

Sept. 22, 1925.

1,554,283

M. H. KERN

REGISTER

Filed Nov. 29, 1921

Fig. 1.

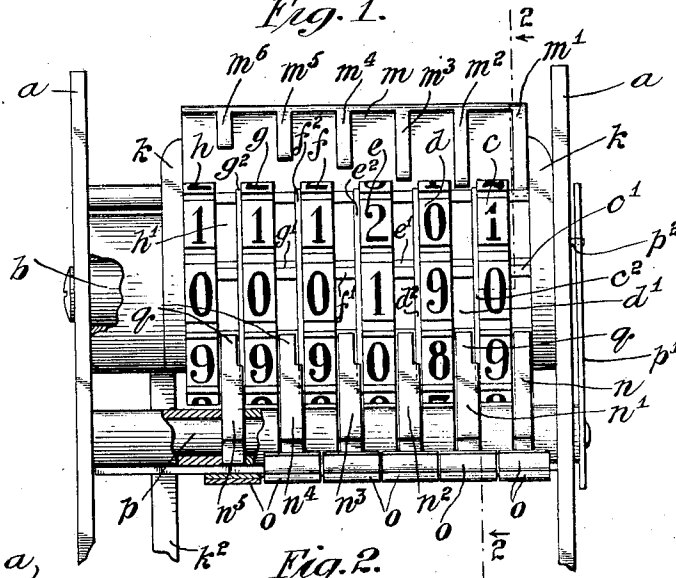


Fig. 2.

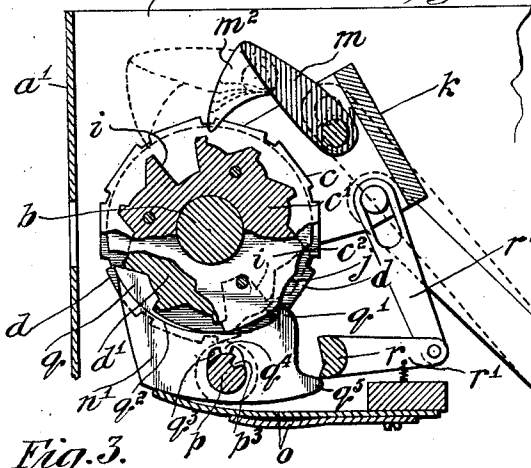


Fig. 3.

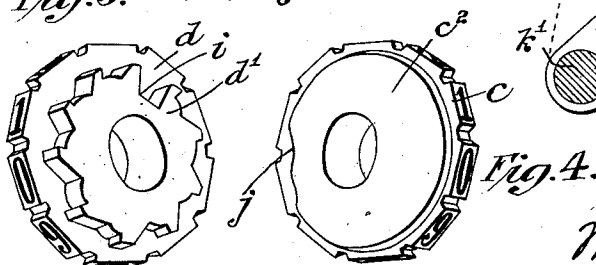


Fig. 4.

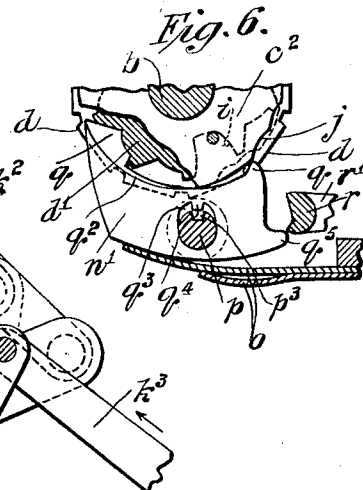


Fig. 6.

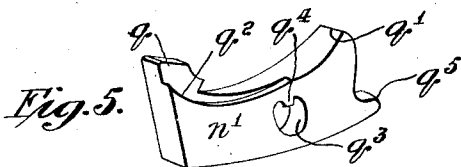


Fig. 5.

Maximilian H. Kern

INVENTOR

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Patented Sept. 22, 1925.

1,554,283

UNITED STATES PATENT OFFICE.

MAXIMILIAN H. KERN, OF RIDGEWOOD, NEW YORK, ASSIGNOR TO ROBERTS NUMBERING MACHINE COMPANY, A CORPORATION OF NEW YORK.

REGISTER.

Application filed November 29, 1921. Serial No. 518,580.

To all whom it may concern:

Be it known that I, MAXIMILIAN H. KERN, a citizen of the United States, residing at Ridgewood, in the borough of Queens, city of New York, county of Queens, and State of New York, have invented certain new and useful Improvements in Registers, of which the following is a specification, reference being had therein to the accompanying drawings, which form a part thereof.

My invention relates to registers, and more particularly to a type thereof adapted for use as counters and employing a sequence of progressively actuated digit wheels.

Registers of the type to which my invention relates are frequently inaccurate owing to the tendency of the actuation of a digit wheel of lower denomination to simultaneously impart a partial rotation to a digit wheel of higher denomination, thus resulting in unreliability in the use of the counters owing to uncertainty as to whether or not skipping has occurred during the progressive actuation of the various wheels. It has been the common practice heretofore to provide more or less complicated transfer mechanisms to correct this difficulty, but when such mechanisms are employed it has been found impracticable to provide means by which the digit wheels may be reset, since the employment of such a mechanism necessitates extreme accuracy in the mechanisms about the machine and added complexities in the mechanisms therein.

With the above conditions in mind, I have produced a register embodying no complicated actuating or transfer mechanisms, in which all of the digit wheels of the denomination about the units wheel will at all times be positively held against rotation excepting when all digit wheels of lower denomination have the figure 9 exposed at the reading point.

A register embodying my invention embodies therein independently operative locking mechanisms operative upon each wheel of higher denomination but controlled by each digit wheel of next lower denomination, which are normally operative to prevent accidental partial rotation of digit wheels of higher denomination as above stated, each locking mechanism being so constructed that it may be so set irrespec-

tive of the position of its controlling member upon the digit wheel of next lower denomination, as to make it inoperative to lock the wheel normally locked thereby, and thus permit a resetting of the register by a differential actuation of the individual digit wheels, entirely independently, one of the others.

In setting the register, the various locking mechanisms are not disengaged from the digit wheels with which they are associated, but are permitted to have such movement as will permit the turning of a wheel irrespective of the position of the digits thereon, while at the same time serving to retard the adjusting movement of each wheel sufficiently to ensure accuracy in the resetting thereof so that when the register has been reset, each wheel will have a definite operative relation to the actuating means therefor, and thus ensure a proper initiation of the actuating movement of the register when it is put in use after being so reset.

The invention consists primarily in a register having therein a sequence of independently rotatable digit wheels, and actuating means co-operating therewith, whereby said wheels will be progressively rotated, a locking member associated with and normally operative upon each digit wheel of a denomination above the units wheel to prevent rotary movement of said wheel, a controlling member operative upon each of said locking means and carried by each wheel of lower denomination than that upon which said locking means operates, whereby when said wheel of lower denomination is so positioned as to require the actuation of the digit wheel of next higher denomination, said locking means will be permitted to move from the locking position with relation to the wheel of next higher denomination, but will be held against movement to lock same at all other times, and means independent of said controlling member whereby said locking member may be made inoperative irrespective of the position of the characters upon the digit wheel of lower denomination; and in such other novel features of construction and combination of parts as are hereinafter set forth and described, and more particularly pointed out in the claims hereto appended.

Referring to the drawings,

Fig. 1 is a front view of a register embodying my invention, with the sight plate removed;

Fig. 2 is a section on the line 2—2 of Fig. 1;

Fig. 3 is a perspective view of one side of one of the digit wheels of a denomination higher than the units wheel;

Fig. 4 is a perspective view of the wheel of next lower denomination than that shown in Fig. 3;

Fig. 5 is a detail view of one of the pawls of the locking mechanism; and

Fig. 6 is a cross-sectional view of the lower portion of the mechanism shown in Fig. 2, showing the relation of parts when the mechanism is in condition to be set.

Like letters refer to like parts throughout the several views.

In the embodiment of my invention shown in the drawings, the frame of the register, shown at *a*, carries a fixed shaft *b* having idly mounted thereon a units digit wheel *c* and digit wheels *d*, *e*, *f*, *g* and *h* of progressively higher denomination.

Each of said digit wheels is of the same construction except as to the strength of parts, embodying therein a ratchet wheel upon one side thereof and a recessed controlling disk upon the other side thereof, except as to the wheel *h*.

The ratchet wheel associated with the units wheel *c* is indicated at *c'*, while the ratchet wheels carried by the other wheels are indicated at *d'*, *e'*, *f'*, *g'* and *h'* respectively. The controlling disk carried by the units wheel *c* is indicated at *c²*, while the corresponding disks carried by the wheels *d*, *e*, *f* and *g* are indicated at *d²*, *e²*, *f²* and *g²* respectively.

The construction and arrangement of each of the ratchet wheels *c'* to *h'* and of the controlling disks *c²* to *g²* is identical so that a detail description of but one of each is necessary.

Each of said ratchets has ten similar teeth, a recess or notch being formed between some two of said teeth as determined by the position of the actuating means with relation to the shaft *b*, so as to bring this notch or recess into the operative relation to the actuating means when the digit 9 is exposed through the sight opening in the front plate *a'* of the register if the construction is such as to require the register of an ascending total, or when the digit 0 is thus exposed when the machine is constructed to register a descending total. In Figs. 2 and 3 said recess is indicated at *i*. It is to be noted that the digits ratchet wheel *c'* by reason of the actuation of this wheel much more frequently than any other wheel, is heavier and stronger than the other ratchet wheels *d'* to *h'*.

Each of the controlling disks *c²* to *g²* is

a true circle of slightly greater diameter than the ratchet wheels *d'* to *h'*, except at one point of the periphery thereof, where there is a recess indicated at *j* in Figs. 2 and 4, so positioned as to be operative in relation to the locking member associated with the wheel of next higher denomination to permit a free oscillation of said member when the digit 9 of the digits wheel carrying said disk is in the visible position.

In the assembled structure, the various ratchet wheels *c'* to *h'* will be to the right of its digit wheel, and the disks *c²* to *g²* will be to the left thereof, thus bringing the controlling disk of a wheel of lower denomination closely adjacent the ratchet wheel of the digit wheel of next higher denomination.

The actuating means for the digit wheels in the form of the invention shown comprises a swing frame *k* pivotally mounted upon the shaft *b* and having a spring-pressed comb pawl *m*, the pawl teeth *m¹*, *m²*, *m³*, *m⁴*, *m⁵* and *m⁶* being of graduated decreasing lengths towards the wheel *h* so as to progressively actuate the various digit wheels. The number of such teeth corresponds with the number of digit wheels so as to cause the automatic progressive actuation of all of said wheels in a manner which will more fully appear hereinafter.

The frame *k* is intermittently actuated through the medium of a double crank shaft *k'*, a link *k²* pivotally connecting one arm of the shaft with said frame, and a link *k³* pivotally connected with the other crank of said shaft *k'* and with any desired mechanism for imparting oscillatory movement to said shaft *k'*. The actuating means may, however, take any desired form, it being merely necessary that some mechanism be used which may be synchronized with the functioning of some other mechanism so as to impart movement to said frame with each cycle of operation of such other mechanism.

To prevent overrunning of a digit wheel when the power of the actuating means is applied thereto, or a return movement of the wheel with said actuating means, each of the ratchet wheels *c'* to *h'* has associated therewith a detent pawl as *n—n'*—*n²*—*n³*—*n⁴*—*n⁵*, the pawl *n* associated with the units wheel acting solely as a detent, while the pawls *n'* to *n⁵* associated respectively with the wheels of progressively higher denomination act as detents and also serve as locking means controllable by the disks *c²* to *g²* for normally acting upon each digit wheel to positively prevent rotary movement of said wheel.

Each of the pawls *n* to *n⁵* has associated therewith a spring *o* which constantly engages its pawl with the ratchet wheel with which it co-operates, irrespective of the functioning of the controlling disk operative

upon said member. Preferably said springs are in the form of a two-ply leaf spring so as to develop a gradually increasing resistance to the flexure of said spring with the increased movement of the pawl and cause the pawl to rapidly engage the succeeding tooth upon its ratchet wheel.

Each of the pawls n to n^5 is mounted to rock upon a shaft p .

The mechanisms above described will ensure a normal and positive locking of all of the digit wheels above the units wheel at all times except when, during the progressive actuation of the machine, a movement of any wheel is required, whereupon the locking member will, as a result of the actuation of the controlling disk operative thereon, cease to function as a locking member while still functioning as a detent pawl. This condition, however, will not permit a rapid resetting of the register, my invention contemplating a construction of the various parts so as to permit the register to be so set as to make the controlling disk associated with each locking member inoperative to prevent movement thereof, while still permitting said locking member to act as a detent pawl to prevent overrunning of any digit wheel during the resetting operation.

Since the setting mechanism to permit resetting of the head is common to all of the locking members, and since the construction of each of said members n' to n^5 is identical, a description of but one of said members will be given, together with the operative relation of said setting mechanism thereon, it being understood that the relation of parts is the same with each of the other members.

Referring more particularly to Fig. 5 of the drawings, which shows one of the locking members as n' , this member embodies therein a laterally reduced pawl tooth q adapted to co-operate with its associated ratchet wheel d' to normally prevent movement thereof, to retard the movement thereof when during the actuation of the register such movement is required, and to ensure the stoppage of the digit wheel d with the digit or character thereon in alinement with the other exposed digits. Upon the other end of said member n' is a fulcrum contact q' adapted to engage the controlling disk c^2 upon the wheel c .

The contact q' is shown as extending for the full width of the locking member which is a mere matter, however, of design, since this member need be only of a width corresponding with the thickness of its controlling disk.

The portion of the locking member at one side of the tooth q is cut away upon a curve as shown at q^2 , to provide clearance for the controlling disk c^2 .

Intermediate the tooth q and the contact

q' the body of the member n' has an elliptical bearing opening q^3 therethrough, the minor axis of which is of a diameter sufficient to receive the shaft q , and has a projection q^4 at one end thereof having a curved inner surface concentric with one minor axis of the opening q^3 so as to afford a true circular bearing for the shaft p under normal conditions, thus limiting the rocking movement of the member n' except when the register is set to permit the resetting of the register wheels, to an oscillatory movement about said shaft p .

The shaft p is provided with a pocket adapted to receive the projection q^4 when this shaft is so turned as to bring said pocket opposite said projection, said shaft p being rotatably mounted in the frame a and provided with an operating arm p' which is preferably in the form of a flat spring having a nub p^2 thereon adapted to enter a locking recess in the side frame.

Since the shaft p must have therein a pocket adjacent the projection q^4 of each of the locking members, I preferably form this pocket in the shaft p in the form of a longitudinally extending slot p^3 , this, however, being merely a matter of design for facilitating the production of the shaft.

Each locking member n' to n^5 is also provided with a heel q^5 adapted to engage an oscillatory recessed stop bar r which normally prevents oscillatory movement of said member while permitting said member to oscillate when the heel is in the position where it may enter the recess in said bar. This bar is actuated with each forward movement of the frame k by means of the crank r' and the slotted link r^2 shown in Fig. 2.

Sufficient clearance is permitted between the bar r and the heel q^5 to permit the members n to n^5 to oscillate freely about the fulcrum point q when the shaft p is turned to permit the setting or resetting of the register.

The digits upon the wheels c to h and recess i may be so arranged with relation to the direction of rotation of each wheel as to cause the actuation of the register to indicate either a progressively increasing or a progressively diminishing total, as desired.

The operation of the herein described register is substantially as follows:—

The register shown in the accompanying drawings is designed for use for indicating an increasing total so that in starting the register, the digit wheels will all be so set that zeros only will appear at the sight opening in the plate a' . Until the units wheel registers a total of 9, the tooth m' will enter between succeeding teeth upon the ratchet wheel c' , the oscillatory movement of the swing frame k advancing said wheel c one-tenth of a revolution with each oscillation of

the shaft k' . During such movement the engagement of the tooth m' with the ratchet wheel c' holds all of the other teeth m^2 to m^6 out of engagement with the ratchet wheels with which they are respectively adapted to co-operate. When, however, the ratchet wheel c' is in a position where the tooth m' may drop into the recess i of said ratchet wheel, the comb pawl m will move under its spring toward the shaft b until the tooth m^2 engages a tooth upon the ratchet wheel d' , it being essential that the depth of the opening i in each ratchet wheel be sufficient to permit the ultimate engagement of the tooth m^6 with its ratchet wheel. In this manner the operative effect of the oscillation of the swing frame k may be limited to the units wheel alone, or extended to any necessary number of wheels, it being understood that all wheels, from the units to the wheel which is engaged by the shortest tooth upon the pawl m , will be simultaneously operated. Hence the condition is such that unless the units wheel has the digit 9 in the registering position, irrespective of the total indicated by the register, no wheels of higher denomination can be actuated by the pawl m , and that no wheel of higher denomination can be actuated unless all wheels of lower denomination have the digit 9 in the registering position.

During the rotation of the units digit wheel, the pawl n will act as a detent upon the ratchet wheel c' , and the circular portion of the controlling disk c^2 will engage the contact member q' of the lock member n' , thus holding the pawl q of said member n' in immovable engagement with the ratchet wheel d' , and thus positively lock the digit wheel d against rotary movement until the digit 9 appears in the registering position upon the units wheel, whereupon said contact member q' will be free to enter the recess j and thus permit a limited oscillatory movement of said member n' under the control of a tooth of the ratchet wheel d' sufficient to permit the tooth of the ratchet wheel d' to pass thereunder. The peculiar formation of the recess j as shown in Fig. 4 will cause a slight return movement of the member n' during the movement of the wheel d , and exert a slight braking action on the ratchet wheel d' as the wheel d is approaching the limit of its rotary movement.

Following the completion of this movement, the contact q' will rise upon the circular portion of the disk c^2 and thus again immediately prevent further movement of the wheel d and maintain it in a locked position until the digit 9 again appears in the registering position upon the digit wheel c .

The above operation is the same with each of the members n^2 to n^5 , said members being always in the locking relation to their respective ratchet wheels until the wheel of

next lower denomination than that of the ratchet wheel with which said members are respectively associated, has the digit 9 in the registering position.

It follows that each of the digit wheels above the units wheel is normally positively locked against rotary movement until all digit wheels of lower denomination have 9 in the registering position. Although any digit wheel which has 9 in the registering position will permit the actuation of the wheel of next higher denomination through the controlling mechanism carried by said first named wheel, no wheel will be subjected to any rotary stresses so long as some wheel between it and the units wheel is positively locked, as a locking member can only be released by the application of rotative stresses to the wheel with which it is associated.

It will thus appear that each wheel of a denomination higher than the units wheel will normally be locked against movement by reason of the immovability of the detent pawl or locking member associated with the ratchet wheel carried thereby, and that movement of said wheel and of said detent pawl or locking member is possible only when during the progressive actuation of the register it becomes necessary that a wheel of next higher denomination be moved.

Under normal conditions each locking member n' to n^5 will have a true circular bearing upon the shaft p by reason of the bearing surface afforded by the projection q^4 , so that while the register is in operation, any locking member will rock about the axis of said shaft.

When it is desired, however, to set or reset the register, the shaft p is turned by means of its handle p' so as to bring the recess p^3 opposite the projection q^4 , which condition, however, will not disturb the operative relation of the locking member and its associated ratchet wheel, but will permit the said locking member to rock about a fulcrum point afforded by the contact q' thereof bearing against the controlling disk with which it is associated, so that any wheel may be turned freely, the locking member associated therewith, however, always acting as a detent pawl to prevent a return movement of the wheel and prevent too free a movement thereof while it is being set. The spring o associated with each locking member will, whenever a digit upon any digit wheel is in proper alinement, engage the tooth q with the ratchet wheel and disengage the projection q^4 from the recess p^3 in the shaft p . Consequently when each wheel of the register has been reset, said projection will be disengaged from said recess, thus permitting a return movement of the shaft p to a position where the engagement of the projection q^4 with the circular

periphery thereof will positively hold the locking member against oscillatory movement unless the recess *j* in the controlling disk carried by the wheel of lower denomination is in a position where the contact *q'* can enter same.

When the shaft *p* is set as above described, the locking members will have no rotary movement about said shaft.

It is apparent that in a register embodying the essential characteristics of my invention, skipping of any digit wheel is absolutely impossible, since the locking members are released only for a sufficient interval to permit a one-tenth rotation of the digit wheels with which they are respectively associated, and no actuating stresses can be applied to said digit wheel unless conditions in the register are such as to require the rotation of that wheel.

A register embodying my invention is particularly adapted for use in counters used in connection with machines used for stamping mail matter, as distinguished from applying stamps thereto, wherein a positive and absolute check is required as to the number of actuations of the machine in order to prevent fraud. It may also be advantageously used in printing presses and other mechanisms wherein it is desired to indicate the total outputs of different runs of a machine, and wherein skipping of wheels of a denomination above the units wheel will cause material shortage in the production of the machine and require re-counting of the product.

It is not my intention to limit the invention to the precise details of construction shown in the accompanying drawings, it being apparent that such may be varied without departing from the spirit and scope of the invention.

Having described the invention, what I claim as new and desire to have protected by Letters Patent, is:—

1. In a register having therein a sequence of independently rotatable digit wheels, and actuating means cooperating therewith, whereby said wheels will be progressively rotated, a locking member associated with and normally operative upon each digit wheel of a denomination above the units wheel to prevent rotary movement of said wheel, a controlling member operative upon each of said locking means and carried by each wheel of lower denomination than that upon which said locking means operates, whereby when said wheel of lower denomination is so positioned as to require the actuation of the digit wheel of next higher denomination said locking means will be permitted to move from the locking position with relation to the wheel of next higher denomination, but will be held against movement to lock same at all other times, and means independent of said controlling mem-

ber whereby said locking member may be made inoperative irrespective of the position of the characters upon the digit wheel of lower denomination.

2. In a register having therein a sequence of independently rotatable digit wheels, a ratchet wheel carried by each of said digit wheels whereby a partial rotation may be imparted thereto, and means co-operating with each of said ratchet wheels whereby said digit wheels will be progressively rotated, a controlling disk carried by each digit wheel of lower denomination adjacent the ratchet wheel of the wheel of next higher denomination, said disks being recessed at one point thereof, a pivotally mounted recessed shaft, a sequence of oscillatory locking members each having an elongated bearing opening therein and a projection adapted to enter a recess in said shaft and projecting within said bearing opening, whereby when said shaft is in one position, said locking member will have a true circular bearing upon said shaft, and when said shaft is in another position, movement of said member radially of said shaft is permitted, each of said locking members having a pawl tooth co-operating with the ratchet wheel of each digit wheel of higher denomination, and a contact engaging the controlling disk of the wheel of next lower denomination, whereby said locking member is normally held against movement with relation to its ratchet wheel and is permitted movement by said contact entering said recess when the wheel carrying said contact is so positioned as to require the actuation of the digit wheel of next higher denomination, and means whereby pivotal movement may be imparted to said shaft.

3. In a register having therein a sequence of independently rotatable digit wheels, a ratchet wheel carried by each of said digit wheels whereby a partial rotation may be imparted thereto, and means co-operating with each of said ratchet wheels whereby said digit wheels will be progressively rotated, a controlling disk carried by each digit wheel of lower denomination adjacent the ratchet wheel of the wheel of next higher denomination, said disks being recessed at one point thereof, a pivotally mounted recessed shaft, a sequence of oscillatory locking members each having an elongated bearing opening therein and a projection adapted to enter a recess in said shaft and projecting within said bearing opening, whereby when said shaft is in one position, said locking member will have a true circular bearing upon said shaft, and when said shaft is in another position, movement of said member radially of said shaft is permitted, each of said locking members having a pawl tooth co-operating with the ratchet wheel of each digit wheel of higher

denomination, and a contact engaging the
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5 lation to its ratchet wheel and is permitted
movement by said contact entering said re-
cess when the wheel carrying, said contact
is so positioned as to require the actuation
of the digit wheel of next higher denomina-
10 tion, means whereby pivotal movement may
be imparted to said shaft, a recessed oscil-

latory shaft adjacent the contacts of all of
said locking members, each of said locking
members having a projecting heel normally
disengaged from, but adapted to engage said 15
recessed shaft, and means whereby said last
named shaft will be actuated from said first
named means.

In witness whereof I have hereunto af-
fixed my signature this 4th day of Novem- 20
ber, 1921.

MAXIMILIAN H. KERN.