in dotted lines, Fig. 1. Ordinarily a single hole in the crank-shaft will be sufficient and will  
15 be so placed in relation to the cranks that at the moment of dismounting in the ordinary way it will be approximately beneath the sliding bolt of the lock and preferably a little behind it. The bolt is easily pushed down  
20 by the hand, and if it should strike the shaft without entering the hole a very slight motion of the bicycle will cause the beveled or rounded end of the bolt to enter the hole, where it remains locked until the combina-  
25 tion is so arranged as to permit its withdrawal. I have referred before to this feature by which the bolt can be instantly locked as one of the special advantages of my construction.

In ordinary riding there is practically no  
30 danger of the bolt slipping accidentally into the hole, since sufficient friction of the parts could be provided to prevent it from being jarred downward; but to absolutely and positively prevent any possibility of this occur-  
35 ring I have provided a retaining device. (Shown in Figs. 3 and 6.) This is a light spring D, secured to the top of the sleeve B, and which follows the curve of the latter. Its free end is a tooth or projection *n*, which  
40 enters a groove *o* in the bolt-head, and it has also a thumb-piece *p*, by which it is released from the groove.

It is quite practicable to do away with the thumb-piece and with any necessity for posi-  
45 tively releasing the spring, because if the groove *o* be made quite shallow and of curved cross-section the bolt can be pushed in past the spring without difficulty, and the spring will automatically snap into the groove as  
50 soon as the bolt is drawn out far enough. When made according to the drawings, however, it is an easy matter to release the spring and push in the bolt with one hand.

It should also be stated that the retaining-  
55 spring can, if preferred, be placed within the casing, there being sufficient room below the tumblers, Fig. 3, to secure such a spring to the interior wall of the casing. In such a

case the bolt itself is slightly grooved, enough for the spring to seat itself. Such a spring so  
60 arranged will hold the bolt securely until a positive pressure is exerted in the bolt-head. This safety device is only used in situations where jar and movement are expected. In using my lock for doors, drawers, and the  
65 like it need not be provided.

What I claim is—

1. A permutation-lock having a casing, a series of rings therein, a bolt having sliding movement in said casing with a catch to en-  
70 gage the rings, said bolt being arranged to turn and operate the rings, said rings being inclosed within the casing to be inaccessible except through the rotary bolt, substantially as described.

2. A permutation-lock having a casing, a series of rings therein, a bolt having sliding movement in said casing with a catch to en-  
75 gage the rings, said bolt being arranged to turn and operate the rings which are inclosed within the casing to be inaccessible except through the rotary bolt and means for hold-  
80 ing the bolt retracted in all the positions to which it may be rotated consisting of the catch on the casing engaging an annular  
85 groove extending about the bolt, substantially as described.

3. In a permutation-lock and in combina-  
90 tion, a casing having an interior ledge or shoulder and an inner removable sleeve; a series of notched permutation-rings held between said sleeve and shoulder and in-  
95 closed within the casing to be inaccessible except through the locking-bolt; and a sliding bolt having a yielding latch and projecting  
through the end of the casing, said bolt being arranged to rotate and operate the rings substantially as described.

4. In a permutation-lock and in combina-  
100 tion, a casing having an interior ledge or shoulder and an inner removable sleeve; a series of notched permutation-rings, one or more being movable, held between said sleeve and shoulder; a sliding and turning bolt pro-  
105 jecting from the casing, and having a yielding latch and a circular groove, and a spring engaging with said groove for holding said bolt in unlocked position, substantially as de-  
scribed.

In testimony whereof I have affixed my sig-  
110 nature, in presence of two witnesses, this 14th day of May, 1895.

S. C. HOUGHTON.

Witnesses:

L. W. SEELY,  
ANNIE WILDE.