

No. 674,158.

Patented May 14, 1901.

F. M. BORING & L. P. CHITWOOD.

COUNTER.

(Application filed Jan. 16, 1901.)

(No Model.)

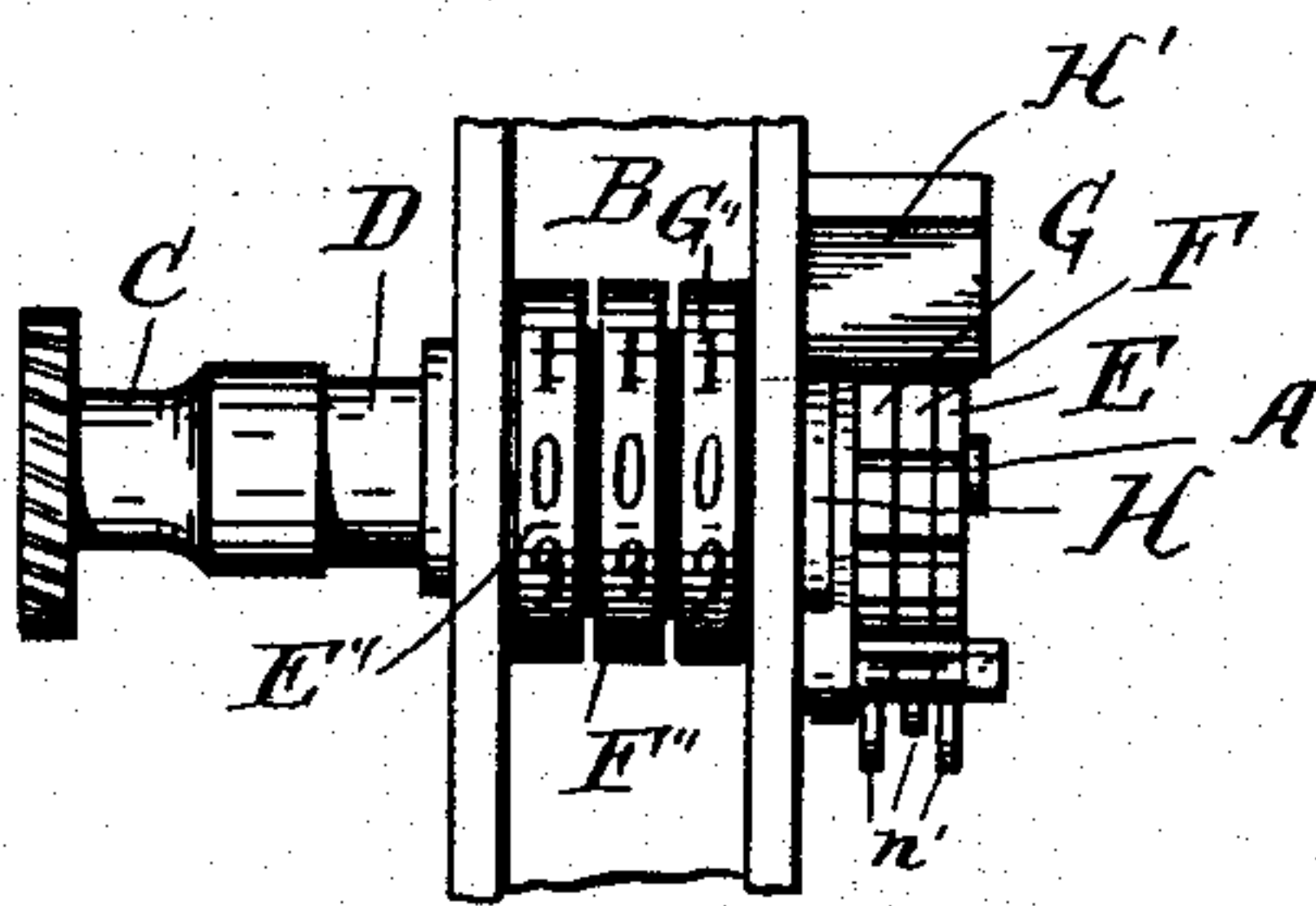


Fig. 1.

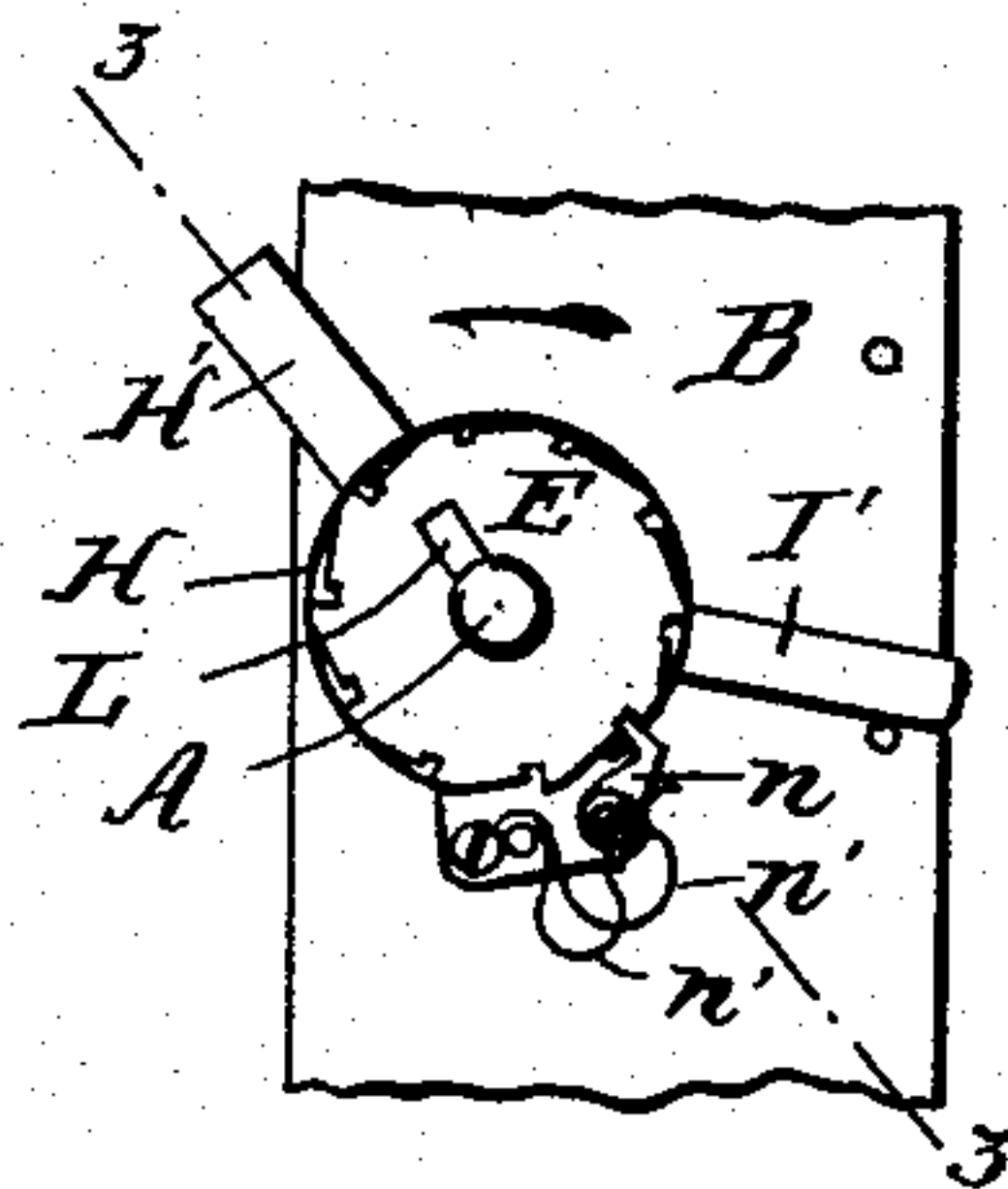


Fig. 2.

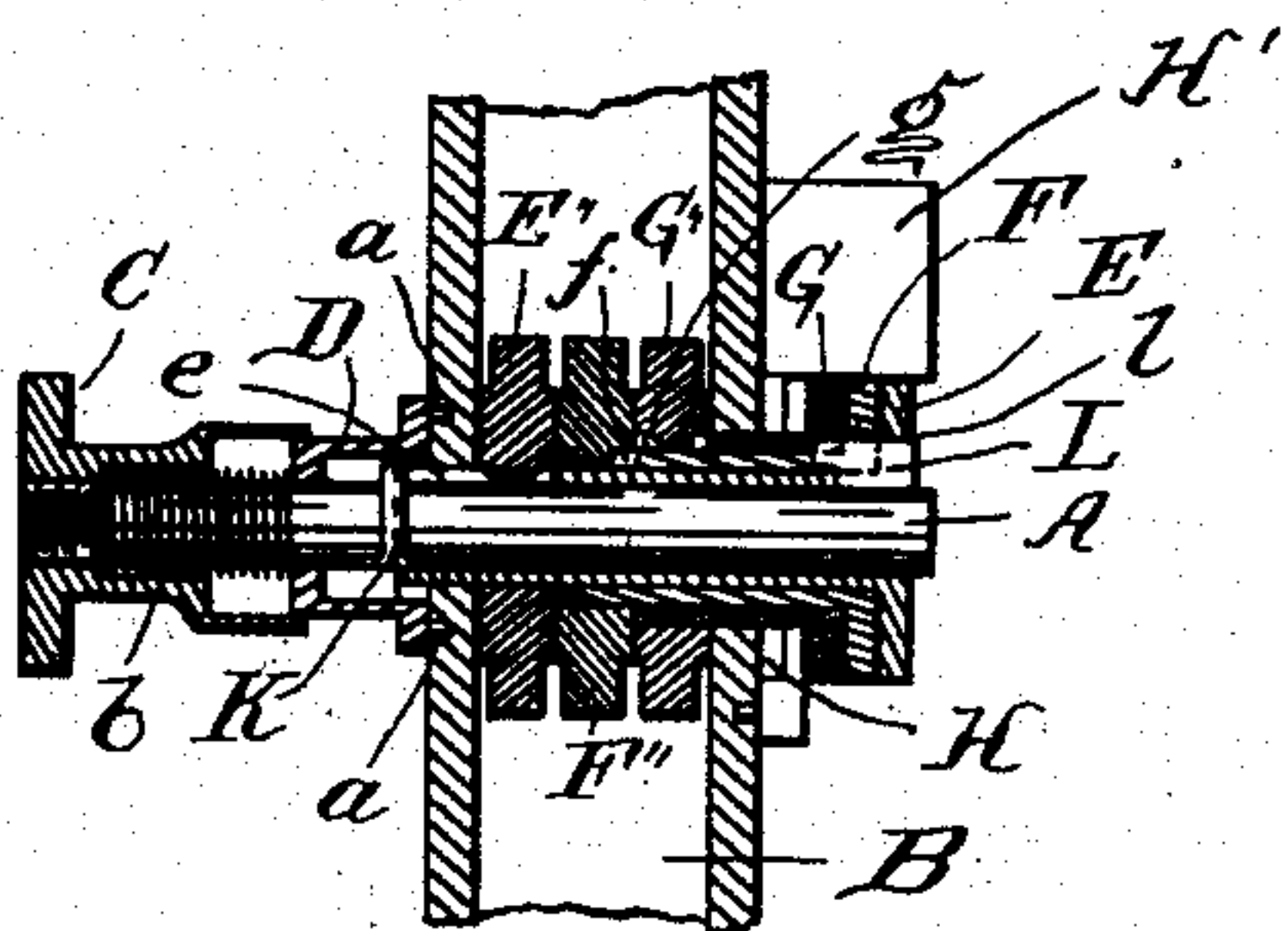


Fig. 3.

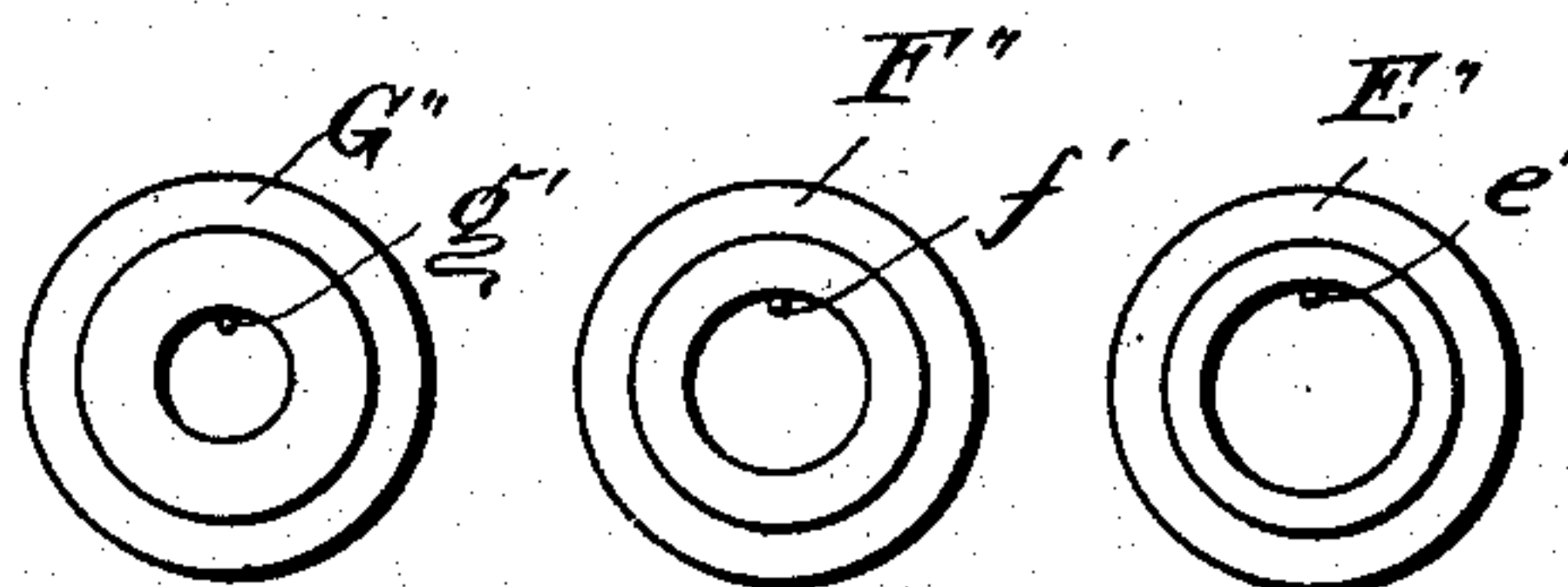


Fig. 4.

Fig. 5.

Fig. 6.

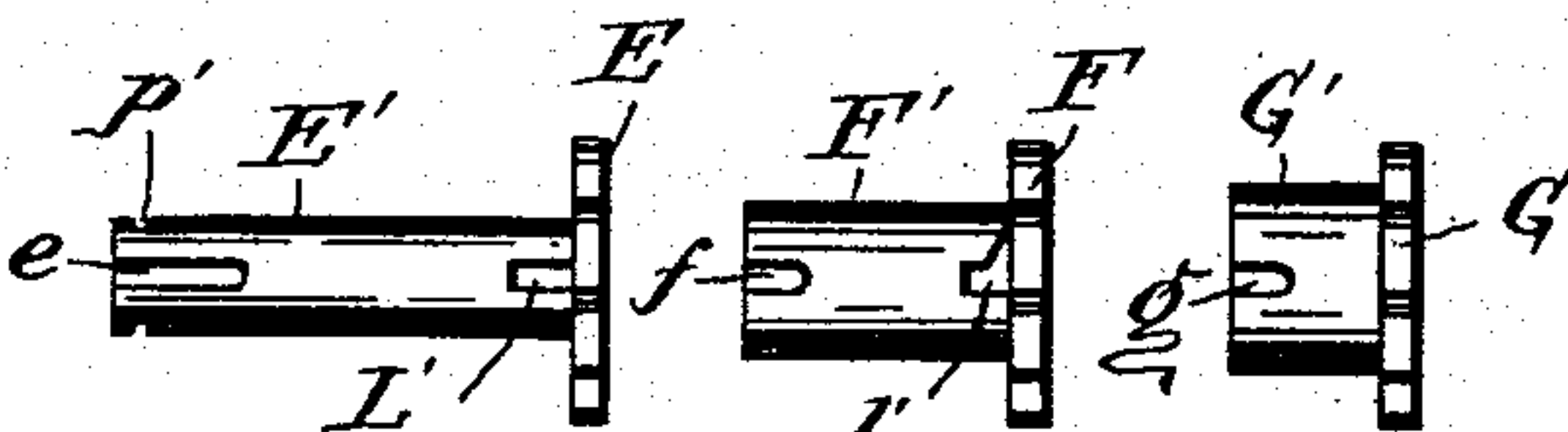


Fig. 7.

Fig. 8.

Fig. 9.

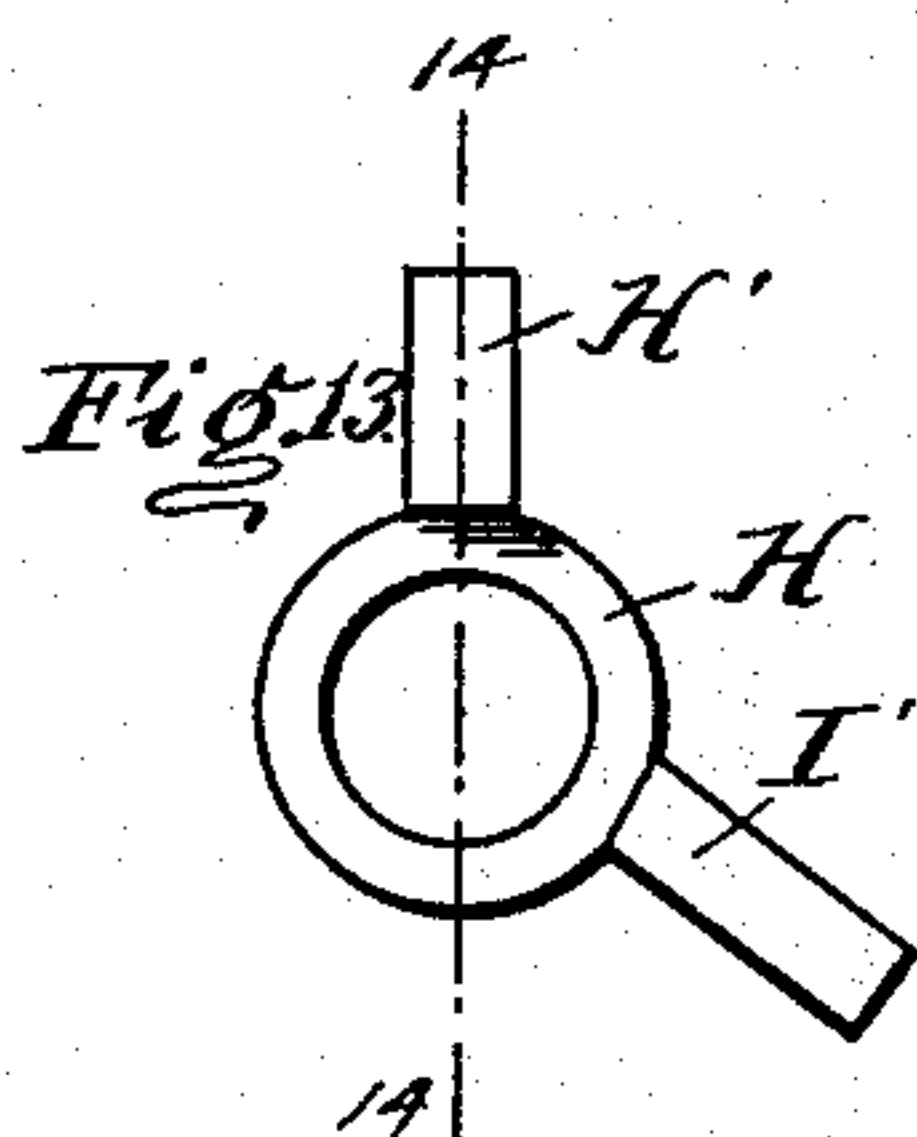


Fig. 13.

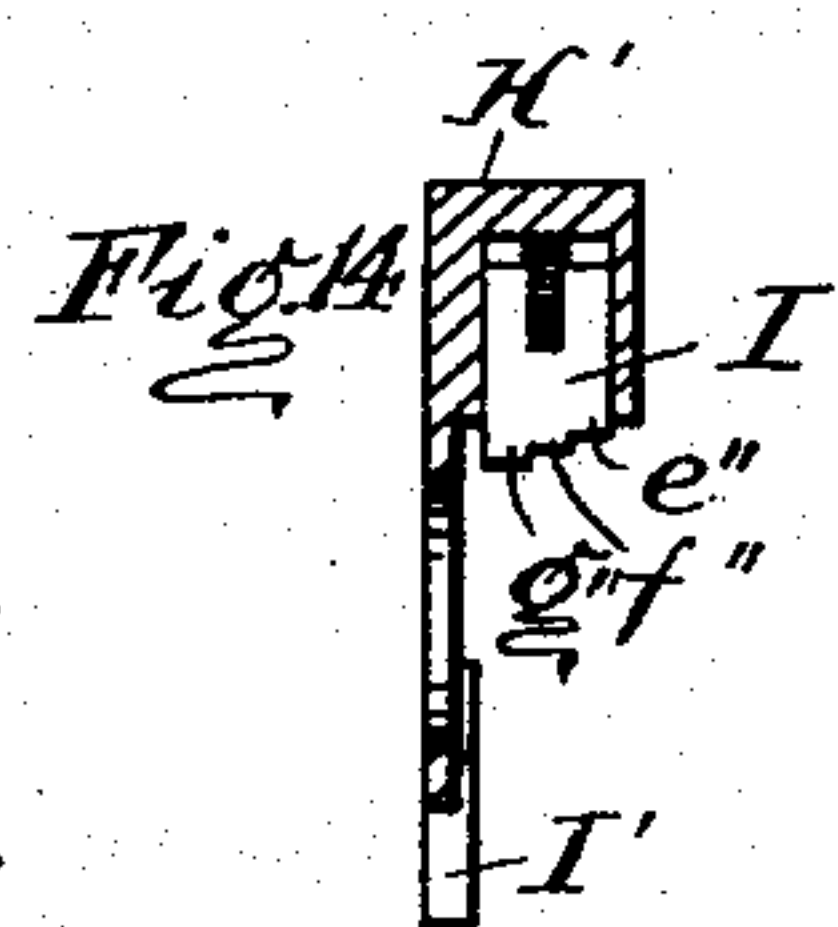


Fig. 14.

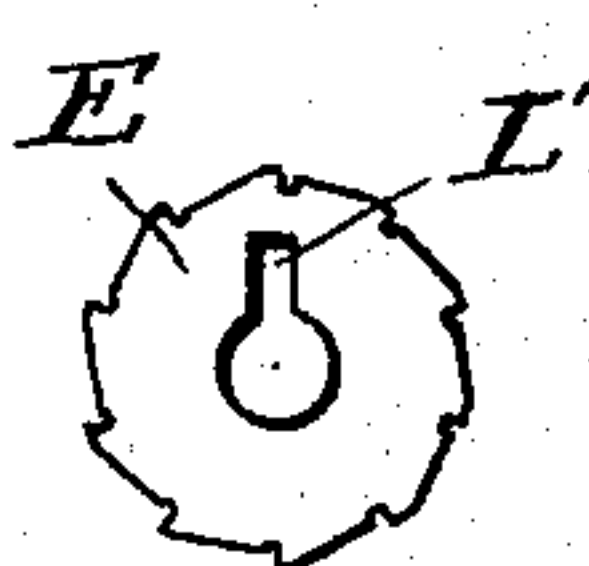


Fig. 10.

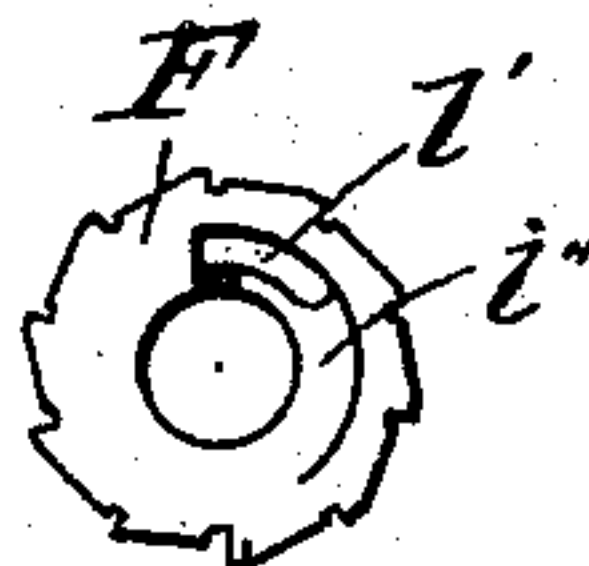


Fig. 11.

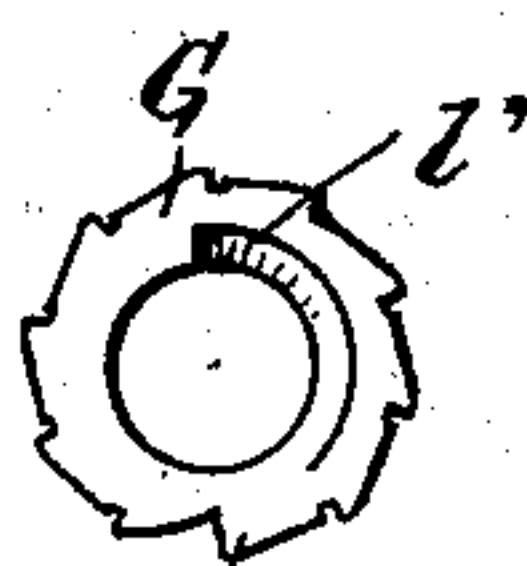


Fig. 12.



Fig. 15.

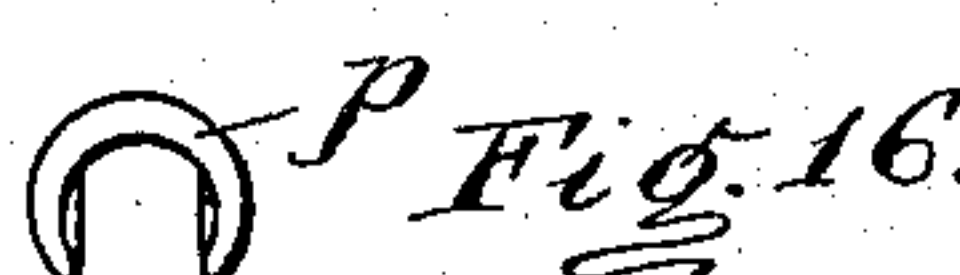


Fig. 16.

Witnesses.
 Clarence E. Muhlhofer
 David B. Van Buren

Inventors.
 Frank M. Boring
 Leonard P. Chitwood.

UNITED STATES PATENT OFFICE.

FRANK M. BORING AND LEONARD P. CHITWOOD, OF DAYTON, OHIO,
ASSIGNORS TO LEOPOLD RAUH, OF SAME PLACE.

COUNTER.

SPECIFICATION forming part of Letters Patent No. 674,158, dated May 14, 1901.

Application filed January 16, 1901. Serial No. 43,552. (No model.)

To all whom it may concern:

Be it known that we, FRANK M. BORING and LEONARD P. CHITWOOD, citizens of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Counters, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

Our improvements relate to counting devices for registering the strokes or operations of various mechanical devices, but more particularly designed for use in voting-machines to register the operations of the voting-levers.

The improvements consist of a certain novel construction and arrangement of parts to be hereinafter particularly pointed out and claimed.

In the drawings, Figure 1 is a front elevation of the counter with the counter-wheels in their zero position. Fig. 2 is a side elevation of the same looking at Fig. 1 from the right. Fig. 3 is a section of Fig. 2 along the line 3 3. Figs. 4, 5, and 6 are side elevations of the counter-wheels. Figs. 7, 8, and 9 are top plan views of the ratchet-wheels operating the several counter-wheels. Figs. 10, 11, and 12 are end views of the same. Figs. 13 and 14 are respectively a side elevation and a section of the pawl-holder. Figs. 15 and 16 are detail views which will be more particularly described later.

The several counter-wheels and ratchet-pawls for operating the same are assembled together on a shaft A, which is mounted in the frame B and provided at one end with a milled head C, rigidly attached to the same in any convenient manner and serving the purpose of turning the shaft A. At one side the shaft A has bearing in a flanged collar D, provided with pins *a a*, which project into the side of the frame B and prevent said flanged collar D from rotating. A spring *b* is mounted on the shaft A and extends between the flange of the collar D and an internal shoulder on the milled head C and normally pulls the shaft A to the left. Loosely and concentrically mounted on the outer extremity of the shaft A are the ratchet-wheels E, F, and G, each of which is provided with sleeves E', F',

and G', said sleeves having slots *e*, *f*, and *g* at their ends. The sleeves of these ratchets are of such diameter that they will readily rotate upon each other. Counter-wheels G'', F'', and E'' are mounted, respectively, upon the sleeves G', F', and E', and said sleeves are of such length that the outer sleeve terminates at the face of the counter F'', the intermediate sleeve F' terminates at the face of the counter-wheel E'', while the inner sleeve E' projects beyond the frame B. The counter-wheels E'', F'', and G'' are provided at their hubs with teeth *g'*, *f'*, and *e'*, which engage, respectively, with the slots *g*, *f*, and *e* at the ends of the sleeves G', F', and E', so that by rotating the ratchet-wheels E, F, and G, respectively, the counter-wheels E'', F'', and G'' are rotated. Mounted on the outer sleeve G' is the pawl-carrier H, which consists of an annular disk provided with a housing H' to contain the pawl I and also provided with a lever I', by which the pawl-carrying mechanism is operated. The pawl I slides loosely in the housing H' and is provided at its upper end with a small coiled spring which bears against the upper face of the housing and tends to hold the pawl in engagement with the ratchet-wheels. This pawl is of a sufficient width to engage the three ratchet-wheels E, F, and G and is provided with three teeth of different lengths, the longest one being to the left, as seen in Fig. 14, and engaging the ratchet-wheel G. Each of the ratchet-wheels E, F, and G is provided with ten teeth, as usual, said teeth being of the same height in each of them, with the exception of the tooth J and the tooth J', respectively, in the wheels F and G. As the pawl-carrier is reciprocated by the lever I' the tooth *g* of the pawl I engages the teeth of the ratchet-wheel G, turning it one division for each operation of the pawl-carrier. It does this until there has been a complete revolution of said wheel G, thus counting nine on the counting-wheel G''. Upon the next reciprocation of the pawl-carrier the tooth *g''* engages the high tooth J' of the ratchet-wheel G and sinks in to such a depth that the next longer tooth *f''* of the pawl I is permitted to engage the teeth of the ratchet-wheel F. The two ratchet-wheels F and G are thus rotated one division, and the

continued reciprocation of the pawl-carrier then continues to rotate the ratchet-wheel G another revolution, and the pawl again dropping into the deep notch at the tooth J' the second ratchet-wheel F is again moved one division, and so on for the units and tens counting-wheels until the tens-wheel F has completed a revolution. This will bring the two deep-notched teeth J' and J in registry, and for the next reciprocation of the pawl-carrier the pawl will sink the full depth of the notch of the tooth J', thus permitting the pawl to engage one of the teeth of the ratchet-wheel E and moving this ratchet-wheel and its corresponding counting-wheel E'' one division. In this way the units are transferred to the tens and the tens to the hundreds counting-wheel, and the counter as illustrated will register up to nine hundred and ninety-nine. Any additional number of ratchet-wheels and counting-wheels can be of course added to register the operations of the lever as high a number as may be desired.

For the purpose of enabling the counting-wheels to be readily and easily reset to zero we provide as follows: As already stated, the ratchet-sleeve E' is mounted loosely on the shaft A, and a spring b normally holds this shaft A to the left. This shaft in its resetting functions is essentially a key provided with a web L and a ward l. With the key-shaft in its normal position to the left the web L fits into the slot L' in the outermost ratchet-wheel E, while the ward l passes through the slot l' in the second ratchet-wheel F, and the inner face of the ward abuts up against the thinnest portion of the cam-surface l'', cut on the face of the ratchet-wheel G. K is a pin secured to the shaft A and extending slightly above the surface of the shaft in such a position as to fit within the slot e in the long sleeve E' of the ratchet-wheel E. With this construction as soon as the ratchet-wheel G is rotated, as heretofore described, the ward l of the key-shaft pressing against the cam-surface l'' on the face of this ratchet-wheel the key-shaft A at once begins to be drawn to the right. This continues with the rotation of the ratchet-wheel G until the end of the ward passes out of the slot l' in the face of the ratchet-wheel F, and with the further rotation of the ratchet-wheel F the ward of the key rides up the cam-surface l''' on the face of the ratchet-wheel F. During this movement of the resetting-key the pin K rides in the slot e. Now when it is desired to reset the counters to zero the key is rotated by means of the milled head C in the opposite direction from that in which the ratchet-wheels are turned in the counting operation. The web of the key fitting in the slot L' in the ratchet-wheel E, this ratchet-wheel and its counting-wheel E'' are carried back, the ward l rides down the cam-surface l''' until the web abuts against the shoulder of the ratchet-wheel F, and the two wheels are then carried around together until the ward rides down the cam-surface l'' on the

ratchet-wheel G, and the ward l abuts against the face of the shoulder of the ratchet-wheel G. The zero-mark on each of the ratchet-wheels is placed in a position so that when the web of the key-shaft has picked up the ratchet-wheels the same digits on each of the counting-wheels will be in line, and it will also be evident that when the ratchet-wheel G has been picked up the resetting-key will be in its normal position to the left. This will bring the pin K beyond the slot e in the sleeve E' of the ratchet-wheel E, and a lug m, Fig. 15, is formed on the inner surface of the flanged collar D in such a position that this pin will strike this lug when the counting-wheels are at zero. The counter is then in position to begin registering again the movements of the reciprocating pawl-carrier. In order to prevent any back movement of the pawl-carrier, dogs n, held in operative position by the springs n', are employed to engage the teeth of the several ratchet-wheels, these dogs and their springs being mounted on the pawl-carrier. These dogs also hold their corresponding ratchet-wheels from any advance movement under frictional contact of the ratchets and sleeves except when positively actuated by the pawl I.

In order to hold the parts together when they are assembled, we form a groove p' in the end of the sleeve E' to secure therein the circular key p, which abuts against the side of the casing. The pin K is held in place by the end of the collar E', the head of the pin coming flush with the surface of the shaft A and underneath the edge of the collar.

Having thus described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In a counter, a series of decimal counting-wheels, keyed respectively to a series of different-lengthed, concentrically-mounted sleeves, ratchet-wheels integral with said sleeves, and operating said ratchet-wheels decimally, and means whereby said counting-wheels are returned to their zero position, substantially as shown and described.

2. In a counter, counting-wheels keyed to a series of concentrically-mounted different-lengthed sleeves, ratchet-wheels integral with said sleeves, and a shaft on which the innermost of said sleeves is mounted, said shaft being provided with a bit, said bit engaging cam-grooves, and slots in said ratchet-wheels and sleeves, and a spring for holding said bit against the action of said cam-grooves, substantially as shown and described.

3. In a counter, a series of different-lengthed, concentrically-mounted sleeves, ratchet-wheels integral with said sleeves, a single pawl with teeth of different lengths for operating said ratchet-wheels decimally, said ratchet-wheels being provided with one deeply-notched tooth, notches being of different depths for each ratchet-wheel, to allow for the successive engagement of the pawl, as each ratchet-wheel completes its revolution,

whereby transfers may be made from each successive wheel, and means for returning said counting-wheels to their zero position, substantially as shown and described.

- 5 4. In a counter, a series of counting-wheels, keyed to a series of concentrically-mounted different-lengthed sleeves, ratchet-wheels integral with said sleeves, and a shaft upon which the innermost of said sleeves is mounted,
10 ed, said shaft being provided with a bit at one end, said bit engaging cam-grooves, with a

pin on said shaft, and a lug on the casing against which said pin abuts when the counting-wheels are in zero position, with a slot in the innermost of said sleeves in which said pin rides when the ratchet-wheels are operated, substantially as shown and described.

FRANK M. BORING.

LEONARD P. CHITWOOD.

Witnesses:

GEO. B. HARLAN,
D. B. VAN PELT.