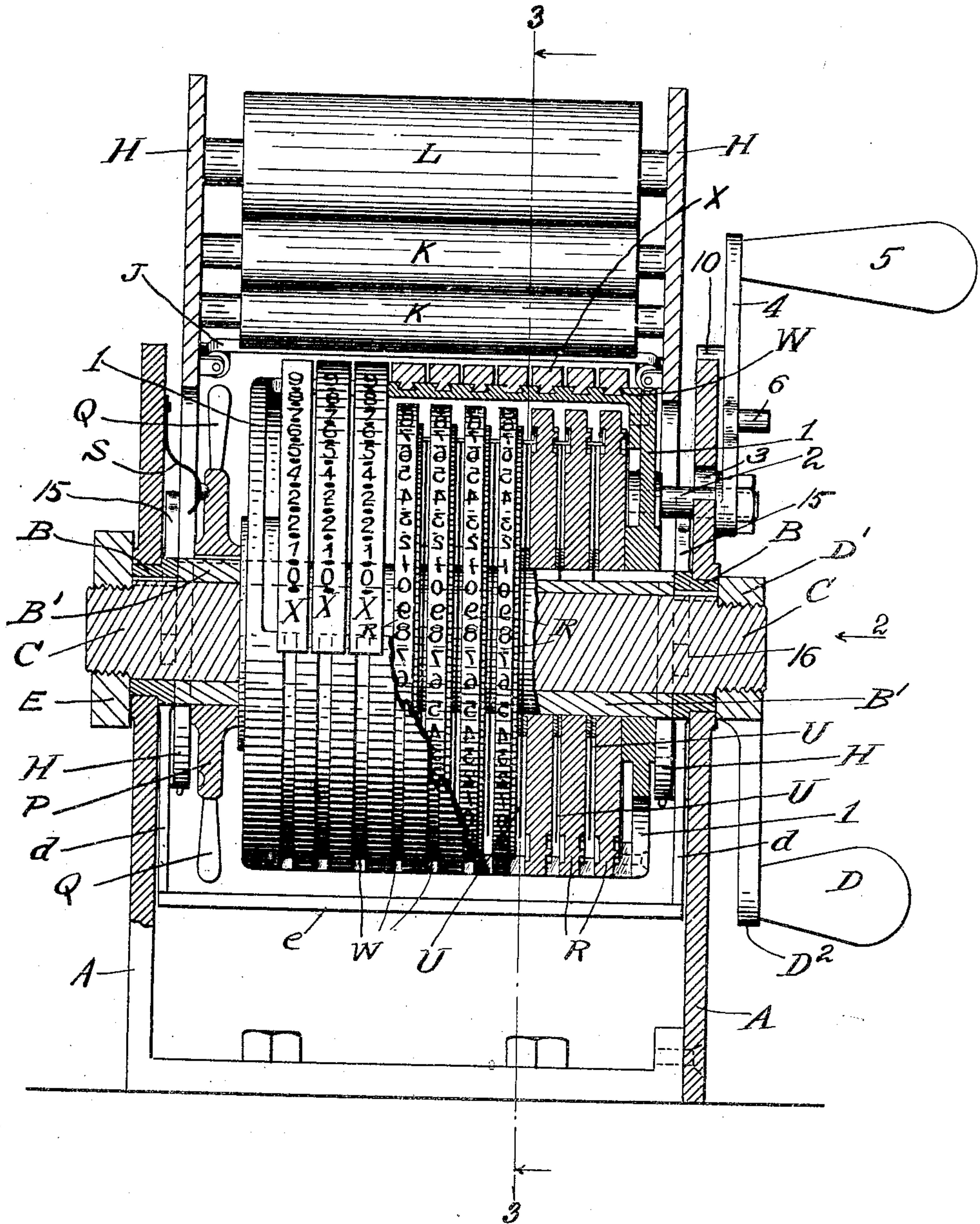


924,298.

C. D. WARD.
CALCULATING MACHINE.
APPLICATION FILED SEPT. 6, 1907.

Patented June 8, 1909.
5 SHEETS—SHEET 1.

Fig. 1



Witnesses
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924,298.

5 SHEETS--SHEET 2.

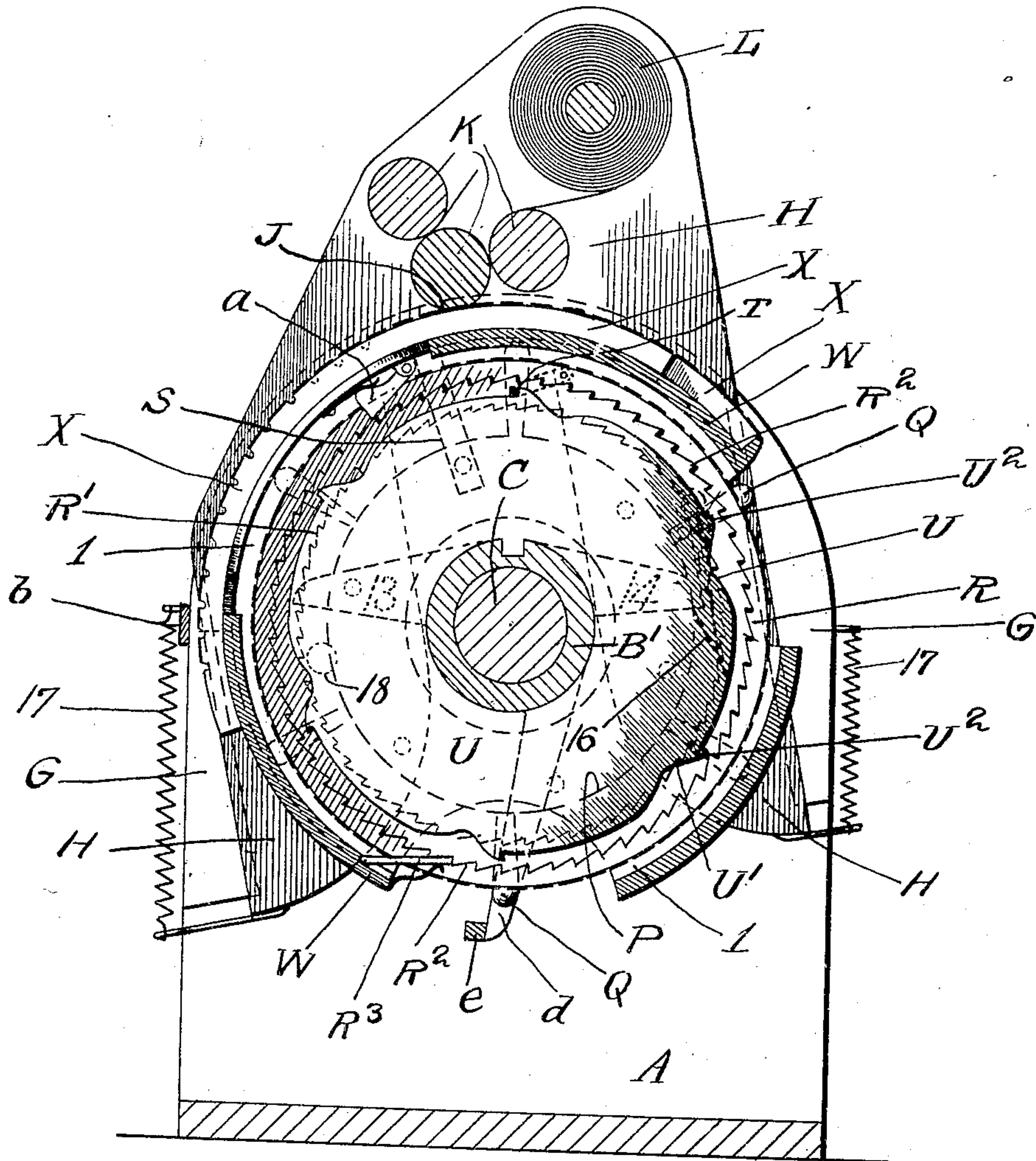
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Patented June 8, 1909.
6 SHEETS—SHEET 3.

Fig. 3



Witnesses
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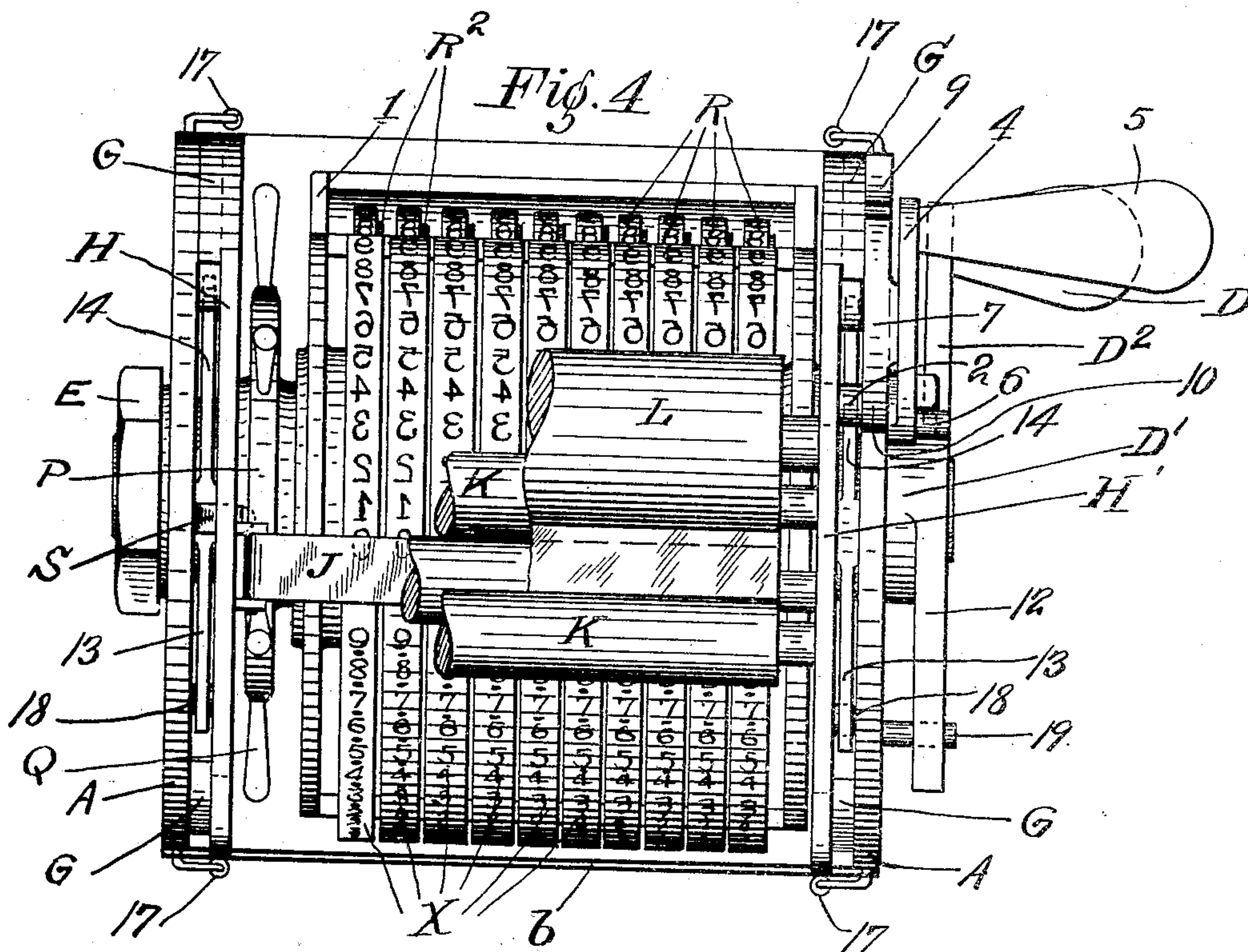
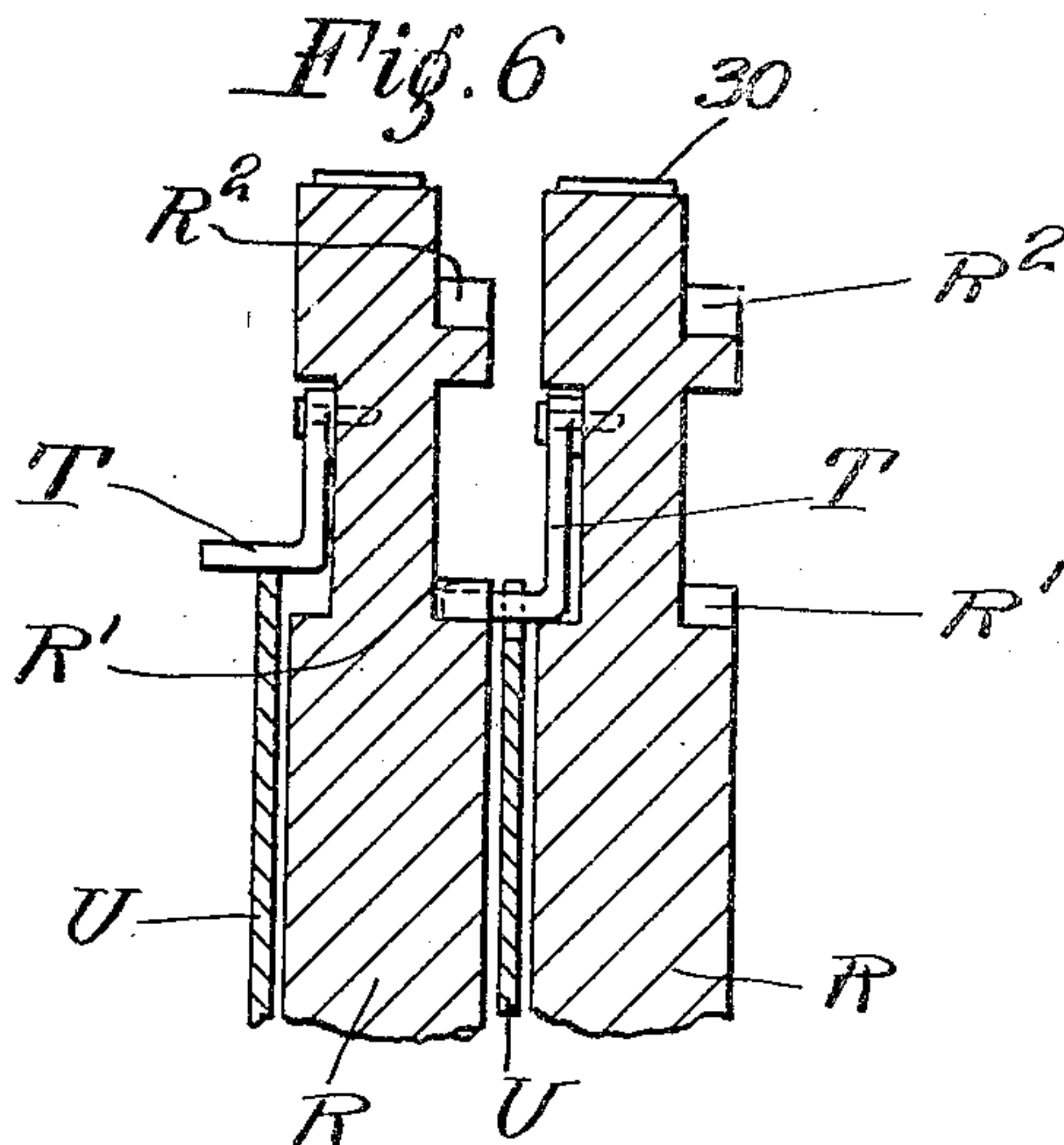
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Patented June 8, 1909.
5 SHEETS—SHEET 4.



Witnesses
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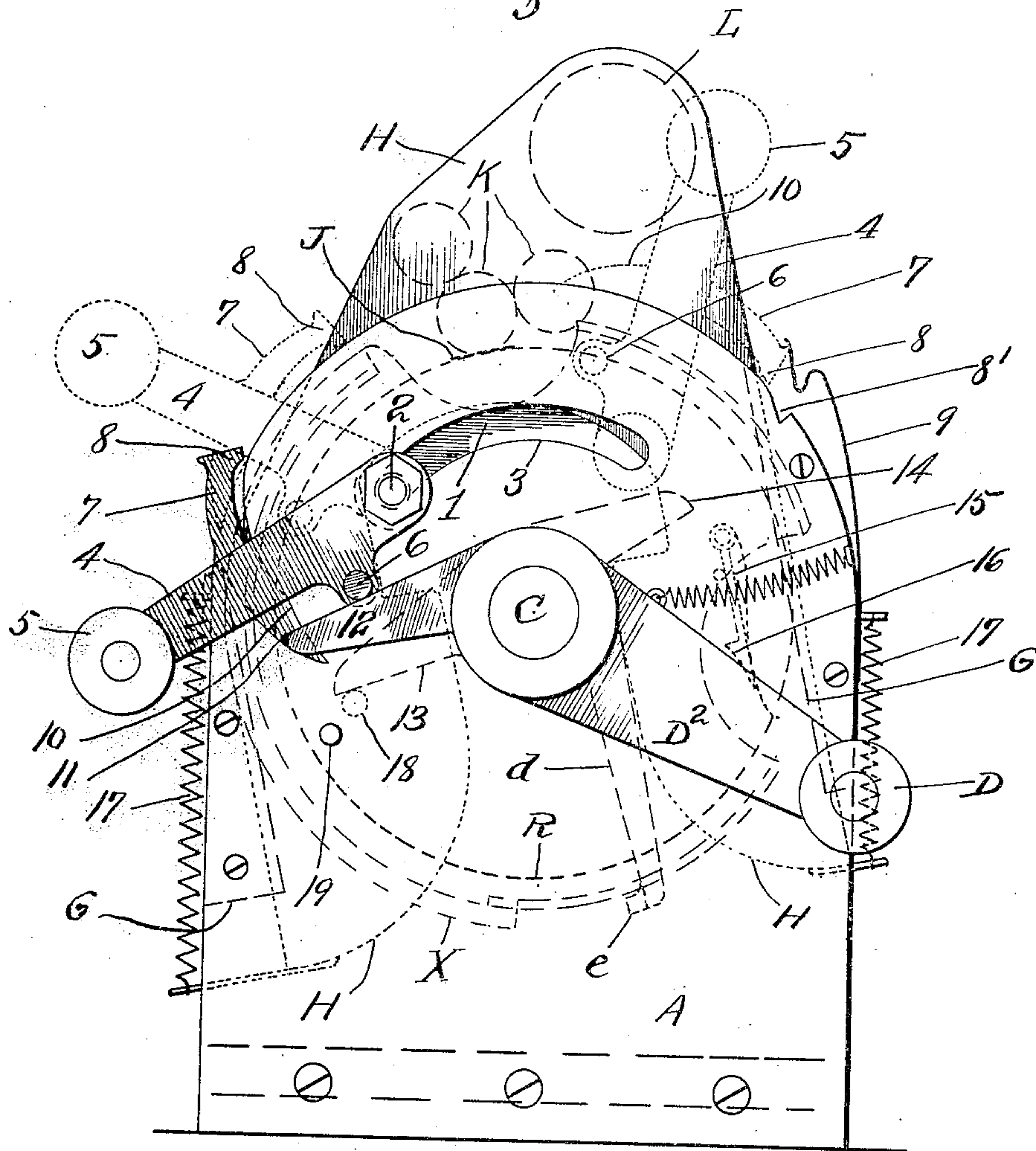
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924,298.

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Fig. 5



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UNITED STATES PATENT OFFICE.

CHARLES D. WARD, OF NEW YORK, N. Y., ASSIGNOR TO DUPLEX ADDING MACHINE COMPANY,
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CALCULATING-MACHINE.

No. 924,298.

Specification of Letters Patent.

Patented June 8, 1909.

Application filed September 6, 1907. Serial No. 391,633.

To all whom it may concern:

Be it known that I, CHARLES D. WARD, a citizen of the United States, residing at New York, in the county of New York, State of New York, have invented a certain new and useful Improvement in Calculating-Machines, of which the following is a specification.

My invention relates to calculating machines and has for its object to provide a new and improved machine of this description which will print on a strip of paper a series of rows of figures, make a summation of such figures, and print the total in its proper place at the foot of such column of figures.

My invention is illustrated in the accompanying drawings in which—

Figure 1 is a longitudinal, sectional elevation, with parts of the mechanism broken away to show the interior parts. Fig. 2 is an end elevation looking in the direction of the arrow in Fig. 1. Fig. 3 is a transverse sectional elevation on the line 3—3. Fig. 4 is a plan view with part of the printing mechanism broken away. Fig. 5 is an end elevation looking in the direction of the arrow in Fig. 1 and showing the mechanism in position for printing the total. Fig. 6 is an enlarged detail view in cross-section of the outer portion of the numeral wheels.

Referring to Fig. 1, A—A are the side frames of the machine in which is mounted a shaft C for supporting the numeral printing wheels and their associated mechanism.

At the left hand end of the shaft is a securing nut E and at the right hand end a screw threaded sleeve D' carrying the operating handle D and its arm D².

The calculating mechanism comprises a series of numeral wheels R, loosely mounted on a sleeve B' on the shaft C, the wheels having on their outer rims a series of figures (see Fig. 6) raised like type, to enable them to print. These numeral types are arranged in groups of ten, six groups being shown, although, of course, any other number might be used, the purpose of using a series of groups being to permit the employment of a wheel of comparatively large diameter, the approximately flat face of such wheel affording a better printing surface than would one of smaller diameter.

Each wheel is recessed near its periphery on both sides, and in one of the recesses are arranged the ratchet teeth R', and in the other recess are located the spring pressed

pawls T (see Fig. 6) having laterally extending fingers for engaging the teeth R' of the adjoining wheel.

Between the wheels are located the carrying and resetting disks U secured to the sleeve B' surrounding the shaft C. These disks U are of the circular shape shown in Fig. 3, but have depressions U' and projections U². The laterally projecting arms of the pawls T normally ride upon the edge of the disk U, thereby being held out of contact with the teeth of the ratchet R' on the adjoining numeral wheel. When the pawl T reaches the depression U', it is permitted (as shown at the right hand of Fig. 6) to engage a tooth and rotate the adjoining wheel a distance of one tooth, after which it rides up and over the projection U² to the surface of the disk. As each ratchet wheel has ten teeth between each two depressions, it will be seen that when one of the numeral wheels is given one-sixth of a complete revolution or ten teeth, it will carry the adjacent wheel forward one tooth. Each of the numeral wheels also has a series of ratchet teeth R² which are engaged by spring pressed stop pawl R³ mounted on the frame to prevent the backward movement of the numeral wheels, and to also insure their proper alinement.

Mounted above the numeral wheels are a series of numeral segments X arranged to move in dovetail grooved guides W.

The guides W are shown as provided with as many grooves as there are numeral wheels; and are curved concentrically with such wheels. Each of the numeral segments X has at its under side a spring pressed pawl α , which engages with the teeth R² of the corresponding numeral wheel R and causes that wheel to rotate about its axis through the same arc as the segment X. Each segment has on its outer face a series of numerals arranged as shown from 0 to 9, with a blank space ahead of the 0 so that a series of zeros need not appear before a number having less than ten figures. Between the numerals are holes or pockets into which a rod or stylus can be inserted in order to move the segment X.

In addition to the numerals above referred to, which are for indicating purposes, these segments are provided with an additional series of printing numbers from 0 to 9, properly positioned for printing and arranged with reference to the printing point so that a

row of figures will be printed corresponding to that indicated at the stop bar *b* by the indicating numerals on those segments which have been operated. As these segments or members, provided with indicating numerals, are located at the front of the machine so that the indicating numerals can be seen by the operator, they will, after they have been successively operated, present to view, in a row, just above the stop bar, the number which is afterward printed. These segments having the numerals on them are indicating devices hereinafter referred to, though it is not intended to limit the claims to the precise construction shown.

The guides *W* are carried between disk shaped end plates 1—1 which are supported on the sleeve *B'*. Secured to the right end plate 1 is a pin 2 projecting through a segmental slot 3 in the end frame *A*, this pin carrying at its outer end an arm 4 having a handle 5. This arm has secured to its outer face a pin 6, and to its inner face, a cam piece 7 having at its end a projection 8 for engaging a notch 8' in the side frame, this end 8 being also provided on its outer side with a notch for engaging a bent spring 9 secured to the frame. The spring 9 normally holds the arm 4, and the attached frames 1—1 in the position shown in Fig. 2. The cam piece 7 has at its left hand portion a curved surface 10 which is adapted, when the arm 4 is rotated about the pin 2, to be guided along the outer curved surface of the side frame *A*, which is provided with a notch 11, corresponding in shape to the end of the cam piece 7 and adapted to receive the same when the arm 4 is swung to its extreme position, as shown in Fig. 5. The slot 3 is of such length that when the pin 2 is moved to abut against the left hand end of the slot, the end plates 1—1 and associated adding and printing wheels will be at the proper position for printing totals. When in this position, a further rotation of the arm 4 about the pin 2 will cause the engagement of the pin 6 with an arm 12, (see Fig. 5) this arm 12 being secured to the sleeve *D'* of the handle *D*. The downward movement of this arm 12 causes a rotation of the shaft *C* and the sleeves *B* located between the shaft and the frame. Each of these sleeves *B* has secured thereto arms 13 and 14, extended in opposite directions, and arranged to operate the printing mechanism in the manner which will be referred to later.

The printing mechanism is carried by a pair of plates *H*, *H* which are of the shape shown in dotted lines in Fig. 2. Supported by these carrying plates are a paper roll *L* and rubber feeding rolls *K*, of the usual type of printing mechanism, *J* being a printing ribbon stretched between two spools and arranged to wind from one to the other in the usual manner, the paper being automatically fed to the rolls by each printing move-

ment, in the manner usual in devices of this kind. These plates *H*, *H* are arranged to slide in guides *G*, *G* secured to the side frames of the machine.

Carried by the plates *H*, *H* are a pair of pivoted, spring-pressed hook devices 15 adapted to engage the ends of the arms 14, the hook shaped portion 16 of said device 15 being so shaped that as the arm 14 rotates, the end of the arm will first engage the hook and pull down the printing plates *H*, so that the printing operation will be effected, and then pass by the hook, which will, owing to the operation of its spring, return to its normal position. Springs 17 secured to the frame serve to restore the plates *H* to their normal position. Pins 18 are secured to the plates *H* in position to engage the arms 13, which by their downward movement cause a sufficient depression of the plates *H* to cause the totals to be printed. Also secured to the sleeves *B* are arms *d* carrying a cross bar *e*. This cross bar *e* serves as a resetting device for the numeral segments *X*, in the manner to be described later. Pins 19 project outwardly from the side frames *A*, *A*, and serve as stops to prevent too great movement of the arms *D*² in the resetting operation. This arm has also connected to it one end of a spring 20, the other end of which is connected to the frame, to restore the arm *D*² and its connected parts to the position shown in Fig. 2.

The sleeve *B'* has secured thereto at its left hand end a resetting disk *P* provided with a series of handles *Q*. This resetting disk has a series of apertures corresponding in number to the number of groups of tens on the numeral wheels *R*, into which apertures a projection carried by a spring *S* will drop when the wheels are reset to zero by the backward movement of the sleeve *B'* and the resetting disk *P*. This resetting mechanism is of a well known type and need not be further described.

The operation of the device is as follows:—The numeral wheels *R* and numeral segments *X* are first set at their proper zero points. When it is desired to make a record and summation of several rows of figures, the operating stylus is inserted into the hole at or below the numeral in that one of the segments representing units, and pulled down until it strikes the stop bar *b*, Fig. 3. This operation is repeated until a whole row of figures is indicated, on the segments which have been pulled down, just above the bar *b*. This same row of figures will appear at that point on the segments just under the ribbon *J* and the paper on the roll *K*, ready to be printed, which printing is accomplished by pressing down the handle *D*. The rotation of this handle *D* causes the engagement of the arms 14 with the hooks 16 of the pivoted devices 15, thereby causing a downward

movement of the printing mechanism, to print the line of figures presented on the numeral segments X. A further rotation of the arm D causes the resetting bar *e* to strike the ends of those numeral segments, which have been operated, and reset them to zero, the printing mechanism having been restored to its upward position by the springs 17—17. This operation is repeated until it is desired to print the total amount. The successive movements of the numeral segments have caused the corresponding numeral wheels to be moved by engagement of the pawls *a* with the ratchet teeth *R*² to count the number which is indicated on the face of the segments, the wheels adding and carrying the successive amounts in a manner well known in devices of this kind.

To print the total, the handle 5 with its arm 4 is moved to the left, thereby disengaging cam piece 7 from the spring 9. A continued movement of the arm 4 carries with it the end plates 1—1 and rotates all the parts that are carried by the sleeve B' until the pin 2 strikes the left hand end of the slot 3, when the parts will be in a position as shown in dotted lines in Fig. 5, in which position, it will be noted, the numeral segments and guides have been rotated to the left a distance sufficient to expose the numeral wheels with their printing types in position to cooperate with the printing mechanism. In order that the printing mechanism may be operated in this position, the arm 5 is turned about rod 2 as a pivot, until the pin 6 strikes an arm 12 which by further movement will rotate the shaft C and the arm 13 carried thereby, the arm 13 engaging with the pins 18 on the printing plates H—H, thereby causing them to move the printing mechanism downward to print the total presented by the adding wheels at the printing point. A backward movement of the arm 4 to the position shown in Fig. 2 rotates the parts to their normal position, and a rotation of the wheel P resets the adding wheels to zero.

What I claim as new, and desire to secure by Letters Patent, is as follows:—

1. In a calculating machine, the combination of a series of adding devices having printing surfaces thereon, a corresponding series of segments mounted coaxially with the adding devices and having indicating numerals and printing numerals thereon and means for operating the adding devices by means of the segments.

2. In a calculating machine, the combination of a series of adding devices having printing surfaces thereon, a series of coaxially mounted segments having both indicating and printing numerals thereon, means for operating the adding devices by means of the segments and a printing mechanism arranged to cooperate with both the adding devices and the segments.

3. In a calculating machine, the combination of a shaft, a series of adding and printing devices mounted on such shaft, a series of indicating and printing mechanisms mounted in a frame carried by the shaft, means for operating the adding devices by movement of the indicating mechanisms, means for rotating the adding devices and indicating mechanisms about the shaft, a printing mechanism and means for causing the rotating mechanism to also operate the printing mechanism.

4. In a calculating machine, the combination of a frame, a shaft, co-acting adding and indicating mechanisms mounted on the shaft, a printing mechanism, means for operating the printing mechanism by rotation of the shaft, means for rotating the adding and indicating mechanisms to a second printing position, an arm on the shaft, and a pin on the rotating mechanism for engaging the arm.

5. In a calculating machine, rotatable co-acting adding and indicating printing mechanisms, a shaft, a sleeve on which such mechanisms are mounted, a printing mechanism, and means connected to both sleeve and shaft for operating such printing mechanism.

6. In a calculating machine, a shaft, a sleeve, adding and indicating mechanisms each provided with printing numerals carried by the sleeve, means for rotating the shaft, means for rotating the sleeve, and a printing mechanism arranged to be operated by either of the rotating means.

7. In a calculating machine, a movable printing device, a shaft, adding and indicating printing mechanisms each provided with printing numerals mounted thereon, and means connected to the shaft for causing the printing device to move to different printing positions.

8. In a calculating machine, a frame, adding devices and indicating members mounted therein, each provided with printing numerals, means for operating the adding devices by means of said members, a printing device, and means for moving the printing device to one position for printing from the adding devices and to another position for printing from the said members.

9. In a calculating machine, a frame, adding devices and indicating members coaxially mounted therein, each provided with printing numerals, means for operating the adding devices by means of said members, a printing device, and means for moving the printing device to one position for printing from the adding devices and to another position for printing from the said members.

10. In a calculating machine, a sleeve, a frame thereon having a series of circular guide grooves therein, indicating and printing segments arranged to slide in the grooves, a series of adding wheels also mounted on the

sleeve, and means for operating the adding wheels from the segments.

11. In a calculating machine, a sleeve, a frame thereon having a series of circular guide grooves therein, indicating and printing segments arranged to slide in the grooves, a series of adding wheels also mounted on the sleeve, means for operating the adding wheels from the segments, and means for rotating the frame.

12. In a calculating machine, a sleeve, a frame thereon having a series of circular guide grooves therein, indicating and printing segments arranged to slide in the grooves, a series of adding wheels also mounted on the sleeve, means for operating the adding wheels from the segments, means for rotating the frame, and a printing device arranged to be operated by such rotating means.

13. In a calculating machine, a shaft, a sleeve thereon, indicating and adding mechanisms mounted on the sleeve, means connected to the shaft for re-setting the indicating mechanism, and means connected to the sleeve for re-setting the adding mechanism.

14. In a calculating machine, a shaft, a sleeve thereon, indicating and adding mechanisms coaxially mounted on the sleeve, means connected to the shaft for re-setting the indicating mechanism and means connected to the sleeve for re-setting the adding mechanism.

15. In a calculating machine, a shaft, indicating and printing mechanisms thereon, a cooperating printing device, means for operating the printing mechanism by rotation of the shaft, and a re-setting device for the indicating mechanism connected to the shaft.

16. In a calculating machine, a shaft, indicating and printing mechanisms thereon, a

cooperating printing device, means for operating the printing mechanism by rotation of the shaft, a re-setting device for the indicating mechanism connected to the shaft, and arranged to be operated by a further rotation of the shaft.

17. In a calculating machine, a series of adding wheels, a frame having coaxially mounted guide ways, indicating members provided with engaging means, mounted in said guide ways, a stop bar cooperating with said members, and means for operating the adding wheels from the indicating members.

18. In a calculating machine, a series of adding and printing wheels, a series of coaxially mounted members having indicating numerals and printing numerals thereon, means for operating the adding wheels from the indicating members; a printing mechanism, mechanism for causing the printing mechanism to print from the indicating members, means for moving the indicating members to another position, and means for causing the printing mechanism to print from the adding wheels.

19. In a calculating machine, a series of adding and printing wheels, indicating devices provided with printing numerals and having means for operating the adding wheels, a frame for such indicating devices, means for shifting the frame, and printing mechanism arranged to print units from the indicating devices and totals from the adding wheels.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

CHARLES D. WARD.

Witnesses:

HERBERT G. OGDEN,
HERMAN MORRIS.