

No. 768,667.

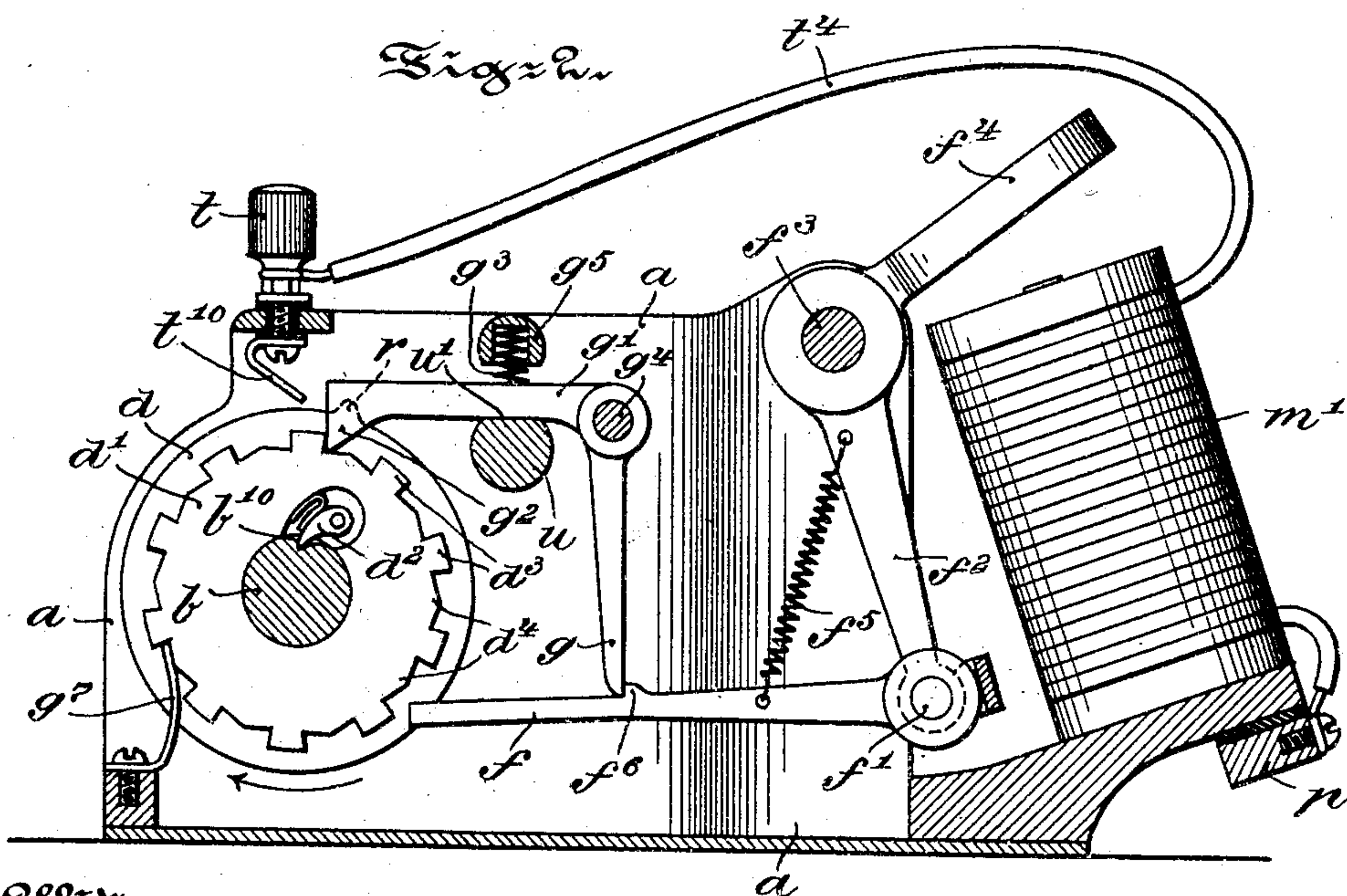
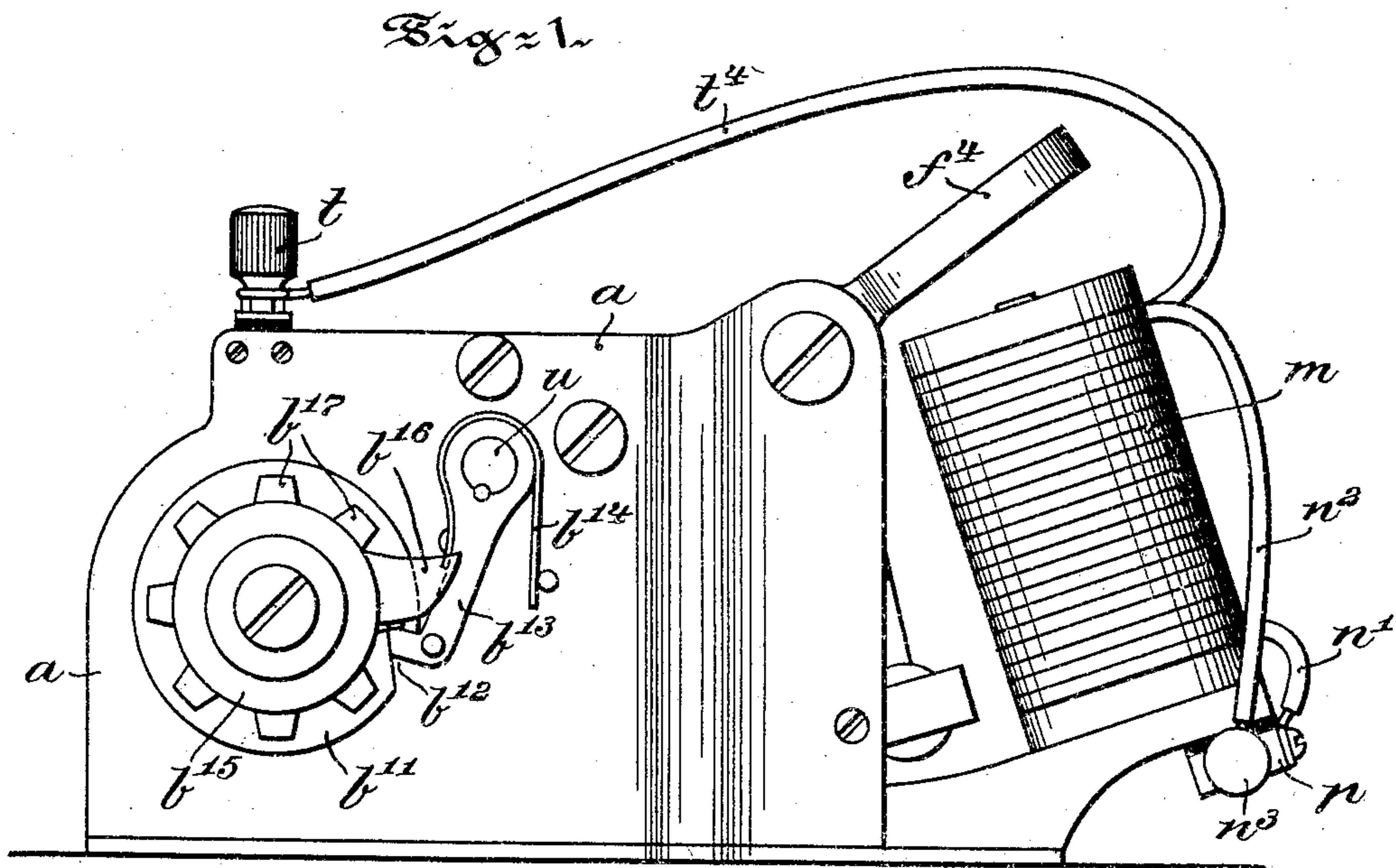
PATENTED AUG. 30, 1904.

J. A. KRAY.
ELECTRICAL COUNTING APPARATUS.

APPLICATION FILED DEC. 31, 1902.

NO MODEL.

3 SHEETS—SHEET 1.



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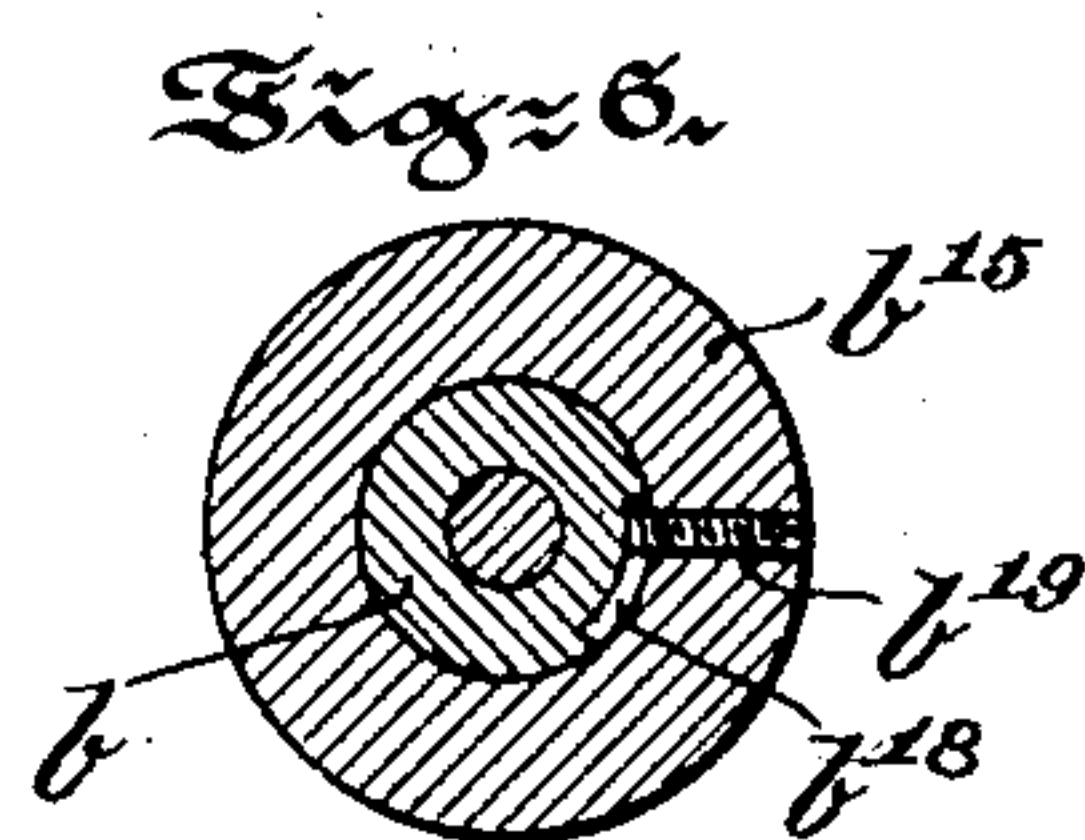
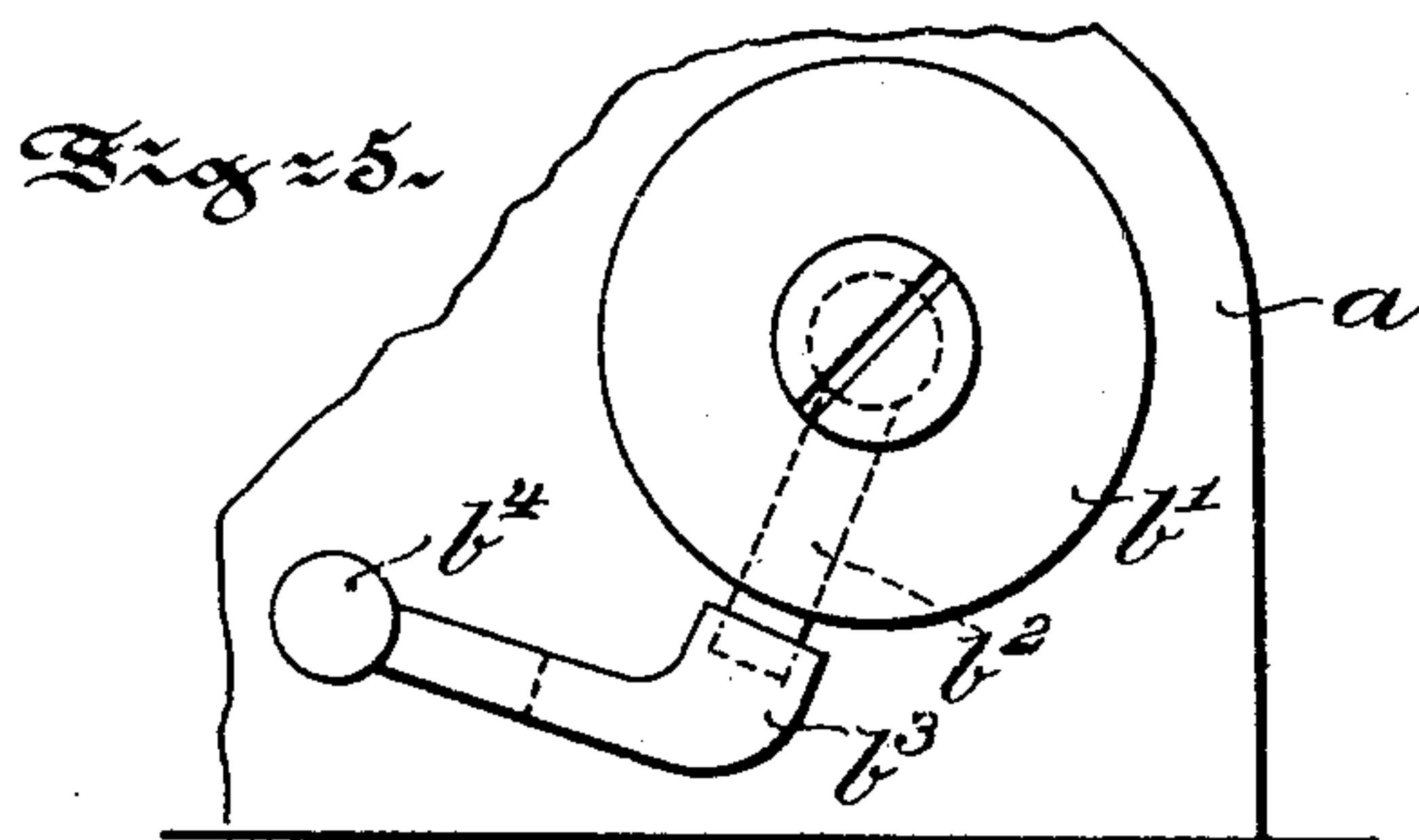
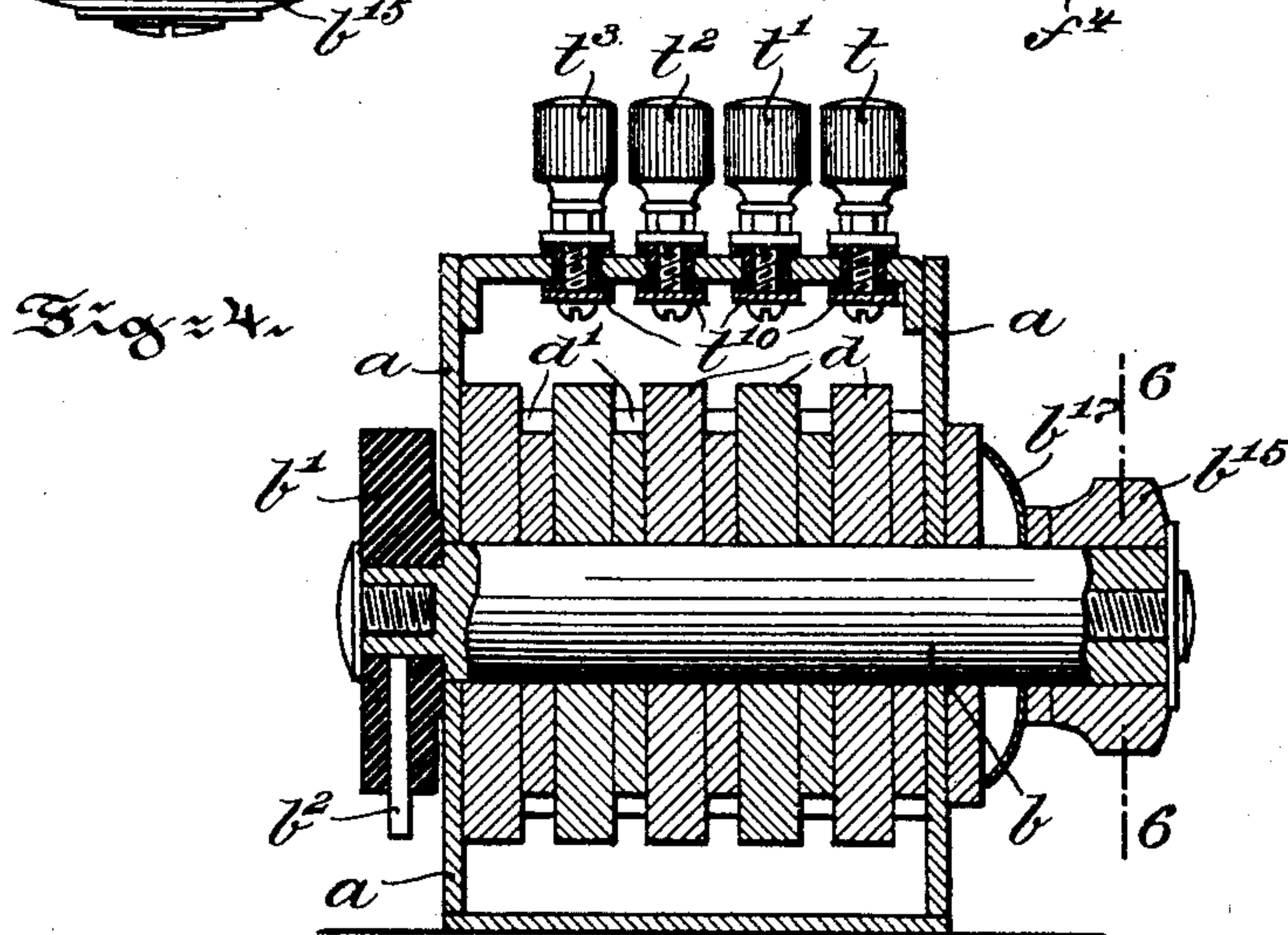
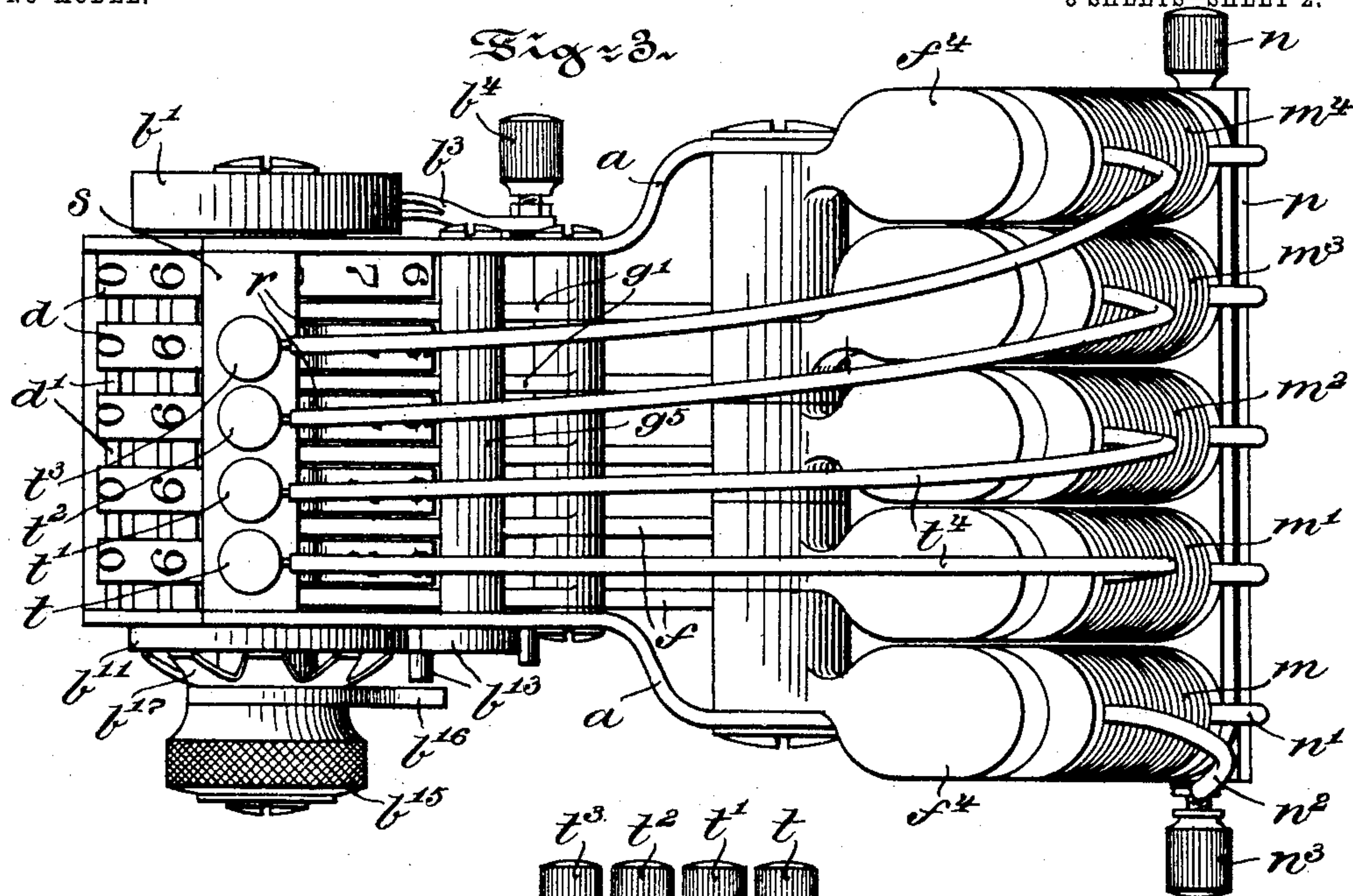
J. A. KRAY.

ELECTRICAL COUNTING APPARATUS.

APPLICATION FILED DEC. 31, 1902.

NO MODEL.

3 SHEETS—SHEET 2.



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No. 768,667.

PATENTED AUG. 30, 1904.

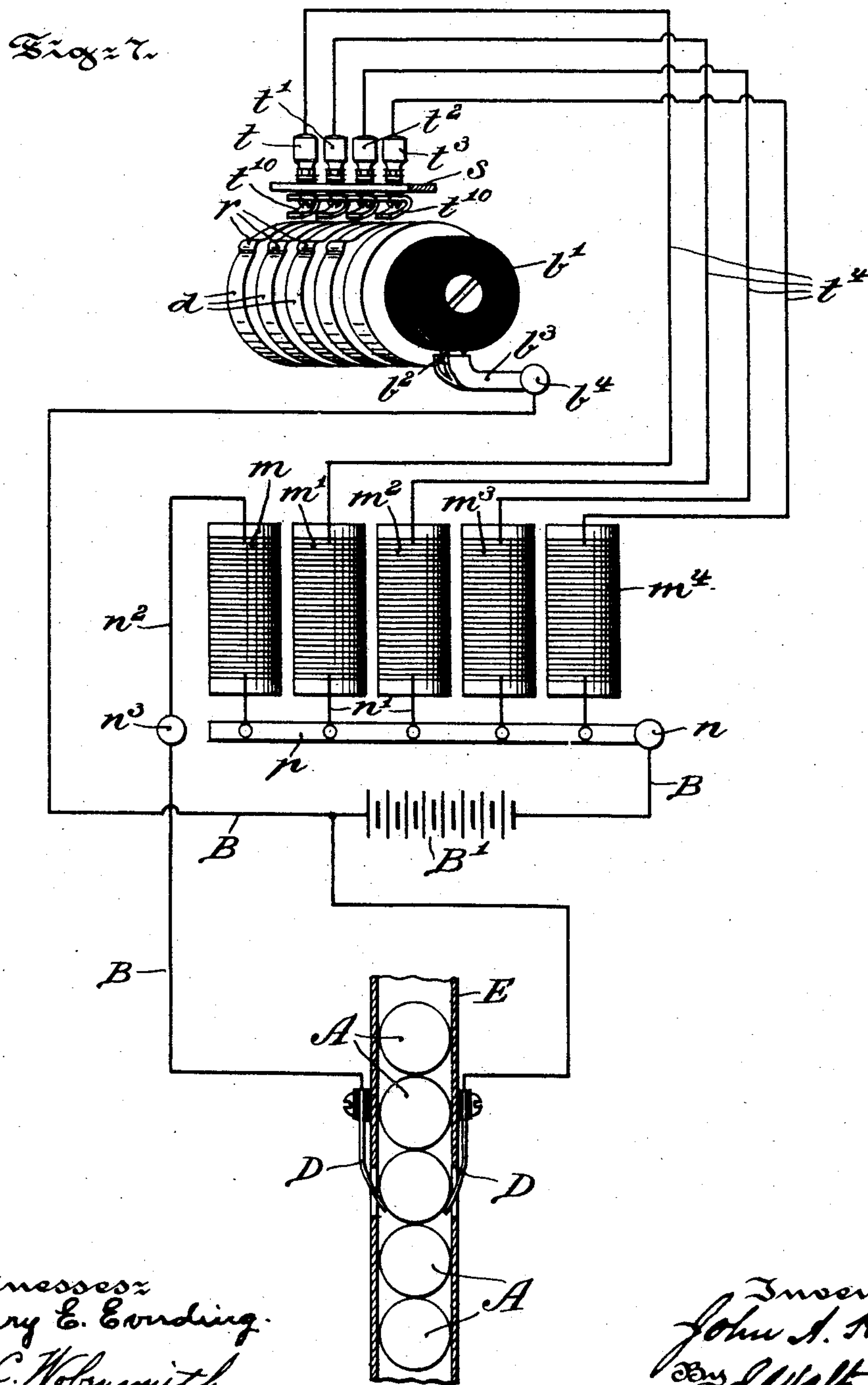
J. A. KRAY.

ELECTRICAL COUNTING APPARATUS.

APPLICATION FILED DEC. 31, 1902.

NO MODEL.

3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

JOHN A. KRAY, OF LANCASTER, PENNSYLVANIA, ASSIGNOR OF ONE-HALF
TO DANIEL M. ROTHENBERGER, OF LANCASTER, PENNSYLVANIA.

ELECTRICAL COUNTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 768,667, dated August 30, 1904.

Application filed December 31, 1902. Serial No. 137,290. (No model.)

To all whom it may concern:

Be it known that I, JOHN A. KRAY, a citizen of the United States, residing at Lancaster, in the county of Lancaster and State of Pennsylvania, have invented certain new and useful Improvements in Electrical Counting Apparatus, of which the following is a specification.

My invention has relation to an apparatus whereby coins, packages, or separate articles of varying descriptions may be automatically and electrically counted; and in such connection it relates to the construction and arrangement of such an apparatus.

The principal object of my invention is to provide a simple and compact apparatus operated electrically, whereby coin, packages, and the like may be automatically counted and registered; and to this end my invention, stated in general terms, consists of an electric counting and registering apparatus constructed and arranged substantially as hereinafter described and claimed.

The nature and scope of my invention will be more fully understood from the following description, taken in connection with the accompanying drawings, forming part hereof, in which—

Figure 1 is a side elevational view of an electrical counting apparatus embodying main features of my invention. Fig. 2 is a longitudinal sectional view of the same. Fig. 3 is a top or plan view. Fig. 4 is a cross-sectional view. Fig. 5 is a detail view of the device for breaking the circuit during the resetting of the apparatus. Fig. 6 is a vertical sectional view taken on the line 6 6 of Fig. 4, and Fig. 7 is a diagrammatic view of the apparatus and of the electric circuit in which said apparatus is included.

Referring to the drawings, *a* represents the framework or casing of the apparatus. In the front end of this casing *a* is arranged a shaft *b*, on which are loosely mounted a series of wheels *d*, each having on its periphery the numerals "0" to "9." Each wheel *d* has on one of its faces a ratchet disk or plate *d'*, by means of which, as hereinafter explained, each wheel may be turned with a step-by-step

movement on the shaft *b* to expose at a predetermined opening in the casing *a* one of the numerals on the number-periphery. Each ratchet-disk *d'* is normally locked against movement in one direction on the shaft *b* by a spring-acting pawl *d''* engaging a slot *b''*, arranged longitudinally in said shaft *b*. The function of the slot *b''* and of the pawls *d''* will be hereinafter more fully set forth.

Movement to each ratchet *d'*, and consequently to a wheel *d*, is obtained by the following preferred mechanism: On the ratchet-periphery is formed a series of square teeth *d'''*, separated by the triangular teeth *d''''*, extending from the center of the disk a less distance than the top of the teeth *d'''*. Arranged adjacent to and adapted to abut against a tooth *d'''* of the disk *d'* is an arm *f*, suspended by a pivotal joint *f'* from one end of a bell-crank lever *f''*. This lever *f''* is pivoted upon a shaft *f'''*, extending across the casing *a* and supported thereby. The other end of the lever *f''* is formed into an armature *f''''*. A spring *f'''''* connects the arm *f* intermediate of its ends to the bell-crank lever *f''* at a point near the shaft *f'''*. It follows from this description that when the armature end *f''''* of the lever *f''* is depressed the arm *f* pushes forward and abuts against a tooth *d'''* to advance the ratchet *d'* one step.

The spring *f''''* permits the arm *f* to swing as it moves forward and also serves to return the arm *f* and the bell-crank lever *f''* to their normal position when the armature *f''''* is free. This latter function of the spring *f''''* is secured by limiting the upward range of movement of the arm *f* upon its pivotal connection with the bell-crank lever *f''*. This limitation is accomplished by a downwardly-projecting tailpiece *g*, forming part of a bell-crank lever *g'*. This tailpiece *g* abuts against the arm *f* and rests alongside a lug *f''''''*, formed on said arm. The lever *g'* is, in fact, a detent, and its horizontal arm is provided with a tooth *g''*, normally resting upon the inclined surfaces of the teeth *d'''* of the ratchet *d'*. The tooth *g''* of the detent *g'* is held downward upon the ratchet *d'* by means of the spring *g'''* and may be raised above the square teeth

d^3 of said ratchet when the lug f^6 is pressed inward by the movement of the arm f against the tailpiece g . The detent g' and tailpiece g swing upon a pivotal support g^4 . The detent g' is normally supported upon a rod or shaft u , having a flat upper surface u' , and the spring g^3 is preferably inserted in a groove formed in the under surface of a bar g^5 , extending across the casing immediately above the rod or shaft u . The detent g' therefore serves as a limitation or stop for the upward movement of the arm f in response to the spring f^5 . It also serves as a stop to prevent the rotation of the disk d' more than the required distance in response to the shifting of the arm f forward. A flat or leaf spring g^7 serves as a stop or pawl to prevent the backward or retrograde movement of the ratchet-disk d' . In the drawings the apparatus is illustrated as provided with a series of five number-wheels d , operated, respectively, by a ratchet d' , and separate mechanisms for advancing each ratchet d' with the required step-by-step movement. There are therefore five armatures f^4 ; each controlling through an arm f and detent g' the operation of a single wheel d .

The wheels, as will be readily understood, indicate in series the respective units, tens, hundreds, thousands, and tens of thousands of the number of articles, &c., to be counted. Each armature f^4 is directly controlled by an electromagnet m, m', m^2, m^3 , or m^4 . The first magnet, m , of the series is operated or energized directly by the passage of a single package or coin A through the receptacle of the apparatus, as illustrated in Fig. 7. The second magnet is arranged to be energized, as hereinafter fully described, when the units-wheel d is turning from "9" to "0," and in the same manner the third, fourth, and fifth magnets are energized when the wheel controlled by the preceding magnet m', m^2 , or m^3 is passing from "9" to "0." To secure this operation of the magnets m, m', m^2 , and m^3 , the following electrical connections are made: One terminal of a battery or other circuit B terminates at the binding-post n in a bus-bar p , and the first magnet, m , is connected by the wire n' with the bus-bar and by the wire n^2 with a binding-post n^3 , connected with the other terminal of the battery or other circuit B. In the circuit formed through the first magnet, m , is interposed a suitable circuit making and breaking device D, controlled by the passage of the article A to be counted. As each article passes through the receptacle E of the apparatus it completes the circuit and momentarily energizes the first magnet, m , which attracts its armature f^4 . The first or units wheel d is then operated by this armature f^4 and intermediate mechanism, previously explained. The first or units wheel continues to revolve with a step-by-step movement until the figure "9" is indicated.

On the periphery of the first wheel d and of succeeding wheels is formed a projection or contact-piece r . The wheels d are brought into electric connection with a battery B' or other source of current preferably as illustrated in the drawings, as follows: Upon one end of the shaft b is secured a wheel or block b' of insulating material, and from the shaft b projects radially a contact-pin b^2 , traversing the wheel or block b' and projecting some distance therefrom. Suitably insulated from the casing a , but supported thereon, is a forked contact-piece b^3 , projecting from a binding-post b^4 . The post b^4 is connected directly to one pole of the battery B' or other current-generator. The bus-bar p is also connected with the other pole of this battery or generator B'. Across the casing a above the wheels d extends a bridge piece or bar s , and suitably insulated from this piece or bar s , but traversing the same, is a series of binding-posts t, t', t^2 , and t^3 . The post t projects downward over the first or units wheel d and carries a finger t^{10} , arranged in the path of the contact-piece r on said wheel. As the first wheel d turns from "9" to "0" the contact-piece r moves into contact with the finger t^{10} . The first binding-post, t , is connected by the wire t^4 with the second magnet, m' , and the return from this magnet m' is through the bus-bar p . As the wheel d turns and its contact-piece r engages the finger t^{10} a circuit is formed, which may be traced as follows: from the source of current through the binding-post b^4 , forked piece b^3 , and pin b^2 , through the shaft b and first wheel d and to the first post, t . Thence it passes by wire t^4 to and through the second magnet, m' , which is energized. The current then passes from the magnet m' through the bus-bar p to the source of current. It follows, therefore, that the travel of the first wheel d from "9" to "0" momentarily energizes the second magnet, m' , and causes the depression of the armature of said second magnet. As previously explained, the depression of an armature causes, through intermediate mechanism, the step-by-step movement of a ratchet d' and wheel d . Hence whenever the second magnet, m' , is energized the second or tens wheel will be operated one point. The second wheel d in like manner, through its projection r and a finger t^{10} , extending from the second binding-post, t' , will when the wheel moves from "9" to "0" cause the third magnet, m^2 , to be energized and the third wheel d to be operated and a similar control of the fourth wheel d by the third wheel d , and so on through the series of wheels can be obtained.

In beginning the counting operation it is desirable that all the wheels be set to "0" and that when a new counting operation is to be begun the wheels d should be reset to "0." To permit of this setting or resetting, the shaft b , on which the wheels turn during their

step-by-step movement, is provided with the longitudinal slot b^{10} , in which the spring-acting pawls d^2 (of the respective disks d') engage. The slot b^{10} is so constructed as to permit during the step-by-step movement of the disks d' the sliding of the pawls d^2 out of the slot and over the remainder of the shaft, but prevents a retrograde movement of said disks and pawls when the pawls d^2 are in engagement with said slot b^{10} . If the shaft b be turned in the same direction as that in which the disks d' turn in their step-by-step movement, it will turn independently of each disk d' until the pawl d^2 of that disk enters the slot b^{10} of the shaft, after which the shaft and the disk are locked together and travel in unison. When, therefore, the wheels d are set in varying positions and the shaft b is turned, the shaft will turn independently of each disk until the pawl of that disk enters the slot b^{10} . When all the pawls d^2 enter the slot, the shaft and wheels turn in unison and all the wheels d travel with their numerals in alinement, since the pawls d^2 of the several disks have the same position with regard to the number-periphery of the wheels. In thus setting or resetting the wheels d it is advisable to break the connection between the shaft b and the terminal or binding post b^4 ; otherwise as the wheels are turned a series of energizations of the magnets m' , m^2 , and m^3 might interfere with the free movement of the disks d' . To permit of this breaking of the circuit preliminarily to the turning of the shaft b , the insulated block or wheel b' and the pin b^2 are turned on the shaft to disengage the pin b^2 from the forked contact-piece b^3 . The shaft b may now be turned, carrying with it the wheels d as collected, and the block b' and pin b^2 until the pin b^2 again enters the forked contact-piece b^3 , when the apparatus is ready for a new counting operation.

To lock the shaft b in proper position, so that the wheels d may expose "0" at the predetermined openings of the casing, the shaft b at that end opposite to the one to which the block b' is secured is provided with a collar b^{11} , having a notch b^{12} in its periphery. A detent b^{13} , acting under the tension of a spring b^{14} , is arranged to ride upon the periphery of the collar b^{11} until the detent enters the notch b^{12} , when the shaft and collar are locked against further turning. To release the detent from the collar b^{11} and to permit the shaft b to be turned, there is provided upon the shaft adjacent to the detent b^{13} a button b^{15} , carrying a projection b^{16} , normally clearing the detent. The button b^{15} is arranged to be pushed inward on the shaft b against the tension of a crown-spring b^{17} to bring the projection b^{16} in alinement with the detent b^{13} . A movement of the button upon the shaft will now cause the projection b^{16} to lift the detent, and thereby release the detent from the collar b^{11} .

The movement of the button b^{15} independ-

ently of the shaft may be secured by annularly slotting or grooving the shaft, as at b^{18} , and engaging this slot by a pin or screw b^{19} , projecting inwardly from the button b^{15} . The button b^{15} can then turn the length of the slot free of the shaft b . The slot b^{18} should be wide enough to permit of the slight in-and-out sliding of the button b^{15} on the shaft b . The detent b^{13} is keyed to the shaft u , having the flat face u' , which shaft u supports, as hereinabove explained, all the detents g' which engage the periphery of each ratchet-disk d' . Consequently when the detent b^{13} is lifted out of the notch b^{12} of the collar b^{11} it oscillates the shaft u sufficiently to lift all of the ratchet-detents g' out of engagement with the periphery of each ratchet, and hence permits the ratchets to be turned.

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

1. In an electrical counting apparatus, a counting-wheel having upon the periphery a series of numerals, mechanism adapted to rotate the wheel with a step-by-step movement, consisting of a ratchet-disk secured to said wheel, an arm arranged to engage a tooth of said disk, a detent arranged to bear on said disk and provided with a device adapted to form a stop for one movement of said arm, an armature for controlling said mechanism provided with a bell-crank lever having a pivotal arm provided with a projection adapted to normally engage the device of said detent, a spring connected with said arm and bell-crank lever and an electric magnet adapted to be energized to attract said armature.

2. In a counting apparatus, a wheel having a numbered periphery, a ratchet-disk secured to said wheel, an arm arranged to periodically engage a tooth of said disk to turn the disk and wheel with a step-by-step movement, a detent arranged normally to bear on the periphery of the disk and having a tailpiece extending to and forming a stop for the upward movement of said arm, a bell-crank lever to one end of which said arm is pivoted, a spring connecting the arm to the lever at or near the fulcrum of said lever and a lug formed upon said arm and arranged to strike the tailpiece and lift the detent when the arm is shifted by the bell-crank lever inward against the ratchet-disk.

3. In an electrical counting apparatus, an electromagnet adapted to be momentarily energized, an armature adapted to be depressed when said magnet is energized, a bell-crank lever, to one end of which said armature is connected, an arm pivotally secured to the other end of said lever, a ratchet-disk arranged to be rotated with a step-by-step movement by said arm, a detent arranged to engage said disk, and a tailpiece formed on said detent and resting against said arm, said tailpiece adapted to be swung inward to release the de-

tent from the disk when said arm is moved toward the disk.

4. In an electrical counting apparatus, a shaft, a plurality of counting-wheels mounted
5 on the shaft, a plurality of mechanisms arranged to control said wheels, each consisting of a ratchet-disk, an arm adapted to periodically engage a tooth of said disk, to rotate the wheel and disk, a detent adapted to bear on
10 the periphery of the disk and provided with a device adapted to form a stop for one movement of the arm, a plurality of armatures

arranged to operate said mechanisms, a plurality of electromagnets arranged to control said armatures and a bell-crank lever connected with each armature and carrying an arm having a lug. 15

In testimony whereof I have hereunto set my signature in the presence of two subscribing witnesses.

JOHN A. KRAY.

Witnesses:

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