

(Model.)

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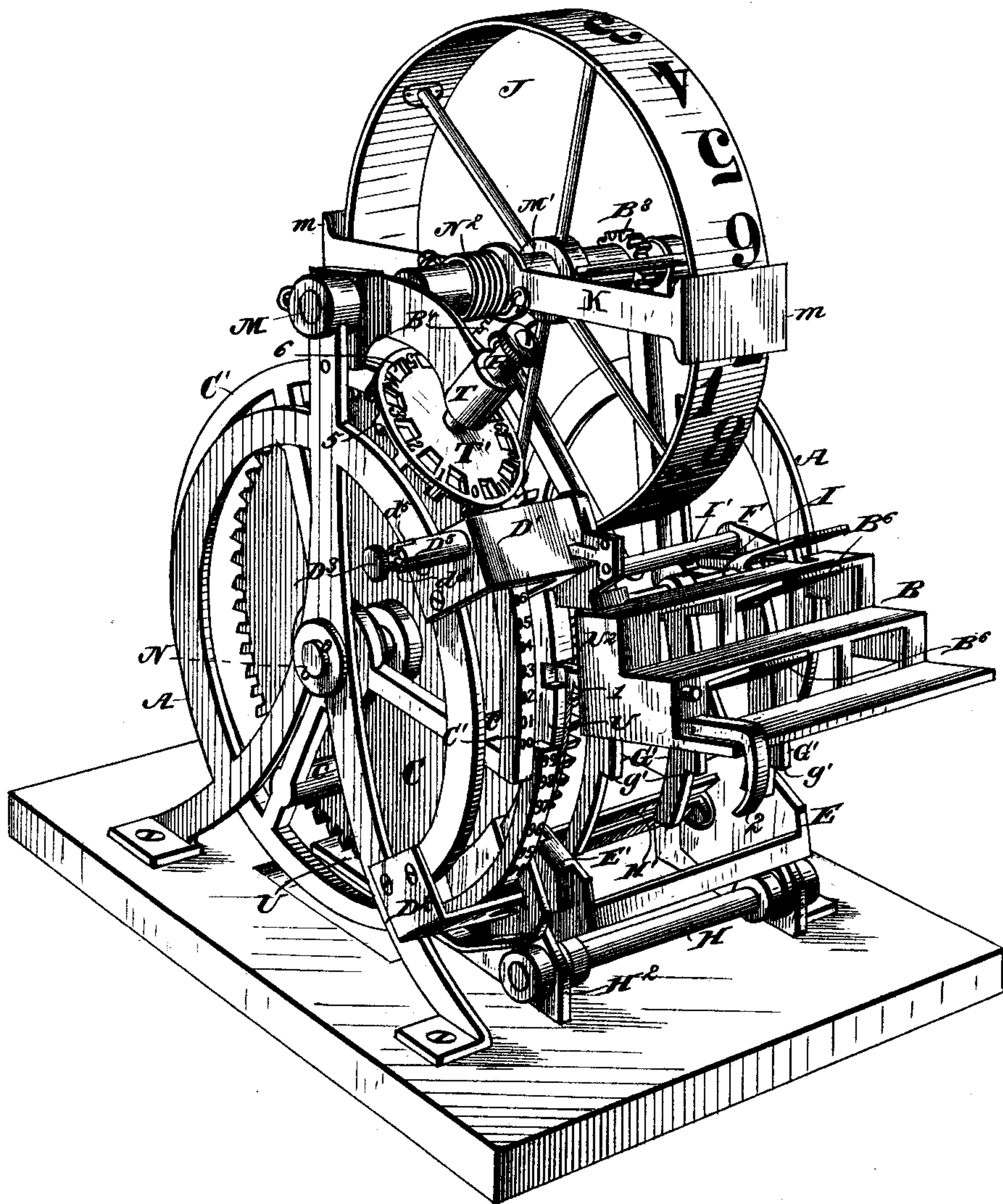
P. YOE.

INDICATING AND CALCULATING MACHINE.

No. 388,518.

Patented Aug. 28, 1888.

Fig 1.



Witnesses:
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Chas A. Mills.

Inventor:
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Attorney.

(Model.)

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Fig. 2.

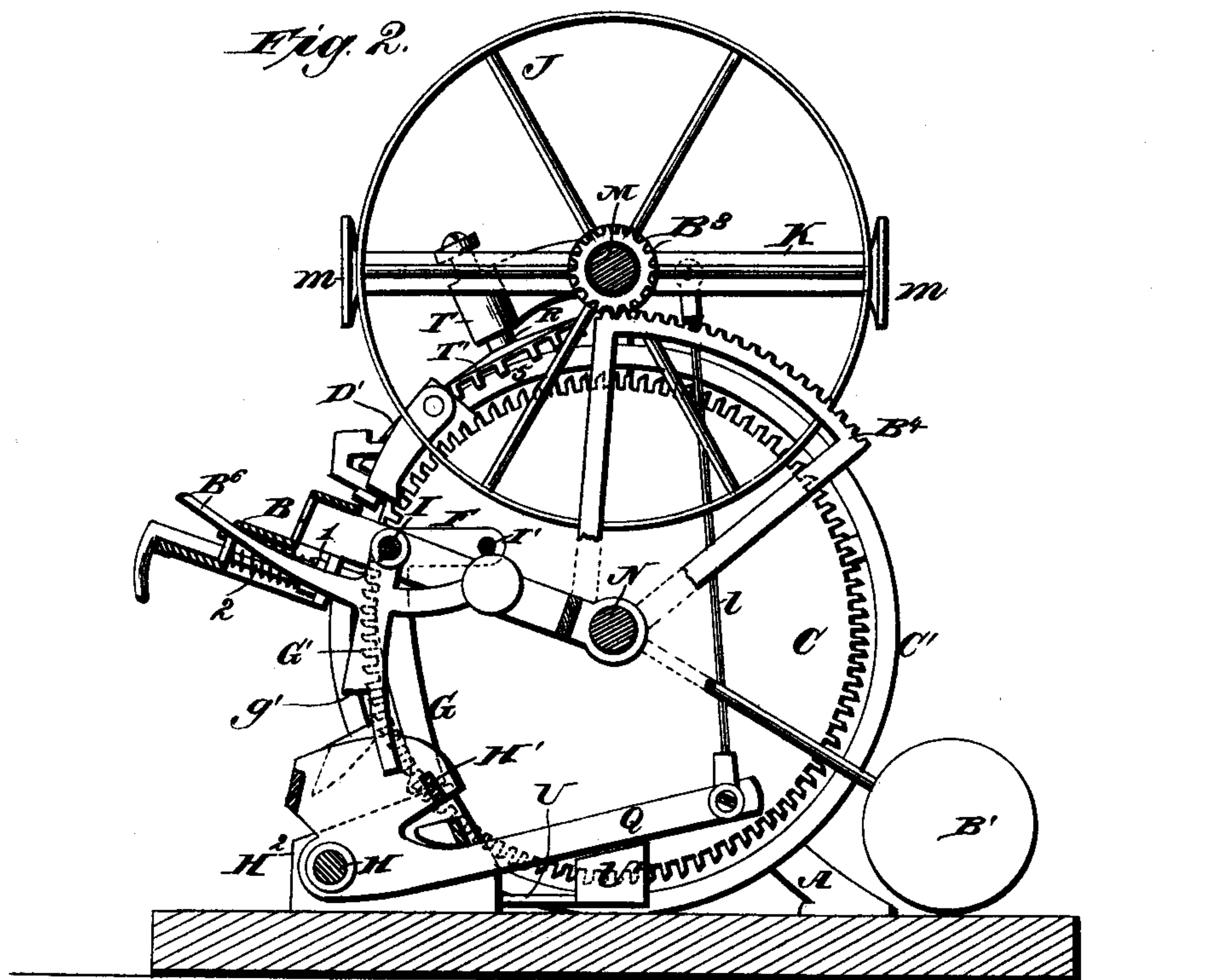
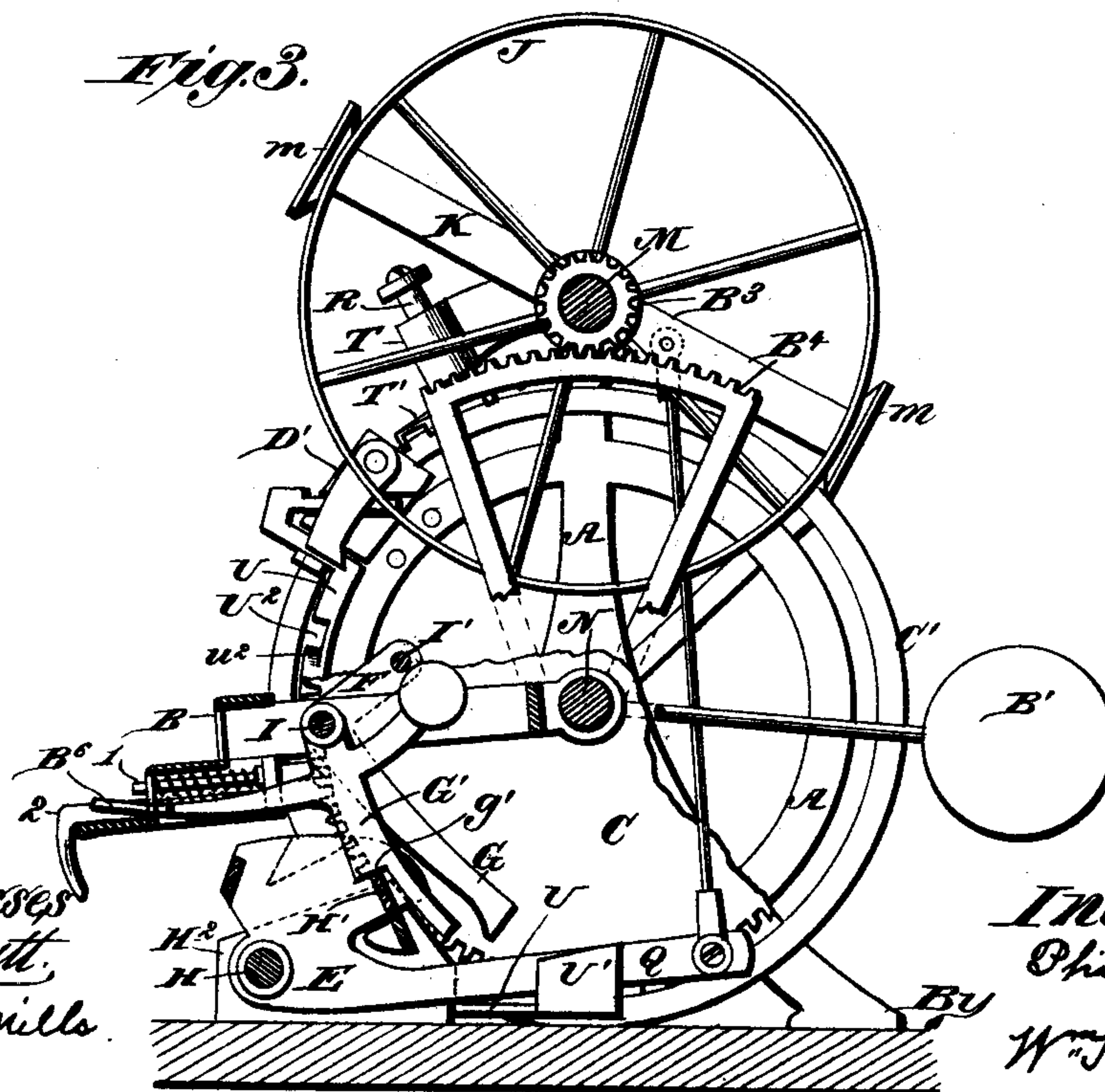


Fig. 3.



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(Model.)

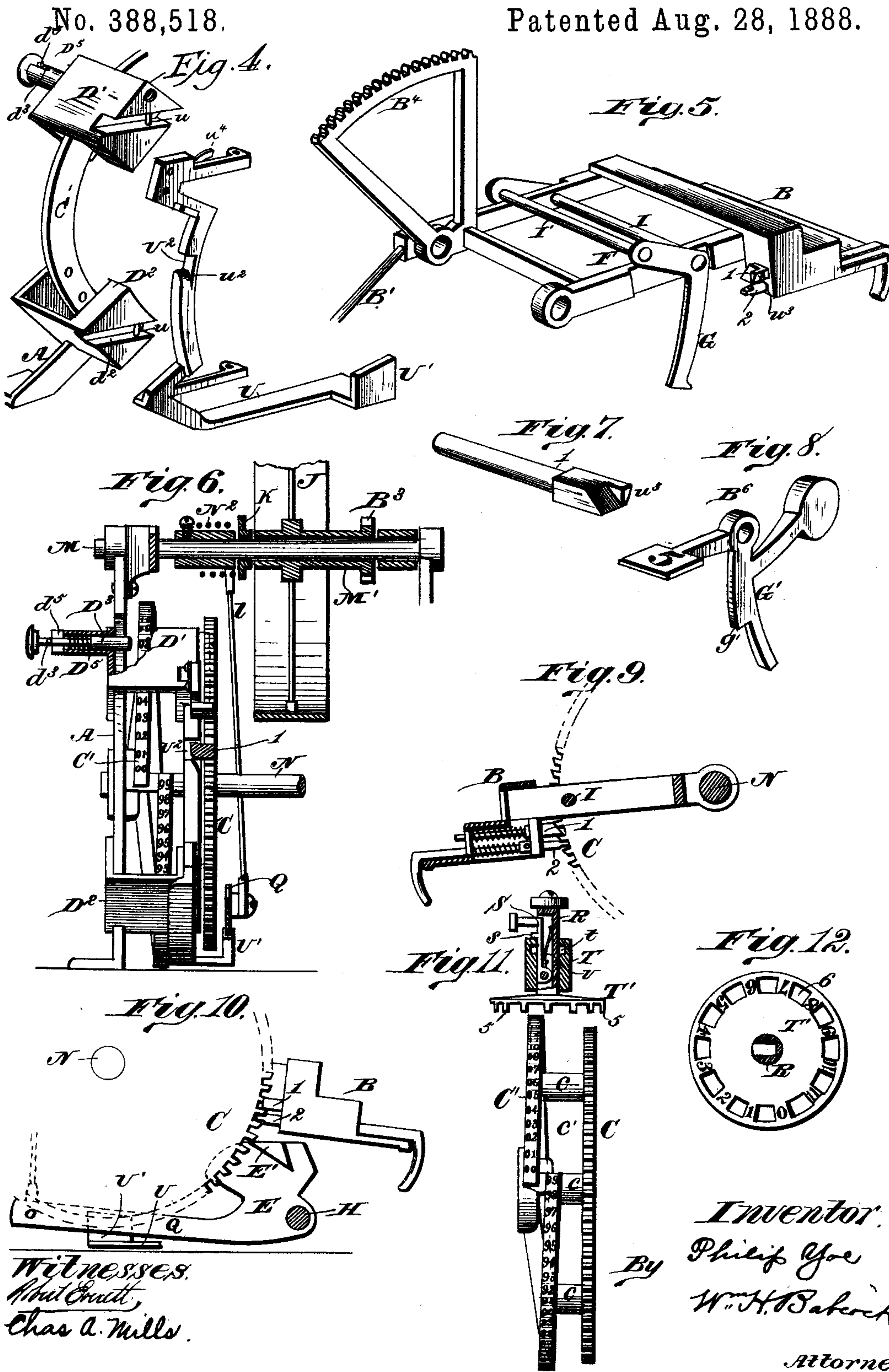
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Fig. 13.

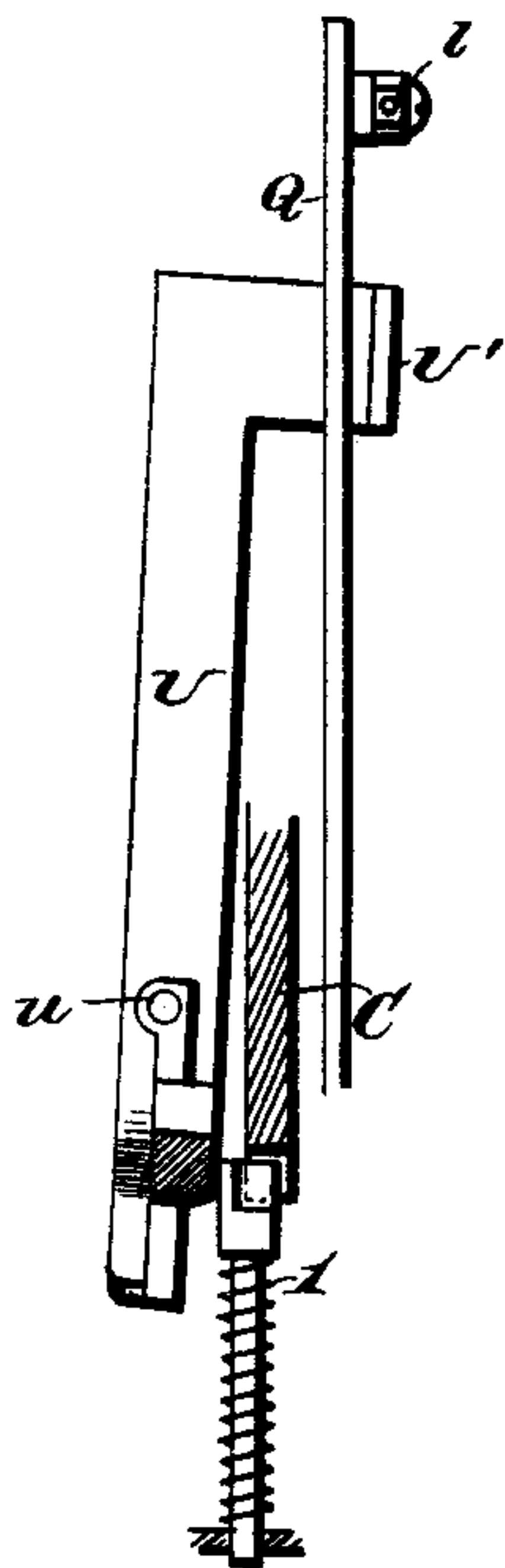


Fig. 14

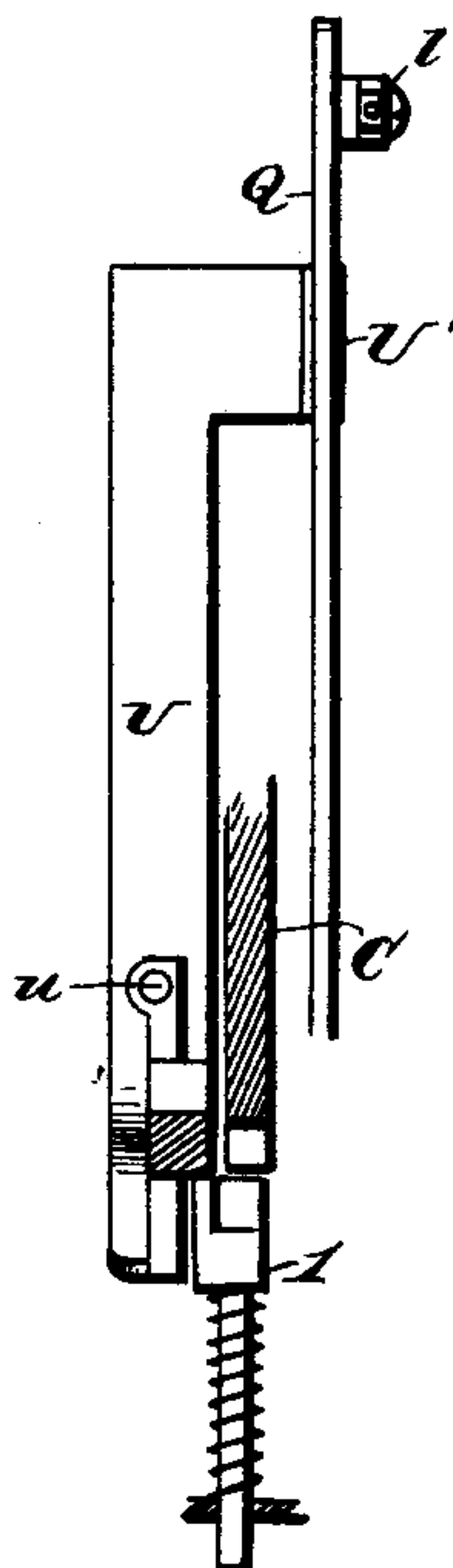
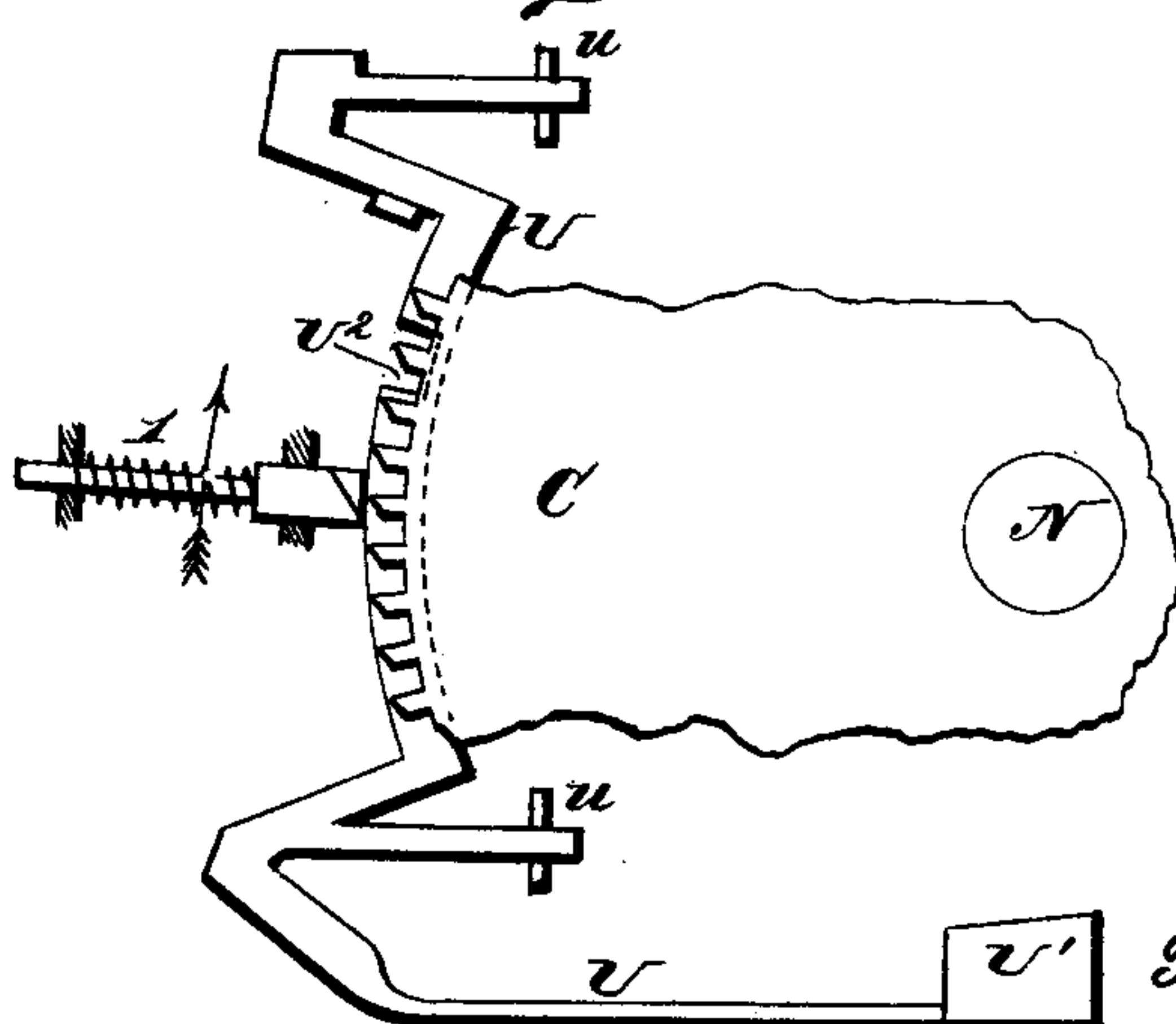


Fig. 15.



Witnesses,
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Chas A. Mills.

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UNITED STATES PATENT OFFICE.

PHILIP YOE, OF DAYTON, OHIO.

INDICATING AND CALCULATING MACHINE.

SPECIFICATION forming part of Letters Patent No. 388,518, dated August 28, 1888.

Application filed December 18, 1886. Serial No. 222,011. (Model.)

To all whom it may concern:

Be it known that I, PHILIP YOE, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented a certain new and useful Improvement in Indicating and Calculating Machines; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to indicating and calculating machines; and it consists in the construction and combination of parts hereinafter particularly set forth and claimed.

In the accompanying drawings, Figure 1 represents a perspective view of an indicating and calculating machine embodying my invention. Fig. 2 represents a vertical transverse section of the same from front to rear, partly broken away, looking toward the toothed wheel C, hereinafter described, the key-frame being in its highest position. Fig. 3 represents a view similar to Fig. 2, except that the toothed wheel C is partly broken away and the key-frame in its lowest position. Fig. 4 represents a detail view of the laterally-movable bar U, its supporting devices, from which it is slightly separated in this figure, and a part of the spiral hereinafter described. Fig. 5 represents a detail view in rear perspective of the key-frame, the supplemental frame attached thereto, and certain additional devices. Fig. 6 represents a partial transverse vertical section of the wheel C, spiral C', and shaft M, with some other parts being shown in elevation. Fig. 7 represents in detail perspective the sliding pin which operates the laterally-moving bar U. Fig. 8 represents one of the keys in detail perspective. Fig. 9 represents in detail the two spring-pressed pawls 1 and 2 and the key-frame and shaft whereby they are supported, a part of the toothed wheel C being shown in outline. Fig. 10 represents a similar view in elevation taken from the other side, the devices for automatically locking the toothed wheel at the end of the downward

movement of the key-frame being shown in part also. Fig. 11 represents the computation-wheel in detail elevation, with the indicator-plate and means for turning the latter back to zero, said means being partly in vertical section. Fig. 12 represents a detail plan view of the indicator-plate, the stem thereof being in cross-section. Figs. 13 and 14 represent enlarged detail plan views of the bar U, the arm Q, and the spring-pressed pin 1, with a part of toothed wheel C shown in section, the former view being taken when the said bar is moved sidewise by said pin, the latter when it is in its normal position. Fig. 15 represents the bar U, pin 1, and a part of wheel C in side elevation.

A designates the frame of the machine, consisting of two upright side castings, which are fastened to a suitable bed. These side plates or castings have bearings formed in them for two horizontal transverse shafts arranged in the same transverse vertical plane, the upper shaft being marked M and the lower one N.

The computation-wheel consists of the spiral C' and a toothed wheel, C, attached thereto by studs c, so as to leave an intervening space, c'. The spiral has its periphery graduated in figures from 0 to 99. The computation-wheel as a whole is fast on shaft N, and of course turns therewith. The teeth of wheel C are beveled on their forward face, using this term with reference to the direction of rotation of said wheel. They admit between them two spring-pressed pins or pawls, 1 and 2, which are similarly beveled on their upper sides and mounted in a vertically-vibratory key-frame, B. The downward motion of said frame causes a corresponding partial rotation of said wheel by reason of the engagement of said pawls with the latter. When the key-frame is to be raised for another impulse, the said pawl 2 is first withdrawn by hand from such engagement, the pawl 1 being automatically withdrawn by the return of bar U, hereinafter described. This key-frame is pivoted on shaft N and provided with an adjustable counterbalance-weight, B'. A toothed segment, B', rigid with said key-frame B, meshes with a pinion, B'', formed with a sleeve, M', turning on shaft M. This sleeve also carries an

indicator-wheel, J, provided on its periphery with two parallel series of numbers in large type, those on the right being visible through the front window of the case and those on the left through the back window of the case, these two series being arranged in reverse order the one to the other. Shields *m* are normally held between these figures and the windows, said shields being carried by the ends of a bar, K, turning on sleeve M', but provided with a coiled spring, N², which ordinarily holds it horizontal. From this bar a rod, L, extends down to a long arm, Q, of a vibratory frame, E, mounted on a fixed shaft, H, under frame B. This frame E is provided with a shoulder, E', which engages with and locks the toothed wheel C when said frame E is depressed. The frame B is normally locked by a fixed plate or flange, H², which is raised from the bed of the machine, and an arm, G, extending downward into contact with said plate or flange from a supplemental frame, F, mounted on a transverse shaft, I, the latter being fixed in the key-frame B. On this shaft I a series of keys, B⁶, is individually pivoted, each key being provided with a rearwardly-extending end below the rear cross-bar, I', of supplemental frame F, so that the depression of the front end of a key will result in lifting said cross-bar I' and rocking said frame F correspondingly on its pivot. Each key has also a downwardly-extending arm, G', provided with a shoulder, g', arranged to come in contact, when lowered a predetermined distance, with the rear cross-bar, H', of pivoted frame E, thereby rocking said frame. The independent downward motion of the front end of each key is limited by the key-frame B.

The frame E is normally locked by a flange, U', raised under the rearwardly-extending arm Q of said frame. This flange forms part of a laterally-movable bar, U, which is supported by its stud *u* in a lateral slot, d², of a plate, D², rigidly attached to the frame A. Said bar U extends upward in a curved line into the space between the graduated spiral and the toothed wheel C. It has a peripheral recess, U², near its upper end, the material at the lower inner corner of which is rounded or beveled at *u*², Fig. 4. This rounded corner receives the oblique lateral impact of the correspondingly-beveled point *u*³ of the spring-pressed pin 1, already referred to as carried by frame B. There are thus independent locking devices for the key-frame and for the toothed wheel, and devices which operate the shields *m*, and these are successively unlocked by the downward pressure of the operator's finger on any one of the keys.

A plate, D', attached to the frame A has a gravity-pawl pivoted to it, which engages with the teeth of wheel C and prevents said wheel and the spiral from turning backward. A spring-pressed friction-rod, D³, works through said plate and bears against the spi-

ral C', locking the machine until withdrawn by hand. After withdrawal it is held out of contact with said spiral by studs *d*³ on the sides of said rod, which come in contact with the outer end of a fixed tube, D⁵, which incloses and guides said rod D³. The said tube is longitudinally slotted at *d*³ inward from said end, to allow the said studs and rod to be drawn out and turned for such locking.

The fixed upper shaft, M, has an arm rigid therewith, which has a tubular bearing, T, formed in its end. This has a recess, *t*, on its inside, which is engaged by a lug, *s*, formed with a small bar, S, pivoted within a stem, R, and forced by a spring, *v*, into such engagement. This stem, recessed on one side to receive said pivoted bar, extends through said tubular bearing, and bears at its lower end an indicator disk or plate, T', provided with a circular series of openings, 6, near its edge. These openings successively expose the successive figures on the periphery of the spiral C', the plate or disk being turned by the contact of said rotating spiral with downwardly-extending crown-teeth 5 of said disk. By forcing inward said bar *s* it is disengaged from bearing T, so that the plate or disk may be turned back to zero. Its edge or peripheral part is graduated between the openings 6.

The operation of the machine is as follows: The graduated spiral C' and the indicator-plate T both are set at zero. One of the keys is then pressed by the operator's finger, so that its rear end will lift the rear cross-bar of supplemental frame F. This causes said supplemental frame to rock on its pivot-shaft I and removes the arm G from contact with fixed plate H², thereby leaving key-frame B at liberty to rock downward. The continued pressure of said key causes this downward rocking of said key-frame. The obliquely-beveled pin 1, carried by key-frame B, simultaneously moves the bar U laterally by the contact of its obliquely-beveled point with the correspondingly-beveled lower inner corner, *u*², of the material bounding recess U². This lateral shifting of bar U removes the locking-flange U' from under the rear arm, Q, of the lower frame, E. Simultaneously the pawl 2, carried by key-frame B, engaging one of the teeth of wheel C, turns said wheel and the spiral C', and this latter turns the indicator plate or disk T', as before stated. The downward motion of frame B continuing and the supplemental frame F being carried thereby, the arm G' of the latter frame soon comes in contact with the rear cross-bar of frame E, rocking said frame backward, so as to put its shoulder E' into contact with one of the teeth C, thereby locking said wheel. The depression of rigid arm U as said frame E rocks backward pulls rod L downward, and thereby rocks the arm K, so as to remove the shields *m* from the figures of wheel J which at the time are opposite the front and rear windows of the case.

These figures are determined by the length and shape of the arm G' or the position thereon of the shoulder g' , since the segment B' , moving with the vibrating key-frame B , turns the sleeve M' and the wheel J during the downward motion of said frame, and since this motion is greater or less according to the distance traveled by said arm G' before coming in contact with the lower frame, E , and causing its flange E' to engage the wheel C . As the keys will have the shoulder g' at different distances from their lower ends, the depression of each key will cause a different figure of wheel J to appear through the windows of the case from that which would be exhibited by similar pressure on any other key. This difference in their action on wheel J would be paralleled by the corresponding action of the keys and intervening parts on spiral C' and indicator-wheel T' , which are equally controlled in their forward motion by the tilting of frame E . After each depression of key-frame B the machine is automatically locked against upward motion by the spring-pressed pawl 2, the end of which then comes in contact with the un-beveled upper side of one of the teeth of wheel C . When this pawl is withdrawn by hand, the key-frame may be raised, the pawl 1 riding upward free of the teeth of said wheel. All the parts then return to their original position, except the wheel C , the spiral C' , the shaft N , the indicator-plate T' , and the stem T . All of these parts have been advanced more or less to a predetermined extent, and this advance they do not lose, it being with them a step-by-step motion forward until intentionally turned back by hand. At each downward motion of key-frame B the rotary step-by-step motion of indicator-plate T' is but very slight, since a complete revolution of spiral C' moves the said indicator-plate only through the distance indicated by one numeral of its series. Thus said indicator-disk is in function a hundreds-wheel, the spiral C' taking the place of a unit-wheel. Of course the key chosen for each impulse will correspond to the sum which is to be registered. This will be shown by the numeral exposed on each side of wheel J , and the same numeral or numerals indicating the same advance will appear on the spiral C' through one of the openings in the indicator-plate T' . The return of the bar U to its original position as the key-frame rises is effected by the action of a replacing spring, w , and this also withdraws the pawl or pin 1 from engagement with wheel C , as already stated.

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

1. The combination of the pivoted key-frame B with a key, B' , pivoted thereto, a supplemental frame, F , pivoted to frame B and arranged to be rocked by said key, an arm on said supplemental frame, a fixed plate en-

gaged by said arm to lock said frames B F until said key moves said arm out of the way of said plate by rocking the frame F , a wheel bearing numerals on its periphery, and intermediate devices whereby said wheel is operated by said frame, substantially as set forth. 70

2. The combination of the shields m , bar K , and rod L with the pivoted frame E , the key and key-frame whereby frame E receives motion, the laterally-movable bar U , provided with a flange for locking said key-frame, and the obliquely-beveled pin 1, carried by said key-frame and arranged to come in contact with a similar bevel on the bar U as the key-frame descends, for the purpose set forth. 80

3. The pivoted frame E , provided with a shoulder, E' , in combination with a peripherally-toothed wheel, C , engaged and locked by said shoulder, a key-frame and key arranged to rock said frame E for effecting said locking, and a peripherally-graduated attachment of said toothed wheel, whereby it becomes an indicating or computation wheel, substantially as set forth. 85

4. In combination with a key and key-frame, a segment moving with said frame, a pinion and indicator wheel driven by said segment, a locking device for said key-frame relieved by said key, a computation-wheel provided with teeth for step-by-step forward motion, and a pawl attached to said key-frame for driving said teeth, substantially as set forth. 95

5. A key and key-frame, in combination with an indicator-wheel, J , intervening gearing whereby said wheel is turned forward or backward as said key-frame vibrates downward or upward, shields m , for covering the numbers on said wheel, a pivoted frame, E , operated by said key and key-frame, a pivoted bar which carries said shields, and a rod connecting said bar to said lower frame, in order that the depression of the key and key-frame may move the indicator-wheel on its axis a certain distance and then uncover the numeral thus presented by its periphery, substantially as set forth. 100 105 110

6. In combination with a key and key-frame, a pawl carried by said key-frame, a toothed wheel moved step by step by said pawl, a graduated spiral carried by said wheel, a toothed indicator-plate engaged and turned by said spiral, and a spring-catch which allows said plate to be turned back to zero at will, substantially as set forth. 120

7. A vibratory key-frame and a spring-pressed pawl which is carried thereby and adapted to be withdrawn by hand, in combination with a toothed computation-wheel which is driven by said key-frame and pawl, an additional graduated wheel, J , and intervening devices whereby the latter wheel is operated by said key-frame, the said pawl serving to lock the key-frame against upward motion by its engagement with the teeth of 125 130

said computation-wheel, substantially as set forth.

5 8. An indicator-wheel having two reverse sets of numerals on its periphery, in combination with a pivoted bar, shields on said bar for simultaneously covering or uncovering the same numerals at front and back, and mechanism for turning said wheel and rocking said bar, substantially as set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

PHILIP YOE.

Witnesses:

B. PICKERING,
SUMNER T. SMITH.