

No. 896,301.

PATENTED AUG. 18, 1908.

W. H. JONES.

PERMUTATION LOCK.

APPLICATION FILED MAY 22, 1907.

2 SHEETS—SHEET 1.

Fig. 1

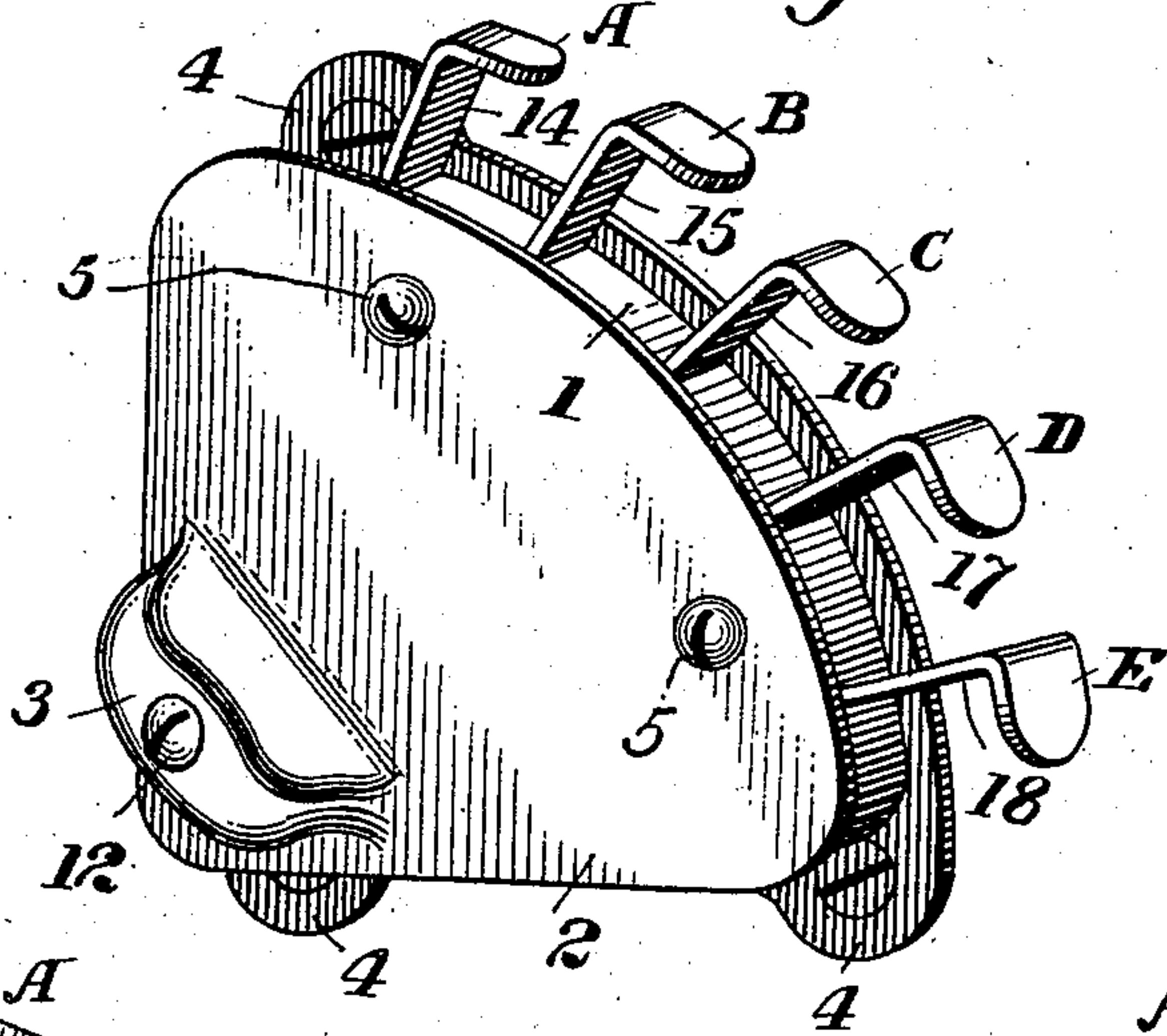


Fig. 2.

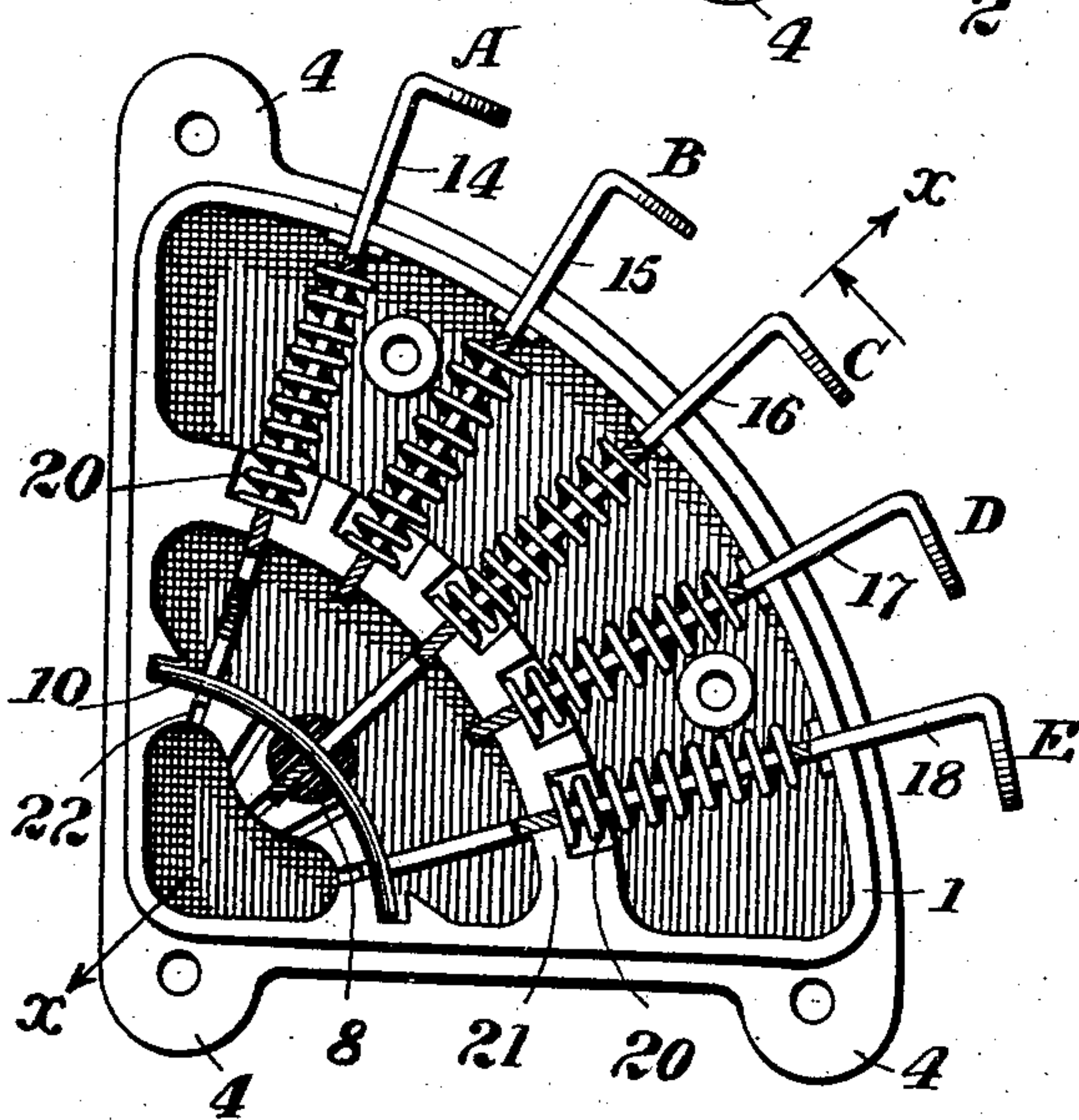


Fig. 3.

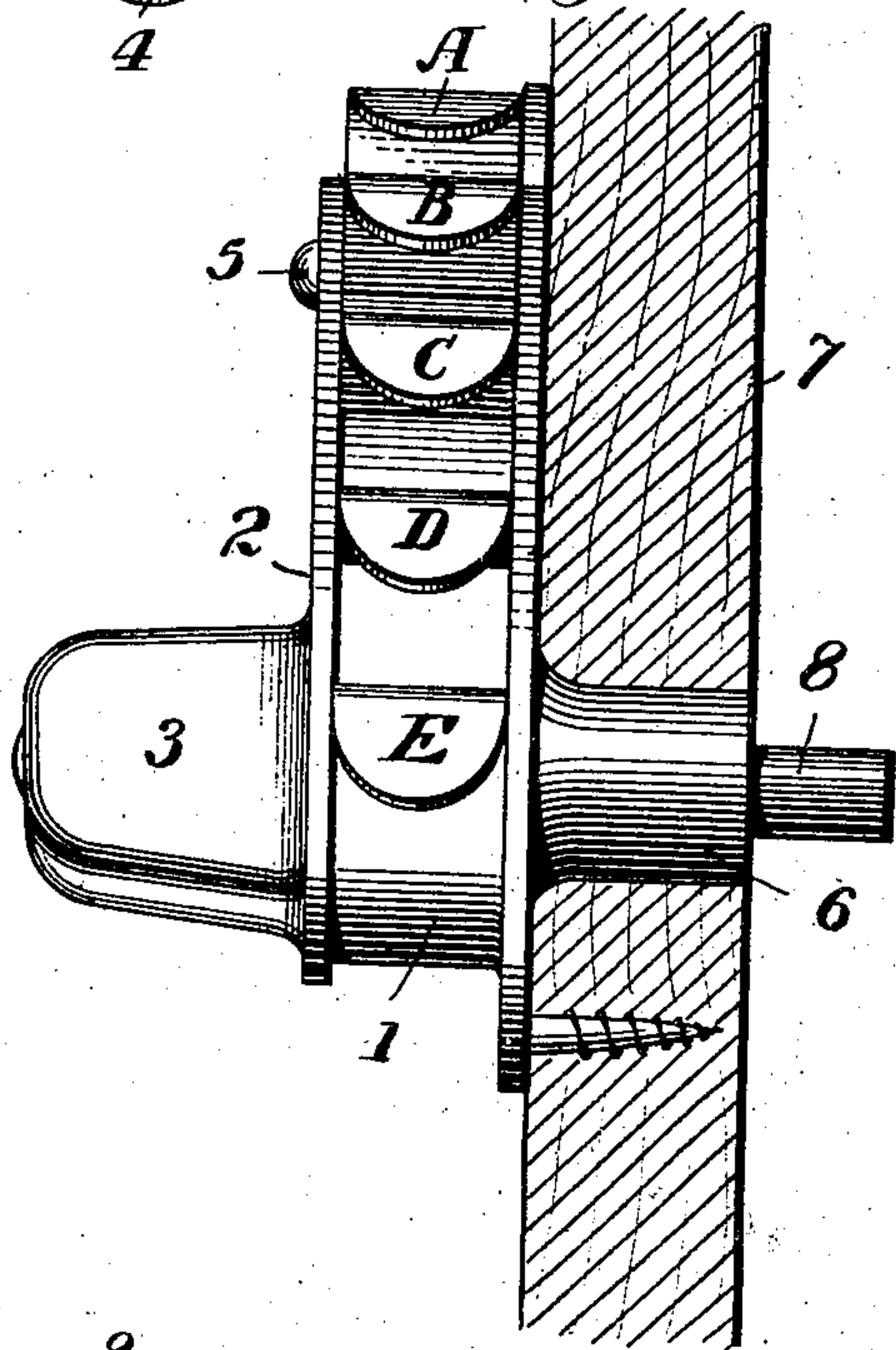
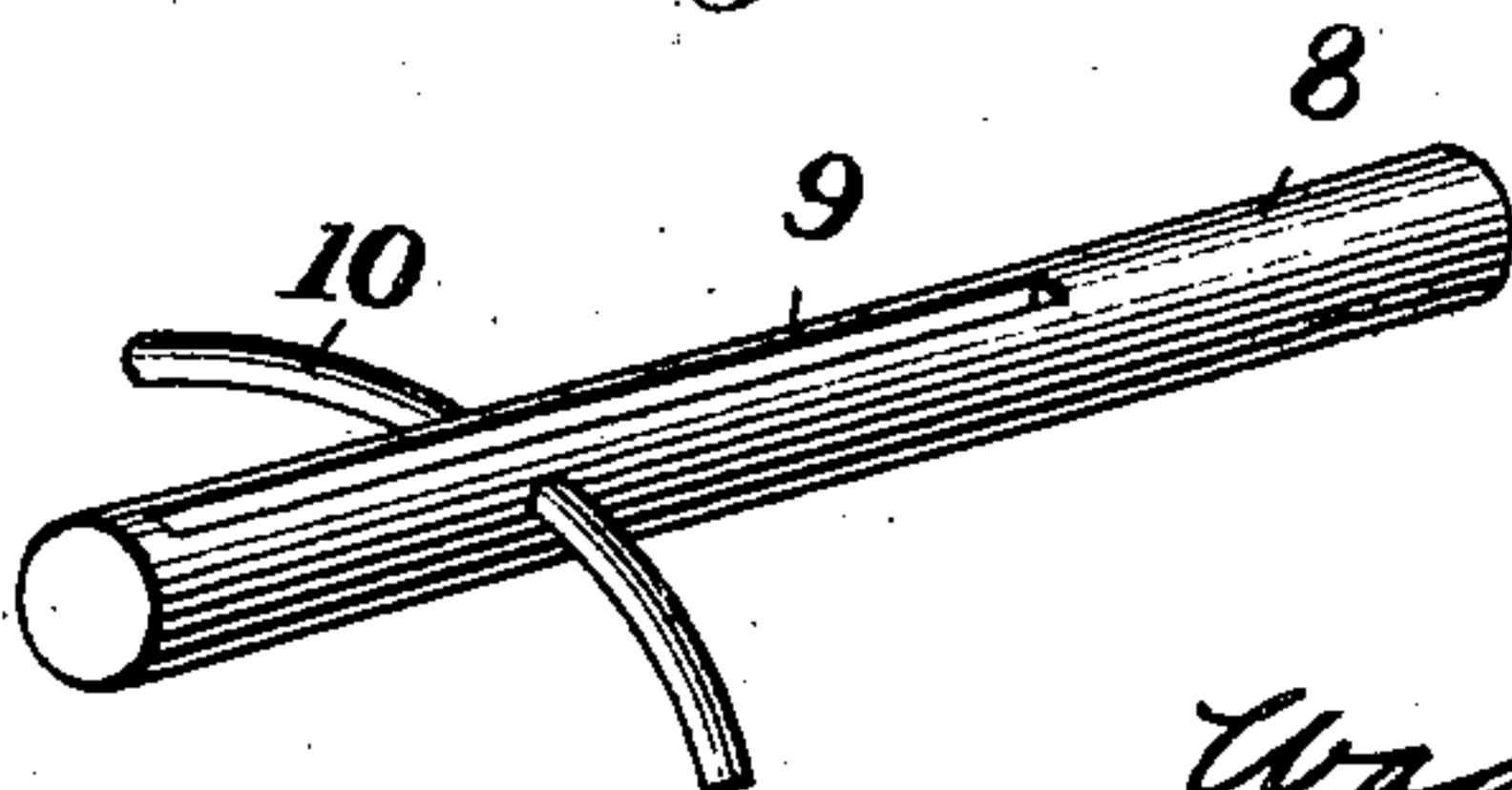


Fig. 4.



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2 SHEETS—SHEET 2.

Fig. 5.

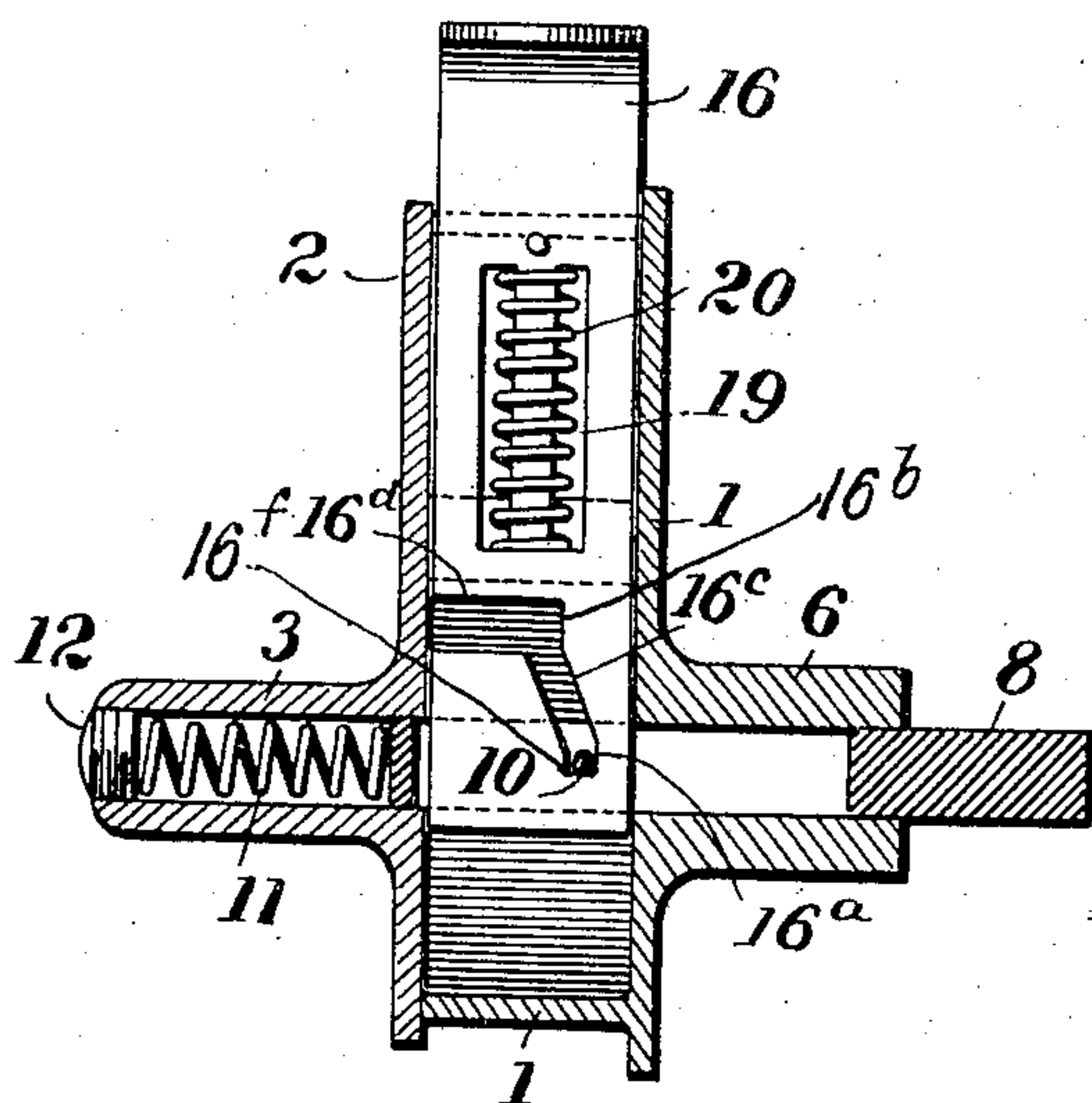


Fig. 6.

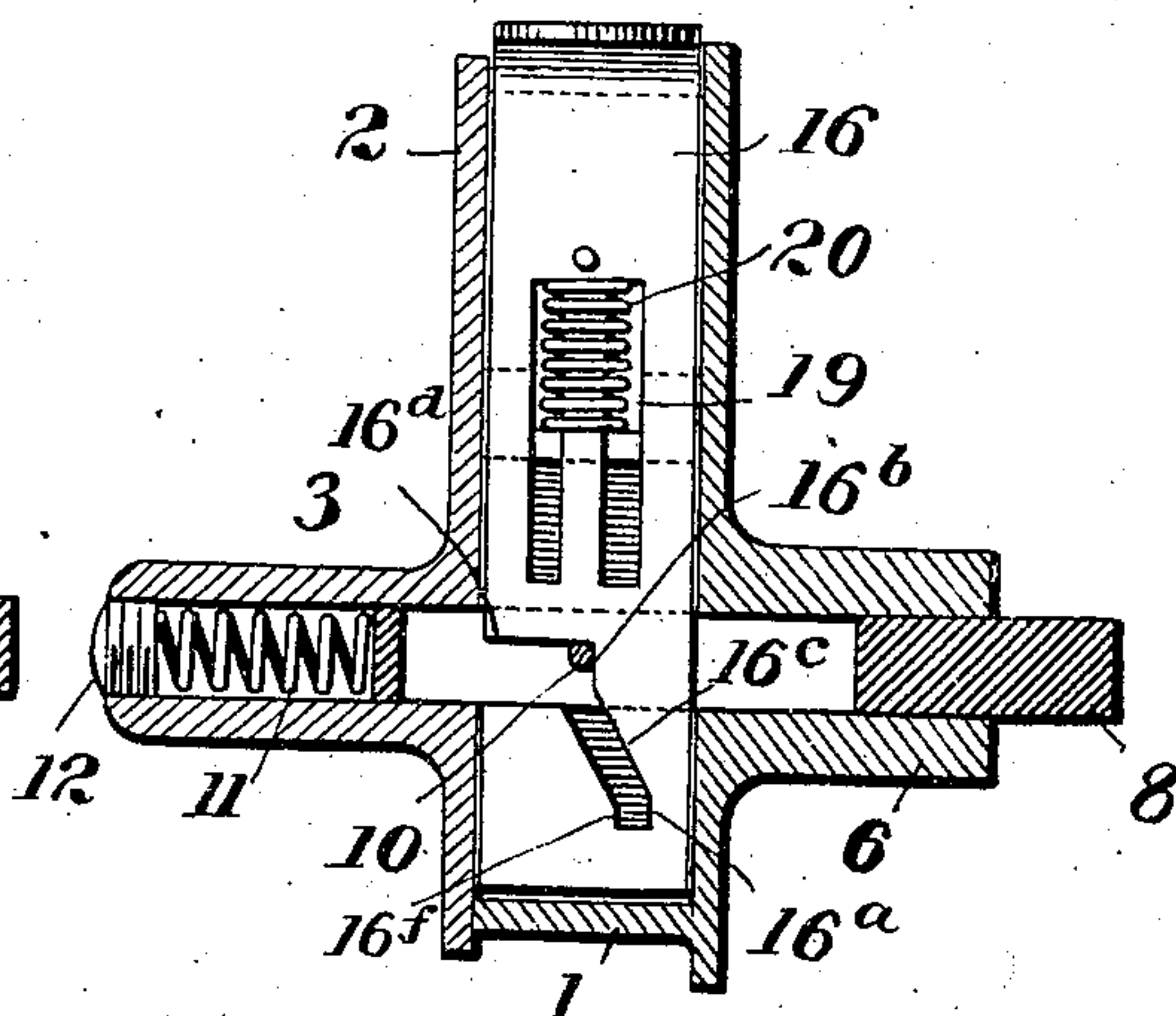


Fig. 7.

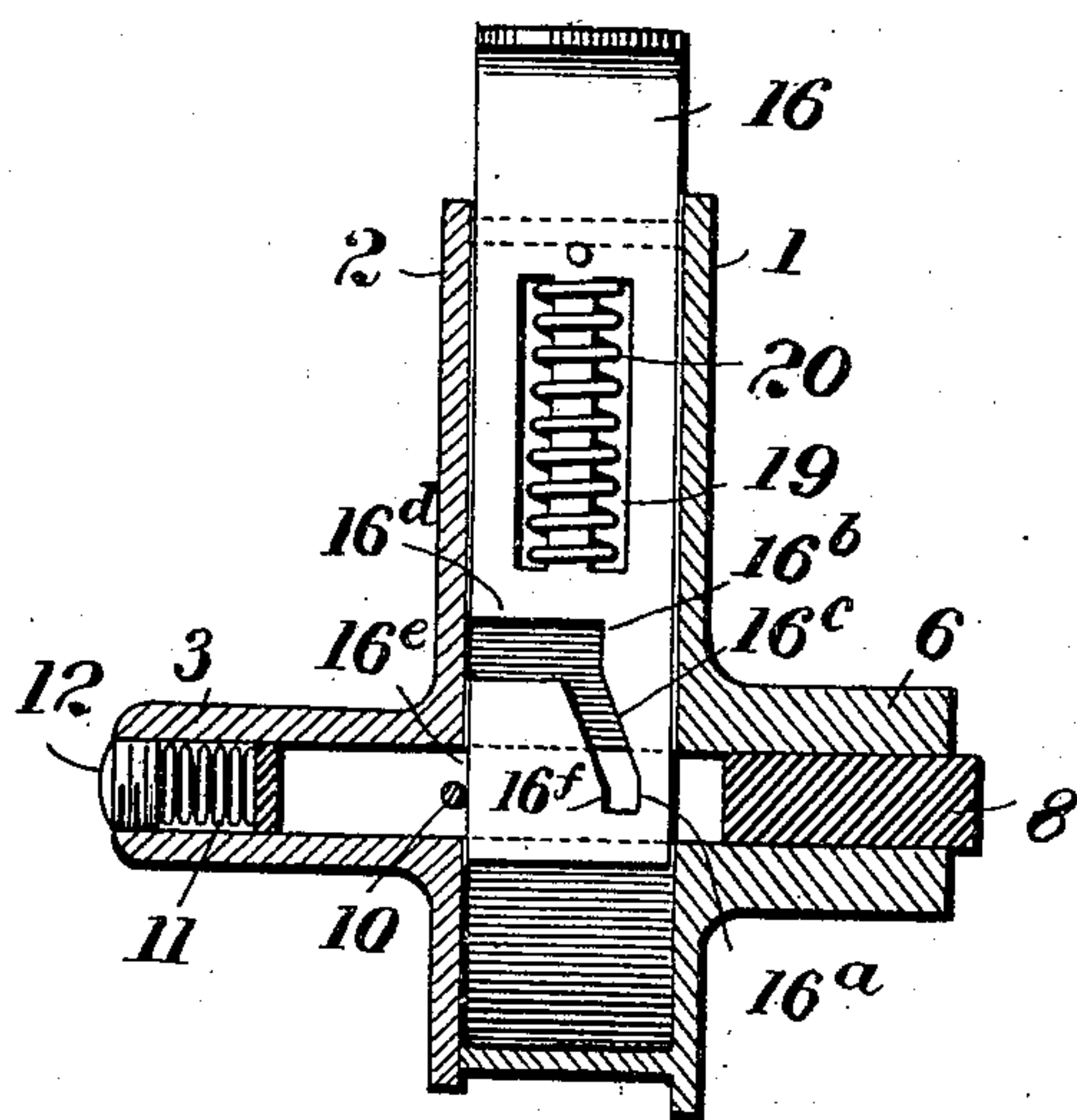
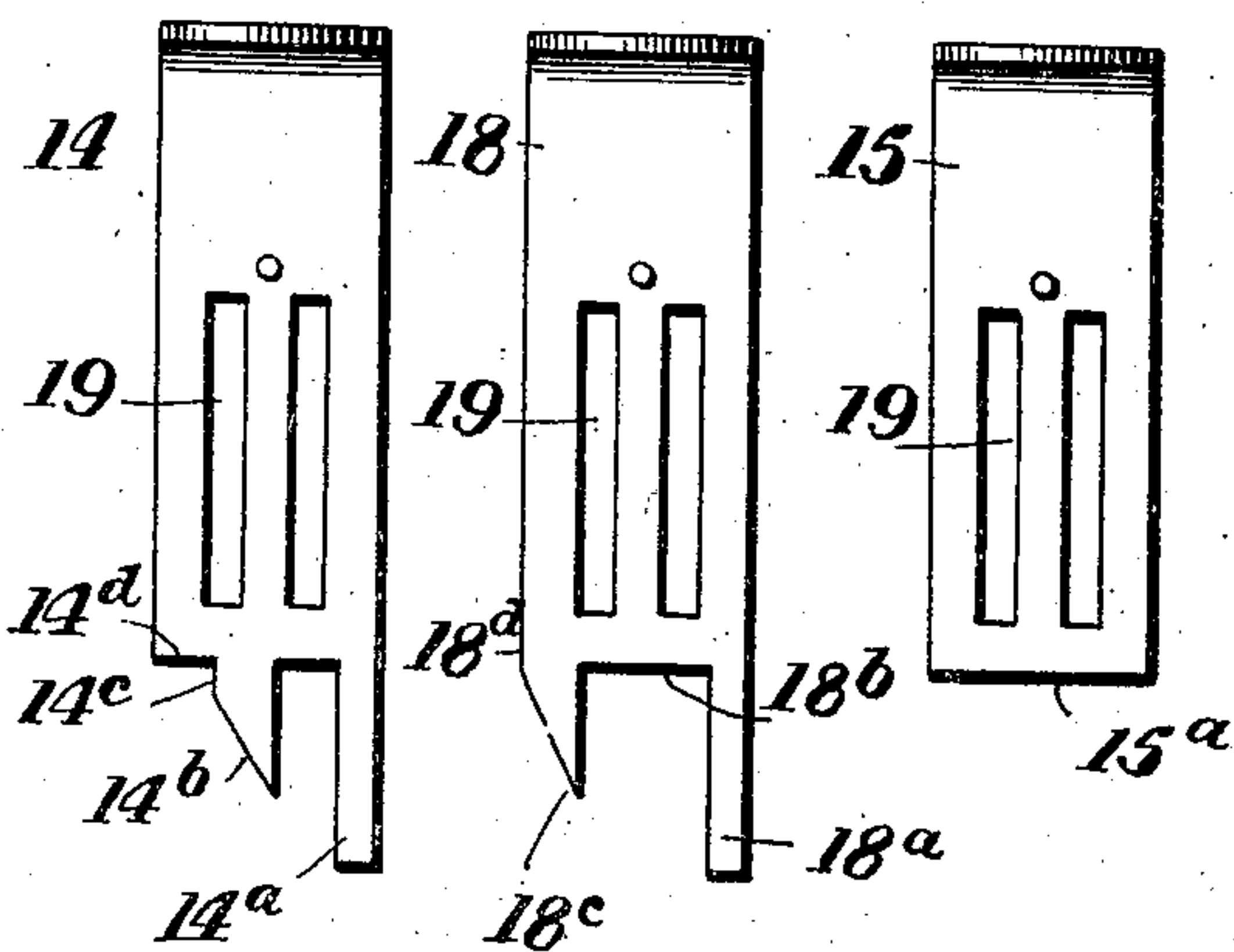


Fig. 8. Fig. 9. Fig. 10.



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# UNITED STATES PATENT OFFICE.

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## PERMUTATION-LOCK.

No. 896,301.

Specification of Letters Patent.

Patented Aug. 18, 1908.

Application filed May 22, 1907. Serial No. 375,100.

*To all whom it may concern:*

Be it known that I, WADE HAMPTON JONES, a citizen of the United States, residing at Abbeville, in the county of Abbeville and State of South Carolina, have invented certain new and useful Improvements in Permutation-Locks, of which the following is a specification.

My invention relates to permutation locks and more particularly to locks of this character which are designed for use upon sliding doors and the like.

The primary object of my invention is to provide a lock having a plurality of keys or tumblers and to so arrange the parts that it is necessary not only to operate a certain combination of the keys in order to release the bolt, but also to operate them in a definite order.

A further object of the invention is to provide a lock of this character which shall be simple in construction and in which the combination may be changed as desired.

With the above and other objects in view, my invention consists in the construction and arrangement of parts hereinafter described and illustrated in the accompanying drawings, in which:

Figure 1 is a perspective view of the complete lock; Fig. 2 is a plan view of the same with the cover removed; Fig. 3 is a side elevation showing the method of attaching the lock to a door; Fig. 4 is a perspective view of the locking bolt, and actuating arm; Figs. 5, 6 and 7 are central transverse sections through the lock casing on the line  $x-x$ , Fig. 2, showing the operating keys in different relations to the locking bolt; Figs. 8, 9 and 10 are side elevations showing the several forms of keys employed.

Referring to the drawings in detail my improved lock consists of a substantially quadrant-shaped casing 1 provided with a cover 2 secured in place by means of screws 5. The casing 1 is provided with lugs 4 having holes to receive screws for securing the lock to the door.

Near the apex of the quadrant, the cover 2 is provided with a hollow projection or protuberance 3, and in line with this projection on the other side of the casing is a tubular sleeve or guide 6. This guide extends through the door 7 to which the lock is secured.

As shown in Figs. 5, 6 and 7, the locking

bolt 8 extends through the guide 6 and into the projection 3. The locking bolt is formed with a longitudinal slot 9 and carries near one end a curved arm 10, as clearly shown in Fig. 4. A spring 11 secured by a screw plug 12 bears against the end of the bolt 8 and normally urges it to locking position.

As shown in the drawings, five keys A, B, C, D, E, are provided. These keys consist of flat strips 14 to 18, inclusive, having their ends bent over at right-angles. These keys are radially arranged in the casing and are supported and guided by suitable guides 21, 22, preferably formed integral with the casing. As will be seen from Fig. 2, some of these keys are locking keys, while others are dummies, or blind keys. In the construction shown, 15 and 17, occupying the key positions, B and D, are shown as blind keys, while the other three are locking keys. The key 16 works through the slot in the locking bolt 8, while keys 14 and 18 operate with the curved arm 10 near each of its ends.

As clearly shown in Figs. 5, 6 and 7, the key 16 is provided near its inner end with a cam slot having two straight portions  $16^a$  and  $16^b$ , substantially parallel with its sides and an inclined portion  $16^c$  connecting them. A slot  $16^d$  at right-angles to the length of the key extends from the cam slot to the edge of the key. As shown in Fig. 8, the key 14 is formed with two projecting prongs at its lower end, one of them,  $14^a$ , being straight, while the other,  $14^b$ , is formed with a beveled face, and also has a straight shoulder  $14^c$  adjacent its upper end. As shown in Fig. 9, key 18 has also two prongs  $18^a$  and  $18^c$ , the latter being formed beveled. As shown in Fig. 10, the blind keys 15 and 17 have no projecting prongs, but terminate abruptly at  $15^a$ , after passing through the first guide block 21.

All of the keys are provided with slots, as 19, in which are disposed springs 20, which seat in pockets in the guide block 21, and normally hold the keys in their outer position.

The arrangement will be best understood from a description of the operation. The normal locking position of the bolt and keys is shown in Fig. 5, in which it will be seen that the arm 10 lies in the bottom of the cam slot in key 16, and rests against the face  $16^a$ . To withdraw the bolt, therefore, the key 16 is first depressed into the position shown in Fig. 6. The arm 10 rides up along the in-



clined face 16<sup>c</sup> and at the end of the stroke rests against the face 16<sup>b</sup>, as shown. Key 14 is next depressed and the arm 10 rides up the inclined face 14<sup>b</sup>, and, at the end of the stroke rests against the face 14<sup>c</sup>. The third key 18 is then depressed, whereupon the arm 10 rides up the inclined face 18<sup>c</sup> and rests against the edge 18<sup>b</sup>, at the end of this stroke. Thus, it will be seen that the bolt is withdrawn by three successive stages. During the operation of the keys 14 and 18 the arm 10 moves from the position shown in Fig. 6, up through the slot 16<sup>d</sup>, into the position shown in Fig. 7, so that, when, after the three keys have been depressed, and key 16 is released, it assumes the position shown in Fig. 7, with the arm 10 resting against the edge 16<sup>e</sup>, thus holding the locking bolt in its withdrawn or inoperative position.

In order to project the bolt into locking position it is only necessary to depress this first operative key, 16, when the bolt, being released, will be shot forward by the spring 11.

It will also be noted that in the normal position of the parts, the arm 10 abuts against the shoulder 16<sup>f</sup>, on the first operative key 16, as shown in Fig. 5, thus locking the bolt in its advanced or operative position, and preventing its being withdrawn, except by that key.

It will be seen from the above arrangement, that it is necessary to operate the keys in the exact order described, for if keys 14 or 18 should be operated first, they would have no effect upon the locking bolt, for the reason that the arm 10 would be too far to the right (as seen in Figs. 5, 6 and 7), for the inclined faces 14<sup>b</sup> or 18<sup>c</sup> to engage it. It will be understood that these keys 14 or 18 may be moved in and out at will, if operated in the wrong order but will not have any effect on the bolt, the arm 10 working in the space between the prongs. Furthermore, these keys will, if operated in wrong order, also lock the bolt against movement by key 16, or otherwise, as the prongs will straddle and engage the arm 10, as long as these keys are depressed. It is necessary to first operate the key 16 in order to raise the arm 10 into the position where it can be engaged first by the face 14<sup>b</sup> and then by the face 18<sup>c</sup>.

The combination of keys necessary to withdraw the bolt as described, therefore, is C—A—E. (See Fig. 2). It is obvious, however, that by removing the cover 2, the keys 14, 16 and 18 may be interchanged at will, and their positions varied, so that the combination instead of being C—A—E may be made to be C—E—A, or A—C—E, etc., a large number of combinations or permutations being possible. Also it is obvious that any of the locking keys may be interchanged with the blind keys 15 and 17, so that the operative keys, may, if desired, be arranged to occupy the first three positions A, B, C, for in-

stance, or any three key positions desired, and by rearranging the order of the locking keys in any one of these different positions, a very large number of arrangements can be effected.

It will thus be seen that I have provided a lock in which not only certain keys have to be selected and operated in order to withdraw the bolt, but these keys have to be selected and operated in a certain predetermined order or sequence. Also, both the positions of the locking keys and their order of operation can be changed as desired.

What I claim is:

1. In a permutation lock, a bolt, a plurality of keys, and means for withdrawing said bolt, actuated by said keys, and responsive only to the operation of the keys in a predetermined order.
2. In a permutation lock, a bolt, a plurality of keys, and means for withdrawing said bolt actuated by certain definite keys only, and responsive only to the operation of such keys in a predetermined sequence.
3. In a permutation lock, a bolt, a plurality of operative keys for actuating the same, one or more blind keys adjacent said operative keys, and means for withdrawing the bolt, responsive only to the operation of a predetermined combination of keys in a definite order, the arrangement being such that both the combination and order may be changed as desired.
4. In a permutation lock, a bolt, a plurality of keys disposed in operative relation thereto, and means whereby the operation of the keys in a predetermined sequence only, serves to positively withdraw said bolt, the arrangement being such that the sequence may be changed as desired.
5. In a permutation lock, a bolt, a plurality of keys for actuating the same, one of said keys serving, when in normal position, to lock said bolt in withdrawn position.
6. A lock comprising a flat, substantially quadrant-shaped casing, a locking bolt mounted therein at right angles thereto, and a plurality of keys radially disposed in said casing projecting from the edge thereof, and mechanically connected with said bolt.
7. A lock comprising a casing, a bolt mounted therein and provided with a longitudinal slot, and a plurality of sliding keys adapted to operate said bolt, one of said keys working in said longitudinal slot.
8. In a permutation lock, a bolt, a plurality of keys, certain of which cooperate to withdraw said bolt, each operative key serving to move the bolt a predetermined part, only, of its stroke.
9. In a permutation lock, a bolt, a plurality of keys for actuating the same, one of said keys serving, when in normal position to lock said bolt in its advanced position.
10. In a permutation lock, a bolt, a plurality of keys for actuating the same, one of said



keys serving, when in normal position to lock said bolt either in its withdrawn or in its advanced or operative position.

11. In a permutation lock, a bolt, a plural-  
5 ity of keys associated therewith and arranged to positively actuate the same, each of said keys serving to move the bolt a part, only, of its stroke.

12. In a permutation lock, a bolt, a plural-  
10 ity of keys for positively withdrawing the

same with a step-by-step movement, and means controlled by one of said keys for projecting said bolt.

In testimony whereof I affix my signature in presence of two witnesses.

WADE HAMPTON JONES.

Witnesses:

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