

No. 679,074.

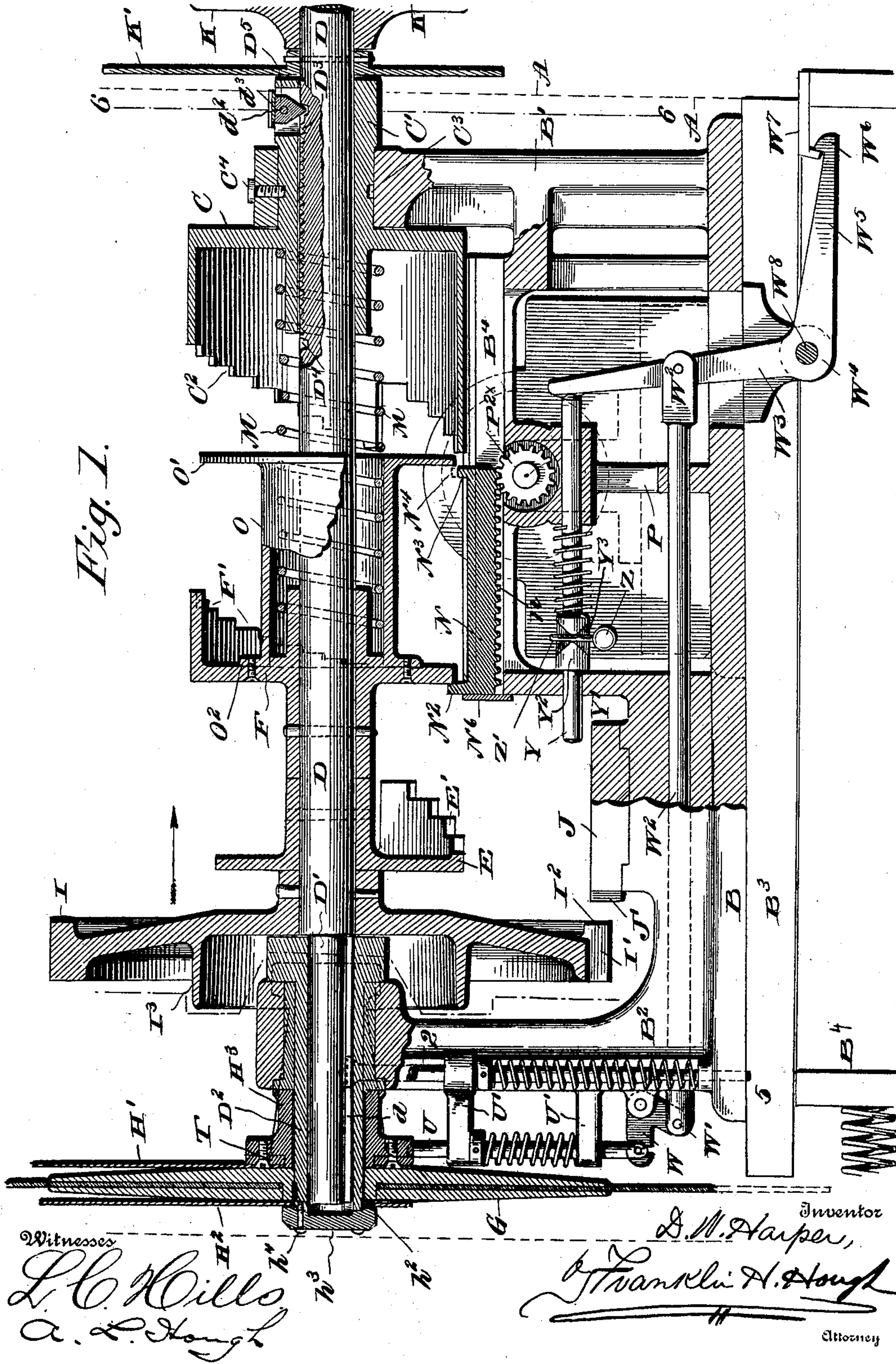
Patented July 23, 1901.

D. W. HARPER.
CASH REGISTER.

(Application filed Nov. 3, 1897.)

(No Model.)

7 Sheets—Sheet 1.



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7 Sheets—Sheet 2.

Fig. 2.

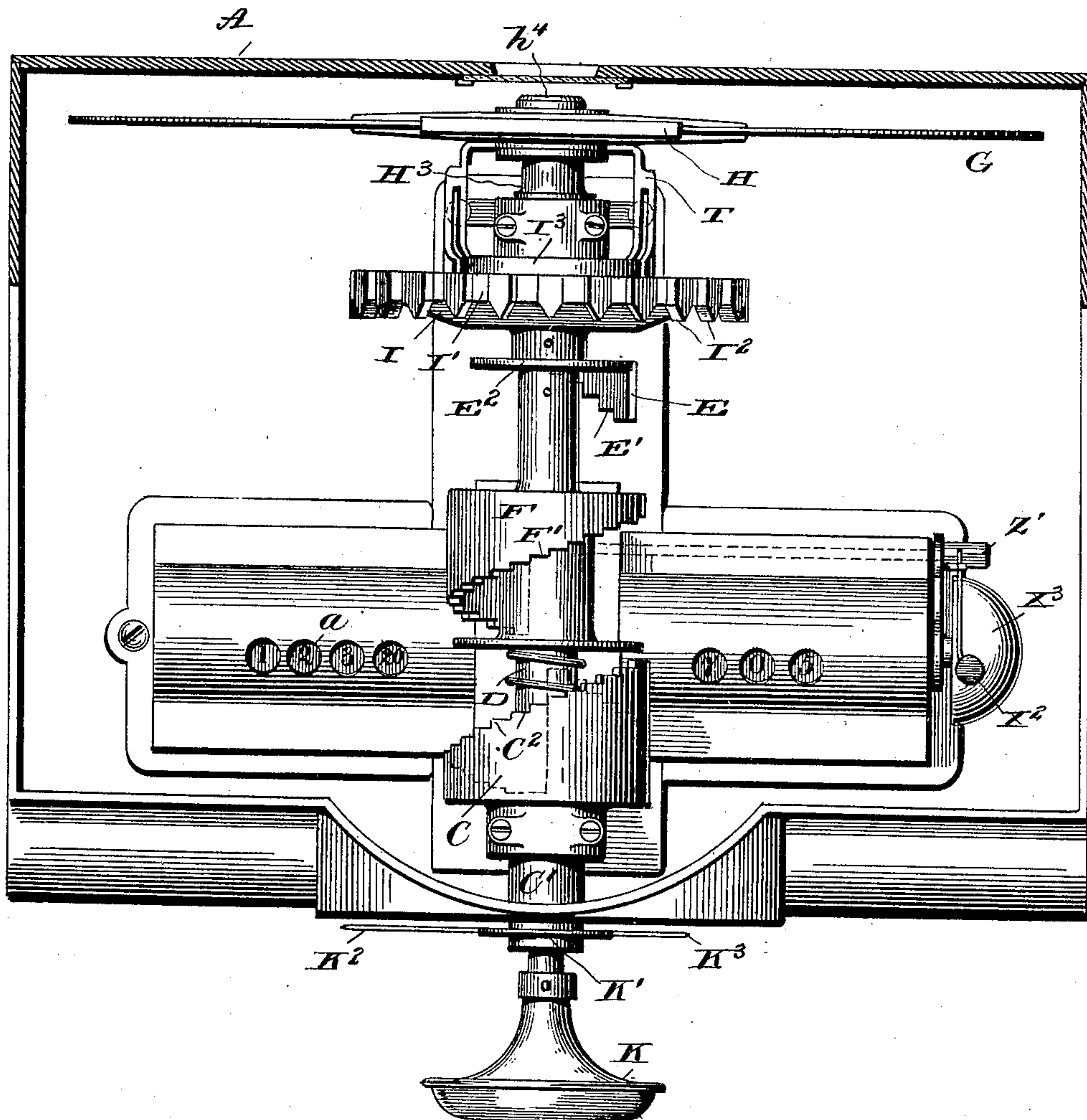
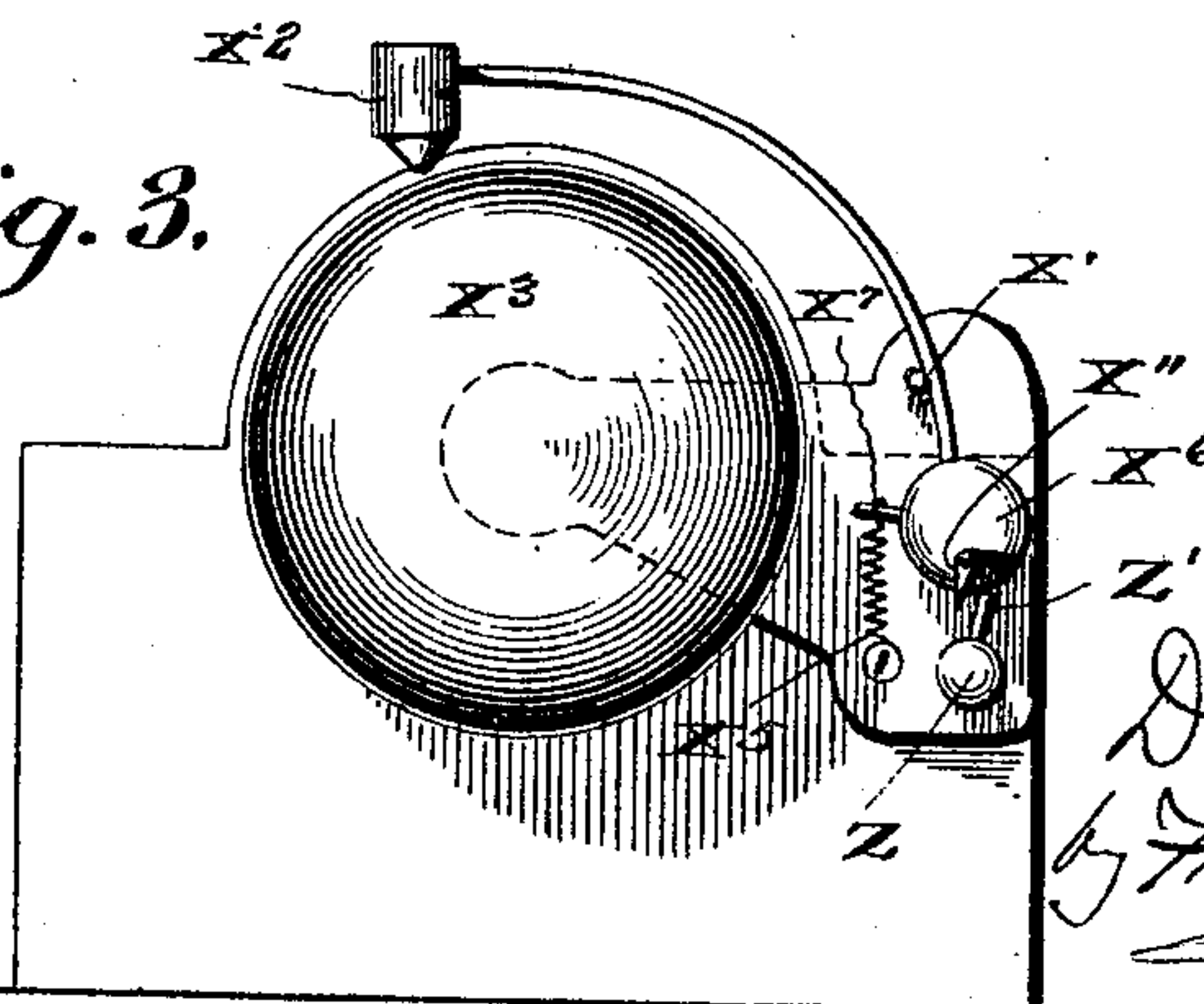


Fig. 3.



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Fig. 4.

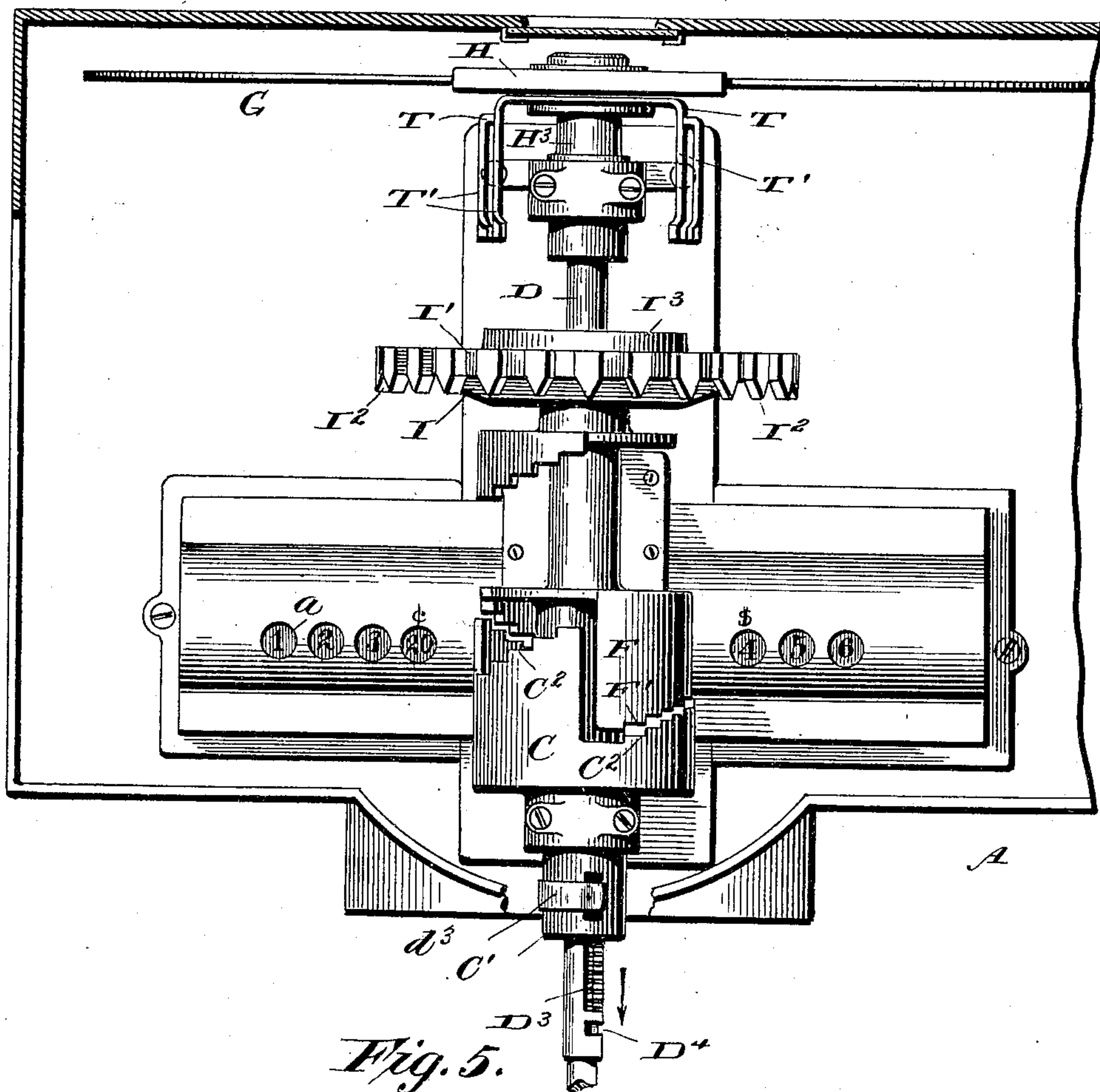
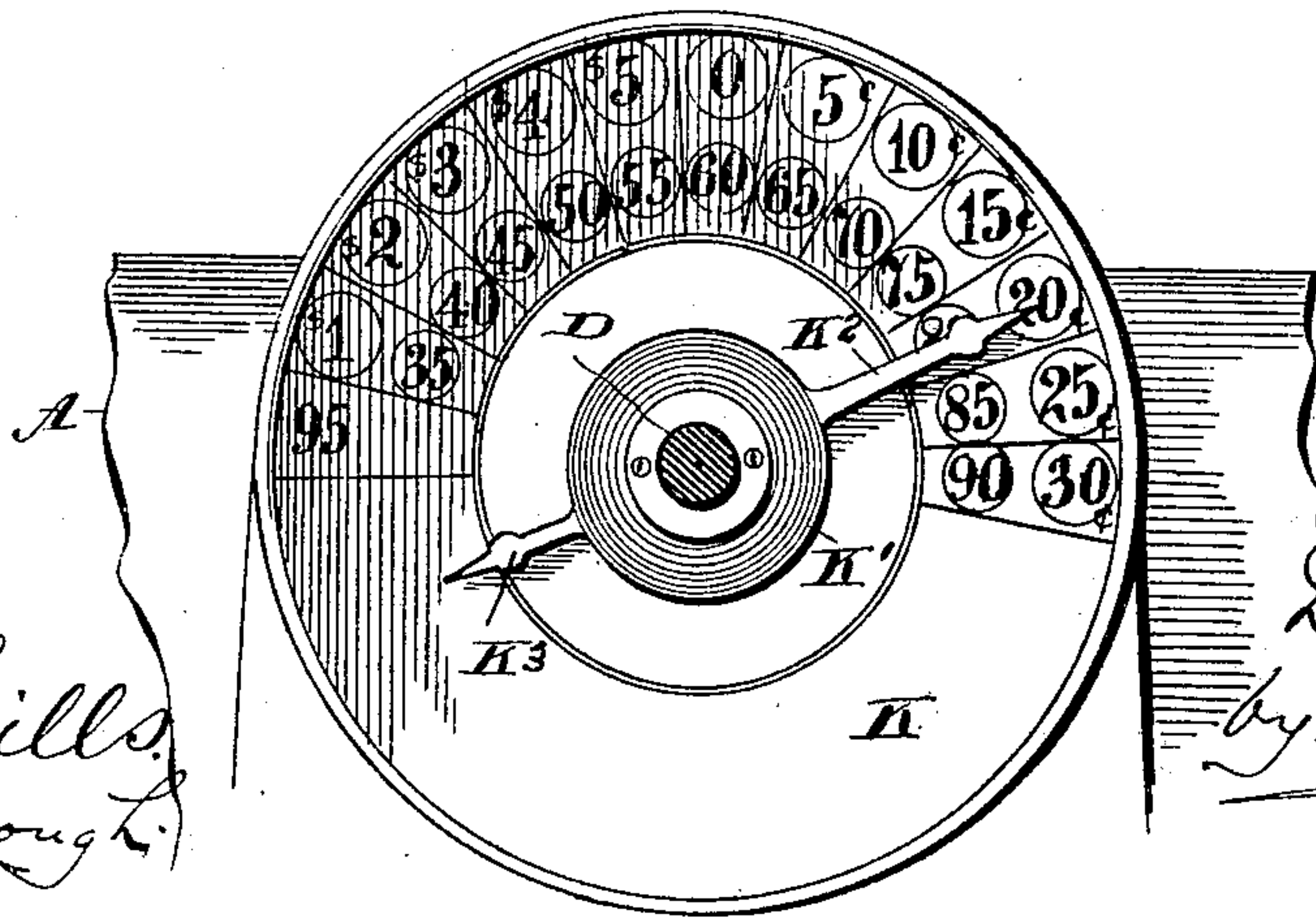


Fig. 5.



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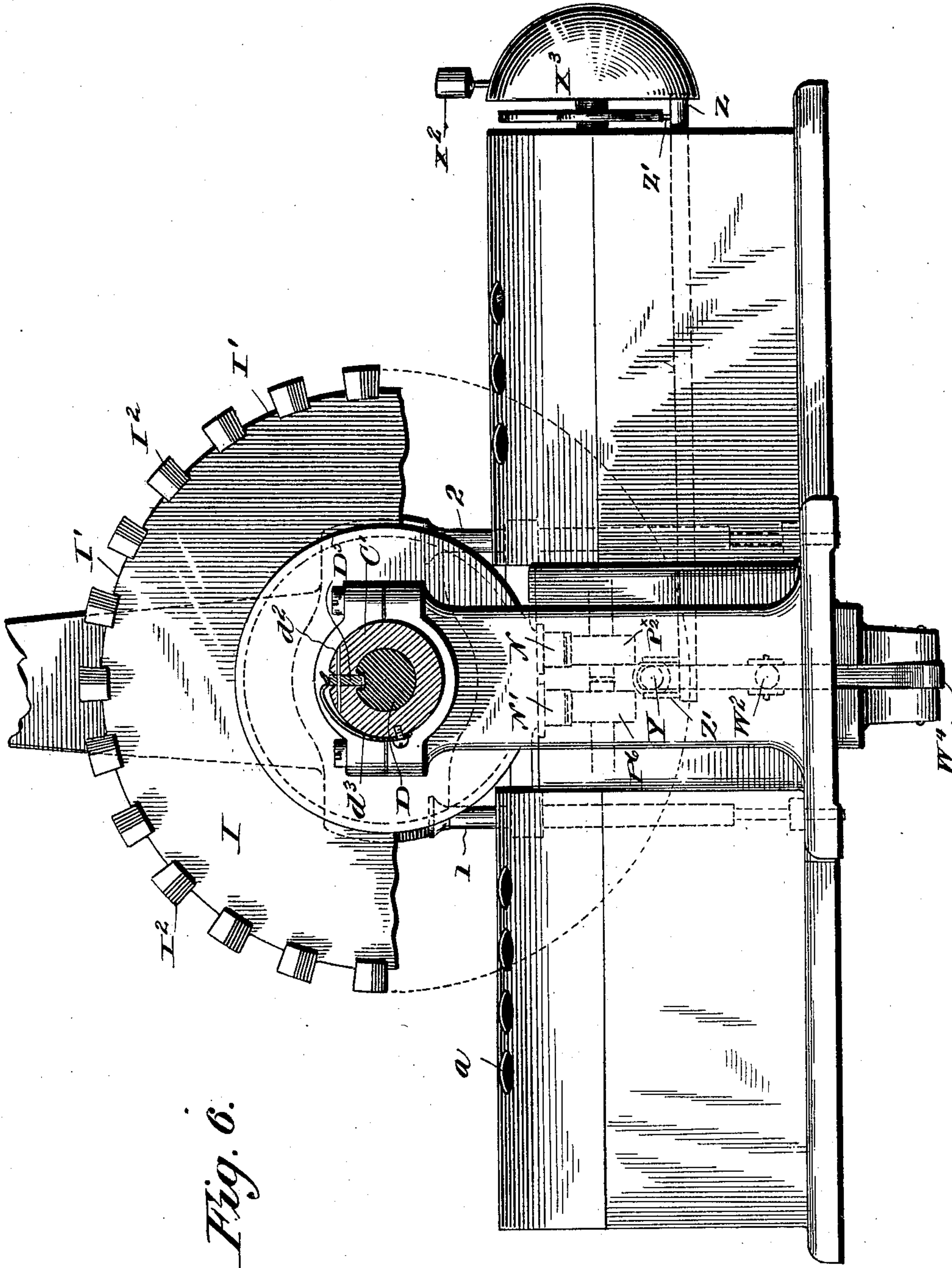
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7 Sheets—Sheet 4.



Witnesses

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Fig. 7.

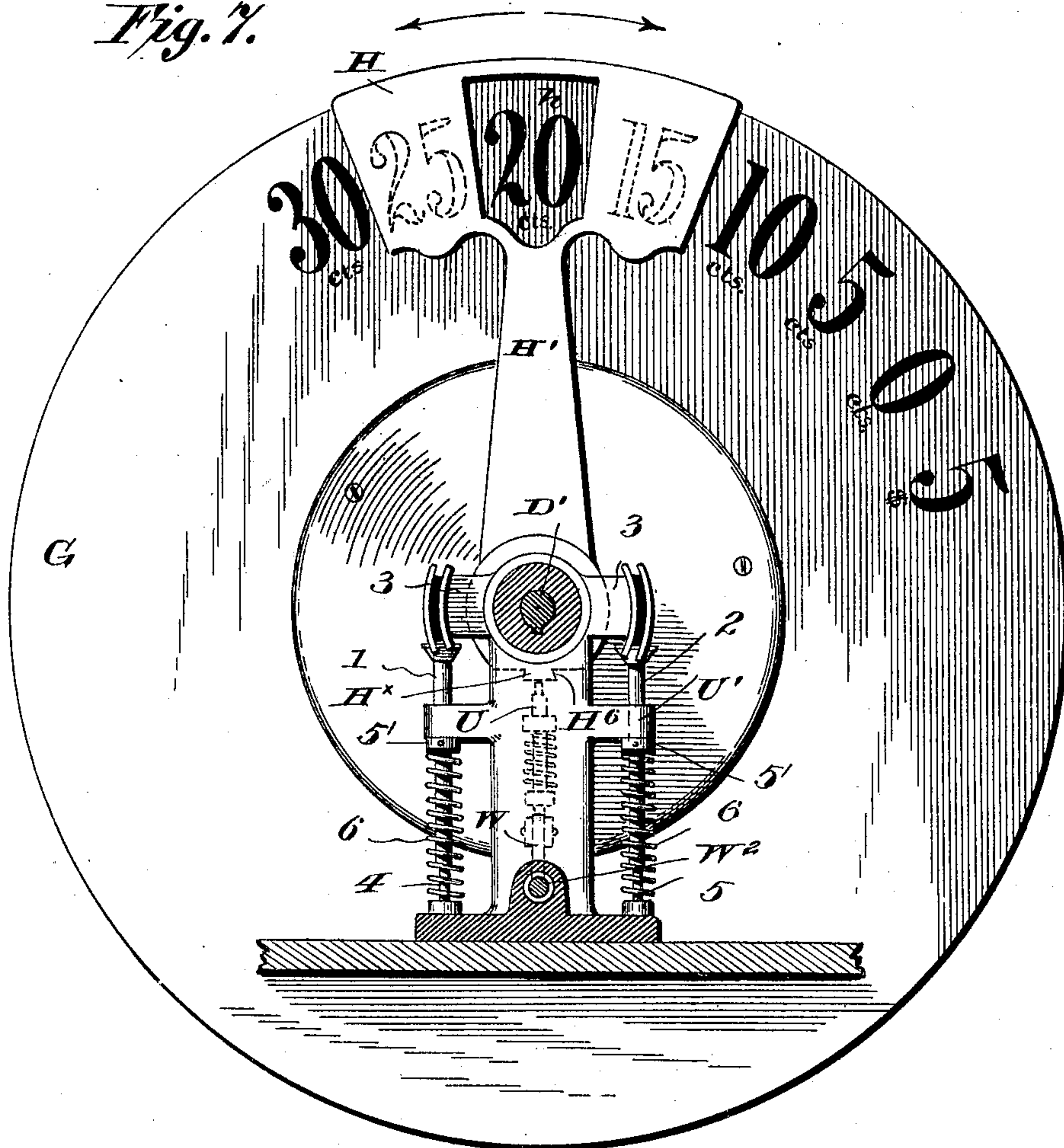
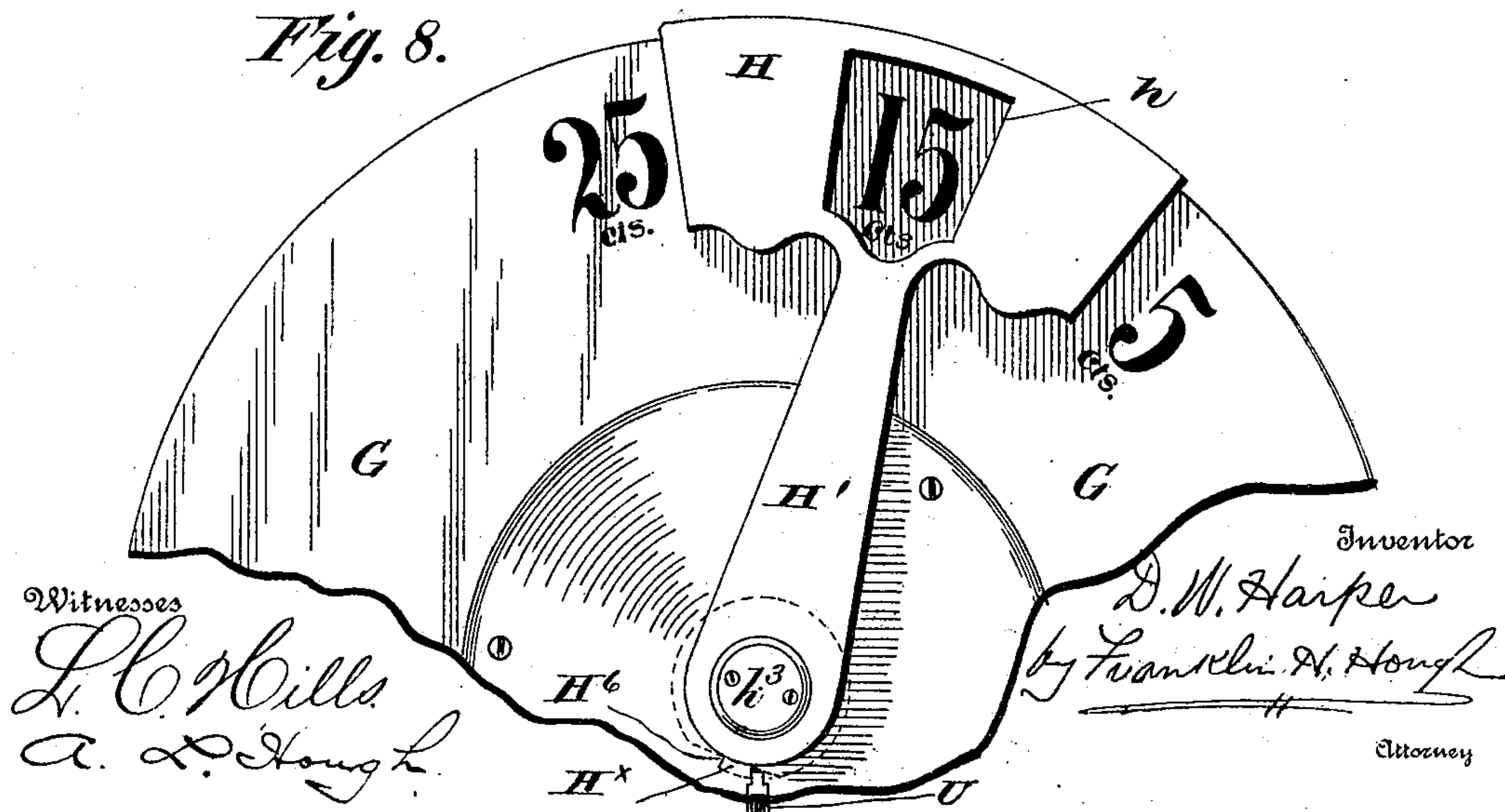


Fig. 8.



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7 Sheets—Sheet 6.

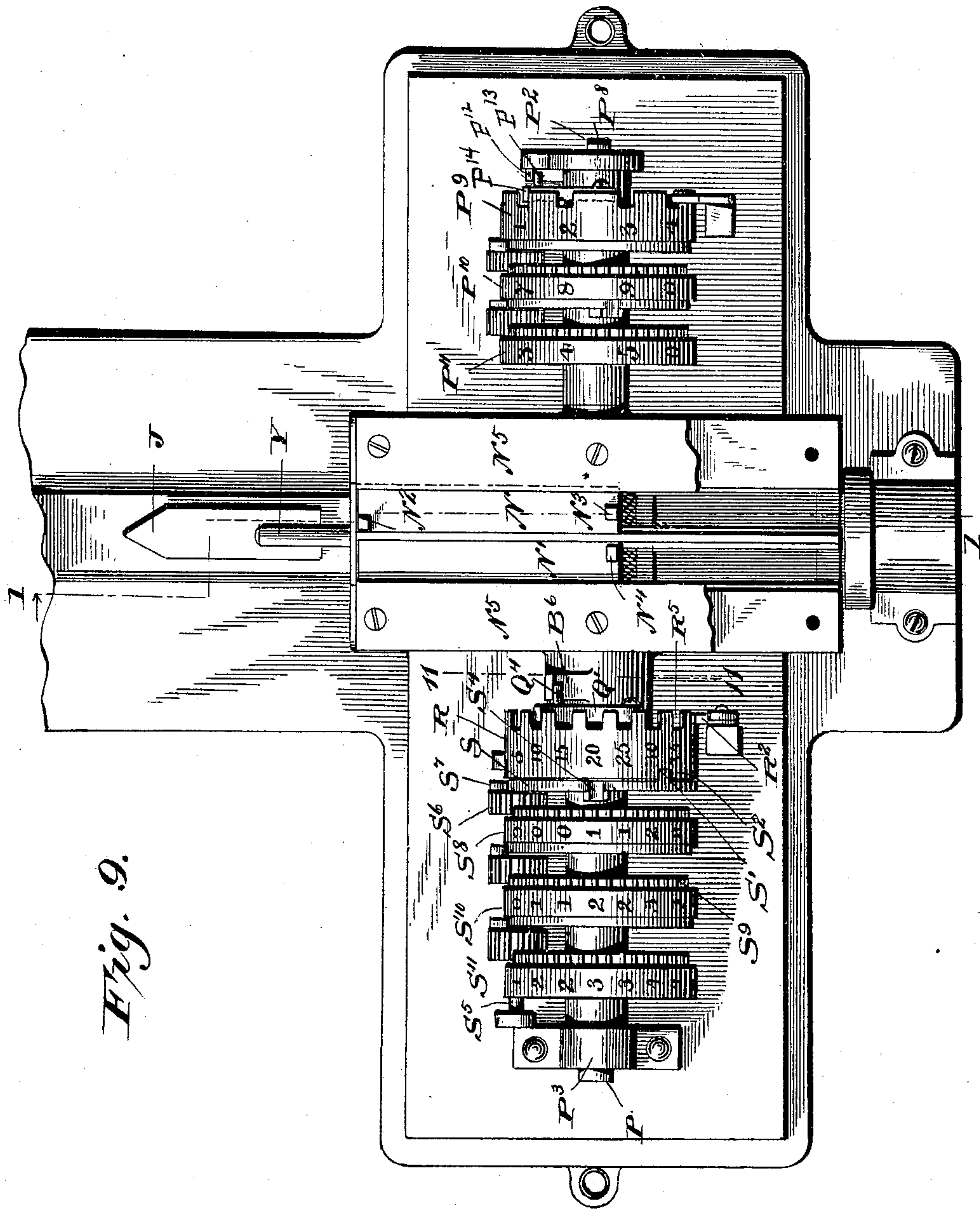


Fig. 9.

Witnesses

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UNITED STATES PATENT OFFICE.

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CASH-REGISTER.

SPECIFICATION forming part of Letters Patent No. 679,074, dated July 23, 1901.

Application filed November 3, 1897. Serial No. 657,268. (No model.)

To all whom it may concern:

Be it known that I, DANIEL W. HARPER, a citizen of the United States, residing at Memphis, in the county of Shelby and State of Tennessee, have invented certain new and useful Improvements in Cash-Registers; and I do declare the following to be a full, clear, and exact description of the invention, such as 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 and figures of reference marked thereon, which form a part of this specification.

This invention relates to improvements in cash-registers, and especially to a rotary indicator in which the purchase price may be indicated on a suitable dial and registering by mechanism, both of which are accomplished by means which is actuated by a partial rotary and longitudinal movement which is imparted to an operating-shaft.

In carrying out the present invention it has been my purpose to generally improve upon and simplify this class of inventions and to produce a register which will accomplish as satisfactory results as machines at present commonly in use which are more or less complicated in their construction.

In order to indicate and register a purchase amount in the present invention, I employ sections of hollow cylindrical shells the circumferences of which are cut away, forming stepped margins, each step of which represents a certain numeral corresponding to similar numerals on the dials of the register, the said shells being made to rotate on an operating-shaft which telescopes with a shaft carrying an indicating-dial, each of the several steps being adapted to trip against and actuate mechanism which will effect the registering of the purchase amount as the steps are brought substantially in alinement with the trip and worked backward and forward by means of the extensible operating-shaft.

For registering purchases amounting to dollars and cents distinct stepped cylindrical shells are employed, both mounted on and rotating with the operating-shaft and having the steps on each so arranged with reference to one another that when it is desired to regis-

ter numerals representing purchases amounting to cents the steps of the cylindrical shell for registering cent purchases will be turned by the operating-shaft, so that one of the steps will contact against a trip for actuating the registering mechanism, while at the same time a blank or recessed-away portion of the second shell for registering dollar purchases will be presented in alinement with the registering actuating mechanism, and vice versa, when it is desired to register purchases amounting to dollars.

A further part of the invention resides in the provision of an automatically-operated shutter which will obscure the numeral at the sight-aperture while the amount of the purchase price is being indicated by a pointer and will disclose the numeral at the sight-aperture immediately in advance of the registering of the purchase price, suitable means being provided to tilt and hold the shutter tilted to one side and to return the same to its normal position, as will be hereinafter described.

A further and important part of the invention relates to the novel mechanism which is employed in connection with the registering apparatus, consisting of a numeral-band, which is held positively from rotation in but one direction and so arranged as to make any tampering with the registering-wheels impossible excepting in the regular way of registering. In connection with the operating-shaft, which as it is worked longitudinally, and thus through a trip unlocks the money-drawer, an attachment to prevent a partial operation of the shaft which would not be sufficient to effect an indicating or registering of the purchase amount, but might allow access to the money-drawer, is provided, which makes it necessary to withdraw the shaft a predetermined distance before it can be returned to its starting position.

Various other features form parts of this invention, the details of which will be hereinafter explicitly described, and specifically defined in the subjoined claims, which, when considered in connection with the various views of the drawings forming a part of this application, will be clearly understood.

In the drawings similar characters of refer-

ence indicate like parts throughout the several views, in which—

Figure 1 is a central vertical longitudinal section through the operating-shaft and connections of the cash-register with the casing removed. Fig. 2 is a top plan view of the mechanism of the register, showing the operating-shaft in its normal position before the telescoping shaft has been extended. Fig. 3 is a side elevation of a bell which is rung each time the money-drawer is unlocked. Fig. 4 is a top plan view similar to Fig. 2, excepting the operating-shaft has been drawn forward, as in the act of indicating and registering the purchase amount. Fig. 5 is a side elevation of the indicating-dial on one side of the cash-register with the pointer shown as keyed to the operating-shaft. Fig. 6 is a view in side elevation, showing the wheel for holding the shaft from rotation during the act of registering and indicating the purchase amount, the said view being taken on line 6 6 of Fig. 1 and showing the operating-shaft in cross-section. Fig. 7 is a side elevation of the indicating-dial and shutter and mechanism for retaining the shutter in a vertical position, the operating-shaft being shown in section. Fig. 8 is a side elevation of the indicating-dial and shutter mounted thereon, the said shutter being shown tilted and held so as to obscure the numeral at the sight-aperture where the purchase price is being indicated and registered. Fig. 9 is a top plan view of the registering mechanism, the parts of the register being removed to better illustrate the details of the invention. Fig. 10 is a central longitudinal vertical section through the registering mechanism, showing the relative arrangement of the geared mechanism for operating the same. Fig. 11 is an enlarged view in side elevation with parts broken away to better illustrate details of the band-wheel attached to one of the registering-wheels. Fig. 12 is an enlarged detail of the geared mechanism for rotating the registering-wheels.

Reference now being had to the details of the drawings by letter, A designates the casing of the register, which is generally shown in section to better illustrate the working mechanism of the machine. The operative parts of the register are supported on the uprights B' and B² of the frame B, which latter is mounted on the block B³ over the money-drawer B⁴. Journalled in the upright B' is the hub portion C' of the hollow cylindrical shell C, which has its open marginal edge formed into a series of steps C². This shell is provided for a purpose which will be hereinafter described in detail. This hub portion has an annular recess C³, in which an end of an adjusting-screw C⁴ is adapted to engage in order to allow the said shell and hub to revolve in its bearing, but to prevent any longitudinal movement to the said shell. Mounted in the said hub is one end of the operating-shaft D, while the opposite end of the said shaft is contracted, as seen at D', and is

splined, as at d, to the sleeve D², which is journalled in an aperture near the upper end of the standard B². From this construction it will be seen that the said sleeve and the shaft D are caused to rotate together; but the contracted end of said shaft has a longitudinal telescoping movement within the sleeve, which is necessary in the operation of the register. Keyed or otherwise mounted on the shaft so as to rotate with the same are the hollow cylindrical shells E and F, which have their circumference broken away and stepped, as at E' and F', respectively. These steps are provided to actuate a trip member, which in turn causes mechanism to be operated which will effect a registering of a purchase amount, and each step on the shell E, which is provided to register purchases amounting to dollars, represents a numeral—that is, in the drawings are illustrated on the shell five steps. The first step represents one dollar and the fifth five dollars, and the steps are graduated in a spiral direction, extending about only a portion of the circumference of the shell, leaving a blank portion at E² of the shell, at which place the cylinder is entirely cut away. This blank space extends, possibly, about one-half the circumference of the head of the said shell. The second shell F, which is utilized when it is desired to register purchases amounting to cents, is similarly constructed, but has more steps, the first of which represents a purchase amounting to five cents and the highest ninety-five cents. This shell has also a blank space having no steps, which space is equal to that taken up by the steps on the shell E, and the two shells E and F are so keyed to the operating-shaft with relation to each other that when the steps on the shell E, for instance, are turned for engagement with the trip underneath the operating-shaft the blank portion of the shell F will be presented adjacent to the trip, so as to pass over the same without striking it, and vice versa, when the shell F is brought for engagement with a trip which will actuate mechanism designed to register purchases amounting to cents.

Keyed or mounted so as to rotate with and on the sleeve D² is the indicating-dial G, which has an arrangement of numerals for indicating the purchase amounts on both sides of the dial. Straddling the said dial is the shutter H, which is provided for the purpose of obscuring the numeral of the purchase price desired to be indicated while the machine is being operated to effect a registering of the amount of the purchase price. This shutter has apertures h for disclosing a certain numeral at the sight-apertures in the register-frame when the shutter is held in its normal position, in which position the apertures in the shutter and those in the casing will register with one another, and has two arms H' and H², the latter of which is fastened to or forms a part of a collar or sleeve H³, that is loosely journalled about the cir-

cumference of the sleeve D^2 . The arm H^2 of the shutter is perforated near its lower end, as at h^2 , and loosely journaled on the end of the sleeve D^2 and held thereon by means of the cap h^3 , secured to the sleeve D^2 by screws h^4 . By having the shutter-arms loosely journaled on the said sleeve it will be noted that the shutter is allowed to rotate independently of the said dial.

Keyed to the shaft D is the wheel I , which has a series of recesses I' about its circumference. Each of the said recesses has its walls on one face of the flange of the wheel tapered to a point, as at I^2 , and mounted upon a portion of the frame of the register mechanism is a block J , the forward end of which, or the end which is adjacent to the said wheel I , is tapered to a point, as at J' , and this member J is held in a horizontal position and is provided as a guide over which the recesses in the said wheel I are adapted to pass, so as to hold the said wheel and the shaft carrying the same from rotation, while the operating-shaft is pulled out for the purpose of indicating and registering a purchase amount. These recesses are disposed at equal distances apart about the circumference of the wheel, and one is provided for each step on the shells, which are keyed to the operating-shaft, so that at whatever position the shaft is stopped in the act of indicating any purchase amount the wheel I will hold the shaft rigidly only while the registering mechanism is being operated.

At the outer end of the operating-shaft is a handle K , keyed to the said shaft, and K' is an indicating-dial which is secured to the outer side of the casing opposite to the rotating dial, hereinbefore described. This dial K has arranged about its outer face numerals indicating in the upper semicircular series dollar purchases extending over a quadrant of the circle and numerals indicating purchases amounting to cents in the second quadrant of the circle, and arranged in a concentric semicircular series are numerals representing purchases amounting to cents. These numerals are arranged in the manner illustrated in Fig. 5 of the drawings, having two semicircular series for convenience, so that the hand of the operator when it is grasping the handle will not obscure any of the numerals, which would be the case if the numerals were arranged in a complete circle about the indicating-dial. It will be noted that the numerals increase from the highest point, which is "0," to the right, while on the left the order is reversed. Keyed to the end of the operating-shaft is the pointer K' , which is double-ended, the longer pointer portion K^2 being provided for indicating numerals in the outer concentric series of numerals, while the shoulder K^3 is provided to indicate or register with the numerals of the inner series.

Disposed longitudinally on the shaft D , in that portion of the shaft which passes through the hub C' of the shell C , is a series of notches D^3 , and at each end of this series of notches

is a depression or recess D^4 , into which the spring-actuated pawl D^5 is adapted to engage when the operating-shaft is drawn out to its farthest limit or when in a closed relation. This pawl D^5 is mounted on a pivot d^2 , which is held in the wall of the hub C' , as clearly illustrated in Fig. 6 of the drawings. Secured to the circumference of the said hub is one end of the spring member d^3 , the upper free end of which spring rests normally on the upper end of the pivotal dog or pawl and is provided to hold the same normally in a vertical position with reference to the recesses in which the said pawl is adapted to engage. By the provision of this mechanism it will be seen that when the operator begins to draw out the operating-shaft, as in the act of indicating and registering the purchase amount, the said dog or pawl D^5 will tilt on its pivot and ride over the notches of the operating-shaft in a tilted position and will prevent any closing of the extensible operating-shaft until it has been drawn out to its farthest limit, in which position the pawl will engage in the recess at the opposite end of the row of notches, and when in this position the operating-shaft may be returned to its starting position by the tension of a coiled spring M , which is interposed between the shell F and the rotatable shell C , both of which are mounted on the operating-shaft. The pawl or dog D^5 , having its free end bearing in the recesses at the ends of the said row of teeth, serves to cause the shell C to rotate with the extensible shaft as the latter is operated to indicate a purchase amount. The dog also serves the same purpose when traveling over the teeth as the shaft is extended or returned to its starting position. The teeth are cut below the surface of the shaft, and hence the free end of the dog while passing over the teeth will cause the said shaft and the hub to rotate together, as will be understood.

Mounted so as to travel horizontally on the platform B^5 are the rack-bars N and N' . The said rack-bars have teeth n on their under faces, and the bar N , which is provided to actuate mechanism for registering purchases amounting to dollars, has two upwardly-extending lugs or trips N^2 and N^3 , against which lugs or trips the shells E and F are adapted to strike in order to impart a longitudinal movement to the said rack as the operating-shaft is extended or closed. The second of the said racks N' has but one lug N^4 , which is slightly longer or extends higher from the upper face of the rack-bar than the corresponding lug or trip N^3 on the end of the rack-bar N . For operating the rack-bar N' , which carries the trip N^4 , the various steps on the shell F are adapted to contact with the said trip as the operating-shaft is extended, and for returning the said rack N' to its normal or starting position the member O is provided, which has a flange O' at its outer end of such a diameter as to allow the said member to freely pass within the cylindrical shell C and

over the spring M, which engages with the shells C and F, over the hub portion of each; but the said flange O' is adapted to strike against the trip N⁴ after the operating-shaft has been drawn forward, and with it the rack-bar N', which has been drawn forward by means of one of the steps F' on the shell F striking against the trip N⁴ as the shaft is extended. The said rack-bars N and N' are held in place by means of the plates N⁵, which overlap the outer longitudinal upper face of each, as clearly shown in Fig. 9 of the drawings, these plates being held in position by means of screws, as shown. The rearward throw of the said rack-bars is limited by the plate N⁶, and the forward throw of each of the said rack-bars is limited by a particular step C² of the shell C, which step may be turned in such a position in rotating the operating-shaft as will come in alinement with the end of the particular rack-bar which is drawn forward when the shaft is pulled out in the act of registering a purchase amount. The steps on the shell C are so arranged relative to the steps on the shells E and F that when a particular step on either of the shells E and F is brought in alinement with and contacts against one of the trips of the rack-bars a corresponding step on the shell C will be brought in alinement with the end of the rack-bar to form a stop for the same, thus limiting its forward throw and making it impossible for any momentum which is imparted to the mechanism for operating the registering-shaft to rotate the registering-shaft farther than the limit interposed by the steps on the shell C.

Journalled in a portion of the framework of the machine is a sleeve P⁵, in which is journalled the shaft P', which is keyed to a portion of the framework by means of the screw P⁴ engaging in the bearing member P³ and thus held stationary. At one end of the sleeve P⁵ is a pinion-wheel P⁶, the teeth of which are adapted to mesh with the teeth on the rack N'. At the opposite end of the sleeve P⁵ is the enlarged portion Q, to the broad face of which is pivoted a pawl Q', and the periphery of the said enlarged portion Q has an annular recess Q², in which recess, at suitable locations, are located the strips Q³, which are secured at their longitudinal centers by means of a screw q, while the ends of the said strips are adapted to engage in a slight annular recess in the inner wall of the numeral-band R, which surrounds the circumference of the enlarged portion Q of the sleeve P⁴. These strips Q³, arranged as described, and clearly illustrated in Figs. 10 and 11 of the drawings, will serve to allow the adjusting members to rotate one within the other and hold the same in such a position, thus preventing any separation of the two members. The said numeral-band R is adapted to rotate only in one direction and is prevented from a backward movement by means of the spring-actuated pawl R², the upper end of which is held by means of the

spring R³, so that its inwardly-bent end R⁴ will catch in any one of the series of apertures R⁵ about the circumference of the numeral-band in case any attempt is made to rotate the said band in a reverse direction. (Indicated by the arrow in Fig. 11 of the drawings.) The pawl Q' has a lug Q⁴ and has its free end outwardly bent and brought to a tapering point, as seen at Q⁵, and this outwardly-bent end is adapted to be thrown into one of the said apertures R⁵ in the numeral-band by means of the tension of the spring Q⁶, which is secured to a portion of the enlarged portion of the sleeve Q by means of a thumb-screw Q⁷, the forward end of which spring bears against the under side of the said pawl Q', and as the sleeve is turned in the direction indicated by the arrow in Fig. 11 of the drawings it will be seen that the shape of the outer end of the pawl Q' will admit of its being easily withdrawn from its retaining-aperture in the numeral-band R.

When the operating-lever is pulled out and the rack N' drawn forward, the sleeve P⁵ will be caused to rotate in the direction of the arrow in Fig. 11 until the end of the pawl Q' engages in the numeral-aperture which it is desired to be brought forward for registering, and in the reverse rotation of the sleeve P⁵ the pawl Q' (the free end of which will have engaged in an aperture in the numeral-band wherever the sleeve happens to stop as it is turned to the left) will cause the numeral-band to rotate with it, which effects a registering of the purchase amount. When the sleeve and the pawl, together with the numeral-band engaged by said pawl, have turned so that the numeral on the said band registers with a slight aperture a in the casing of the register, the lug Q⁴ strikes against the extension B⁶, which is a stationary part of the frame of the machine, and prevents any further rotation of the said sleeve and numeral-band to the right, thus making it impossible to register a greater amount than is indicated on the dial.

Loosely journalled on the shaft P' is the registering-wheel S, which wheel is actuated by means of the said numeral-band by means of an offset S' on the said wheel engaging in a notch or recess in the circumference of the said numeral-band, said notch being clearly seen at S² in Fig. 9 of the drawings. Integral with the outer broad face of the said wheel S is a rib S³, which extends from the hub of the said wheel to a point near the circumference of the said wheel, and the said rib is recessed at its end, as shown at S⁴. Loosely journalled on a shaft S⁵, mounted on the framework of the casing, is a pinion-wheel S⁶, which pinion-wheel has a series of teeth about its circumference, and to one face of the said pinion-wheel is a star or triangular-shaped wheel S⁷, which is clearly shown in the detail view in Fig. 12 of the drawings, as well as in other figures. The office of this integral, angular, or star wheel S⁷, before referred to, is for the

purpose of imparting a rotary movement to the next adjacent recording-wheel, which in the drawings is represented by letter S⁸. At each revolution of the said wheel S, when the numeral-band R will have made a complete revolution, the notch S⁴ will come adjacent to one of the points or teeth of the said angular or star wheel S⁷, and as the said wheel S is caused to make a further rotation one of the points of the angular wheel will engage in the said recess and cause a partial revolution of the said angular wheel and also of the pinion-wheel forming a part of the said angular wheel. It will be noted that the spaces between the points of the said angular wheel are slightly concaved and are on the arc of a circle which has a radius similar to that of the wheel S, against the circumference of which the said concaved portion is adapted to bear until the said wheel S has made a complete revolution, when the angular wheel will again be caused to make a partial revolution by a point engaging in the recess, as before. The teeth of the pinion-wheel S⁵ are adapted to mesh with a series of teeth on a shouldered portion S⁹ on the wheel S⁸, and thus cause a partial revolution to the wheel S⁸. Adjacent to the said wheel S⁸ and loosely mounted on the same shaft P' are the registering-wheels S¹⁰ and S¹¹, which are of the same general construction as the wheel S⁸, and the wheels S⁸ and S¹⁰ have on their faces the same ribbed construction, each with a notch at its end, and on the said shaft S⁵, between each of the said wheels S⁸, S¹⁰, and S¹¹, are pinion and angle wheels of a similar construction to that illustrated clearly in Fig. 12 of the drawings, and at each revolution of the wheel S⁸ it will be understood that the ribbed portion of the wheel S⁸ will engage with and cause a partial revolution to be imparted to the wheel S¹⁰, which wheel S¹⁰ in turn as it makes the revolution will cause a partial revolution to the last wheel S¹¹, and when the registering mechanism has reached its limit or the highest amounts that may be indicated or registered the mechanism may be returned to its starting position in readiness for a new register.

In order to register purchases amounting to dollars, the mechanism on the right of the frame of the register is employed, which mechanism is of the same general construction as that of the mechanism heretofore described, with the exception of a loosely-mounted sleeve similar to that hereinbefore described. In this dollar registering mechanism the shaft carrying the pinion P^{2x} keyed thereto is journaled at its outer end in the stationary member P⁸, which has a lug P¹² thereon, similar to that illustrated in Fig. 11 of the drawings, and against this lug the lug P¹³, carried by the pawl P¹⁴, is adapted to bear in order to throw the free end of the said pawl into one of the notches in the periphery of the band P⁹. Interposed between each of the registering-wheels P¹⁰ and P¹¹ is a similar con-

struction to that which has been heretofore described for actuating the said registering-wheels. Integrally formed on the wheel I is the flange I³, which is provided for the purpose of imparting a rocking movement or partial revolution to the shutter H in the following way: Journaled on a shoulder of the sleeve H³ is the member T, which has integral therewith the arms T', which are interposed at right angles to the said member and are arranged in pairs, as clearly seen in the drawings, with a slight space intervening between each pair. This space is of such a width as to allow the said arms to snugly bind against the said flange I³ on the wheel I when the operating-shaft is in its normal position before it has been drawn out in the act of registering a purchase amount. It is proposed to have these spring-arms bear with sufficient friction against the flange, so as to cause the shutter to tilt on its axis as the wheel I and its shaft are rotated. This movement will cause the shutter to present a blank space or obscure the numeral at the sight-aperture. In order to hold the shutter in its tilted position, the following mechanism is employed, consisting of the bolt U, which is mounted vertically in the apertured arms U' of the frame, which bolt has a shoulder keyed to the same, between which and the lower of the two arms U' is located a spring about the said bolt and serves as a means to hold the said bolt at its highest upward throw. At the lower end of the arm H' of the shutter is the lug H^x, which has the angled notches on each side, as seen at H⁶, in which notches, on one side or the other, the contracted end of the spring-actuated bolt U is adapted to be thrown by the spring on the bolt when the shutter is tilted to one side, as illustrated in Fig. 8 of the drawings, which figure shows the shutter tilted and held in such position by means of the bolt engaging in one of the said notches. Pivoted to a shoulder on the said frame is an angled lever W, to one end of which is pivoted the lower end of the bolt U, while its other end is pivoted, as at W', to the rod W², which rod is mounted in apertures in the framework of the machine and has its forward end bifurcated, as at W², and has pivoted thereto, near its longitudinal center, the arm W³ of the angle-lever W⁴, while the other end of the said angle-lever W⁵ has a notched end W⁶, which is adapted to engage with a catch W⁷ in the casing of the money-drawer in order to hold the drawer locked. Mounted horizontally in the frame of the casing in a plane parallel to that of the shaft W² is the sliding shaft Y, the forward end of which is located adjacent to the upper end of the arm W³ of the angle-lever W⁴, and the outer end of the said shaft Y extends slightly beyond the vertical wall Y' of the frame of the machine and in the path of the wheel I, so that each time the operating-shaft is drawn out the wheel I will strike against the outer end of the said shaft I and impart a longitudinal

movement to the same, which will cause the lever W^4 to tilt on its pivot W^8 and allow the notched end of the said angle-lever to be released from the catch on the money-drawer, and by means of the spring at the lower end of the money-drawer the latter will be caused to be thrown open, as will be readily understood. An enlarged portion Y^2 of the shaft Y forms at one end a stop or shoulder to limit the outer movement of the said shaft Y , while the inner end of the said enlarged portion forms a shoulder against which a coiled spring Y^3 engages, and the other end of the said spring bears against a shoulder on the framework of the machine, which spring is provided to hold the bolt in the position shown in Fig. 1 of the drawings. The said shoulder is apertured, as seen at Y^3 , and has the walls of the said aperture tapering inwardly on opposite sides of the said shouldered portion, with the exception of the said pivoted portions adjacent to each other, and near the center of the said shaft Y . Journaled in the frame of the machine is a shaft Z , which has the upright pin Z' mounted therein, which pin is held in the aperture in the said enlarged portion of the shaft Y , and this shaft Z is adapted to rock in its bearings as the shaft Y is moved longitudinally, this rocking motion being caused by the walls of the apertures in the enlarged shouldered portion of the shaft Y contacting against the said pin Z' , on diametrically opposite sides thereof, as the said shaft Y is moved longitudinally back and forth. The outer end of the shaft Z is provided with a pin Z^2 , which as the said shaft Z is rocked strikes against a pawl X'' , which is pivoted in a recessed portion of the solid pivoted end X^6 of the striking-hammer rod X' . To the upper end of said rod is fastened the hammer X^2 , and X^7 is a pin secured to the solid end X^6 , to which is attached one end of the spring X^5 , the other end of said spring being connected to a lug on the bell-supporting casting. This spring is provided to return the hammer to its normal position when the bell X^3 has been struck. The pawl X'' bears against the wall of the recessed portion of the solid end X^6 as the pin Z^2 is turned to the left and strikes against the said pawl, which causes the hammer to strike the bell; but on the return movement of shaft Z as it rotates to the right the pin striking against the pawl will cause the latter to rock on its pivot and allow the pin to pass by and not raise the hammer, as will be understood.

In order to hold the shuttle normally in a vertical position, as shown in Fig. 7 of the drawings, the upright posts 1 and 2 are provided, the upper ends of which bear against the under sides of the outwardly-extending portions 3, which form a part of the member carrying the frictional arms T . These posts 1 and 2 telescope over smaller posts 4 and 5, both of which are mounted in a vertical position and are guided in apertures in the extensions U' . Each of the posts 1, which are

hollow for the reception of the smaller posts 4, have shoulders $5'$ secured thereto, which are limited in their upward throw by the under side of the extensions U' , and interposed between the said shoulders and the base portions on which the posts 4 are supported are the springs 6, which are provided to normally hold the shutter in the position illustrated in Fig. 7 of the drawings. When the shutter has been tilted, it will be noted that one of the springs 6 will be under greater tension than the opposite spring, as when the shutter is being held in the position illustrated in Fig. 8 of the drawings, but that when the operating-shaft is drawn forward as in the act of registering the purchase on its backward throw the forward face of the wheel I will strike against the outer end of the shaft Y , and through the medium of the angle-lever W^4 , the shaft W^2 , and the angle-lever W , which is connected with the bolt U , the said bolt U will be drawn down, so as to disengage its upper end from the notch H^6 , and the shutter will tilt back by means of the excessive tension of one of the said springs 6. In this position the shutter will remain, thus disclosing the numeral representing the purchase amount at the sight-aperture in the cash-register, which aperture does not show in the drawings, as the casing has been removed, but which aperture will register with the aperture in the shutter when the latter is in the position illustrated in Fig. 1 of the drawings.

In operation the indicating - pointer is turned so that one end thereof registers opposite the numeral which it is desired to register, and at the moment the shaft D begins to rotate the shutter will begin to obscure the numerals at the sight-aperture in the casing over the rotary dial at the opposite end of the register by means of the frictional arms which are connected to the shutter, binding slightly against the flange I^3 of the wheel I after the said flange has made a partial revolution and causing to rotate with it the shutter until one of the notches at the lower end of the shutter-arm comes in alignment with the bolt U , at which moment the spring on said bolt will cause the contracted end of the latter to engage in such notch and hold the shutter from further tilting by reason of the tension of the said spring-actuated bolt overcoming the frictional contact between the arms T and the said flange I^3 , allowing the flange to continue in its rotary movement independently of the said arms. The shutter thus tilted will remain in this position until the indicating-pointer registers opposite the numeral sought to be indicated and registered and the extensible shaft is drawn forward to such a distance that the wheel I will strike against the end of the longitudinally-movable shaft Y , and as the said shaft is pushed forward by the wheel I it will be seen that the spring-actuated bolt U will be drawn down through its connections W , W^2 , and W^3 with the inner end of the said shaft Y .

As the bolt U is drawn down the dial will be returned to its starting position by means of one of the spring-actuated posts 1, which has been depressed as the shutter tilts, and the two spring-actuated posts will serve to hold the shutter in the position shown in Fig. 7 of the drawings until the shaft has been rotated again for indicating another purchase. As the operating-shaft is rotated in the act of indicating the purchase price on the dial, a step on one or the other of the cylindrical shells (which step corresponds to the numeral which has been indicated) will be presented in alinement with one of the rack-bars N or N', so that as the extensible shaft is drawn out said step will strike one of the lugs on the rack-bars and impart a longitudinal movement to the same. In order to limit the forward movement of the rack-bar and insure a correct registering of the purchasing amount, the hollow stepped shell C has its steps so arranged relative to those steps on the other shells which actuate the rack-bars that when, for instance, a step for registering a five-dollar purchase is brought in alinement with a rack-bar the fifth step from the lower portion of the stop-cylinder will come in alinement with the opposite end of the same rack-bar, and so on in same order with other numerals. While the extensible shaft is being drawn out and the registering effected, it is important that there be no rotary motion to the operating-shaft which would change the numeral or obscure same on the dial, and to hold the shaft from rotation the recessed wheel I engages over the wedge-shaped end of the member J and holds the same from rotation while the shaft is being drawn forward and returned to its starting position. To prevent any tampering with the machine by pulling out the operating-shaft part way without recording a purchase amount, the pawl D⁵ will tilt as the shaft is started to be extended and the end of said pawl will engage in the notches in a tilted position, thus making it impossible to return the shaft to its starting position until the shaft shall first have been extended to its farthest outward throw, so as to allow the pawl to tilt in the inner of the two recesses D⁴ and ride back over the notches while tilted in the opposite direction.

By my improved manner of effecting the registering of the purchase amount in which I utilize the construction clearly illustrated in Fig. 11 of the drawings I am able to produce a machine in which an accurate register may be kept of all purchases made without making it possible to tamper with the registering mechanism excepting in the regular way of indicating and registering.

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

1. A rotary cash-register having an extensible operating-shaft, stepped cylindrical

shells mounted thereon, each of said shells having a blank space without steps about its circumference, the two shells keyed to the operating-shaft, so that, when the steps of one cylinder-shell are presented for engagement with registering operating mechanism, a blank space on the second cylindrical shell will be presented in alinement with the step which is positioned to actuate the registering mechanism and a step-cylinder forming a stop, as set forth.

2. A rotary cash-register, having two cylindrical stepped shells for actuating registering mechanism, an extensible operating-shaft to which said shells are keyed, a third stepped shell on the said shaft for limiting the movement of the operating-shaft, said last-referred-to shell being reversed on the shaft, and registering operating mechanism interposed between the reversed stepped shells, as set forth.

3. A rotary cash-register consisting of an extensible operating-shaft, hollow cylindrical stepped shells keyed to said shaft, a registering-shaft, means intermediate said stepped shells and said registering-shaft to rotate the latter, and a stop-cylinder to limit the forward throw of the stepped shells, as set forth.

4. In a rotary cash-register, the extensible operating-shaft, the stepped cylindrical shells keyed to said shaft, and a third stepped shell, which is rotatable in a fixed position in the framework of the register, and through which the said operating-shaft is longitudinally movable, combined with the registering mechanism, as set forth.

5. In a rotary cash-register, the extensible shaft, the stepped shells keyed thereto, a longitudinally-movable registering actuating member, a lug carried thereby, a stationary, but rotary stepped cylinder forming a stop to the said member, and a flanged shell for returning the member to its starting position, combined as set forth.

6. In a rotary cash-register, an extensible operating-shaft, stepped cylindrical shells keyed thereto, a stationary rotatable stop cylindrical shell, a flanged cylinder secured to one of the stepped cylinders, the flanged portion of which is adapted to freely enter the said stop-cylinder, combined with mechanism for actuating a registering-shaft, as set forth.

7. In a cash-register, the extensible shaft, the stepped cylindrical shells keyed thereon, the stepped, rotatable stop-cylinder, a spring interposed between said stop-cylinder and one of the stepped cylindrical shells, the flanged cylinder, combined with a longitudinally-movable rack-bar, and lug thereon, and registering-shaft and pinion-wheel for engagement with said rack-bar, combined as set forth.

8. In a rotary cash-register, the combination with the extensible operating-shaft, shells mounted on and rotating therewith, said shaft having a row of teeth in its sur-

face, of a pawl pivoted to the hub of one of the shells and adapted to rotate therewith, and to engage with said teeth, as set forth.

9. In a rotary cash-register, the combination with the extensible operating-shaft, said shaft having a longitudinal row of teeth cut in its surface with recesses in the shaft at each end of the said row, of the hub of shell rotating with said shaft, of the pivoted pawl mounted in a recess of the hub, said pawl engaging with the teeth in the shaft, as set forth.

10. In a rotary cash-register, the extensible operating-shaft, the stepped cylinders, flanged cylinder and rack-bars designed to be actuated thereby, the reversely-arranged hollow stepped stop-cylinder, with extended hub portion, the set-screw mounted in the frame of the machine, and having its end engaging in an annular recess in the said hub, combined as set forth.

11. In a rotary cash-register, the extensible shaft with stepped cylinders secured thereto, the stepped stop-cylinder having an elongated hub mounted to rotate with said shaft, registering mechanism operated by said cylinder, a pawl pivoted in a recess in said hub, and designed to engage with teeth in the surface of the shaft, and the spring secured to the hub with its free end bearing yieldingly against the upper end of said pawl, as shown and described.

12. In a rotary cash-register, the extensible rotary operating-shaft, the sleeve in which one end of said shaft is splined, the dial-wheel mounted on said sleeve, the friction-wheel secured to the extensible shaft, the shutter, a collar loosely mounted on said sleeve and carrying the shutter, and frictional means for rocking the latter at the moment the shaft begins to rotate, as set forth.

13. In a rotary cash-register, the extensible shaft, the sleeve in which a contracted end of the shaft is splined, a friction-wheel secured to said shaft, the dial-wheel secured to said sleeve, and the shutter having friction-arms for engagement with the said friction-wheel, combined as described.

14. In a rotary cash-register, the extensible shaft, the sleeve in which the end of said shaft is splined, the wheel secured to the shaft, and friction-flange on said wheel, the rotary dial keyed to said sleeve, combined with the shutter having apertured arms which are loosely journaled on said sleeve, and friction members secured to one of said shutter-arms, as set forth.

15. In a rotary cash-register, the extensible operating-shaft, the sleeve to which one end of said shaft is splined, the wheel with friction-flange thereon, secured to the operating-shaft, the numeral-dial mounted to rotate with said sleeve combined with a second sleeve loosely journaled over the splined sleeve, and a shutter having an arm secured to said outer sleeve, and friction members for

engagement with the said friction flanged wheel, as set forth.

16. A rotary cash-register, having in combination with the extensible operating-shaft, the friction-wheel, the sleeve in which one end of said shaft is splined, the rotary indicating-dial mounted to turn said sleeve, the sleeve loosely journaled on said splined sleeve, the shutter having arms straddling the indicating-dial, one of which arms is loosely journaled on the splined sleeve, the other secured to the outer sleeve, and the friction-arms mounted to rotate with the shutter, as set forth.

17. In combination with the extensible operating-shaft, the friction flanged wheel secured thereon, the sleeve in which the operating-shaft is splined, the indicating-dial mounted to turn with said sleeve, the sleeve loosely journaled about the splined sleeve, the shutter having an arm secured thereto, and the member, T, mounted to rotate with the shutter, and spring friction-arms secured in pairs at right angles to said member, as set forth.

18. In a rotary cash-register, the longitudinally-extensible operating-shaft, the sleeve in which one end of said shaft is splined, the numeral-dial keyed to said sleeve, a shutter loosely mounted on the sleeve, a frictional wheel secured to the extensible shaft and adapted to travel with the shaft in its longitudinal movements, and frictional arms engaging said wheel, combined as set forth.

19. In a rotary cash-register, an extensible operating-shaft, a sleeve in which one end of said shaft is splined, a dial-wheel keyed to said sleeve, a shutter loosely mounted on the sleeve, a friction-wheel secured so as to rotate with the extensible shaft and movable with the shaft longitudinally, frictional arms connected to the shutter and held yieldingly against the flange of the friction-wheel, when the shaft is in its closed or starting position, combined as shown and described.

20. In combination with the extensible shaft, the sleeve in which one end of the shaft is splined, the shutter and sleeve carrying same, which latter is loosely journaled on the said sleeve, the friction-arms, the friction-wheel carried by the extensible shaft in its longitudinal movements, and means for holding the dial in a tilted position, as shown and described.

21. In combination with the extensible shaft, the friction-wheel mounted thereon, the numeral-dial and sleeve carrying same, shutter, friction-arms secured thereto, and spring-actuated members for holding the shutter normally in a vertical position, as set forth.

22. In a cash-register, the combination with the extensible shaft, the wheel with friction-flange mounted to rotate therewith, the numeral-dial and sleeve carrying same, the loosely-journaled shutter, the spring-actuated bolt designed to engage in notches or

recesses in a portion of the shutter to hold the latter tilted, and means for automatically operating the said bolt, as set forth.

23. In a rotary cash-register, the combination with the extensible splined shaft, the flanged friction-wheel secured to said shaft, of the sleeve carrying one end of the operating-shaft, the numeral-dial, the sleeve mounted loosely on said sleeve splined to the operating-shaft, of the shutter secured to the loosely-mounted sleeve, lateral projections on the latter, and spring-actuated posts bearing against the said extension, as and for the purpose set forth.

24. In a rotary cash-register, the extensible operating-shaft, the sleeve splined thereto, the numeral-dial mounted on said sleeve, the friction-wheel carried by said shaft, of the loosely-mounted sleeve and shutter carried thereby, with friction-arms secured to the loosely-mounted sleeve having lateral extensions, combined with mechanism for holding the shutter tilted, and spring-actuated telescoping posts for holding the shutter in a numeral-exposing position, as set forth.

25. In combination with the operating-shaft, sleeves, shutter and wheel with frictional flange as described, frictional arms secured to the shutter-carrying sleeve, designed to engage with said flange, the spring-actuated bolt engaging with said shutter-carrying sleeve, the longitudinally-movable rod and connections between same and said spring-actuated bolt, and members for normally holding the shutter-arms in a position to expose a numeral at the sight-aperture, as set forth.

26. In a rotary cash-register, the operating-shaft, the flanged friction-wheel carried thereby, the sleeve in which said shaft is splined, dial-wheel rotating with said sleeve, a loosely-mounted sleeve, the shutter with friction-arms carried thereby, the spring-actuated bolt engaging with said loosely-mounted sleeve, the angle-lever pivoted to the frame of the register, and having one of its arms connected to the said spring-actuated bolt, the longitudinally-movable rod W^2 , angle-lever W^4 and spring-actuated bolt Y in the path of said friction-wheel, combined as set forth.

27. In combination with the operating-shaft, the friction-wheel carried thereby, the sleeve in which said shaft is splined, the numeral-dial carried by said sleeve, the shutter and loosely-mounted sleeve carrying the latter, friction-arms secured to the shutter-carrying sleeve, the telescoping posts mounted vertically in extensions of the register-frame, the upper ends of said posts having flaring heads, and shoulders to limit their upward throw, as shown and described.

28. In a rotary cash-register, the combination with the extensible shaft, a wheel secured thereto having a frictional flange on one side thereof, shutter mechanism and means for frictionally engaging the flange to operate said shutter mechanism, the outer circumfer-

ence of said wheel having a series of recesses therein, of the wedge-shaped guide-block designed to engage with the recesses of the wheel, as set forth.

29. In a cash-register, the combination with the extensible operating-shaft and wheel secured thereto, the spring-actuated shaft, Y , having one end disposed in the path of said wheel to be moved longitudinally thereby as the shaft carrying said wheel is drawn forward, the shaft, Z , and pin carried thereby, which shaft is caused to rock as the shaft, Y , is moved longitudinally, and a bell, and means for ringing same, as the shaft rocks, as shown and described.

30. In combination with the spring-actuated shaft, Y , and means for imparting a longitudinal movement thereto, an elongated shouldered portion of said shaft having an aperture therein, with beveled walls, a shaft, Z , mounted at right angles to said shaft, Y , and a pin, Z' , engaging in said aperture for rocking the shaft, Z , to ring a bell arranged as shown and described.

31. In combination with the rocking shaft, Z , and means for operating same, as described, the hammer-rod, having a solid portion recessed out, a pawl pivoted in said recessed portion, a pin carried by shaft, Z , to trip against said pawl, which causes the hammer on the said rod to strike a bell.

32. In combination with the rocking shaft, Z , and means for rocking same, the hammer-rod, having a solid portion, X^6 , which is recessed, a pawl pivoted in said recess, the pin, Z^2 , mounted on the shaft, Z , and adapted to bear against said pawl and raise the hammer-rod as the said shaft rocks in one direction only, and a pin, X^7 , and spring for returning the hammer to its normal position, as set forth.

33. In a registering mechanism for cash-registers, the combination with the shaft, sleeve and pinion-wheel loosely mounted thereon, and rack-bar for rotating the sleeve, of a numeral-band loosely mounted on said sleeve and provided with a notched edge, a pawl pivoted to the sleeve and designed to engage said notches from the under side of the band, of a stop against which the pawl is adapted to engage, and means for preventing a backward rotation of the numeral-band, as set forth.

34. In a registering mechanism for cash-registers, the combination with the stationary shaft, sleeve and pinion loosely mounted thereon, with rack for rotating said sleeve, of the notched numeral-band loosely held on said sleeve and separated from the pinion, the spring-actuated pawl pivoted to the sleeve, and designed to engage with the notched circumference of the numeral-band, of a stationary member in the path of the pawl, against which the latter is adapted to strike, and a pawl to prevent a backward rotation of said band-wheel, as set forth.

35. In a registering mechanism for a cash-

register, the stationary shaft, a sleeve loosely journaled thereon, means for rotating said sleeve, a numeral-band mounted about an enlarged portion of said sleeve, a pawl carried by the enlarged portion of the sleeve, which engages with the numeral-band, the circumference of said enlarged portion of the sleeve having an annular groove and members carried therein, by which the numeral-band and sleeve are held together, and the registering, actuating mechanism driven by the numeral-band.

36. In a registering mechanism for cash-registers, the combination of the shaft, the pinion-wheel and sleeve loosely mounted thereon, the numeral-band separate from the sleeve and mounted thereon, the pawl pivoted to the sleeve and engaging with the notched numeral-band, the registering-wheels loosely mounted on said shaft and a disk with lug thereon engaging with the numeral-band and adapted to actuate the transfer mechanism for the registering-wheels, as set forth.

37. In combination with the stationary shaft, a sleeve loosely journaled thereon, an enlarged circular portion of said sleeve having about its circumference an annular groove, a numeral-band with an annular groove about its inner circumference registering with the groove in said sleeve, and strips secured in the groove of the sleeve, the ends of which strips engage in the annular groove in the numeral-band, a pawl on the sleeve engaging with the numeral-band, and registering actuating mechanism driven by the numeral-band, as set forth.

38. In combination with the stationary shaft carrying registering-wheels, a loosely-mounted sleeve and pinion-wheel, and means for rotating the pinion-wheel, a numeral-band having a series of notches on its edge, said band rotatable loosely on the enlarged circular part of said sleeve, means for holding the band against lateral movement, and the disk loosely mounted on the shaft, and rotated by the numeral-band, and means for imparting a movement to said registering-wheels, as set forth.

39. In combination with the stationary shaft carrying registering-wheels, the sleeve with enlarged circular portion thereon, a pawl pivoted to said enlarged portion of said sleeve, registering-wheels, a disk, and means for actuating said wheels, said disk being driven by the numeral-band, and a stationary portion of the frame having a lug forming a stop for the said pawl to hold the free end of same in a recess or aperture in the numeral-band, as shown and described.

40. In combination with the shaft carrying registering-wheels, the sleeve loosely mounted thereon, the pawl pivoted to an enlarged portion of the sleeve, and outwardly bent, the notched numeral-band loosely mounted to rotate in one direction on the circumference of the enlarged portion of the sleeve, and to be engaged by said pawl, means for holding the

band from lateral movement, a stationary stop in the path of said pawl and means for actuating the registering-wheels, as set forth.

41. In combination with the shaft carrying registering-wheels, the sleeve loosely mounted thereon, the pawl pivoted to the enlarged circular portion of the sleeve, and outwardly bent and having a double beveled end, a spring held yieldingly against its under edge, the notched numeral-band loosely mounted to rotate in one direction on the circumference of the enlarged portion of the sleeve, and to be engaged by said pawl, means for holding the numeral-band against lateral movement and a stationary stop having a projection in the path of a lug carried by the pawl, as shown and described.

42. In a registering mechanism for cash-registers, the shaft with registering-wheels mounted thereon, one of said wheels consisting of a sleeve and numeral-band mounted thereon, and means for actuating same, combined with a disk journaled on said shaft, and having a lug on one edge designed to engage in a notch in the numeral-band and to be rotated by the latter, and means for operating the registering-wheels of higher order, as said disk is rotated, as set forth.

43. In a registering mechanism for cash-registers, the shaft with registering-wheels mounted thereon, one of said wheels consisting of a sleeve and numeral-band mounted thereon, and means as set forth for actuating same, combined with a disk journaled on said shaft, an integral projection of the disk engaging with a notch in the edge of the numeral-band, a rib, with recessed end, on the face of the disk, and geared mechanism meshing with said recessed rib for operating the registering-wheels of higher order as shown and described.

44. In combination with a rocking member, and registering-shaft, a pawl pivoted on said member, and lug on the pawl, a stationary stop, a numeral wheel or ring having a rotary movement in one direction, said pawl designed to turn idly, when the member carrying same, is rocked in one direction, and when rocked in the other direction to engage with said numeral wheel or band to rotate the latter with said member to the starting or normal position of the pawl, and hold the same stationary by means of the lug coming in contact with said stop, as shown and described.

45. In combination, in a rotary cash-register, the casing, the fixed dial secured to the face thereof, a semicircular series of numerals arranged on the face of said dial above the center of the dial, and adjacent to its periphery, a second semicircular series above the center and located within the outer series of numerals, combined with the operating-shaft, the two indicating-pointers mounted on said shaft, and disposed in the same plane, whereby indications may be made without the hand of the operator obscuring the numerals, as set forth.

46. In a rotary cash-register, a longitudinally-movable operating-shaft, a sleeve in which one end of said shaft is splined and has a longitudinal movement, a numeral-dial rotating with said sleeve and shaft, a registering mechanism, a rotary member longitudinally movable with the operating-shaft and having projections of unequal length which are designed to operate said registering mechanism to an extent governed by the various lengths of said projections.

47. A rotary cash-register having an extensible shaft, a registering mechanism, members having projections of unequal length, mounted on said shaft, each of said members having a blank space without projections, whereby when the projections of one of said members are presented for engagement with said registering mechanism, a blank space of the second member will be presented in alignment with the projection which is positioned to actuate the registering mechanism.

48. A rotary cash-register having an extensible shaft, a registering mechanism, cylindrical members, having projections of unequal length, mounted on said shaft, each of said members having a blank space without projections, whereby when the projections of one of said members are presented for engagement with said registering mechanism, a blank space of the second member will be presented in alignment with the projection which is positioned to actuate the registering mechanism.

49. In a rotating cash-register, the extensible operating-shaft, the indicating dial and shutter, means for moving the shaft into positive engagement with the shutter and out of engagement therewith, whereby the shutter is rotated to obscure the indicator when the latter is turned by said shaft.

50. In a rotary cash-register, the extensible operating-shaft, a numeral dial and shutter, frictional gripping-arms on the latter, and means on the shaft to engage said arms when the shaft is pushed in.

51. In a cash-register, an extensible shaft, tilting shutter, spring-pressed latch, side restoring-springs, means for turning the shutter for obscuring a numeral, and connections between said shaft and latch, as set forth.

52. In combination with the shutter having a lug or catch thereon, a central spring-post for engagement with the latter, and side spring-actuated members for restoring the shutter on the releasing of said central post, as shown and described.

53. In a registering mechanism, the combi-

nation with the shaft, registering-wheels mounted thereon, a sleeve loosely journaled on the shaft, means for rotating the sleeve in two directions, a numeral-band loosely mounted on the sleeve, a pawl carried by the latter and engaging said band, and mechanism connected with the band for operating the registering-wheels, as set forth.

54. In a registering mechanism, in combination with a rotatable numeral-carrier, a rotatable actuating member for said carrier, a main operating member, said operating member provided with means to rotatably set the actuating member to a predetermined numeral on the carrier and to rotate it in the other direction to effect a registration, means to prevent the operation of the registering mechanism until a complete setting movement has been effected, and a pawl to prevent the operation of the carrier in the direction of the setting movement, substantially as set forth.

55. In a cash-register, an extensible, revolvable operating-shaft, a fixed dial having two rows of numerals arranged in concentric arcs, a registering mechanism, two stepped members fixed on said shaft and having projections adapted to actuate said registering mechanism, the number of steps or projections corresponding with the number of numerals on said fixed dials, two indexes fixed upon said shaft, and describing respectively circles with which said concentric arcs coincide, and means for revolving said two stepped members and said pair of indexes in unison, whereby the position of the indexes indicates which stepped member and which step or projection are in operative relation with the registering mechanism.

56. In a cash-register, an extensible revolvable operating-shaft, a registering mechanism, two stepped members fixed to and movable with the shaft and adapted by the longitudinal movement of the shaft to actuate said registering mechanism, a series of spirally-arranged steps on said stepped members, in equidistance relation, except that in the place of one step is a blank which at this point permits the longitudinal movement of the shaft without engagement of the stepped members with the registering mechanism.

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

DANIEL W. HARPER.

Witnesses:

F. H. HOUGH,
A. L. HOUGH.