

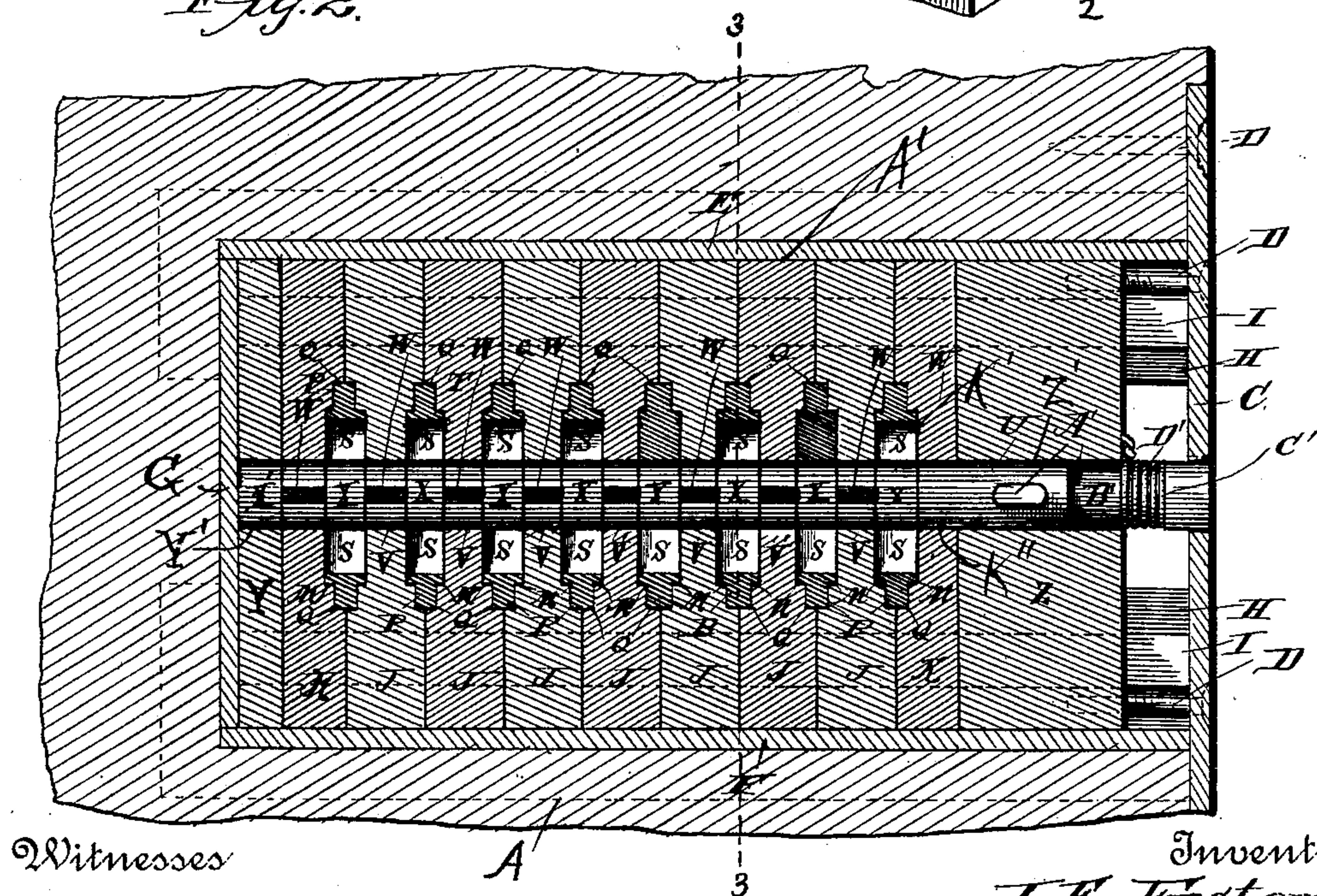
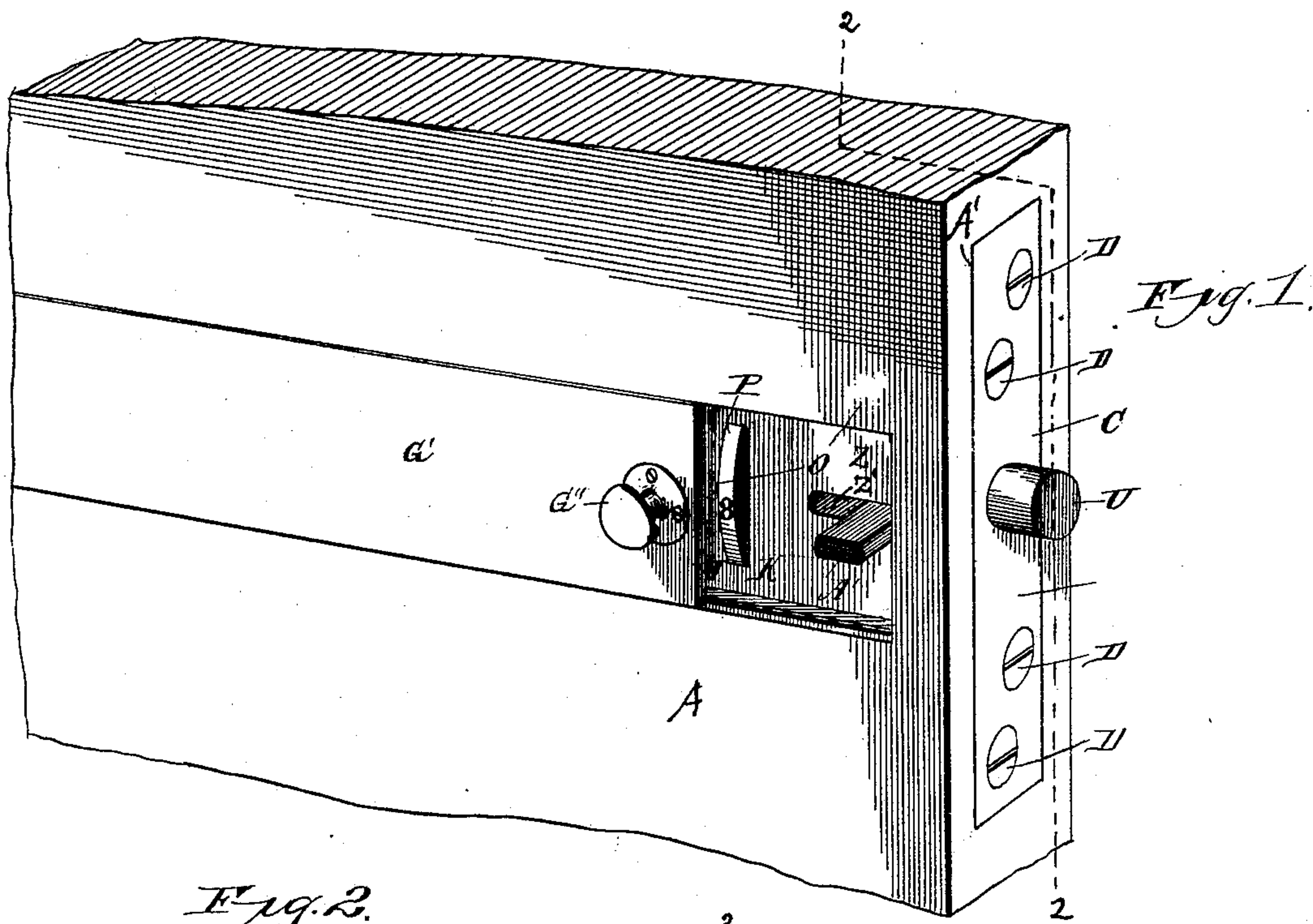
(Model.)

3 Sheets—Sheet 1.

J. F. FOSTER.
COMBINATION LOCK.

No. 479,412.

Patented July 26, 1892.



Witnesses

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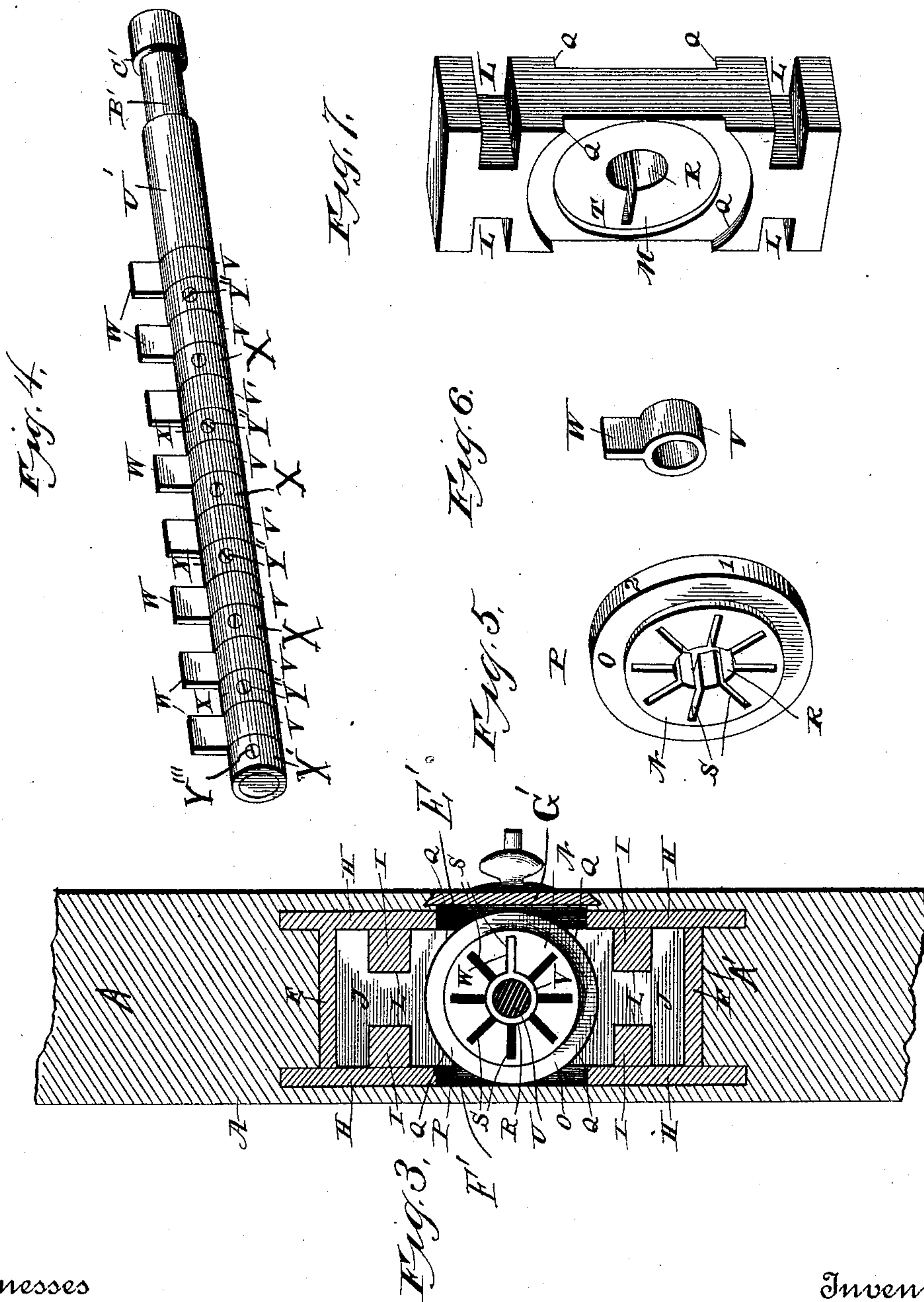
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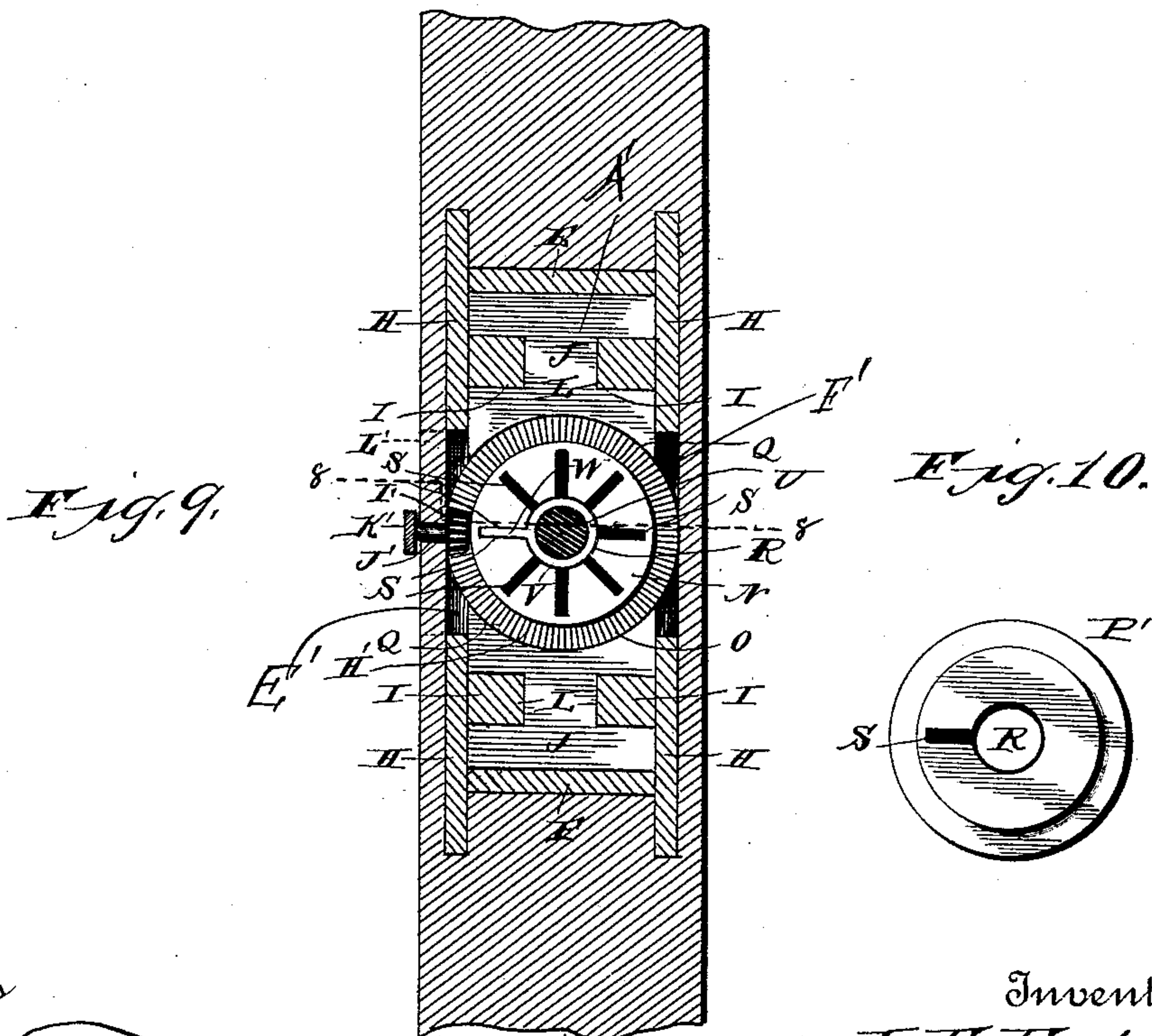
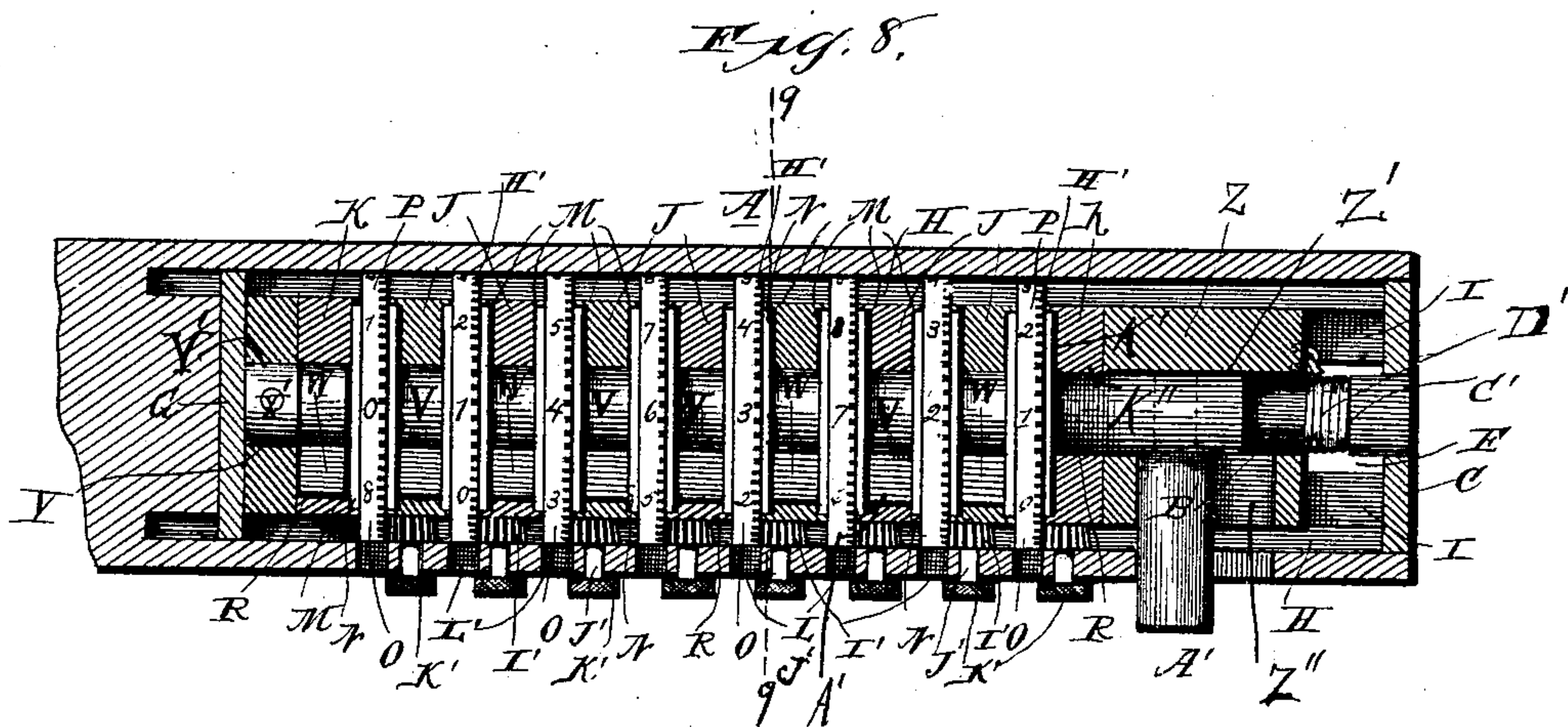
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JOHN F. FOSTER, OF MARCELINE, MISSOURI.

COMBINATION-LOCK.

SPECIFICATION forming part of Letters Patent No. 479,412, dated July 26, 1892.

Application filed December 2, 1890. Serial No. 373,317. (Model.)

To all whom it may concern:

Be it known that I, JOHN F. FOSTER, of Marcelline, Linn county, Missouri, have invented certain new and useful Improvements in Combination-Locks, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention relates to what are known as
10 "combination" or "permutation" locks, and the objects of my invention are to produce a combination or permutation lock which shall be simple, strong, durable, and comparatively inexpensive in construction, and which shall
15 be adapted for effective application to the doors of safes, buildings, apartments, and to all kinds of doors and other similar structures which require to be securely locked for the protection of persons or property.

20 A further object of my invention is to provide a combination or permutation lock which, in addition to the advantages above mentioned, shall be capable of a great variety of combinations, and the construction of which
25 shall be such as to preclude all possibility of effectively tampering with the lock and of being opened by unauthorized persons not having knowledge of the combination in which the lock is set.

30 To the above purposes my invention consists in certain peculiar and novel features of construction and arrangement, as hereinafter described and claimed.

35 In order that my invention may be fully understood, I will proceed to describe it with reference to the accompanying drawings, in which—

Figure 1 is a perspective view of a door having my improved lock applied thereto. Fig. 2 is
40 a central vertical longitudinal section of the same on the line 2 2 of Fig. 1. Fig. 3 is a transverse vertical section of the same on the line 3 3 of Fig. 2. Fig. 4 is a detached perspective view of the locking-bolt with its
45 revoluble collars and interposed stationary washers in operative position upon the bolt. Fig. 5 is a detached perspective view of one of the revoluble and radially-recessed permutation-disks of the lock. Fig. 6 is a detached
50 perspective view of one of the revoluble collars for the locking-bolt. Fig. 7 is a detached

perspective view of one of the interior bearing-plates of the locking-bolt. Fig. 8 is a horizontal longitudinal section of a modified form of the lock, the line of section being taken on 55 the line 8 8 of Fig. 9. Fig. 9 is a transverse vertical section of the same on the line 9 9 of Fig. 8. Fig. 10 is a detached view, in side elevation, of one of the blank disks.

In the said drawings, A designates a portion 60 of a door, it being understood that the said door is of any suitable or preferred form and material, and is to be the door of a safe, a building, an apartment, or of any other suitable or preferred locality, it being also understood 65 that A may designate any structure similar in purpose to a door—that is, for closing a receptacle of any kind, so as to conceal and protect the contents thereof. In this door or similar structure A is formed a mortise A', which 70 is of such form and size as to properly receive the casing and operative mechanism of the lock, the said mortise opening at its outer end through the outer edge of the door or similar structure. The inclosing casing of the lock 75 consists of an outer end or face plate C which is of elongated rectangular form and of such length as to extend at its ends above and below the upper and lower walls of the mortise A', the said face-plate being countersunk in 80 the outer edge of the door, and being also secured removably in position by suitable screws D or equivalent devices, which pass through the ends of the face-plate and enter the door above and below the mortise. The casing of 85 the lock is also further composed of a top plate E and a bottom plate F, said plates being united at their outer ends to the face-plate C and corresponding in length and width with the length and width of the mortise A'. The 90 inner end of the lock-casing is formed by an inner or back plate G, which is suitably united to the inner ends of the top plate E and bottom plate F, and which corresponds in length and width with the height and width of the 95 mortise A', while the sides of the lock-casing are formed by two side plates H, which are suitably united to the adjacent edges of the top and bottom plates, and also to the back plate, the said side plates corresponding in 100 length and height to the length and height of the mortise A'. Upon the inner sides or

surfaces of the side plates H are formed four longitudinal horizontally - extending and inwardly-projecting guide-ribs I, the said ribs being arranged in two oppositely-disposed pairs, each of which is formed upon one of the side plates H, and one rib of each pair being at the upper part of the plate, while the companion rib is at the lower part of said plate. Between these two pairs of horizontal guide-ribs are interposed a number of detachable standards or supports J for the locking-bolt, to be hereinafter described. At opposite sides of its end portions each of these supports or standards J is formed with a pair of oppositely-disposed grooves or notches L, there being thus four of these notches or grooves arranged in pairs at opposite sides of the standards and at the ends of the same. These grooves or notches L receive the guide-ribs I, and thus said ribs sustain the supports J in parallel vertical position within the casing of the lock. Midway of its length each support or standard J is formed with an opening R, the axis of which when the standards or supports are in proper operative position extends longitudinally of the casing, and from each of these central openings R extends radially a flat or narrow recess or notch T, which also extends entirely through the support or standard transversely. A cavity or depression M is formed in each of the two opposite wider sides or faces of each support or standard J, the margin of said cavity or depression being circular and concentric with the opening R. At its upper and lower parts each of the wider sides or faces is also formed with two shoulders Q, each of which is of segmental form and each of which is also concentric with the opening R and with the margin of the cavity or depression M, it being thus understood that there are four of these shoulders disposed in two pairs at opposite sides of the standard or support. At the inner extremity of the interior of the lock-casing is located a flat plate Y, the wider sides of which are left perfectly plain and the edges of which are formed with recesses or notches corresponding with the recesses or notches L of the supports or standards J. In the center of this flat plate Y is formed an opening Y', for a purpose to be hereinafter explained. At each end of the interior of the casing of the lock is located an auxiliary supporting plate or standard K, the outer side of which is perfectly plain, while its inner side is formed centrally with a cavity or depression K' and also in its middle with an opening K'', corresponding precisely in form and location with the openings R in the supports or standards J. Each of these auxiliary standards or supports K is, furthermore, formed at its edges with notches or grooves corresponding in form and location with the notches or grooves L in the edges of the standards J. Between the inner side of the face-plate C and the outer surface or side of the outer auxiliary standard or support K is interposed

a block Z, which corresponds in height and width with the height and width of the interior of the lock-casing and which is also of such thickness as to fill the space between the said outer auxiliary standard and the said face-plate C. Two screws D'' are inserted through the face-plate C and impinge at their inner ends upon the upper and lower parts of the outer side of the block Z, so as to retain the standards J and K and the plate Y and also certain of the other operative parts of the lock in proper position, as hereinafter more fully explained.

P designates a number of permutation-disks, each of which is marginally of circular form and also of flat form transversely. Through the center of each of these disks is formed an opening R of circular form marginally, and from this opening radiate eight or any suitable or preferred number (more than one) of narrow recesses S, each of which extends transversely entirely through the disk. The middle of each side of the disk is formed with an outwardly-extending boss N, and the margin of each disk is formed or provided peripherally with a number of numerals or other characters, each of which is in exact alignment with the outer end of one of the recesses S. When in proper operative position, the two bosses N of each permutation-disk P enter the two adjacent cavities or recesses M of the two consecutive standards J, the marginal portions O of each disk also being interposed between the segmental shoulders Q of the said standards. The bosses and marginal portions of the inner side of the innermost disk and of the outer side of the outermost disk respectively enter the cavities and are interposed between the segmental recesses of the end auxiliary standards K. At intervals are interposed between certain of the standards J blank disks P', which have each a central opening R, but each only a single radial recess S. These blank disks are also marked marginally with numerals or characters similarly as are the operative disks P; but said disks (of which there may be two or any desired number) serve only to mystify unauthorized persons who might attempt to open the lock by leading such persons to suppose that it is necessary to adjust the blank disks as well as the operative disks.

U designates the locking-bolt, the said bolt being of elongated cylindrical form, but of greater diameter throughout a portion U' near its outer end than throughout its principal length. The outer extremity of the bolt is formed with a cylindrical head C', between which and the outer end of the enlarged portion U'' is located a reduced portion B', for a purpose to be hereinafter explained. The enlarged portion of the bolt passes horizontally through an opening Z' in the middle of the block Z, while the body portion or reduced inner part of the bolt extends horizontally through the openings R in the disks P and the corresponding openings in the blank disks

P' and in the auxiliary end supports K and end plate Y. This inner part of the bolt is surrounded by a number of revoluble collars V, having each a radially-extending wing or lug W, the said collars and wings corresponding in width and each being of a width corresponding to the thickness of the permutation-disks P and the blank disks P'.

Between each successive pair of the collars V is interposed a washer X, each of which corresponds in width or length with the width or length of the collars V, so that each collar V is separated from the next succeeding collar V by a space equal to its own width or length. Each washer X is rendered stationary upon the bolt by a set-screw Y'', the inner end of which impinges upon the bolt and thus prevents the washer from turning. It is to be observed that the collars V and washers X correspond in diameter with the diameter of the enlarged portion U' of the bolt, so that when the collars and washers are in position the external surfaces of the bolt and its collars and washers present a uniform diameter. At the extreme inner end of the bolt U is mounted a washer X', which corresponds in all respects with the washers X, previously described, and which is retained in position by a set-screw Y''', corresponding in all respects with the set-screws Y. The bolt U is arranged to move longitudinally in the lock-casing, and when at the inner limit of its movement the said washer X' is received by the central opening in the end plate Y, while when said bolt is at the outer limit of its movement its end washer X' enters the central opening of the inner auxiliary standard K.

One of the side plates H of the lock-casing is formed with an opening F' to permit the permutation-disks to properly rotate without being impeded by contact with the said side plate, and the opposite side plate H is formed with an elongated horizontal opening E'. This opening E' is of twice the length of the space occupied by the permutation and blank disks of the lock, and the upper and lower margins of said opening are preferably dovetailed to receive the dovetailed upper and lower margins of a slide G', which is arranged to be moved longitudinally in the opening E', so as to expose or conceal the marginal or peripheral characters upon the disks of the lock. A suitable knob or handle G'' projects outwardly from the slide G' and serves to facilitate the moving of the same. From the outer end portion of the bolt U, or, in other words, from its enlarged portion U', extends radially a finger-piece A', which projects through and is movable in a horizontally-elongated opening or slot Z'' in the corresponding side of the block Z, before described. A spiral spring D' surrounds the reduced end portion of the bolt U', between the head C' and the outer end of the enlarged portion U' of the bolt, the inner end of the spring pressing against the outer side of the block and the outer end

of said spring pressing against the inner end of the head C'. Thus it will be seen that the tendency of the spring D' is to hold the bolt in its outward position.

In Figs. 8 and 9 I have shown a modification of my invention whereby the rotation of the permutation-disks for throwing off or forming a combination is facilitated. In this instance each of the permutation and blind disks is formed on one side with a circular marginal set of gear-teeth Q. A number of short stub-axes J', corresponding in number with the number of the permutation and blind disks, are inserted horizontally through that side wall or plate H of the casing which is adjacent to the opening E, and each of said stub-axes carries upon its inner end a beveled gear-pinion I', each of said pinions meshing with one of the circular sets of gear-teeth Q. A knob K' is also formed or mounted upon the outer end of each stub-axle, and the arrangement is such that by turning the axle J' the disks shall be also rotated upon the bolt U. This obviates the necessity of applying the fingers directly to the peripheries of the disks, as is necessary in the construction previously described. In all other respects the structural features of the two arrangements are precisely alike.

In order to retract the locking-bolt U and thus unlock the door, it is necessary to open the slide G' and turn the disks until the required characters constituting the combination are exposed in horizontal series through the opening E' of the lock-casing. The wings W will then all be in alignment, and the bolt may be readily retracted by the finger-piece A'. When the required combination is not thus brought to view, it is impossible to retract the bolt, because one or more of the wings W will be opposed in any inward movement by the closed portions of the adjacent disks. As soon as the finger-piece is released the spring D' will shoot the bolt or throw it outward, locking the door.

From the above description it will be seen that I have produced a permutation or combination lock which is simple, strong, durable, and inexpensive in construction, and also capable of application to a great variety of situations. Furthermore, that it is impossible for any one to tamper with the lock or to retract the bolt without first knowing the combination at which the lock has been set.

Having thus described my invention, what I claim as new therein, and desire to secure by Letters Patent, is—

1. A permutation-lock comprising a casing having guide-ribs upon the inner surfaces of its sides, a number of supports or standards having notches upon their edges to receive the ribs, and also having each a central opening, a central cavity in the side of the support or standard having a circular margin, and an upper and lower segmental shoulder formed upon the side of the standard concentric with the margin of the cavity, and

a number of revoluble permutation-disks, each provided with a central opening and on each side with a boss having a circular margin to register with the margin of the standard cavity, and a circular periphery registering with the segmental shoulders of the standards and having, also, a number of recesses, each communicating at its inner end with the central opening of the disk, substantially as set forth.

2. A permutation-lock comprising a suitable casing, a number of standards or supports having each a central bore, a number of operative permutation-disks having each also a central opening, and a number of recesses opening radially from said central opening, and a number of intermediate blind disks having each a central opening and also a single radial recess opening from said central opening, substantially as set forth.

3. A permutation-lock comprising a longitudinally-movable bolt having a reduced body portion, a number of collars mounted revolubly upon the reduced portion of the bolt and having each a radial lug or wing, and a number of stationary washers also surrounding the reduced portion of the bolt and retained in position by set-screws, substantially as set forth.

4. A permutation-lock comprising a suitable casing having a number of guide-ribs upon the inner surfaces of its sides, a number of supports having notched edges to receive the guide-ribs, a number of revoluble disks mounted in cavities in opposite sides of the supports and having each a central opening, and a number of radial recesses opening from said opening, and a locking-bolt extending through said openings and provided with revoluble collars having each a radial lug or wing to enter one of the radial recesses, substantially as set forth.

5. A permutation-lock comprising a suitable casing having guide-ribs upon the inner surfaces of its side walls, a number of supports having notches in their edges to receive said ribs, and having also each a central opening and a circular cavity in each side, a locking-bolt having a number of revoluble collars,

each provided with a radial lug or wing, a number of revoluble permutation-disks mounted revolubly in said cavities and having each a central opening, and a number of radial recesses opening from said central opening, and a spring surrounding the bolt and operating to retain the same in its outermost position, substantially as set forth.

6. A permutation-lock comprising a suitable casing, a number of supports mounted therein, a block mounted in the outer part of the casing, a bolt extending horizontally through the block and supports, a laterally-projecting finger-piece carried by the bolt, a slot in the block to receive the finger-piece, and screws passed through the end of the lock-casing and impinging upon the block, substantially as set forth.

7. A permutation-lock comprising a suitable casing having an opening in one of its side walls, a slide working in said opening, and a number of permutation-disks mounted revolubly within the casing and having characters upon their peripheries, the peripheries of the disks being exposed through the opening when the slide is moved into open position, substantially as set forth.

8. A permutation-lock comprising a suitable casing having guide-ribs upon the inner surfaces of its side walls, a number of supports for the locking-bolt having central openings and notches upon their peripheries to receive the ribs, a plate located at the inner end of the lock-casing and having notched edges and a central opening, auxiliary supports at the ends of the casing having notched edges and a circular cavity in one side and also a central opening, a block located in the outer end of the casing and having a central channel for the bolt, and screws passed through the outer end of the casing and impinging upon the block, substantially as set forth.

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

JOHN F. FOSTER.

Witnesses:

GEO. Y. THORPE,
H. E. PRICE.