

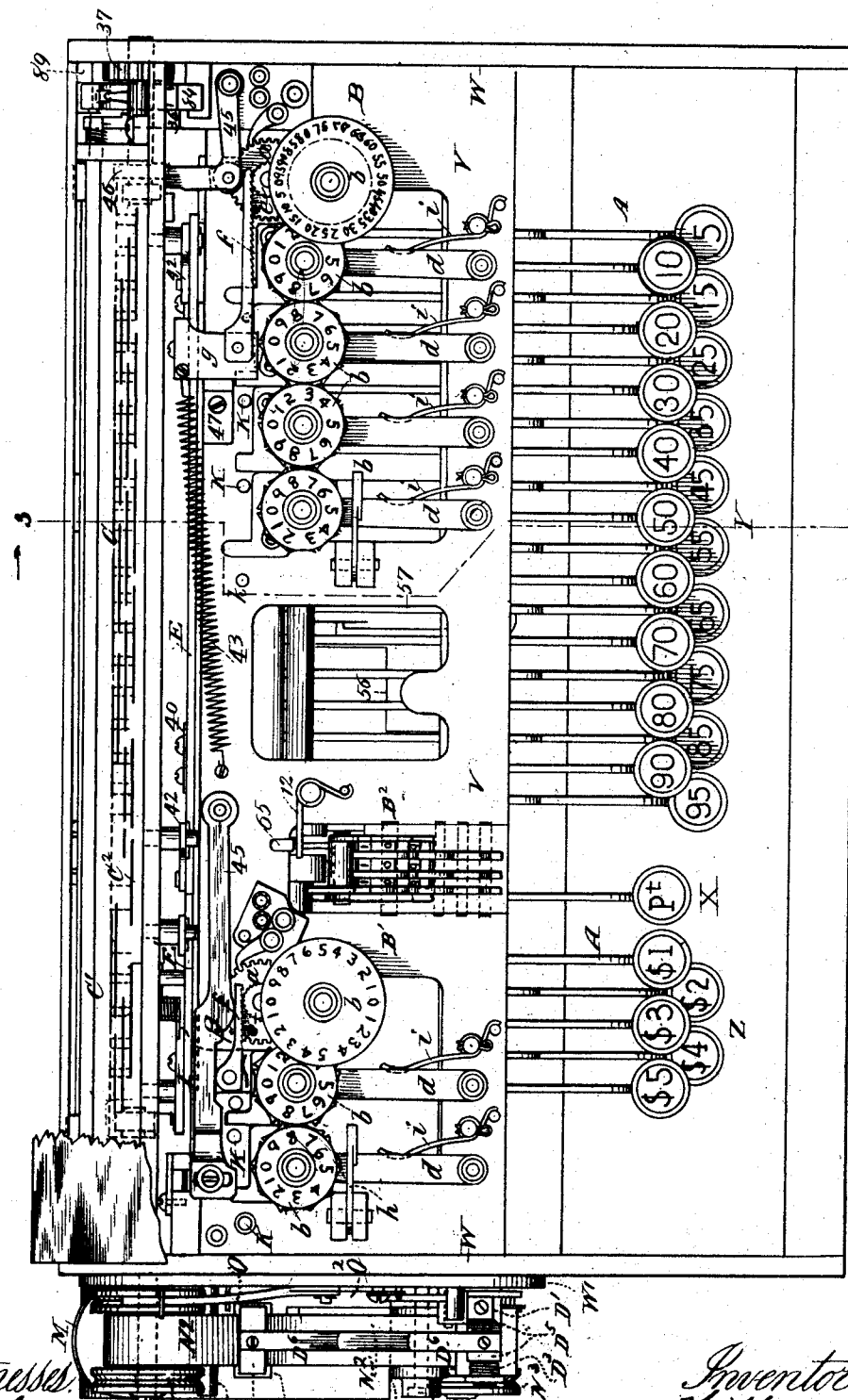
(No Model.)

4 Sheets—Sheet 1.

W. KOCH.
CASH REGISTER AND RECORDER.

No. 505,555.

Patented Sept. 26, 1893.



Witnesses
E. L. Hearlow
A. F. Nelson

Inventor
William Koch
By *Emmeline E. E. E.*
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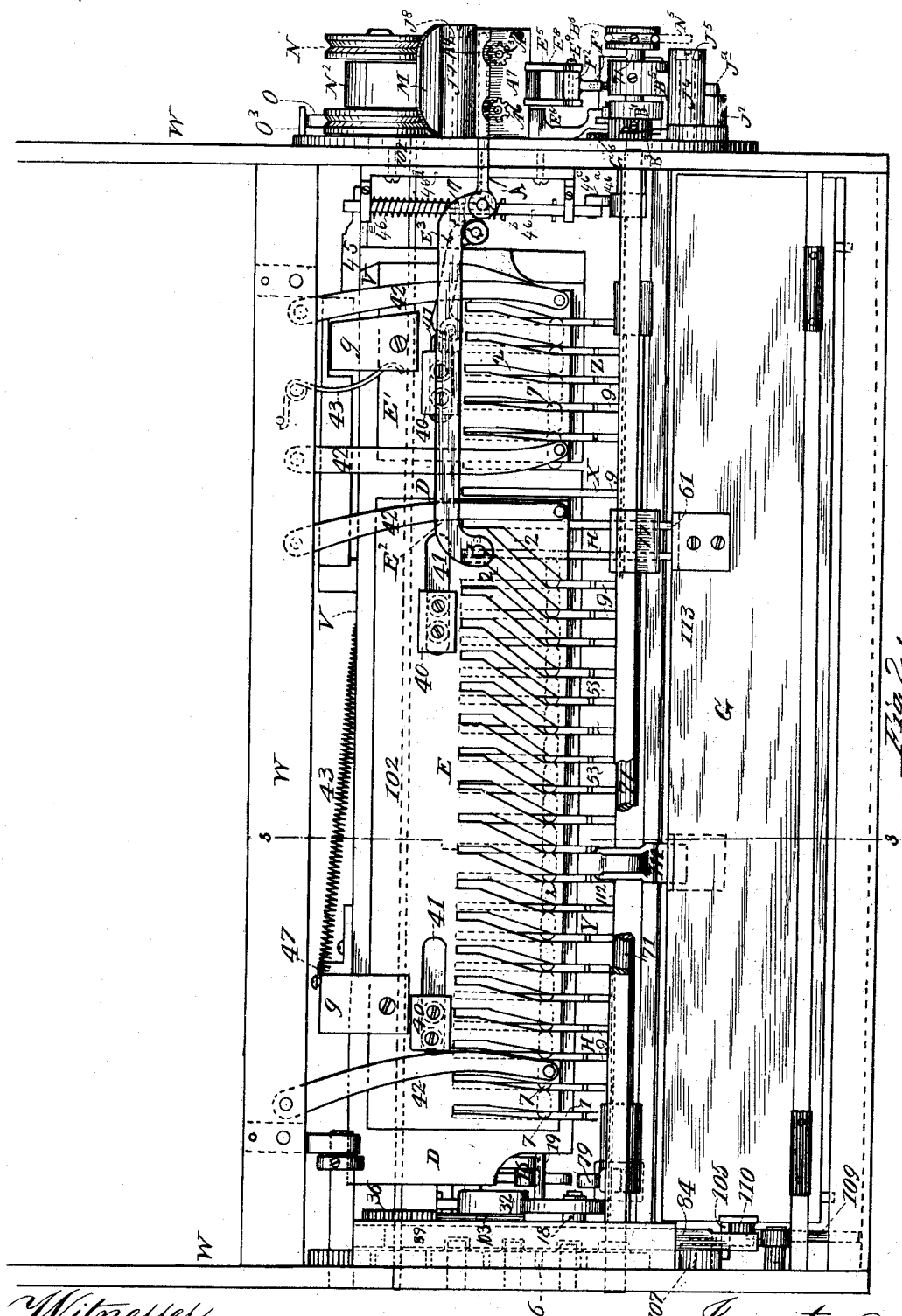
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4 Sheets-

W. KOCH.
CASH REGISTER AND RECORDER.

No. 505,555.

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Witnesses
E. L. Hearlow.
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(No Model.)

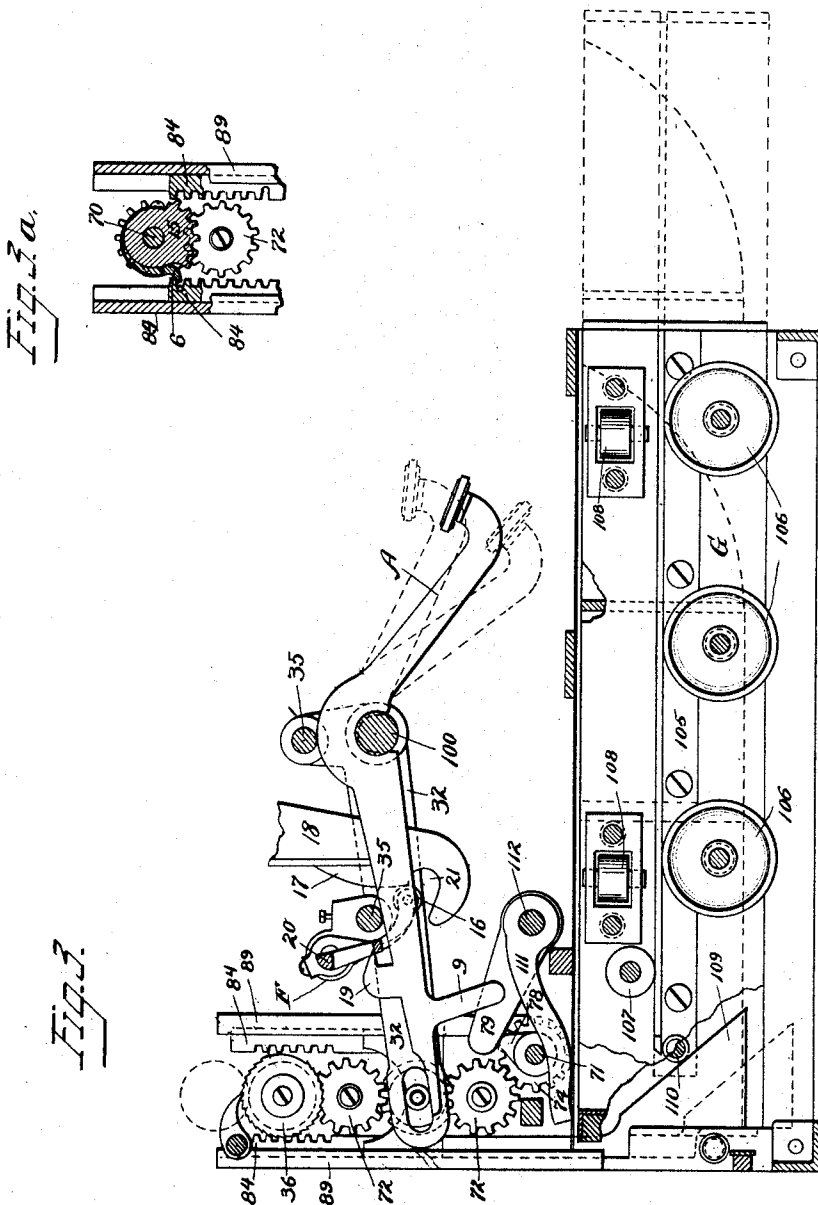
4 Sheets—Sheet 3.

W. KOCH.

CASH REGISTER AND RECORDER.

No. 505,555.

Patented Sept. 26, 1893.



Witnesses
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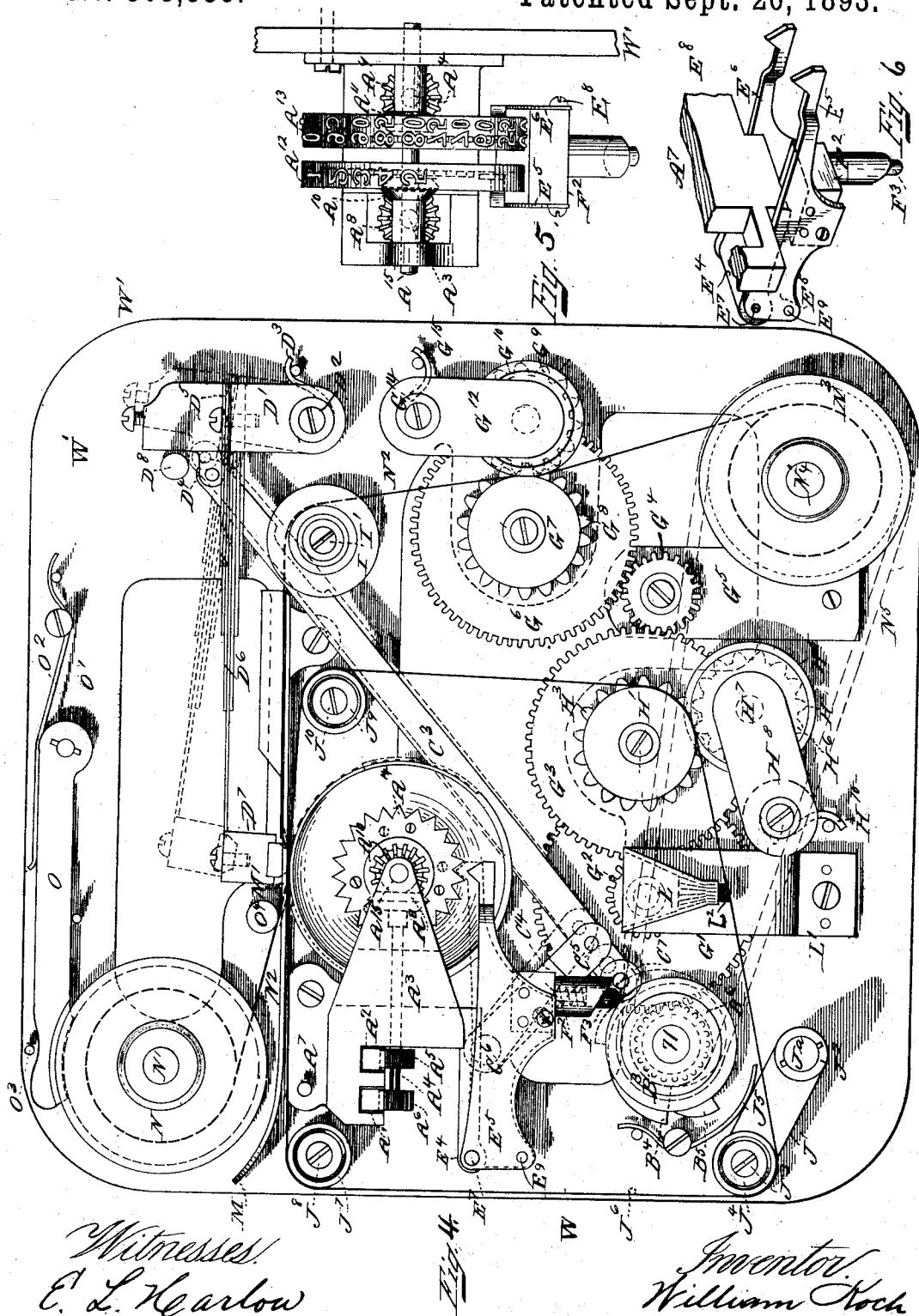
(No Model.)

4 Sheets—Sheet 4.

W. KOCH.
CASH REGISTER AND RECORDER.

No. 505,555.

Patented Sept. 26, 1893.



Witnesses:
E. L. Harlow
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UNITED STATES PATENT OFFICE.

WILLIAM KOCH, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS,
TO THE NATIONAL CASH REGISTER COMPANY, OF DAYTON, OHIO.

CASH REGISTER AND RECORDER.

SPECIFICATION forming part of Letters Patent No. 505,555, dated September 26, 1893.

Application filed February 29, 1892. Serial No. 423,268. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM KOCH, a citizen of the United States, residing in the city, county, and State of New York, 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 more particularly to machines of the character shown and described in my pending application, Serial No. 399,640, filed July 15, 1891, and consists chiefly in the application to that machine of a printing mechanism by which the amounts indicated and registered by the operations of the various keys may be also printed upon a paper strip carried by the machine. In the machine shown in my prior application the values of the operated keys in each set were added into a common total, so that at the end of a day's business the proprietor could ascertain the gross amount of the sales by inspecting the register, but he could not ascertain the character or amounts of the different sales. It is desirable in this class of machines, for reasons familiar to those experienced in the sale and use of such machines, that the proprietor shall be able at the end of a day's business to readily ascertain not only the total amount of the sales but to have before him a record of the individual sales, so that he may know just how many sales of different amounts have been made.

To that end my present invention consists in equipping my former machine with a printing mechanism by which a record of such individual sales may be automatically made and preserved. In combining such a mechanism with the machine of my prior application, however, I have produced substantially a new machine, containing combinations of parts and modes of operation which are broadly new, and my present invention is therefore not restricted, in its broader scope, to the particular construction of the machine shown in my prior application, or the particular construction of the printing mechanism which has been combined with it, but contemplates broadly the new combinations and modes of operation set forth in my respective claims

without further limitation than is therein expressed.

Having thus premised the general nature of my invention, I will proceed to describe, first the general construction of the machine as shown and described in my prior application, and next the combination of the printing mechanism therewith, reference being had to the accompanying drawings, in which—

Figure 1 represents a top plan view of the machine, removed from its casing, and with some of the parts broken away to expose others beneath; Fig. 2 a rear elevation of the machine, with the indicating mechanism removed; Fig. 3 a vertical section of the machine approximately on the line 3—3 of Fig. 1 with one of the operating keys partly depressed; Fig. 3^a a detail of the segment forming part of the mechanical movement for converting the reciprocating movements of the keys into rotary movement in a shaft; Fig. 4 an enlarged side elevation of the printing attachment upon the left hand side of the machine; Fig. 5 a detail front elevation of the two type wheels and associated parts; and Fig. 6 a detail perspective view of the locking dogs for the type wheels and associated parts.

The same letters and numerals of reference are used to indicate identical parts in all the figures.

Inasmuch as the general construction of the machine is described in detail in my aforesaid pending application I will here give only such brief description of the parts and their mode of operation as may be necessary to an understanding of my present invention. The operating levers consist of bent levers A fulcrumed on a horizontal rod 100, Figs. 1 and 3. They fit in grooves in said rod, or are properly spaced upon it by interposed collars, and their rear ends are confined and adapted to have their vertical play in guide slots in a fixed plate D of the framework, Fig. 2. Hung upon the rod 100 is a swinging frame composed of two side arms 32 rigidly connected in rear of the fulcrum rod 100 by a rod 35 overlying the keys, and having their vertically extended front ends also rigidly connected by a second rod 35 immediately over the fulcrum rod 100. This latter rod serves to hold the key levers A in position in the

grooves in the rod 100, the upper edges of the keys against which the rod 35 bears being curved in the arc of a circle struck from the center of the rod 100. The two side arms 32 and the cross rods 35 constitute a rigid frame hung upon the rod 100. In the normal position of the parts the rear rod 35 rests a slight distance above the upper edges of the keys, and whenever any key is operated it contacts with the rod after it has been moved slightly from normal position, and lifts the swinging frame with it. The keys are provided upon their upper sides in rear of the rod 35 with hooks 19 adapted to co-operate with a coupling bar 20 loosely hung between ears F upon the upper edges of the side arms 32, said coupling bar having at one end a downwardly and forwardly curved arm carrying a roller 16 adapted to co-operate with a cam 17 upon a fixed plate 18 depending from an upper part of the framework, and with a recess 21 in said plate below the cam 17, to cause an operated key to become hooked to the bar 20, and thereby coupled to the swinging frame, as soon as it has been substantially displaced from normal position, as will be readily understood, and as is explained at length in my aforesaid pending application. The key levers A are in this instance divided into two sets, Y and Z, the former representing cents in multiples of five from 5 to 95, and the latter representing dollars in multiples of one from 1 to 5, with an intermediate special key X adapted to operate an independent registering mechanism B². The front ends of the key levers in the two sets are preferably so bent as that the finger buttons of the alternate keys will stand in two horizontal lines or banks, as shown, and as is usual in this class of machines.

Upon the rear side of the fixed guide plate D heretofore referred to, Fig. 2, are mounted two longitudinally movable plates E and E', the former overlying the rear ends of the keys in the cents bank Y, and the latter overlying the rear ends of the keys in the dollar bank Z. The plate E is provided with two longitudinal slots 41 through which pass screw studs upon the rear side of the fixed plate D, said studs being surrounded with anti-friction collars, and having plates 40 secured upon their outer ends, which plates serve to hold the plate E in proper position relatively to the plate D. In addition to its support upon the studs above referred to the plate E is also hung to the lower ends of a pair of links 42 pivoted at their upper ends to the cross bar W of the framework. The plate E' is similarly supported upon the plate D by studs and by a second pair of links 42, as seen in Fig. 2. The plate E is provided with a series of differentially inclined slots 2, one for each key in the cents bank Y. The lower ends of these slots, when the plate is in its normal position, rest immediately over and in line with the respective keys, so that when the front end of any key is depressed

its rear end in rising will enter its co-operating slot. The varying inclination of these slots is such that when the rear end of any key lever is moved upward through the entire length of its co-operating slot it will move the plate E longitudinally a distance proportionate to the value of such key. Thus, the slot at the extreme left hand end of the plate E in Fig. 2 is but slightly inclined from vertical position. This slot co-operates with the extreme right hand key in the cents bank Y, Fig. 1, so that the operation of said key will move the plate E but a slight distance. Taking this distance as a unit of movement, the next slot in the plate E is inclined from vertical position far enough to cause its co-operating key to move the plate E two units of distance, and so on in regular order to the nineteenth slot at the extreme right hand end of the plate E in Fig. 2, which slot is so inclined as to cause the operation of its co-operating key to move the plate E nineteen units of distance. The plate E has secured to it an angle plate *g* whose upper end projects forward in horizontal position over the main top plate V of the framework, Fig. 1. The plate *g* has pivoted to it a ratchet-bar *f* which co-operates with a ratchet *e* fast upon the master wheel *a* of a train of registering-wheels B, and to which the differential movements of the plate E under the operations of different keys are transmitted, as will be readily understood and as is explained in detail in my aforesaid application. A coiled spring 43 connected at one end to the plate *g* and at the other to the fixed frame plate V yieldingly holds the plate E in and returns it to normal position. The plate E' is provided with a similar set of differentially inclined slots 2, one for each key in the dollar bank Z, and the movements of said plate are transmitted to a second registering mechanism B' through the medium of a plate *g*, ratchet-bar *f*, ratchet wheel *e* and master wheel *a*, as in the case of the first mentioned registering mechanism.

The inclined slots in the plates E and E' terminate in vertical portions at both their upper and lower ends, so that the rear end of an operated key will enter its co-operating slot and become fully engaged with the plate E before it begins to move the latter, and after it has passed through the inclined portion of its slot and given the plate E its full movement in one direction the key will have a further idle movement in the vertical upper end of its slot, and the plate E will remain stationary. So, when the key is released and its rear end begins to descend it will be moved downward some distance before the plate E will begin to return to normal position, and the plate will be completely returned to such position and come to rest before the key is disengaged from the vertical lower end of its slot. This provision for idle movement of the operated key at the end of its positive stroke, after it has given the differential plate

its full movement corresponding to the value of the key, is especially important in connection with my present invention, since these plates are employed to set the type wheels during the positive strokes of the keys, and the latter end of such stroke of the operated key, after the plate has come to rest, is employed to actuate the platen to print the number which the movement of the plate has brought to the printing point; all as will be hereinafter more particularly referred to.

As seen in Fig. 3 the rear ends of the key levers are reduced in size and shaped to fit the slots in the plates E and E', and the adjustment of the parts is such that there is no room for lateral play between the sides of the key and the walls of its slot, and independent movement of the plates, and consequent inaccurate operations, is prevented. The inclined portions of the slots are wider than the vertical portions, the latter having simply to accommodate the thickness of the key while the former must accommodate more or less of the width of the key, according to the inclination of the slot.

The printing mechanism and the means for transmitting the differential movements of the plates E and E' to the type wheels or carriers, and the means for actuating the platen and co-operating parts, may now be described. The printing mechanism is mainly supported upon a plate W', Figs. 1, 2, 4 and 5, secured to the left hand side frame of the machine. As seen in Figs. 4 and 5 the plate W' has secured to it a bracket plate A⁷, in the pointed forward end of which is mounted one end of a rod or shaft A¹⁵ whose opposite end is secured in the plate W', Fig. 5. Loosely mounted upon this rod A¹⁵ are the two type wheels A¹² and A¹³, the former bearing upon its periphery five type numbers representing multiples of one from 1 to 5, and the latter bearing a series of type numbers in multiples of five from 5 to 95 inclusive, and in this instance also a zero type. Each type wheel consists of a thin circular disk, Fig. 4, and a band or flange secured to or formed integral with it and upon whose surface are formed the type numbers. Secured to the hub of the wheel A¹² is a beveled gear A¹⁰ which meshes with a beveled gear A⁸ fast upon a rod A³ journaled near its rear end in the cross piece of the bracket A⁷ and having its extreme forward end journaled in a fixed collar surrounding the rod A¹⁵ between the gear A¹⁰ and the forward extension of bracket A⁷. The type wheel A¹³ has fast to its hub a similar beveled gear A¹¹ which meshes with a beveled gear A⁹ fast upon a shaft A⁴, Fig. 5, said shaft A⁴ being journaled in the bracket A⁷ and in a second fixed collar between the beveled gear A¹¹ and the right hand flange of the plate A⁷ by which the latter is secured to the plate W', Fig. 5. The shaft A⁴ has fast upon its rear end a pinion A⁶, Figs. 2 and 4 with which meshes a rack A⁵, Fig. 4, whose left hand end is pivoted to the right hand end of an arm or link 17, Fig. 2, whose left

hand end is pivoted to the differential plate E, and the adjustment of the parts is such that whenever any key is operated the movement given the plate E will be transmitted to the type wheel A¹³ and the latter turned to bring to the printing point the number corresponding to the value of such key. The shaft A³ has fast upon its rear end a pinion A⁵, Figs. 2 and 4 which meshes with a rack A², Fig. 4 whose left hand end is fitted to the right hand end of a similar link 17, Fig. 2, which link is pivoted at its left hand end to the differential plate E', so that upon the operation of any key in the dollar bank the movement imparted to the plate E' will be transmitted to the type wheel A¹² and the latter turned to bring to the printing point the number corresponding to the value of such key.

The platen which co-operates with the type wheels, the means for advancing the paper strip, and the means for moving the inking ribbon, are all actuated by a rotary shaft 71', Figs. 2, 3, and 4, which extends entirely across the rear side of the machine, is journaled at its left hand end in the left hand side frame of the machine, or a bearing thereon, and projects at its right hand end through the right hand side frame and plate W' which supports the printing mechanism. This shaft is given a complete revolution at each full operation of any one of the key levers, by means which may be briefly described as follows, reference being had to Figs. 2, 3 and 3^a: At its extreme left hand end, Fig. 2, just within the side frame of the machine, the shaft has fast upon it a gear 74, which, by a series of intermediate gears 72, is geared to a rotary stub shaft 70 suitably journaled and supported at one end in the left hand side frame of the machine. This shaft has fast upon it, beside its gear 72, a toothed segment 15, Fig. 3^a, adapted to co-operate with two racks 84 formed upon the vertical arms of a vertically reciprocating frame arranged in guide ways 89 upon the side frame of the machine. The rack frame is provided with a laterally projecting stud 87 which fits in a slot in the rear end of one of the side arms 32 of the swinging frame heretofore described, by means of which when the front end of any key lever is depressed the rack frame is lifted, and when said key lever is returned to normal position the rack frame is carried down with its rear end. The segment 15 is provided with a recess in which is pivoted a spring-tooth 6 also adapted to co-operate with the racks. With the parts in the position shown in Fig. 3^a, when the front end of any key lever is fully depressed and the rack bars 84 lifted the rear rack will turn the segment 15 and shaft 70 forward a half revolution, at the end of which the spring-tooth 6 will engage the forward rack 84, so that upon the return of the key lever to normal position and downward movement of the racks the forward rack will turn the segment

and shaft 70 an additional half revolution, as will be readily understood, and as has been fully explained in my aforesaid prior application. In this manner the shaft 70 is given a complete revolution at each operation of the machine, and the shaft 71, through the train of gears 72 and gears 74, is given a similar movement. The shaft 70 also has fast upon it a ratchet 36 with which co-operates a pawl, to prevent reverse movement of the shaft, and thereby to compel a complete movement of the reciprocating rack frame in each direction, and inasmuch as the operated keys are locked to said frame by said coupling bar, the provision of the ratchet 36 and co-operating pawl insures a complete stroke of an operated key in each direction after it has been started, as in the machine described in my prior application. As seen in Fig. 4 the shaft 71 has secured upon it at its extreme left hand end, outside the frame and plate W', two cams B⁴ and B⁵, the former of which is adapted to co-operate with an anti-friction roller C⁷ mounted upon the lower rear end of a link C³ which is pivoted near said end to the lower forward end of an arm C⁵ loosely hung to a support upon the plate W' at C⁶. The upper forward end of the link C³ is pivoted to an ear D⁴ upon a vertical arm or plate D' which is pivoted at its lower end to a suitable support D² upon the plate W'. A spring D³ coiled around the support D² of the arm D' and bearing against a pin upon the plate W' presses the arm D' rearward, its movement in that direction being limited by a stop D⁸ upon the plate W'. Secured to a shoulder or ledge upon the inner side of the arm D' is an arm D⁶, in this instance composed of a series of thin spring plates, which projects rearward at a right angle to the arm D' and carries at its rear end a platen D⁷ immediately above and adapted to co-operate with the two type wheels. When the front end of a key lever is depressed and the shaft 71 given a half revolution in a forward direction its cam B⁴ rides under the roller C⁷ on the link C³ and moves the latter upward and forward, tilting the arm D' and the platen arm and platen to the positions indicated by the dotted lines, against the stress of the spring D³. Just as the operated key completes its downward stroke the cam D⁴ clears the roller C⁷ and the spring D³ throws the parts back to normal position, the arm D' being arrested by the stop D⁸ and the resiliency of the platen arm D⁶ permitting the momentum of the parts to throw the platen D⁷ against the type wheels. A horizontal plate M, having an upwardly curved rear end, is secured at its inner edge to the plate W' and extends over the type wheels. It is provided with an opening M' immediately above the type wheels, through which the platen D⁷ may pass.

The supply of paper strip N² is carried upon a spool N mounted upon a stud N', whence the strip is led forward beneath a guide O⁴, thence beneath the platen D⁷, thence

forward around a guide roller I loosely mounted on a stud I', thence downward between a pair of feed rollers G⁷ G⁹, and thence around a storage spool N³ loosely mounted on a stud N⁴. The shaft 71 has fast upon it besides the cams B⁴ B⁵ a grooved wheel or disk B⁶, and the storage spool N³ has fast upon it a similar, though larger, grooved wheel. A yielding cord or band N⁵ passed around these two grooved wheels serves to transmit movement from the shaft 71 to the storage spool N³, to cause the latter to wind up the length of paper strip N² advanced to it by the feed rollers G⁷ G⁹ at each operation, the yielding character of the cord or band N⁵ permitting it to slip upon the grooved driving wheel B⁶ when the storage spool has been turned far enough to wind up the slack in the paper strip; as will be readily understood. The feed-rollers G⁷ G⁹ are driven by a train of gearing from the shaft 71, the latter having fast upon it a pinion which meshes with a large gear wheel G⁷, which latter has secured to its side a pinion G² which meshes with a large gear wheel G³, which latter in turn meshes with a pinion G⁴ loosely mounted upon a support G⁵ and meshing with a large gear wheel G⁶. The latter has fastened to it the feed roller G⁷ and also a toothed wheel G⁸, which latter meshes with a toothed wheel G¹⁰ fast upon the feed roller G⁹. The roller G⁹ is carried by a swinging arm G¹² hung to a pivotal support G¹⁴ near its upper end and pressed rearward by a spring G¹⁵ to hold the roller G⁹ against the roller G⁷. An endless inking ribbon is passed around guide rollers J⁴, J⁸ and J¹⁰ at three corners of a square, and between a pair of feed-rollers H, H' at the other corner of the square. The roller H' is fast upon the gear G³ above referred to and the roller H is mounted in a swinging arm H³ and pressed by a spring H¹⁰ against the roller H', and the movement imparted to the gear G³ from the shaft 71 causes the rollers H H' to advance the inking ribbon at each operation of the machine, to present a fresh inking surface at the printing point. The guide roller J⁴ is carried by an arm J' which is pressed by a spring J⁵ downward and rearward to hold the inking ribbon taut. The inking ribbon may be of the ordinary character, and be removed and a new one applied whenever it has become so used or dry as to print imperfectly; but I have provided means for automatically inking the ribbon and keeping it in fresh condition. Secured to the upper end of a bracket plate L', above the inking ribbon in its passage from the feed rollers H H' to the tension roller J⁴, is an ink well L, in this instance of hopper form and having a series of strips of felt secured in its lower contracted end, with their lower ends depending from it and bearing against the inking ribbon. A supply of ink is kept in the well L and transmitted by the strips of felt to the inking ribbon as the latter is drawn across the former.

For the purpose of automatically locking the type wheels in position while the printing is being effected I have provided a pair of locking arms or dogs E^5 E^6 pivoted at their rear ends to the opposite sides of a plate E^4 projecting rearward from the bracket plate A^7 heretofore described, Figs. 4 and 6. These arms have secured between them, below and in front of the plate E^4 , a block F^2 , so that the arms and said block constitute a rigid frame hung to the plate E^4 . The forward ends of the arms E^5 E^6 are bent inward toward each other so that their toothed ends may co-operate with toothed locking wheels A^{14} secured to the hubs of the respective type wheels, these toothed wheels lying within the vertical planes of the sides of the type wheels, and the bent ends of the arms E^5 E^6 permitting their locking teeth to engage the toothed wheels. The block F^2 has upon its lower side a tubular housing in which is confined a spring plunger F^3 whose lower end rests upon the periphery of the cam disk B^5 . During the downward stroke of an operated key and forward half of the revolution of the shaft 71 the cam B^5 will ride under the spring plunger F^3 just at the end of such half revolution and throw the arms E^5 E^6 upward and engage their teeth with the toothed wheels A^{14} , and hold the type wheels locked in their adjusted positions while the printing is being effected, after which, at the beginning of the return stroke of the operated key and second half of the revolution of the shaft 71 the cam B^5 will clear the lower end of the spring plunger F^3 and the arms E^5 E^6 will drop to normal position and release the type wheels.

The supply spool N before referred to has secured to it a grooved disk or wheel with which co-operates a brake arm O pressed against it by a spring O^2 , to preserve the proper tension upon the strip.

From the foregoing description it will be seen that when the front end of any key lever is depressed its rear end enters the corresponding slot in the differential plate, moves said plate the proper distance in one direction as it travels through the inclined portion of the slot, thereby turning the type wheel until the number representing the value of the key is brought to the printing point, and then during the further idle movement of the key, in the vertical upper end of the slot, the locking dogs are thrown into engagement with the toothed locking wheels, to lock the operated type wheel in its adjusted position, and the platen is retracted, against the stress of its spring, and then released and thrown against the type wheels to effect the printing; and that after this has been done, during the first downward movement of the rear end of the operated key, through the vertical upper end of its slot, the locking dogs will be disengaged from the type wheels and the latter released, and then during the return of the key through the inclined portion of its slot the differential plate will be re-

turned to normal position and carry the operated type wheel with it to such position, after which the rear end of the key will pass downward through the vertical lower end of its slot and be disengaged from the differential plate. As before stated the provision for idle movement of the operated key (with respect to the differential plate) at the end of its positive stroke is particularly important in my present invention, since it enables the type wheel to be turned to proper position and then come fully to rest before it is locked in such position and before the platen is actuated to effect the printing. Under the construction illustrated the provision for this idle movement is made by terminating the inclined slots in vertical portions at their upper ends, but provision for such movement may be made in various other ways in machines employing differentially movable plates or frames of a different character from that employed in my machine; and my invention in this respect is not restricted to the employment of a differentially movable plate having inclined slots, nor to an endwise moving plate or frame, or a plate or frame which slides in or upon guide ways, but, in its broader scope, contemplates, in the combinations set forth in my claims, all forms and arrangements of differentially movable plates or frames employed to set a type wheel or carrier and actuated by the keys in such manner as to be given their proper movements, proportionate to the values of the keys, by less than the full positive strokes of the keys, for the purpose described.

I am aware that it has heretofore been proposed to combine a series of keys of different values with a differentially movable plate or frame, and a type wheel geared to said frame, and a spring-actuated platen arranged to be retracted during the positive stroke of the key and released and thrown against the type wheel at the end of such stroke, to effect the printing; and that in some instances such differentially movable plate or frame has consisted of an endwise moving plate arranged to slide in guide ways and provided with a series of differentially inclined slots; but in all of the instances with which I am familiar the complete positive stroke of an operated key was required to give the frame or plate the necessary movement for setting the type wheel or carrier, and no provision was made for idle movement of the key, with respect to such frame or plate, at the end of the positive stroke of the key, as hereinbefore explained.

As seen in Figs. 2 and 3 the machine is provided in its lower portion with a drawer compartment in which fits a backwardly and forwardly sliding money drawer G having secured upon its opposite sides angle plates 105, whose horizontal portions rest upon rollers 106 mounted upon bearings upon the inner sides of the drawer compartment. The horizontal flanges of the plates 105 also prefer-

ably travel beneath guide rollers 107 upon the walls of the compartment, while rollers 108 mounted upon vertical axes in bearings secured to the sides of the compartment receive the side thrusts of the drawer and guide it in and out without friction. The vertically reciprocating rack frame heretofore described has an extension depending into the drawer compartment and carrying a cam plate 109 having an inclined or beveled front edge adapted to engage the roller 110 upon a stud on the side of the drawer when the front end of a key lever is depressed and the rack frame and cam plate lifted. The drawer is automatically locked and held in its closed position by a latch 111 fast on a rock-shaft 112. This rock-shaft also has fast upon it an arm 79 which co-operates with a cam 78 fast upon the rotary shaft 71 heretofore described. When the operating keys are in their normal position of rest the cam 78 projects rearward from the shaft 71 and the latch arm 111 rests upon a cross piece of the framework below and immediately in rear of the shaft 112, the rear end of the latch arm in such position resting immediately in front of the upper edge of the rear wall of the drawer and holding the latter closed. When the front end of any key lever is depressed, as in Fig. 3, the first forward movement of the rotary shaft 71 will carry the cam 78 under the rear end of the arm 79 and lift the latch 111 out of engagement with the drawer, as seen in said figure, and the further depression of the front end of the key lever and lifting of the rack frame and cam plate 109 will cause the latter to force the drawer part way open.

There is combined with each set of keys a series of laterally displaceable stops 7, Fig. 2, for preventing simultaneous operation of two or more keys in the same set, as is usual in this class of machines, and for the purpose of locking the unoperated keys until the operated one has been returned completely to initial position the keys are provided in line with the stops 7 with pendent extensions 9, Fig. 3, which co-operate with the stops in the usual well known manner.

The indicating mechanism of the machine may be either that of my aforesaid pending application, or that of another prior pending application, Serial No. 414,294, filed December 7, 1891, or it may be of any other suitable character.

Having thus fully described my invention, I claim—

1. The combination of a differentially movable plate or frame, a plurality of operating keys of different values co-operating therewith to move the same different degrees proportionate to the values of the keys, and each key having a movement independent of the plate at the end of its positive stroke, a type carrier actuated by the movable plate, and a platen co-operating with the type carrier to effect the printing of the value of the operated key, substantially as described.

2. The combination of a differentially movable plate or frame, a plurality of operating keys of different values co-operating therewith to move the same different degrees proportionate to the values of the keys, and each key having a movement independent of the plate at the end of its positive stroke, a type carrier actuated by the movable plate, a locking device co-operating with the type carrier and actuated by the operated key during its independent movement at the end of its positive stroke, and a platen co-operating with the type carrier during such independent movement of the key to effect the printing of the value of the latter, substantially as described.

3. The combination of a differentially movable plate or frame, a plurality of keys of different values co-operating therewith to move the same different degrees proportionate to the values of the keys, and each having a movement independent of the plate at the end of its positive stroke, a type carrier actuated by the movable plate, a platen co-operating with the type carrier, a spring for throwing the platen against the carrier to effect the printing, and means actuated by the keys for retracting the platen during the positive stroke of the operated key and releasing it during the independent movement of the key at the end of such positive stroke, substantially as described.

4. The combination of a differentially movable plate or frame, a plurality of keys of different values co-operating therewith to move the same different degrees proportionate to the values of the keys, and each key having a movement independent of the plate at the end of its positive stroke, a type carrier actuated by the movable plate, a locking device co-operating with the type carrier and actuated by the operated key during its independent movement at the end of its positive stroke, a platen co-operating with the type carrier, a spring for throwing the platen against the carrier, and means actuated by the operated key for retracting the platen during the positive stroke of the key and releasing it during the independent movement of the key at the end of such stroke, substantially as described.

5. The combination of a differentially movable plate or frame, a plurality of operating keys of different values co-operating therewith to move the same different degrees proportionate to the values of the keys, a type carrier actuated by the movable plate or frame, a platen co-operating with the type carrier, a rotary cam for actuating the platen, and means intermediate the keys and cam for rotating the latter, substantially as described.

6. The combination of a differentially movable plate or frame, a plurality of operating keys of different values co-operating therewith to move the same different degrees proportionate to the values of the keys, a type carrier actuated by the movable plate or frame,

a platen co-operating with the carrier, a spring for throwing the platen against the carrier, a rotary cam for retracting the platen against the resistance of its spring, and means intermediate the keys and cam for rotating the latter, substantially as described.

7. The combination of a differentially movable plate or frame, a plurality of operating keys of different values co-operating therewith to move the same different degrees proportionate to the values of the keys, and each key having a movement independent of the plate at the end of its positive stroke, a type carrier actuated by the movable platen, a platen co-operating with the carrier, a spring for throwing the platen against the carrier, a rotary cam for retracting the platen against the stress of its spring, and means intermediate the keys and cam for rotating the latter, substantially as described.

8. The combination of a differentially movable plate or frame, a plurality of keys of different values co-operating therewith to move the same different degrees proportionate to the values of the keys, a type carrier actuated by the movable plate or frame, a platen co-operating with the type-carrier, a locking device co-operating with the carrier to lock it in its adjusted position while the printing is being effected, a rotary cam for actuating said locking device, and means intermediate the keys and cam for rotating the latter, substantially as described.

9. The combination of a differentially movable plate or frame, a plurality of operating keys of different values co-operating therewith to move the same different degrees proportionate to the values of the keys, a type carrier co-operating with the movable plate or frame, a platen co-operating with the type carrier, a spring for throwing the platen against the carrier, a rotary cam for retracting the platen against the stress of the spring, a locking device co-operating with the carrier to lock it in adjusted position while the printing is being effected, a rotary cam for actuating said locking device, and means intermediate the keys and cams for rotating the latter, substantially as described.

10. The combination of a differentially movable plate or frame, a plurality of keys of different values co-operating therewith to move the same different degrees proportionate to the values of the keys, and each key having a movement independent of the plate at the end of its positive stroke, a type carrier actuated by the movable plate or frame, a platen co-operating with the carrier, a spring for throwing the platen against the carrier, a rotary cam for retracting the platen against the stress of its spring during the positive stroke of a key and releasing it during the independent movement of the key at the end of such stroke, a locking device co-operating with the type-carrier to lock it in adjusted position while the printing is being effected, a rotary cam co-operating with such locking device to

effect the locking of the type carrier during the independent movement of the key at the end of its positive stroke, and means intermediate the keys and cams for rotating the latter, substantially as described.

11. The combination of a plurality of operating keys of different values, a differentially movable plate or frame actuated thereby and movable different degrees by different keys proportionate to their values, a type carrier actuated by such movable plate or frame, a platen co-operating with the carrier, a pair of feed rollers for moving a paper strip between the platen and type carrier, a rotary shaft for actuating the feed rollers to advance the strip, and means intermediate the keys and shaft for rotating the latter, substantially as described.

12. The combination of a plurality of operating keys, a differentially movable plate or frame actuated thereby and movable different degrees by different keys proportionate to their values, a type carrier actuated by the movable plate or frame, a platen co-operating with the carrier, an inking ribbon led between the platen and carrier, a pair of feed rollers for advancing the ribbon, a rotary shaft for actuating the feed rollers, and means intermediate the keys and shaft for actuating the latter, substantially as described.

13. The combination of a plurality of operating keys of different values, a differentially movable plate or frame actuated thereby and movable different degrees by different keys proportionate to their values, a type carrier actuated by such movable plate or frame, a platen co-operating with the carrier, an inking ribbon led between the platen and carrier, means actuating by the keys for automatically advancing said ribbon, and an ink well having a distributing pad or brush bearing against the inking ribbon and operating to automatically ink the latter, substantially as described.

14. The combination of a plurality of keys, a movable plate provided with a plurality of differentially inclined slots, each terminating at one end in a portion in line with the movement of the key, a type carrier actuated by such plate, and a platen co-operating with the carrier, substantially as described.

15. The combination of a plurality of keys, a movable plate provided with a plurality of differentially inclined slots, each terminating at one end in a portion in line with the movement of the key, a type carrier actuated by such plate, a platen co-operating with the carrier, a spring for throwing the platen against the carrier, and means actuated by the keys for retracting the platen against the stress of its spring, substantially as described.

16. The combination of a plurality of keys of different values, a differentially movable plate or frame actuated thereby, the differential movements of the plate being effected by a series of differential cam engaging surfaces between the keys and plate, each of said

surfaces beginning and ending in portions in line with the strokes of the keys, a type carrier actuated by such movable plate, and a platen co-operating with the carrier, substantially as described.

17. The combination of a plurality of keys of different values, a differentially movable plate or frame actuated thereby, said plate or frame being provided with a plurality of differential cam surfaces adapted to be engaged by the different keys and each beginning and ending in a portion in line with the stroke of the key, a type carrier actuated by such movable plate, and a platen co-operating with the carrier, substantially as described.

18. The combination of a plurality of keys, a movable plate provided with a plurality of differentially inclined slots, each of said slots terminating at both ends in portions in line with the movement of the key, a type carrier actuated by such movable plate, and a platen co-operating with the carrier, substantially as described.

19. The combination of a plurality of operating key levers, a vertically arranged longitudinally movable plate extending transversely across the rear ends of said levers and provided with a plurality of differentially inclined slots, each terminating in a vertical portion at its upper end, a type carrier actuated by such plate, a platen co-operating with the carrier, a spring for throwing the platen

against the carrier, and means actuated by the keys for retracting the platen against the stress of the spring, substantially as described.

20. The combination of a plurality of operating keys of different values, a differentially movable plate or frame actuated thereby and movable different degrees proportionate to the values of the keys, a type carrier actuated by such movable plate or frame, a platen co-operating with the carrier, a spring for throwing the platen against the carrier, a rotary cam for retracting the platen against the stress of its spring, a locking device for locking the carrier in adjusted position while the printing is being effected, a rotary cam for actuating such locking device, a pair of feed rollers for drawing a paper strip between the platen and carrier, a pair of feed rollers for advancing the ribbon, a rotary shaft for driving the feed rollers and the rotary cams, and means intermediate the keys and shaft for rotating the latter, substantially as described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 23d day of February, A. D. 1892.

WILLIAM KOCH.

Witnesses:

GEORGE WINTER,
EDW. L. WATERBURY.