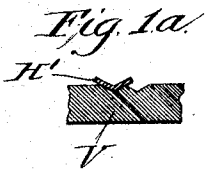
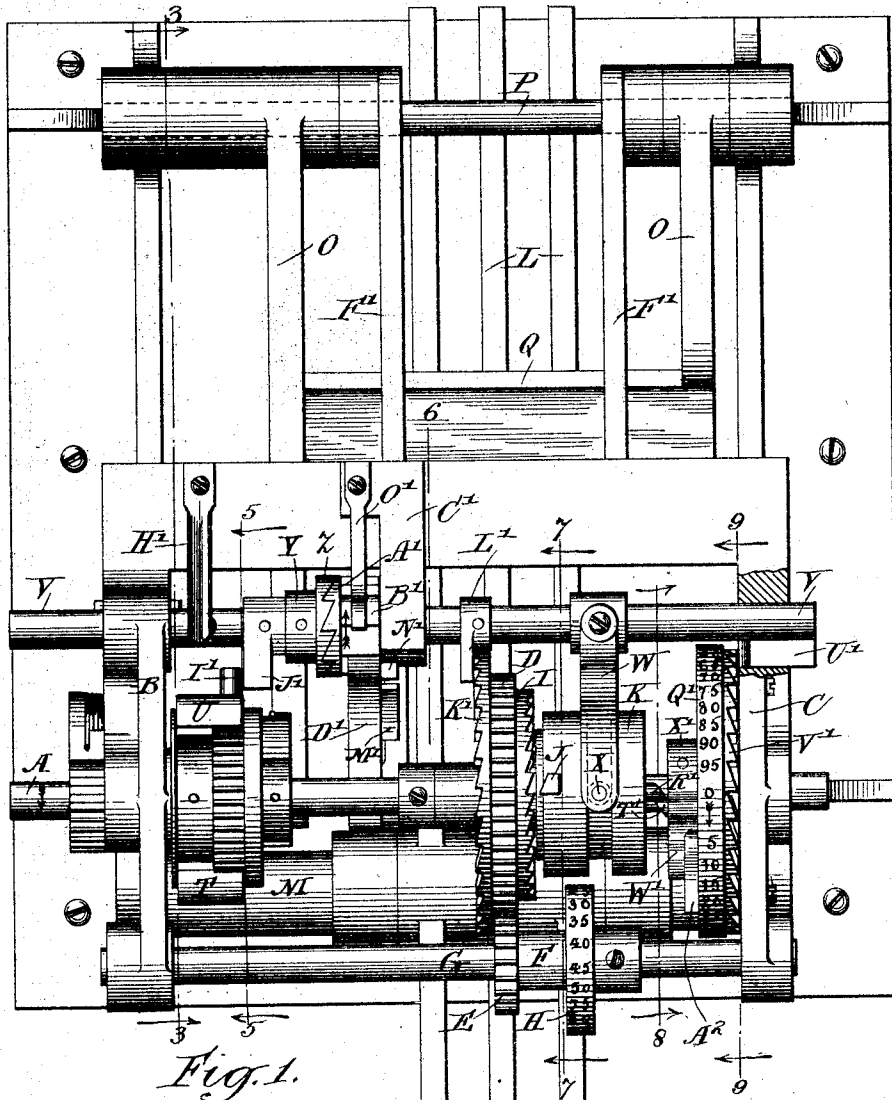


H. COOK.
CASH REGISTER AND RECORDER.

No. 503,947.

Patented Aug. 29, 1893.



Witnesses
Wm. L. Fleming
J. M. Rhen;

60
N
90
N
30
N

Inventor
Hugo Cook
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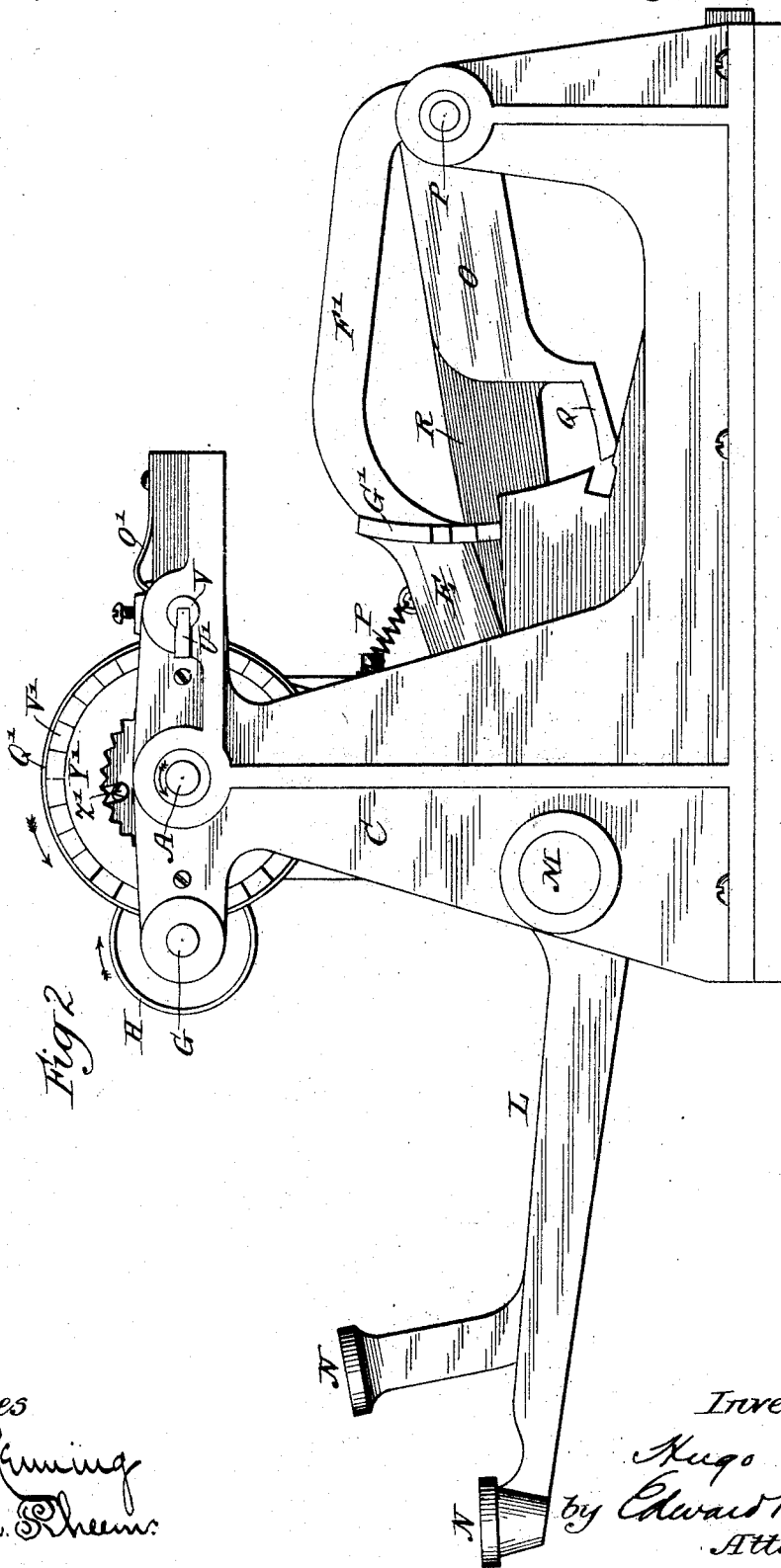
(No Model.)

5 Sheets—Sheet 2.

H. COOK.
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(No Model.)

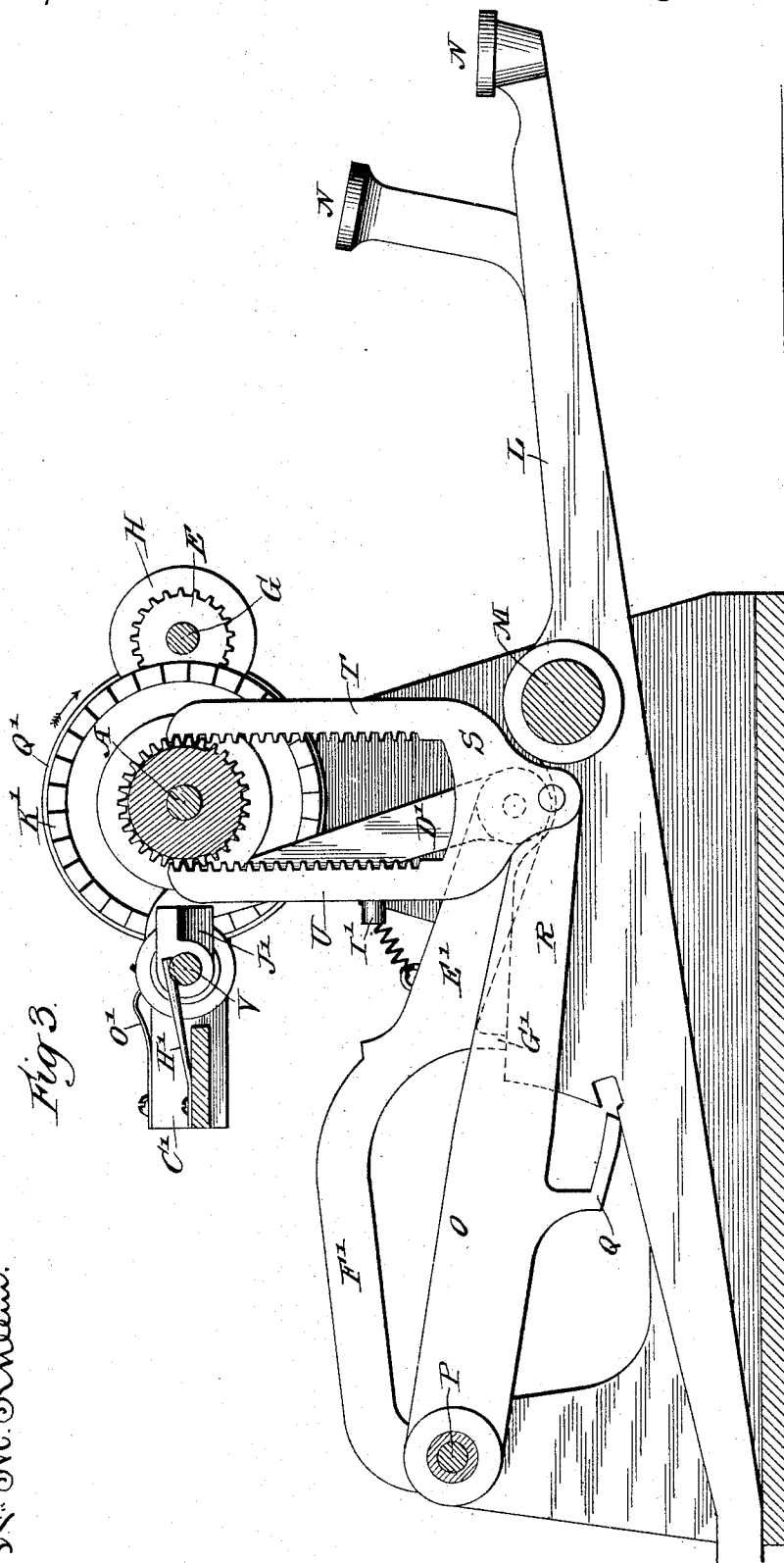
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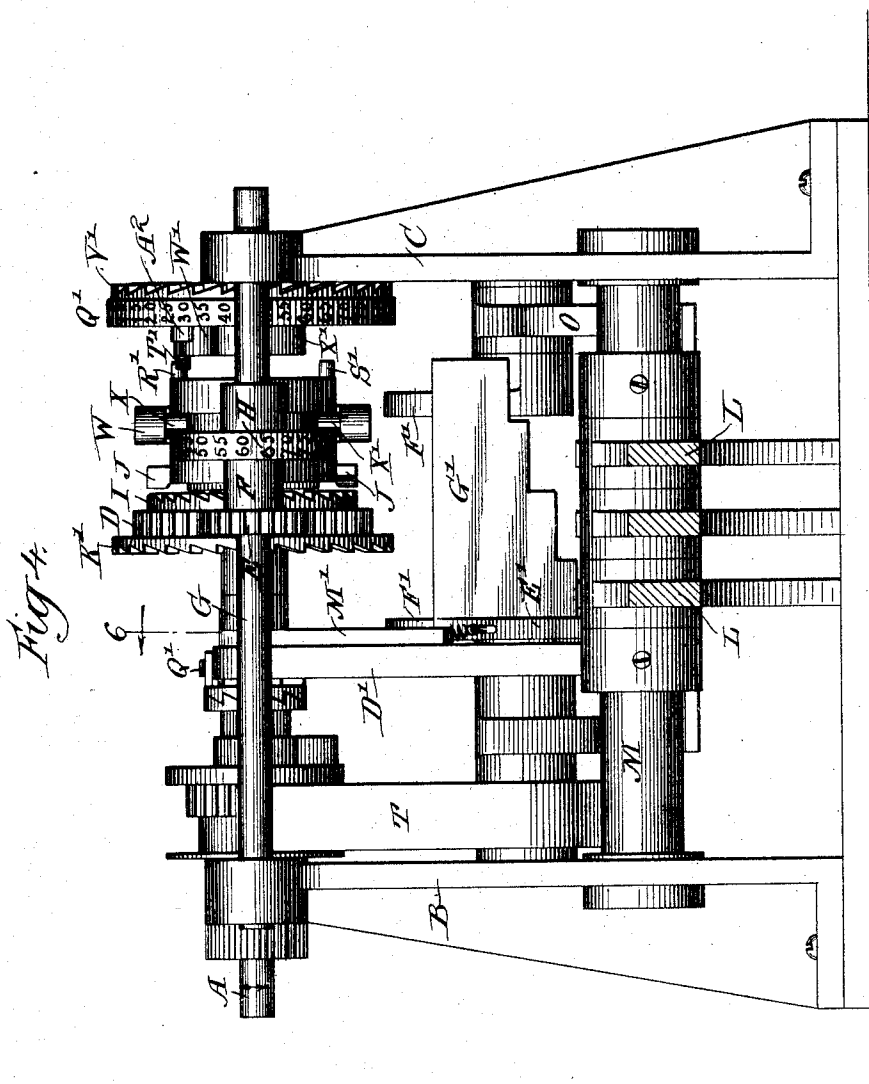
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Witnesses

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Fig 5.

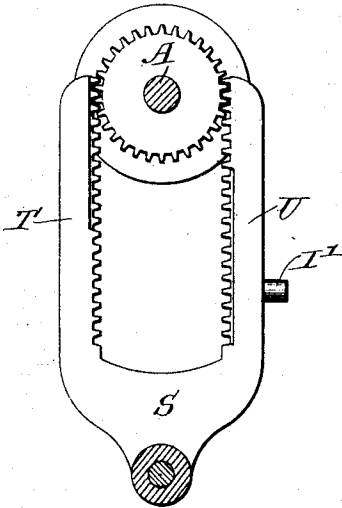


Fig 7.

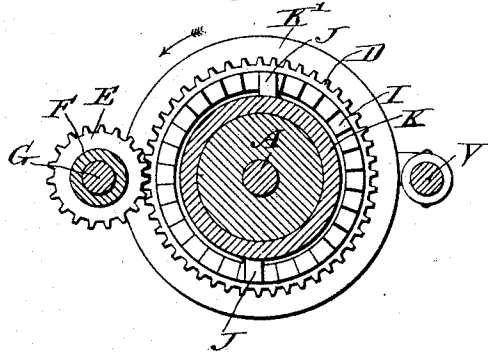


Fig 8.

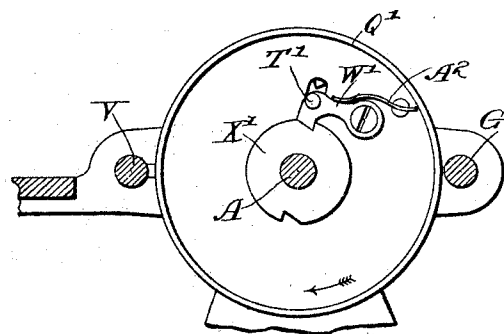


Fig 6.

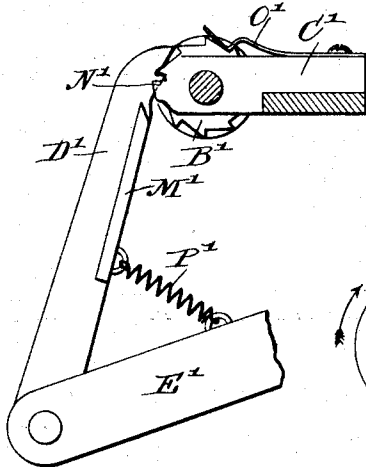


Fig 9.

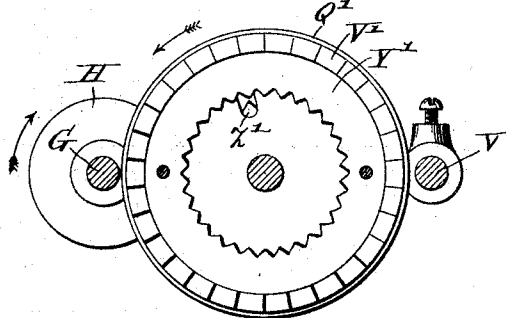
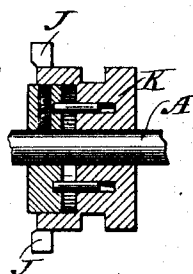


Fig 10.



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UNITED STATES PATENT OFFICE.

HUGO COOK, OF DAYTON, OHIO.

CASH REGISTER AND RECORDER.

SPECIFICATION forming part of Letters Patent No. 503,947, dated August 29, 1893.

Application filed November 19, 1892. Serial No. 452,570. (No model.)

To all whom it may concern:

Be it known that I, HUGO COOK, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented a certain new and useful Improvement in Cash-Registers, of which the following is a description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates chiefly to the registering devices of such machines, but incidentally also to recording and printing devices which may be employed in connection with or independently of the registering devices.

Its novelty consists in the new combinations and modes of operation, as well as construction and arrangement, of the parts, all as will be hereinafter set forth and particularly pointed out in the claims.

In the accompanying drawings, in which I have illustrated only so much of the machine as is necessary to a clear explanation of the principle and mode of operation of the invention, Figure 1 represents a top plan view; Fig. 1^a, a sectional detail of the spring catch for shifter rod; Fig. 2, a side elevation of the right hand side of the machine; Fig. 3, a vertical section just within the left hand side frame of the machine, on the line 3—3 of Fig. 1; Fig. 4, a front elevation of the machine with the front ends of the operating keys cut off; Figs. 5, 6, 7, 8 and 9, sectional details upon the lines 5—5, 6—6, 7—7, 8—8 and 9—9 respectively of Fig. 1; and Fig. 10 a detail vertical section through the clutch member on a line longitudinal of its axis.

The same letters of reference are used to indicate identical parts in all the views.

It has heretofore been common in registering and like machines to combine a driving device (generally having a uniform movement at each operation) with a registering, indicating or recording device, or all three, a series of keys, stops or trips representing different amounts, and means controlled by said keys, stops or trips for intermittently connecting the driving device with and disconnecting it from such driven devices for the purpose of imparting to the latter different portions of the movement of the driving device determined by the particular key, stop or trip which is operated or set. In such machines the driv-

ing device has been actuated independently of the operation of the keys, generally by a lever, crank or other suitable handle, producing what has been known as a "two motion" machine; that is to say, a machine in which the mere operation of a key was not sufficient to register, indicate or record its value, but in which it was first necessary to operate or set the proper key or keys and then give the driving device its independent movement by means of the operating handle before referred to. The main distinguishing feature of my present machine consists in the fact that the driving device is itself actuated by the same operating keys which determine the portion of its movement which shall be imparted to the registering or other driven device, so that by the simple operation of any key its value may be registered. In its broader scope, therefore, my invention consists in this new mode of operation, and in the broad combination of elements employed in carrying it out, irrespective of any particular form, arrangement or construction of the parts. In the so-called "two motion" machines to which I have referred the driving device has sometimes been a rotary one, turning forward the same distance at each operation; in others the driving device has been an oscillatory one, moving forward and backward a given distance at each operation. So, in some of such machines the driving device has been coupled to the registering or other driven device at different points in the movement of the driving device, determined by the particular key which has been operated or set, and uncoupled or disconnected from such driven device at a fixed point; while in others of such machines the driving device has been coupled or connected to the driven device at a fixed point and disconnected from it at different points determined by the particular key operated, for the same purpose and with the same result. In my improved machine either of the above modes of operation may be employed, but in the form illustrated in the drawings the organization is such that the driving member of the combination is normally disconnected from the driven member and is connected with the latter at different points in its movement, determined by the particular key operated, and is disconnected from it at a fixed

point. From an explanation of such machine the variations in the mode of operation above referred to may be readily understood.

Referring now more particularly to the embodiment of my invention which has been illustrated in the accompanying drawings, the element which may in this instance be said to constitute the driving member of the mechanical movement or combination is a rotary shaft A journaled at its opposite ends in the side frames B C of the framework, Fig. 1. Loose upon this shaft is a wheel D, which may be the primary registering wheel, or the driving wheel for a train of registering wheels. In this instance it is shown as a gear wheel meshing with a pinion E fast upon a sleeve F loose upon a transverse shaft G, the sleeve F having also fast upon it a numbered wheel H which constitutes the primary registering wheel, from which a train of registering wheels may be driven in the usual or any suitable manner. Assuming now that the shaft A be given a definite movement in the direction of the arrow at each operation of the machine, it will be understood that if it be connected with the wheel D at different points in its movement and disconnected from said wheel at a fixed point the wheel D will be turned by it different distances determined by the different points at which the shaft and wheel were connected. The third element of the combination therefore consists in some suitable means for connecting the shaft and wheel at different points in the movement of the shaft, and a clutch of usual or suitable construction may form a convenient means for this purpose.

In the particular machine illustrated in the drawings I have employed a clutch member K mounted upon and turning with the shaft A but capable of slight movement longitudinally of the shaft, Fig. 10. This clutch member is provided with one or more teeth J (preferably two, upon diametrically opposite sides of it), which co-operate with a ratchet or series of clutch teeth I upon the right hand side of the wheel D. If the clutch member K be slid to the left during the movement of the shaft A and its teeth J engaged with the ratchet I the wheel D will be carried with the shaft until the clutch member K is slid to the right again. The next element of the combination therefore consists in a shifter, or other means, for sliding the clutch member K to the left at different points in the movement of the shaft A and sliding it to the right again at a fixed point in the movement of said shaft, and this shifting device is to be controlled by the operating keys, which may now be referred to. These keys in this instance consist of levers L fulcrumed on a shaft M and provided at their front ends with the usual numbered finger buttons N. In the drawings I have shown only three of these key levers, representing respectively thirty, sixty and ninety, but it will be understood that any desired number, within reasonable limits,

may be employed without changing the mode of operation of the parts.

In the machine illustrated in the drawings the registering devices are such as would be adapted to co-operate with a series of nineteen keys, representing multiples of five from five to ninety-five inclusive. In other machines it would be desirable to employ several sets or series of keys, each set containing nine keys representing units from one to nine inclusive, or other amounts in that ratio, and in such machines there would be employed three such wheels as D and three clutch members and shifters co-operating therewith, one for each set of keys, with means intermediate each set of keys and its corresponding shifter for engaging the clutch with the wheel D at the proper points in the movement of the shaft A determined by the key operated. It will be understood that there need in such case be only one driving shaft A, all of the clutch members K being mounted to turn with and slide upon said single shaft.

Hung by its side arms O upon a shaft P at the rear of the machine is what may be called a vibrating frame, composed of said side arms O and a cross bar Q carried thereby and resting upon the upper sides of the key levers L between their fulcrum shaft and the shaft P. Whenever the front end of one of the key levers L is depressed the vibrating frame will be lifted, and when the key is released the frame will be re-set to normal position, springs being employed to aid its gravity in the latter operation if desired. The left hand side of the vibrating frame has projecting forwardly from it an arm R to the front end of which is pivoted a plate or frame S having two vertically extending rack arms T U whose racks co-operate with devices hereinafter referred to to impart a rotary motion to the shaft A from the reciprocating movements of the vibrating frame, the shaft A being turned forward a half revolution during the downward movement of the front end of any key lever and upward movement of the vibrating frame, and another half revolution during the return movements of the operated key and frame. In this manner the operation of each key will give the shaft A and clutch member K a complete forward revolution. The shifting device for the clutch in this instance consists of a shaft V mounted at its opposite ends in the side frames and capable of slight longitudinal play. This shaft has fast upon it a yoke W whose arms embrace the clutch member K and are provided with pins X fitting in a circumferential groove in said member, so that while the clutch member is free to turn it will be moved laterally with the shaft V. The shaft V has fast upon it toward its left hand end a hub or collar Y provided on its right hand face with beveled shoulders or teeth Z with which co-operate corresponding teeth A' upon the left hand face of a ratchet B' loose upon the shaft. The right hand side of the ratchet B' bears

against a bracket C' upon the framework, so that when the ratchet is turned rearward, in the direction of the arrow, the passage of the teeth A' carried by it over the teeth Z of the collar Y fast upon the shaft V will force said shaft to the left, thereby carrying the clutch member K in that direction and engaging its teeth J with the teeth I on the wheel D. The ratchet B' is turned rearward at each operation by means of a pawl arm D', Fig. 6, which is pivoted at its lower end to an arm E', Fig. 3, extending forward from a second vibrating frame composed of two side arms F' F' hung upon the shaft P and a cross bar or plate G' overlying the keys in rear of their fulcrum shaft M. As seen in Fig. 4 the under side of the plate G' is graduated or formed into steps, causing the several keys to contact with the plate at different points in their respective movements and consequently to lift the plate different distances, the result being that the ratchet B' will be turned rearward and the shaft V slid to the left, in the manner before explained, at different points in the movements of the respective keys. Thus, the left hand one of the three keys, which represents ninety, will lift the plate G' at almost the beginning of the movement of the key, and as the actuating pawl of the arm D' is normally in operative engagement with one of the teeth of the ratchet B', Fig. 6, the latter will be turned rearward and the shaft V slid to the left and the clutch member K engaged with the wheel D by the time the key has completed one-tenth of its downward stroke; while in the operation of the middle key, which represents sixty, the same result will not be brought about until the key has completed four-tenths of its downward stroke, and in the case of the right hand key, representing thirty, the key will complete seven-tenths of its stroke before the ratchet is turned to shift the clutch. If there were nineteen keys in the series, representing multiples of five from five to ninety-five, as before suggested, the under side of the plate G' would be provided with nineteen steps or gradations, and the adjustment would be such that the key would effect the shifting of the clutch when it had completed one-twentieth of its stroke, the 90 key when it had completed two-twentieths of its stroke, the 85 key when it had completed three-twentieths, and so on down to the 5 key, which latter would not effect the shifting of the clutch until the key had completed nineteen-twentieths of its stroke. The wheel D is so geared to the primary registering wheel H that the latter will be turned one complete revolution for each half revolution of the wheel D, and as the wheel H is provided with a series of twenty numbers, from 5 to 95, arranged at equidistant points around its periphery, each twentieth of a half revolution made by the wheel D will turn the wheel H a twentieth of a whole revolution and advance it one number, so that the operation of the 90 key, which will turn the wheel D nine-

tenths of a half revolution, as before explained, will advance the wheel H eighteen numbers and add ninety upon it. Likewise the operation of the 60 key will advance said wheel twelve numbers and add sixty upon it, while the operation of the 30 key will advance it six numbers and add thirty upon it.

A spring H' fastened to the framework operates at its front end with two notches in the shaft V, Figs. 1 and 1^a, to hold the shaft in its opposite shifted positions. When the shaft is shifted to the left and the clutch engaged with the registering wheel, in the manner before described, the spring H' engages the right hand notch in the shaft and holds it in its left hand position with the clutch engaged with the registering wheel. At the end of the downward stroke of the operated key and half revolution of the shaft A the shaft V is slid back to the right and the clutch disengaged from the registering wheel by means of a projection I' upon the rack arm U, Fig. 3, which projection at the end of the upward movement of the vibrating frame which carries the racks strikes a beveled arm J' fast upon the shaft V and forces the shaft to the right, the spring H' re-engaging the left hand notch in the shaft and holding the parts in this normal position until the ratchet B' is turned rearward again by the operation of another key. During the return strokes of the operated key and vibrating frame and the second half of the revolution of the shaft A and clutch member K the latter is disconnected from the wheel D and the wheel remains stationary while the shaft and clutch complete the revolution alone.

The wheel D has fast upon its left hand side a locking ratchet K' with which co-operates a locking arm L' fast upon the shaft V. The arm L' is normally engaged with one of the notches in the ratchet K', and the wheel H thereby locked from forward movement, but when the shaft V is slid to the left to engage the clutch with the wheel the locking arm L' is carried out of engagement with the ratchet K' and the wheel released. Likewise at the end of the downward stroke of the operated key the shifting of the shaft V to the right again carries the arm L' back into engagement with the ratchet K', so that the wheel D becomes locked again as soon as the clutch is disengaged.

It will be seen that the teeth Z upon the collar Y and the teeth A' upon the ratchet B' act simply as cams in their co-operation with each other to move the shaft V, and it is evident that any other sort of cams might be employed for the same purpose, or that wholly different means might be used for shifting the shaft V back and forth. Under the construction shown the pawl-arm D' turns the ratchet B' rearward only one tooth at each operation of the machine, a laterally projecting rib M' upon said pawl-arm, Fig. 6, co-operating with a cam surface N' upon the bracket C' to disengage the pawl-tooth from

the ratchet when the latter has been turned the distance between two of its teeth. A spring O' bearing against the ratchet B' serves to yieldingly hold the latter in position and a spring P' connected to the pawl-arm D' and the arm E' which carries it serves to hold the pawl arm in operative position.

From the foregoing description it will be seen that, so far as its co-operation with the registering wheel is concerned, the last half of the revolution of the shaft A is an idle one, the clutch being disengaged from the registering wheel and the latter remaining stationary. It is therefore clear that the shaft A could as well be made to oscillate forward and back through a half revolution at each operation, instead of turning a complete revolution in one direction. To this end the only means necessary for giving the shaft A its forward and backward movements would be a simple rack and pinion connection between it and the vibrating frame O O Q before described. The forwardly extending arm R of said frame might carry a simple rack arm spring-pressed or otherwise held in mesh with a pinion fast upon the shaft A. In the machine which I have illustrated in the drawings the shaft A is made revoluble and given a complete revolution at each operation for purposes independent of its co-operation with the registering wheel. Any suitable means for converting the reciprocating movements of the vibrating frame into rotary movement in the shaft A may be employed for that purpose. Inasmuch as there are many well known forms of devices employed in machines of this class, for this purpose, and illustrated and described in numerous patents heretofore granted, it is unnecessary to illustrate and describe any particular form in detail. One suitable form, however, may be found in my pending application, Serial No. 452,569, filed November 19, 1892. This or any other one suitable for the purpose may be employed. Again, while under the arrangement and operation which have been described the driving shaft A is coupled to the registering wheel at different points in the forward movement of the shaft and uncoupled from it at a fixed point, in order to transmit different portions of its movement to the registering wheel according to the particular key operated, it will be readily understood that this operation might be reversed and the shaft A be normally coupled to the registering wheel and be uncoupled from it at different points determined by the particular key operated, for the same purpose. Thus the arrangement of the parts might be such that the teeth J of the clutch member K would be normally engaged with the teeth I on the wheel D, so that when the front end of any key lever was depressed the shaft A would carry the wheel D with it until the clutch member K was shifted to the right to release the wheel and permit the shaft to continue its movement alone, the clutch being shifted

to the left again and re-engaged with the wheel D when the operated key and parts actuated by it were returned to normal position. Again, while under all of the operations above described or suggested the driving member of the combination, the shaft A, is given a uniform movement by the operations of the different keys, yet this is not essential, it being only necessary that the driving member be given a sufficient movement at each operation to impart the requisite movement to the registering wheel, and any surplus movement of the driving member beyond this is immaterial. Thus, the vibrating frame O O Q, instead of being moved uniformly by all of the keys, might be given variable movements by different keys. This variable movement would in no wise change the mode of operation of the combination, provided the movement given the vibrating frame and driving shaft A at each operation were sufficient for the purpose of turning the wheel D the necessary distance, and while it is not the purpose and intended mode of operation of my invention to control the movement of the registering wheel by the extent of movement given the driving member, but on the contrary to control the movement of said wheel solely by the points of connection or disconnection of the driving member and registering wheels by means of the clutch or otherwise, I wish it clearly understood that my invention may not be evaded by giving the driving member variable movements, instead of a uniform movement, by the operation of different keys.

It is common in machines of this general character to employ a type wheel which is actuated at each operation of the machine to bring to the printing point a number corresponding to the value of the operated key, a platen co-operating with such wheel at the end of the positive stroke of the key to effect the printing of the number upon a paper strip or ticket, and the type wheel being returned to zero or initial position during the return stroke of the key. Thus, at each operation the type wheel is turned to bring the proper number to the printing point, the printing is effected, and the type wheel is then restored to initial position ready for the next operation. I will describe how such a type wheel may be employed in my present machine and be actuated by the driving member of the combination to bring its proper numbers to the printing point at the operations of the respective keys. The shaft A has loose upon it just within the right hand side frame C of the machine a wheel Q'. This wheel may itself be the type-wheel, or it may be geared to a type wheel or other form of type carrier in any suitable manner. In the present instance, for the purpose of an explanation of this feature of the invention, it may be assumed to be the type wheel itself and a line either vertically above or below its axis be assumed to be the printing line, since I have not illustrated any platen co-operating

with the wheel. The wheel is in this instance provided with two series of numbers in multiples of five, each from 0 to 95 inclusive and occupying a little less than one-half of the periphery of the wheel, and the zero in each set being arranged adjacent to the 95 instead of adjacent to the 5 as is usual. The clutch member K has projecting from its right hand side two diametrically opposite projections R' S', Fig. 4, which co-operate with a projection T' upon or carried by the wheel Q'. When the clutch member K is in its right hand normal position the projection T' on the wheel Q' stands in the path of travel of the projections R' S', so that when the shaft A and clutch K are turned forward one or the other of the projections R' S' will engage the projection T' and carry the wheel Q' in the direction of the arrow. When the clutch member K is slid to the left, to couple the shaft A to the registering wheel, the projections R' S' are carried out of the plane of the projection T' and the wheel Q' thereby released and allowed to stop while the driving shaft and clutch member turn on without it. In this manner at each operation of the machine the wheel Q' is turned forward with the driving shaft A until the clutch is shifted to couple the shaft to the registering wheel, and this shifting of the clutch uncouples or disconnects the shaft from the wheel Q', so that it is released and comes to rest at the moment the registering wheel is connected to the shaft and begins to turn. The sum of the movements of the two wheels thus equals the full movement given the driving shaft by the downward stroke of an operated key. The downward stroke of the key, as before explained, turns the shaft A a half revolution; if, therefore, the clutch is shifted when the operated key has completed five-twentieths of its downward stroke the wheel Q' will be turned five-twentieths of a half revolution, and then released, and the wheel D turned fifteen-twentieths of a half revolution by the remaining fifteen-twentieths of the downward stroke of the key. If the clutch is shifted when the operated key has completed ten-twentieths or one-half of its downward stroke the wheel Q' will first be turned one-fourth of a revolution and then the wheel D will be turned a like distance, and so on, the full movement given the driving shaft by the downward stroke of the key being divided between the wheels Q' and D in proportions determined by the particular key operated. The numbers in each of the two series upon the wheel Q' are arranged in reverse order relatively to the direction of movement of the wheel, the result being that when the wheel is turned forward in the manner before described the numbers from ninety-five downward are successively brought to the initial or printing point, which we may assume to be the position occupied by the "0" in Fig. 1 of the drawings. The result of this arrangement of the numbers upon the wheel Q' is that in the division of the movement of the

driving member between said wheel and the registering wheel the wheel Q' will be turned forward just far enough each time to bring to the initial point the number which is to be added upon the registering wheel. Thus, if the 60 key be operated the wheel Q' will be turned forward four-tenths of a half revolution, in the manner before explained, before the clutch is shifted to release said wheel and couple the shaft to the registering wheel, and this will bring the number 60 upon the wheel Q' to the initial point. So, if the 90 key be operated the clutch will be shifted as soon as the key has completed one tenth of its downward stroke and the wheel Q' been turned forward one tenth of a half revolution, and this will bring the number 90 upon said wheel to the initial point, as will be readily understood.

For the purpose of positively arresting the wheel Q' when it is released by the engagement of the clutch with the registering wheel there is provided a locking plate U' upon the right hand end of the shaft V, which plate, when the shaft V is slid to the left, engages a notch in a locking ratchet V' fast upon the right hand side of the wheel Q'. The wheel Q' is restored to initial position during the return stroke of the operated key and last half of the revolution of the driving shaft A and clutch member K by that projection R' or S' opposite the one which engaged the projection T' in turning the wheel during the first half of the revolution of the shaft and clutch. Thus, with the projection R' in engagement with the projection T', as shown in the drawings, if the 30 key be operated the wheel Q' will be carried around approximately seven-tenths of a half revolution, so that during the remainder of the first half of the revolution of the clutch K the projection R' will be carried three-tenths of a half revolution after it is disengaged from the projection T', and as the projection S' is diametrically opposite the projection R' said projection S' will then stand seven-tenths of a half revolution distant from the projection T'. During the second half of the revolution of the clutch K, therefore, the projection S' will come in contact with the projection T' when the clutch has completed seven-tenths of the second half of its revolution, and during the remaining three-tenths of this half revolution the projection S' will carry the wheel Q' onward approximately three-tenths of a half revolution and bring to the initial point the zero in the other series of numbers, which is diametrically opposite the one which had previously stood at the initial point. If the 60 key had been the one operated the projection R' would have turned approximately six-tenths of a half revolution after it had cleared the projection T', and the projection S' at the end of the half revolution would stand at approximately four-tenths of a half revolution from the projection T' so that during the second half of the

revolution the projection S' would engage the projection T' and pick up the wheel Q' and carry it with it during the last six-tenths of its half revolution to bring the zero upon said wheel to the printing point. In this manner at each operation of the machine the wheel Q' is given a full half revolution, being first turned, during the downward stroke of the operated key and first half revolution of the driver, from zero to the number in the same series which corresponds to the value of the operated key, and then, during the return stroke of the operated key and second half revolution of the driver, being turned onward in the same direction until the zero in the other series of numbers is brought to the initial point.

In the foregoing explanation it has been assumed that the projection T' is a rigid projection secured upon the wheel Q', since it might as well be such for the purposes of the operation which has been so far described; but I provide an auxiliary locking device for the wheel Q' (supplemental to the locking plate U' on the shaft V), and incidental to the construction of this auxiliary locking device the projection T' is arranged upon an arm or dog W', Fig. 8, pivoted to the side of the wheel Q'. The shaft A has fast upon it immediately to the left of the wheel Q' a collar X' provided with two diametrically opposite notches which co-operate with the dogs W'. One side of each notch is beveled and the other preferably abrupt. Rigidly secured to the inner face of the right hand side-frame C of the machine, Figs. 2 and 9, is an internally-toothed locking disk or ring Y'. The dog W' is provided on its right hand side with a locking tooth Z' which projects through a slot in the wheel Q' and is adapted to co-operate with the teeth of the locking ring Y', the operation being as follows: When the parts are in normal position the dog W' is engaged with one of the notches in the collar X', as seen in Fig. 8, a spring A² yieldingly pressing it against the collar. In this position the locking tooth Z' upon the opposite side of the dog is free to revolve within the toothed locking ring Y', so that during the first forward movement of the parts the wheel Q' turns with the shaft A as before described, and the dog W' remains in engagement with the notch in the collar X'. But when the clutch is shifted and the wheel Q' released by it and locked by the plate U' on the shaft V, in the manner before described, the shaft A and collar X' turn on forward independently of the wheel Q' and as the notch in the collar X' with which the dog W' was engaged is carried from under the dog the latter is forced outward and rides upon the periphery of the collar and the locking tooth Z' is engaged with one of the notches in the toothed locking ring Y' and maintained in engagement with such notch by the engagement of the dog W' with the periphery of the collar X'. The shaft V is slid to the right, it will be remembered, at the end of the down-

ward stroke of the operated key, so that the locking plate U' is carried out of locking position at that time, but the wheel Q' remains locked by the engagement of the tooth Z' with the locking ring Y' until in the second half of the revolution of the driving shaft the opposite notch in the collar X' is brought under the dog W', and inasmuch as the notches are arranged approximately co-incident with the projections R' S' upon the clutch member K such notch will be brought under the dog W' at the moment the projection S' which is to carry the wheel Q' onward to the end of its half revolution comes in contact with the projection T', so that the wheel Q' is not only held locked from the moment the clutch is shifted to disconnect it from the driving shaft and connect the registering wheel with said shaft, during the downward stroke of the operated key and first half of the revolution of the driving shaft, but it is also held locked during the return stroke of the key and second half of the revolution of the driving shaft until the projection S' comes in contact with the projection T' to turn the wheel on to initial position. In this manner the wheel Q' is always positively locked except at such times as it must be free to be moved.

From the foregoing description it will be understood that the co-operation of the driving shaft and clutch member with the wheel Q' is wholly independent of their co-operation with the wheel D, and that my invention may be utilized as well in a machine which employs either one of these wheels without the other as in a machine which employs both of them.

The indicating mechanism of the machine may be of any suitable character, as for instance the usual numbered tablets carried upon vertically guided rods resting upon the rear ends of the key levers.

I am aware that it has heretofore been proposed to actuate the registering wheel in machines of this character by means of a driving device given variable movement under the operations of the different keys and connected with and disconnected from the registering wheel by means of a clutch. Thus it has been proposed to actuate the registering wheel by means of such a frame as the frame F' F' G' of my present machine, a rack being affixed to such frame and arranged to mesh with a clutch pinion mounted beside the registering wheel upon the same axis and adapted to be slid into and out of engagement with clutch teeth upon the wheel; but in such cases the clutch was always shifted at a fixed point in the strokes of the operated keys, and not at different points determined by the particular key operated. Thus, if the clutch were engaged with the registering wheel at the beginning of the stroke of a key it would remain engaged with it until the end of the positive stroke of such key and the wheel would be turned a distance governed by the extent of movement given the driving device or gradu-

ated frame. During the return stroke of the operated key the teeth of the clutch pinion would either slip idly backward over the teeth upon the registering wheel, or else the pinion would be shifted entirely out of engagement with the teeth upon the registering wheel at the end of the positive stroke of the key and held out of engagement with it until the key and other parts were re-set to normal position, whereupon it would be re-engaged ready for the next operation. In other cases the clutch pinion would be normally disengaged from the registering wheel and during the positive stroke of the operated key would be turned forward independently of the wheel a distance governed by the movement given the driving device or graduated frame, and at the end of such stroke of the key it would be engaged with the registering wheel to carry the latter with it upon its return movement. In all of these instances the movement given the registering wheel was governed by the movement given the driving device, whereas under the novel mode of operation of my invention the extent of movement of the driving device has nothing whatever to do with the degree of movement given the registering wheel, provided only that the driving device is given a sufficient movement at each operation, the distinguishing feature of my invention in this respect being that the driving device may be given either a uniform movement at each operation, or any desired movement that is sufficient, while the extent of movement of the registering wheel is determined by the portion of the movement of the driving device which is imparted to the wheel under the operations of the different keys.

Having thus fully described my invention, I claim—

1. The combination of a series of operating keys representing different amounts, a driving member actuated thereby, a driven member, and means for connecting the two members, controlled by the keys and operating to connect the driving member with or disconnect it from the driven member at different points in the movement of the driving member determined by the particular key operated, for the purpose of imparting to the driven member different portions of the movement of the driving member, substantially as described.

2. The combination of a series of operating keys representing different amounts, a driving member actuated thereby, a driven member, a clutch or connecting member for intermittently connecting the driving and driven members, and means controlled by the operating keys for shifting the clutch at different points in the movement of the driving member, for the purpose of imparting to the driven member different portions of the movement of the driving member, substantially as described.

3. The combination of a series of operating keys representing different amounts, a vibrat-

ing frame common to the keys and moved by the operation of any one of them, a driving member, a rack and pinion connection between said driving member and the vibrating frame, a driven member, a clutch or connecting member for intermittently connecting the driving and driven members, and means controlled by the operating keys for shifting the clutch at different points in the movement of the driving member, substantially as and for the purpose described.

4. The combination of a series of operating keys representing different values, a vibrating frame common to the keys and moved by the operation of any one of them, a driving member, a rack and pinion connection between said driving member and the vibrating frame, a driven member, a clutch or connecting member for intermittently connecting the driving and driven members, a shifter for the clutch, a second vibrating frame common to the series of keys and given different degrees of movement by the operations of different keys, and a connection between said frame and the shifter for actuating the latter to shift the clutch at different points in the stroke of the respective keys, substantially as and for the purpose described.

5. The combination of a series of operating keys representing different values, a driving shaft actuated by said keys, a wheel loose upon said shaft, a clutch or connecting member mounted to slide upon but turn with the shaft and co-operating with the wheel to intermittently connect it with the shaft, and means controlled by the operating keys to shift the clutch at different points in the movement of the driving shaft for the purpose of imparting different portions of its movement to the wheel, substantially as described.

6. The combination of a series of operating keys representing different amounts, a vibrating frame common to said keys and moved by the operation of any one of them, a driving shaft, a rack and pinion connection between said shaft and the vibrating frame, a wheel loose upon the shaft, a clutch or connecting member mounted to slide upon but turn with the shaft and co-operating with the wheel to intermittently connect it with the shaft, a shifter for the clutch, a second vibrating frame common to the series of keys and given different degrees of movement by the operations of different keys, and a connection between said frame and the shifter for actuating the latter to shift the clutch at different points in the strokes of the respective keys, substantially as and for the purpose described.

7. The combination of a series of operating keys representing different amounts, a driving member actuated thereby, a driven member, a clutch or connecting member for intermittently connecting the driving and driven members, means controlled by the operating keys for shifting the clutch at different points in the movement of the driving member, and

a lock actuated by the keys to lock the driven member while it is disconnected from the driving member and to release it when connected with said member, substantially as described.

8. The combination of a series of operating keys representing different amounts, a driving member actuated thereby, a driven member, a clutch or connecting member for intermittently connecting the driving and driven members, a shifter for the clutch actuated by the operating keys to shift the clutch at different points in the movement of the driving member, and a lock for the driven member actuated by the shifter to lock said member when the clutch is shifted in one direction and to release it when it is shifted in the other direction, substantially as described.

9. The combination of a series of operating keys representing different amounts, a driving member actuated thereby and having a uniform movement at each operation, a driven member, and means controlled by the operating keys for connecting and disconnecting the two members, to cause the driven member to be turned at each operation from initial position to a point determined by the operated key during one-half of the movement of the driving member, and to be turned to initial position during the other half of the movement of the driving member.

10. The combination of a series of operating keys representing different amounts, a driving member actuated thereby and having a uniform movement at each operation, a driven member, and means controlled by the operating keys for connecting and disconnecting the two members, to cause the driven member to be turned at each operation from initial position to a point determined by the operated key during the first half of the movement of the driving member, and to be turned thence to initial position during the second half of the movement of the driving member.

11. The combination of a series of operating keys representing different amounts, a revoluble driving shaft actuated thereby and given a uniform movement by the operations of the different keys, a driven member loose upon the shaft, a connecting member mounted to slide upon the shaft and turn with it and provided with two driving projections co-operating alternately with a projection upon the driven member, and means controlled by the operating keys for shifting the connecting member toward and from the driven member at points in the movement of the driving shaft determined by the particular key operated, substantially as and for the purpose described.

12. The combination of a series of operating keys representing different amounts, a revoluble driving member actuated thereby and turning in one direction only, a driven member also revolving in one direction only, and means controlled by the operating keys

for connecting and disconnecting the driving and driven members for the purpose of imparting to the latter different portions of the movement of the former, substantially as described.

13. The combination of a series of operating keys representing different amounts, a revoluble driving member actuated thereby and turning in one direction only, a driven member revolving on the same axis and in one direction only, and means controlled by the operating keys for connecting and disconnecting the driving and driven members, substantially as and for the purpose described.

14. The combination of a series of operating keys representing different amounts, a revoluble driving member actuated thereby and turning in one direction only, a driven member revolving on the same axis and in one direction only, a clutch for intermittently connecting the driving and driven members, and means controlled by the operating keys for shifting the clutch at different points in the movement of the driving member, substantially as and for the purpose described.

15. The combination of a series of operating keys representing different amounts, a revoluble driving member actuated thereby and turning in one direction only, a driven member revolving on the same axis and in one direction only, a clutch or connecting member interposed between the driving and driven members and revolving with the driving member, for intermittently connecting the two members, and means controlled by the operating keys for shifting the clutch at different points in the movement of the driving member, substantially as and for the purpose described.

16. The combination of a series of operating keys representing different amounts, a revoluble driving shaft actuated thereby and turning in one direction only, a driven member loose upon said shaft, a clutch or connecting member mounted to slide upon and turn with the shaft and adapted to be engaged with and disengaged from the driven member, and means controlled by the operating keys for shifting the clutch at different points in the movement of the driving shaft, substantially as and for the purpose described.

17. The combination of a series of operating keys representing different amounts, a revoluble driving member actuated thereby and turning in one direction only, a driven member also revolving in one direction only and moving at each operation first to a point determined by the operated key and thence to initial position, and means controlled by the operating keys for connecting and disconnecting the driving and driven members, substantially as and for the purpose described.

18. The combination of a series of operating keys representing different amounts, a revoluble driving member actuated thereby and turning in one direction only, a driven member also revolving in one direction only

and moving at each operation first to a point determined by the operated key and thence to initial position, a clutch or connecting member interposed between the driving and driven members for intermittently connecting them, and means for shifting the clutch at different points in the movement of the driving member, substantially as and for the purpose described.

19. The combination of a series of operating keys representing different amounts, a driving member actuated thereby, a driven member, and means controlled by the operating keys for connecting the driving and driven members at different points in the movement of the driving member and disconnecting them at a fixed point at each operation, substantially as and for the purpose described.

20. The combination of a series of operating keys representing different amounts, a driving member actuated thereby, a driven member, an interposed clutch or connecting member for intermittently connecting the driving and driven members, and means controlled by the operating keys for shifting the clutch in one direction at different points, to connect the driving and driven members, and in the opposite direction at a fixed point to disconnect them, substantially as described.

21. The combination of a series of operating keys representing different amounts, a driving member actuated thereby, two independently movable driven members, and means controlled by the operating keys for alternately connecting said driven members with the driving member, whereby the movement of the driving member, or a definite part thereof, is divided between the two driven members in proportions determined by the particular key operated.

22. The combination of a series of operating keys representing different amounts, a driving member actuated thereby, two independently movable numbered wheels having their numbers arranged in reverse order relatively to the directions of movement of the respective wheels, and means controlled by the operating keys for alternately connecting the two wheels with the driving member, whereby the movement of the latter, or a definite part thereof, is divided between the two wheels in proportions determined by the particular key operated.

23. The combination of a series of operating keys representing different amounts, a driving member actuated thereby, a registering wheel and an independently movable type-wheel, having their numbers arranged in reverse order relatively to the directions of movement of the two wheels, and means controlled by the operating keys for alternately connecting the two wheels with the driving member during the first half of the movement of the latter, substantially as described.

24. The combination of a series of operating keys representing different amounts, a driving shaft actuated thereby, two independ-

ently-movable wheels loose upon said shaft, a sliding clutch mounted upon and turning with the shaft between the two wheels, and means controlled by the operating keys for shifting the clutch at different points in the movement of the driving shaft, substantially as described.

25. The combination of the operating keys L representing different amounts, the driving shaft A, mechanism intermediate said shaft and keys for turning the shaft, the wheel D loose upon the shaft and provided on one side with the clutch teeth I and on the opposite side with the locking ratchet K', the clutch member K mounted to slide upon and turn with the shaft and provided with one or more teeth J adapted to co-operate with the teeth I, an endwise movable shaft V connected with the clutch member K for shifting the latter, the locking arm L' fast, upon the shaft V and co-operating with the ratchet K' upon the wheel D, and means intermediate the operating keys and shaft V for moving the latter endwise at different points in the movement of the driving shaft A, substantially as described.

26. The combination of the operating keys L representing different amounts, the revoluble driving shaft A, means intermediate the keys and shaft for turning the latter, the wheel Q' loose upon the shaft and provided with a projection, as T', the sliding member K mounted to slide upon and turn with the shaft A and provided with the two projections R' S' adapted to co-operate with the projection T', and means controlled by the operating keys for shifting the member K toward and from the wheel Q', substantially as and for the purpose described.

27. The combination of the operating keys L representing different amounts, the revoluble driving shaft A, means intermediate the keys and shaft for turning the latter, the wheel Q' loose upon the shaft and provided with a projection, as T', and with the locking ratchet V', the sliding member K turning with the shaft and provided with two projections R' S' adapted to co-operate with the projection T', the endwise moving shaft V connected with the member K and provided with the locking plate U co-operating with the ratchet V' on the wheel Q', and means controlled by the operating keys for moving the shaft V endwise to carry the member K toward and from the wheel Q', substantially as and for the purpose described.

28. The combination of the wheel V', the independently-revoluble notched collar X', the fixed locking ring Y', and the arm W' carried by the wheel Q', and co-operating with the collar X' and provided with the locking tooth Z' co-operating with the ring Y', substantially as and for the purpose described.

HUGO COOK.

Witnesses:

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