April 25, 1933. V. A. SVENSSON 1,906,019

NUMBERING MACHINE

Filed July 9, 1930 2 Sheets-Sheet 1

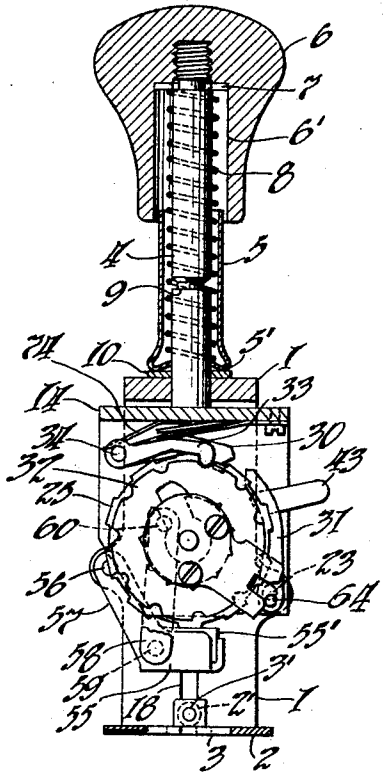


Fig. 1

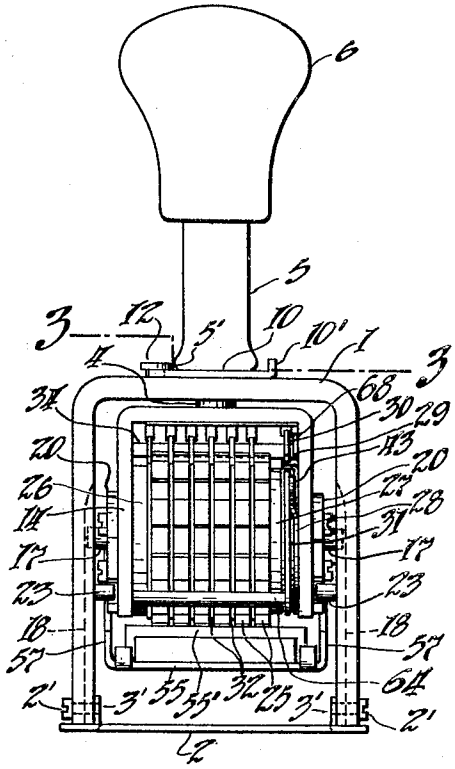


Fig. 2

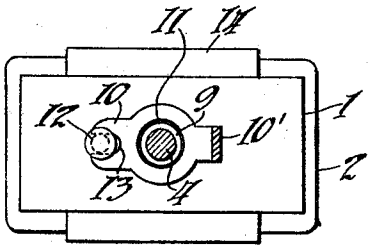


Fig. 3

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NUMBERING MACHINE

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Fig. 4

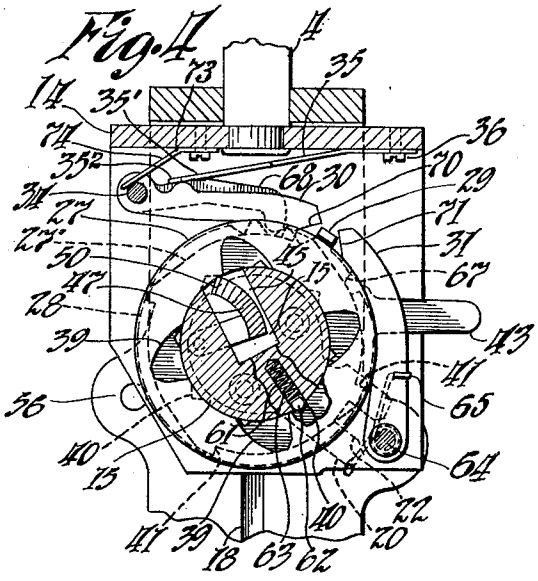
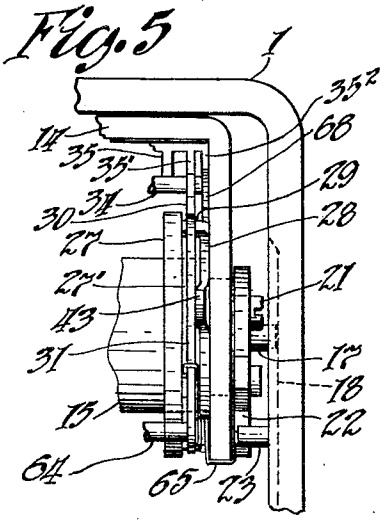


Fig. 5



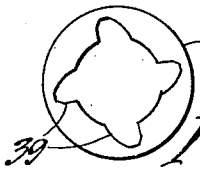


Fig. 9

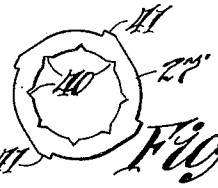


Fig. 10

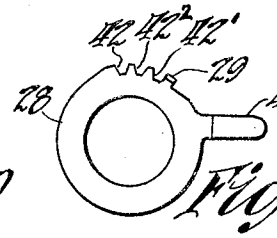


Fig. 11

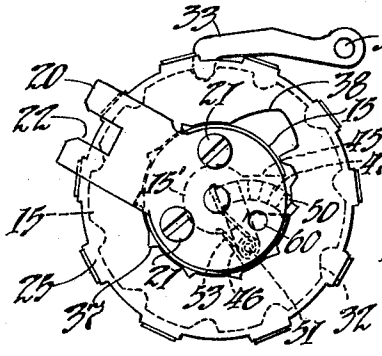


Fig. 6

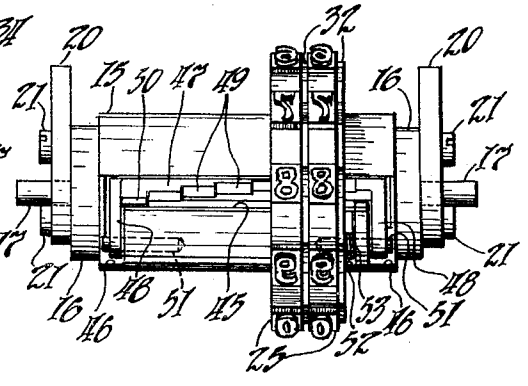


Fig. 7

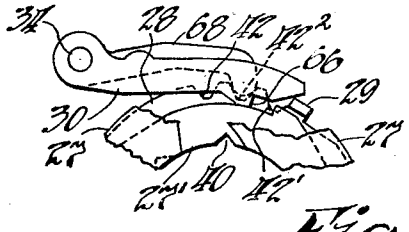


Fig. 8

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Patented Apr. 25, 1933 1,906,019

UNITED STATES PATENT OFFICE

VICTOR A. SVENSSON, OF MONTCLAIR, NEW JERSEY, ASSIGNOR TO THE BATES MANUFACTURING COMPANY, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY

NUMBERING MACHINE

Application filed July 9, 1930. Serial No. 466,740.

My invention relates to numbering machines and more particularly to that class of numbering machines which are automatic in their action and which are usually so constructed as to enable a user of such a machine to print numbers consecutively, or to print each number several times before the machine automatically changes one or more of the numbering or type wheels to effect the printing of the next number upon the next operation thereof, or to repeat the printing of the same number over and over again.

The present invention is especially adapted for embodiment in numbering machines of the general type of that disclosed in U. S. Patent No. 1,770,919, granted July 22, 1930, on an application of William F. Haupt and entitled Numbering machines, being in some respects an improvement on the invention described and claimed in such application, and is particularly applicable to "three-movement machines", that is, to machines having three different index settings. Some of the features of my invention, however, are also adapted to application to other types of numbering machines.

The machine shown and described herein as a preferred embodiment of my invention, is constructed so that it may be set to repeat, to print consecutively, and to duplicate. However, my invention is adapted to be embodied in three-movement machines which have various other combinations of movements or settings, two of which settings will be "repeat" and "consecutive" and the third of which, instead of being the "duplicate" setting of the embodiment hereinafter specifically described, may be "triplicate" or "quadruplicate" or "quintuplicate", etc.

One of the principal objects of my invention is to provide in a numbering machine, an improved mechanism for controlling the actuation of the numbering wheels by the working pawl or equivalent device, which while designed for the same general purposes as the control mechanisms of different forms of numbering machines heretofore designed including that disclosed in said Patent No. 1,770,919, is simpler in construction and more positive and dependable in its operation.

Another object of my invention is to provide a control mechanism of the character described involving novel principles of design whereby the same is adapted to be so constructed as to adapt a numbering machine to which the same is applied for any desired one of the various combinations of movements or settings referred to above.

A further object of my invention is to provide an improved device of simple construction and capable of being more readily moved to operative position, for locking the usual plunger box carrying the numbering wheels in a depressed position to thereby hold the usual ink pad frame so positioned as to render the ink pad readily accessible for re-inking, removal, and replacement.

In general my invention resides in an improved numbering machine, which is not only of more simplified and of less expensive construction than previous machines of the same general type, but which will have greater positiveness, dependability and stability in operation.

Additional objects and features of my invention will be hereinafter more specifically described and claimed.

My invention is capable of being expressed in many mechanical forms, but for the purposes of illustration, a preferred form of a "three-movement" machine is shown in the drawings accompanying and forming part of this specification, wherein:

Figure 1 is a view in side elevation, partly in section and partly broken away, of a numbering machine embodying my invention;

Figure 2 is a view in front elevation of the machine shown in Figure 1;

Figure 3 is a sectional view taken on line 3—3 of Figure 2, showing the rod of the numbering wheel head in depressed position;

Figure 4 is an enlarged detailed view in end elevation, partly in section and partly broken away, showing the oscillatory barrel, the working pawl, the control mechanism for the working pawl when in the duplicate

setting, and the retaining pawls associated with the control mechanism, the parts being shown in the positions they occupy at the beginning of the return stroke and the end of the working stroke of the working pawl;

Figure 5 is a view in elevation looking from the right in Figure 4.

Figure 6 is an enlarged detailed view in end elevation, looking from the left with reference to Figure 7, showing one of the numbering wheels with its retaining pawl, and the numbering wheel actuating means including the barrel which constitutes the support for said wheels and the working pawl, the parts being shown in the positions they occupy at the end of the return stroke and the beginning of the working stroke of the working pawl;

Figure 7 is a view in rear elevation of the structure illustrated in Figure 4, two of the numbering wheels being shown and the retaining pawls for said wheels being omitted;

Figure 8 is an enlarged fragmental view showing certain of the parts of the machine in the positions thereof as shown in Figure 4;

Figures 9 and 10 are detailed views of two different parts of the control ratchet; and

Figure 11 is a detailed view of the control ratchet governor or index member.

In the drawings 1 represents the usual inverted U-shaped main frame between the sides or legs of which are mounted the numbering wheel head and the principal parts of the operating mechanism of the machine. As is customary a gage plate 2 having a substantially rectangular opening 3 through which the type of the numbering wheels project in imprinting the numbers, is applied to the lower ends of the legs of frame 1. Preferably the plate 2 is provided with upwardly extending struck-up lugs 3′ adjacent the ends of opening 3, which lugs are so located that when the plate is in position they respectively lie closely against the inner sides of the legs of frame 1, the plate being removably secured in position by screws 2′ extending through said legs and threaded into said lugs. A gage plate of this improved construction presents a smooth even under surface to the material being stamped or numbered and obviates all danger of such material being torn by the plate, as is likely to occur where the plate is secured in place in the usual manner, viz. by screws extending up through the plate from the under side thereof and threaded into the lower ends of the legs of the main frame. A vertical stem or rod 4 is secured to the numbering wheel head and extends upwardly through an opening in the top of frame 1 and also loosely through a cylindrical sleeve 5 having an annular enlarged or flanged lower end 5′. The stem 4 has a handle or knob 6 threaded on its upper end, said knob having a cylindrical axial recess 6′ within which the upper end of sleeve 5 extends slightly when the stem and numbering wheel head are in their uppermost or raised positions. A washer 7 is mounted on the shouldered portion of stem 4 adjacent the bottom of recess 6, and a helical spring 8 disposed about the stem and within sleeve 5 coacts with washer 7 and the end 5′ of the sleeve to hold the latter with its lower end adjacent the top of frame 1 and also normally to yieldingly hold the stem and thereby the numbering wheel head in raised position, as shown in Figures 1 and 2. Some distance above the numbering wheel head, the stem 4 is provided with an annular recess 9 having a lower horizontal wall and an upper inclined wall, and mounted on the top of frame 1 just beneath the lower end 5′ of sleeve 5, is a member 10 adapted to coact with said recess to lock the stem, together with said head and the parts carried thereby, in partially depressed position. The member 10 is in the form of a small metal plate having an enlarged central portion provided with a central circular opening 11 slightly larger in diameter than stem 4 and through which the latter normally loosely extends. At one end the member 10 is provided with an upstanding lug 10′ and at its other end with an open-ended slot 13 which engages fairly closely with the shank of a headed stud 12 fixed to the top of frame 1. Accordingly member 10 is adapted for bodily pivotal and slidable movement in any direction with respect to stud 12 by applying pressure to its lug 10′. It is apparent that when the stem 4 and the numbering wheel head are moved to a position in which the recess 9 is adjacent member 10, they may be effectively locked in such position merely by moving said member with respect to stud 12 in any direction so as to engage an edge portion of the wall of opening 11 in such member with said recess. The ink pad frame will then have been removed from the path of the numbering wheels, as will be later described, and by means of the locking device just described, will be firmly held in such a position as to render the ink pad accessible for re-inking, removal and replacement. To now release the numbering wheel head and its stem 4, it is only necessary to depress the same by applying pressure to knob 6, whereupon the upper inclined wall of recess 9 will coact with the wall of opening 11 to move member 10 to its non-locking position, in which said opening is in substantially coaxial relation to stem 4. Upon then removing the pressure from knob 6, spring 8 will at once act to return the stem 4 and the numbering wheel head to their uppermost or raised position.

The numbering wheel head or plunger box, indicated at 14, is in the form of a yoke

or inverted U. A barrel 15 having an axial opening 15′ therethrough, is mounted in a horizontal position between the legs or side members of said head for oscillatory movement, by means of short cylindrical slightly reduced sections 16 fixed to the ends of the barrel and journaled in suitable aligned openings provided in said legs. The sections 16, which may be considered as parts of barrel 15, are provided centrally thereof with reduced cylindrical portions or pins 17 which extend outwardly beyond the sides of head 14 and into vertical slots or guideways 18 formed in the legs of main frame 1, the ends of said pins being closely adjacent the bottoms of the respective guideways. The pins 17 fit fairly closely in the slots 18 and coact therewith to guide the head 14 in its reciprocatory movements in the main frame. These pins also respectively extend through actuating arms 20 which are disposed between the end sections 16 of the barrel and the legs of frame 1 and which are secured to said sections in the same angular relation thereto by screws 21. The screws 21 also serve to secure the sections 16 to the main body portion of the barrel 15. Arms 20 are provided at their outer ends with slots 22 which are respectively engaged by inwardly extending aligned pins or studs 23 suitably secured to the legs of the main frame 1, and coact with said pins to oscillate barrel 15 upon reciprocatory movement of head 14 in the main frame.

The numbering wheels 25, of which there are six in the machine illustrated, are annular and are rotatably mounted side by side on the barrel 15 and within the head or yoke 14, these wheels being preferably respectively the usual units, tens, hundreds, thousands, tens of thousands and hundreds of thousands wheels. Other suitable series of wheels may be employed and the numbers of wheels used may also be varied as desired. The wheels 25 are disposed closely adjacent each other and a spacing ring 26 is loosely mounted on barrel 15 between the wheel of highest order and the adjacent side member of head 14. Reference characters 27, 27′ and 28 indicate annular members comprising parts of my improved mechanism for controlling the operation of the working or stepped pawl, in the various settings of the machine, said members being mounted on the barrel 15, in the order named, between the units wheel 25 and the adjacent leg of the head 14. The members 27 and 27′, sometimes referred to herein as the "control ratchet", may be made as a single integral part, but are preferably, for purposes of manufacture, made as separate parts and then riveted or otherwise locked together in concentric relation as shown. The member 28, sometimes referred to herein as the "ratchet governor" or "index member", has no resilient or other connection with the control ratchet 27, 27′, but is provided at its outer edge with a laterally extending projection 29 adapted and arranged to coact with two ratchet pawls 30 and 31, to be later described, to control the operative relation of said pawls with respect to the control ratchet and thereby the actuation of the latter by the oscillatory barrel 15 and of the numbering wheels 25 by the working pawl.

Each of the numbering wheels 25 is provided on one side with an outside ratchet 32 which may be formed integrally therewith, but which is preferably, for purposes of manufacture, formed separately from the wheel and then riveted or otherwise secured rigidly thereto and concentrically therewith. Retaining pawls 33 which are pivotally mounted on a horizontal rod 34 secured at its ends in the opposite sides of yoke 14 adjacent the back and top of the latter, respectively coact with the ratchets 32 to prevent backward movement of wheels 25 in the return movements of the working pawl, which are effected upon the down strokes of head 14 in frame 1, and to permit the actuation or advancement of the wheels in the forward or working movements of the working pawl, which are effected upon the up strokes of head 14. Leaf springs 35 secured at one end, by screws 36, to the top of head 14, respectively bear at the other end on pawls 33 and act to maintain the same constantly in engagement with ratchets 32. Each numbering wheel, as is customary, has nine spaced shallow notches 37 and one deep long notch 38 in its inner annular edge, these notches having the usual disposition, i. e., there is one shallow notch 37 for each of nine of the ten numbers on the wheel and the deep notch 38 is employed for the tenth number and for "carrying" to the wheel which is of the next order.

Where my invention is applied to a three-movement machine in which the movements or settings are "repeat," "consecutive," and "duplicate," and which is otherwise of the specific construction shown in the drawings, the member 27 of the control ratchet has its inner periphery formed with four equi-spaced deep notches 39, and intermediate smooth circular sections, while the associated member 27′ has its inner periphery formed with eight equi-spaced shallow V-shaped notches 40 and its outer periphery with four equi-spaced ratchet teeth 41. The annular ratchet governor or index member 28, in addition to the lateral projection 29, is provided on its outer periphery with three adjacent V-shaped locking notches 42, 42′, and 42^2. This index member also has an integral handle 43 extending forwardly therefrom through a vertical slot provided in the usual front cover plate (not shown) which is removably secured to the head 14, such

handle serving as an index lever whereby the member 28 may be directly angularly moved to adjust the machine to any desired setting.

The main body portion of barrel 15 has a longitudinal slot or cut-away portion 45 extending inwardly from its outer surface and intercepting the axial opening 15′, and also at its ends, has arcuate slots or recesses 46 which intercept the opening 15′ and the slot 45. The working pawl 47 consists of a long bar having integral crank arms 48 at its ends, a series of integral stepped pawls 49 corresponding in number and respectively adapted to coact with the numbering wheels 25, and a pawl or tooth 50 located between that pawl 49 which coacts with the units wheel, and the arm 48 at the adjacent end of the bar. The pawl 50 is slightly longer or higher than the adjacent highest stepped pawl 49 and is adapted to coact with the control ratchet member 27 at its inner periphery. The pawl 47 is mounted on barrel 15 with its crank arms 48 disposed in the arcuate recesses 46, being pivotally supported in position by aligned pins 51 fixed in the barrel and having end portions which extend into said recesses and loosely engage openings in said arms. The working pawl 47 as thus mounted, is adapted for inward and outward movements with respect to the axis of barrel 15 about pins 51, and with the machine assembled, is received in the opening 15′ and slot 45 of the barrel, the said opening and slot being of such size and shape as to accommodate the working pawl in all the positions it assumes in the operation of the machine and thereby provide for proper coaction of pawls 49 and 50 with the wheels 25 and control ratchet member 27. The barrel 15 is also provided with another arcuate slot 52 through which one of the pins 51 extends, and disposed in this slot and coiled about said pin is a spring 53. This spring, which is under tension, bears at one end against barrel 15 and at its other end against the working pawl 47, and thus constantly tends to force said pawl outwardly, about pins 51, into coacting engagement with the notched inner peripheries of the wheels 25 and the control ratchet element or member 27.

When head 14 is reciprocated in frame 1, barrel 15 and thereby working pawl 47 are oscillated to advance the numbering wheels by the usual step-by-step movements; it being understood, of course, that when the machine is adjusted to its multiple setting (which in the machine shown is the "duplicate setting") the working pawl will be held from coacting with and advancing said wheels except in every second or third or fourth, etc., reciprocation of head 14, (dependent upon whether such multiple setting is "duplicate," or "triplicate," or "quadruplicate," etc.) while when the machine is set for "repeat" the working pawl will be continuously held from coacting with and advancing said wheels. Such oscillatory movement is imparted to barrel 15 and thereby to working pawl 47 upon the up and down reciprocatory movements of head 14, by reason of the engagement of the pins 23 secured to the main frame 1, with slots 22 of the arms 20 secured to the barrel. The arrangement is such that the return strokes of the working pawl are effected upon the printing or down strokes of head 14, and the advancing or working strokes of said pawl are effected upon the return or up strokes of the head. However, in the machine shown and described herein, the working pawl 47 is held by reason of the engagement of its highest tooth 50 with one of the smooth inner peripheral sections of the control ratchet member 27 between the deep clearance notches 39, from coaction with the wheels 25 on all the working strokes except those in which the control ratchet occupies an angular position relative to barrel 15 in which one of said notches 39 is opposite the working pawl so that it may accommodate the latter. When the control ratchet is so relatively positioned during any working stroke of pawl 47, the latter is permitted to engage one or more of the numbering wheels to actuate or advance the same, such a working stroke of said pawl being referred to herein as an actuating stroke.

The machine is provided with a frame 55 carrying a pad 55′ for inking the numbers of wheels 25. The ink pad frame 55 is pivotally supported from frame 1 by pivot screws 56 threaded through the legs of said frame and having smooth inwardly extending end portions respectively loosely engaging openings formed in the upper ends of arms 57 which are provided at the ends of the ink pad frame. Movements of frame 55 towards and from the wheels 25 about the pivot screws 56, are effected by barrel 15 in its up and down and oscillatory movements, upon reciprocation of head 14, through links 58 which have their opposite ends respectively pivotally connected, at 59 and 60, to said frame and barrel. With this construction the frame 55, upon each down or printing stroke of head 14, will be moved outwardly by barrel 15 about the pivot screws 56 to that position in which the same is most remote from the wheels 25; while upon each up or return stroke of the head, said frame will be moved inwardly by the barrel about the screws 56 so that upon the completion of such return stroke the pad 55′ will be pressed against the numbers of wheels 25 which are to perform the next printing.

The barrel 15 is provided with a radial cylindrical recess 61 extending inwardly

from its outer surface and in alignment with control ratchet member 27′, and disposed in this recess is a ball 62. A coiled compression spring 63 disposed in recess 61 between the bottom of the same and the ball 62 constantly tends to force the latter outwardly so that it projects from the barrel into engagement with the inner periphery of member 27′. The spring-pressed ball 62 is thus adapted to engage and coact with any of the V-shaped notches 40 of member 27′ with which it may be registered to thereby yieldingly lock the control ratchet 27, 27′ and working pawl together so as to cause the latter to impart to said ratchet the same oscillatory movements which are given to it when the machine is operated. The pawls 30 and 31 are respectively pivotally mounted on the rod 34 and a horizontal spacing bar 64 which is secured at its ends in the opposite sides of the head 14 adjacent the front and bottom of the latter, said pawls being arranged in alignment with each other and with the control ratchet member 27′. A leaf spring 35′ secured to frame 14 at one end, engages pawl 30 at its other end and constantly tends to force said pawl towards ratchet member 27′, while a coiled spring 65 disposed about bar 64 with one end engaging the edge of frame 14 and the other end engaging pawl 31, constantly tends to force the latter pawl towards said ratchet member. The teeth 66 and 67 of said pawl 30 and 31 are thus spring biased to engagement with the outer periphery of ratchet member 27′ for coaction with the ratchet teeth 41. The arrangement is such in the machine shown, that the teeth 66 and 67 of said pawls 30 and 31 are adapted to engage the outer periphery of member 27′ at points which are angularly spaced 45°. Reference character 68 represents a pawl which is pivotally mounted in alignment with the ratchet governor 28 on the same rod 34 as are the pawls 30 and 33, and which is constantly yieldingly held by leaf spring 35^2, with its rounded free end bearing on the outer periphery of said governor so as to be adapted to engage and coact with the notches 42, 42′ and 42^2 and thereby yieldingly lock said governor in its "consecutive", "repeat" and "duplicate" positions respectively when the governor is adjusted to such positions by the handle or index lever 43 thereof. The adjacent ends of pawls 30 and 31 are respectively provided with inclined cams 70 and 71 with which the lateral projection 29 of the ratchet governor 28 is adapted to coact to lift said pawls from operative engagement with the control ratchet member 27′, lift said pawls from operative engagement with the control ratchet member 27′, the said ends being spaced apart a sufficient distance to accommodate said projection 29 freely therebetween as shown in Figure 4, this being the position of said projection corresponding to the "duplicate" setting of the machine.

The leaf springs 35, 35′ and 35^2 which respectively bear on pawls 33, 30 and 68, are preferably formed from a single resilient sheet metal member and extend from a portion of said member secured to the top of head 14 by screws 36 (only one of which is shown). In order to maintain the pawls 33, 30 and 68 properly spaced and respectively aligned with the ratchets 32, control ratchet member 27′ and ratchet governor 28, I provide a member 73, preferably formed of thin sheet metal, which is suitably secured, as by screws, to the top of head 14 and has a series of teeth 74 of proper width, extending downwardly and rearwardly and respectively engaging fairly closely between the adjacent pivoted end portions of said pawls.

The front plate (not shown) secured against the front edges of head 14 and having the vertical slot through which the index lever 43 extends, will preferably have applied thereto at points adjacent the upper and lower ends of said slot, and substantially midway between said ends, suitable indication marks for respectively designating the positions of said lever for effecting the "repeat," "consecutive," and "multiple" settings of the machine, which marks, in the machine shown, will respectively be the letters "R," "C," and "D," to designate "repeat," "consecutive," and "duplicate." In order to change the setting of the machine, it is merely necessary to move lever 43 up or down to a position opposite that letter "R," "C," or "D" which designates the desired setting, and the ratchet governor or index member 28 will then be yieldingly locked in its adjusted position by the engagement of the spring-pressed pawl 68 with one of the three notches 42′, 42, or 42^2 in the outer edge of the index member, which notches respectively correspond in their location with "repeat," "consecutive," and "duplicate" settings of said member. When the member 28 is in its "repeat" setting, only pawl 31 of the two ratchet pawls 30 and 31 is engaged with the control ratchet member 27′, for the projection 29 of the index member then engages and coacts with cam 70 of pawl 30 to hold the latter in raised inoperative position; when said index member is in its "consecutive" setting, pawl 30 is engaged with ratchet member 27′ and pawl 31 is held in raised inoperative position by the engagement of its cam 71 by the projection 29; while when the index member is in its "duplicate" setting both of the pawls 30 and 31 are engaged with said member 27′ as the projection 29 then occupies a position between the adjacent ends of said pawls, as shown in Figure 4.

Each of the deep notches 39 in the con-

trol ratchet member 27 is large enough so that it will provide sufficient clearance for the highest tooth 50 of the stepped pawl 47 to permit maximum engagement of the teeth 49 of said pawl with the inner peripheries of numbering wheels 25. One side of each notch 39 also serves as a cam which is adapted to coact with the highest tooth 50 of the stepped pawl to effect disengagement of the said pawl from the inner peripheries of all the numbering wheels. Where a machine in accordance with my invention is designed for a combination of "repeat," "consecutive," and "duplicate" movements or settings, as is the machine shown in the drawings, there are, as hereinbefore stated, four of the deep clearance notches 39, equi-spaced, on the inner periphery of control ratchet member 27, eight of the shallow V-shaped notches 40, also equi-spaced, on the inner periphery of control ratchet member 27′, and four of the ratchet teeth 41, likewise equi-spaced, on the outer periphery of said member 27′.

In the machine shown, there is one ratchet tooth 41 on the outer edge of control ratchet member 27′ only for every other one of the notches 40 on the inner edge of such member. Preferably the member 27′ is first made with its ratchet teeth 41 corresponding in number and angular spacing to the notches 40 on its inner edge, and then one of said teeth is removed for each clearance notch 39 in the control ratchet. Thus it is apparent that in the control ratchet the number of ratchet teeth 41 (four) is equal to the difference between the number of notches 40 (eight) and the number of clearance notches 39 (four). The teeth 66 and 67 of pawls 30 and 31 are adapted to engage member 27′ of the control ratchet at points which are angularly spaced the same amount as adjacent notches 40, viz. 45°. In the construction shown an angular movement or throw of 55° is given to barrel 15 and thereby to working pawl 47, upon each down or printing stroke and also upon each up or return stroke of head 14. The relation between the pawls 30 and 31 and the control ratchet is such that when the tooth 66 or 67 of either of said pawls is engaged with one of the ratchet teeth 41 at the completion of the down or printing stroke of head 14 and of the return stroke of working pawl 47, one of the notches 40 in the control ratchet will be exactly opposite the spring-pressed ball 62 in barrel 15. The said ball then acts to yieldingly or resiliently lock the barrel 15 and control ratchet 27, 27′ together, and accordingly upon the succeeding up or return stroke of head 14 and the accompanying working stroke of pawl 47, said control ratchet will be moved clockwise (referring to Figure 4) with said barrel and pawl through an angle of 55°. The clearance notches 39 and locking notches 40 of the control ratchet are so relatively arranged (in the machine shown) that, dependent upon whether one or the other of any two adjacent notches 40 is engaged by the spring-pressed ball 62, the stepped pawl will either register with one of the notches 39 and be entirely free for engagement with the notched inner peripheries of the numbering wheels or will be entirely disengaged from said wheels by reason of the coaction of its highest tooth 50 with a smooth portion of the inner periphery of control ratchet member 27 lying between two of the notches 39.

The operation of the particular machine shown herein in each of its settings will now be briefly described.

In the "repeat" setting of the machine, the spring-pressed ball 62 engages one of the notches 40 which corresponds to entire disengagement of pawl 47 from the numbering wheels 25, the pawl 30 is held from engagement with control ratchet member 27′ by projection 29 of the index member 28, and tooth 67 of pawl 31 engages the member 27′ at such a point that, if the machine is operated, it will ride over a portion of the outer periphery of said member 27 which lies wholly between two adjacent teeth 41. Accordingly when the machine is operated in this setting thereof, the pawl 31 will idle, the control ratchet will be maintained resiliently locked to the barrel 15 by the ball 62 throughout each of the 55° oscillatory movements of said barrel and of pawl 47 so as to partake of such movements, and the same number will be printed over and over again upon successive actuations of the machine.

Upon changing the setting of the machine to "consecutive", either from the "repeat" or "duplicate" setting thereof, pawl 30 will engage control ratchet member 27′ and pawl 31 will be held wholly disengaged from such member by the coaction of projection 29 with the cam 71. If this change to "consecutive" is made from the "repeat" setting of the machine, the pawl 30 will upon the first down stroke of head 14 and after the first 10° of the accompanying 55° oscillatory return stroke of barrel 15 and working pawl 47, engage one of the ratchet teeth 41 of member 27′ to effect the release of ball 62 from the notch 40 with which it is then engaged and to hold the control ratchet against turning movement during the last 45° of the said 55° return stroke of the barrel and working pawl. Accordingly upon such return stroke the barrel 15 and the control ratchet are moved relatively through an angle of 45°, and at the end of such stroke ball 62 is engaged with another notch 40 in control ratchet member 27′ which corresponds to a position of the control ratchet permitting full engagement of working pawl 47 with the wheels 25 and in which one of

the clearance notches 39 is opposite said working pawl. In the next or up stroke of head 14 and the accompanying oscillatory movement of barrel 15, and also in each succeeding oscillatory movement of said barrel, the pawl 30 will idle over a portion of the outer periphery of member 27′ lying between two of the teeth 41, while the control ratchet will be resiliently locked to the barrel by ball 62 and partake of its oscillatory movements and the said clearance notch 39 will thus be maintained opposite the pawl 47. Accordingly, as the control ratchet will then permit free engagement of pawl 47 with the wheels 25, each of the working strokes of said pawl will be an actuating stroke and the machine, upon successive actuations thereof, will print consecutive numbers. If the change to the "consecutive" setting is made after a number has been set up on the machine when in "duplicate" setting and before the machine has been actuated to effect the first printing of such number, the adjustments effected and the operation of the machine will be exactly the same as just described when the setting is changed from "repeat" to "consecutive". If, however, the change to "consecutive" setting is made after a number set up on the machine when in "duplicate" setting has been printed once and before the machine has been actuated to effect the second printing of such number, the control ratchet member 27 is then in an angular position relative to the barrel 15 and to pawl 47 in which one of the clearance notches 39 is located opposite or practically opposite the pawl 47 to permit free engagement of the latter with the wheels 25, while the tooth 66 of pawl 30 so engages the outer edge of member 27′ that it will idle on a portion of such edge located between two teeth 41 when the control ratchet is oscillated with barrel 15. Accordingly if the machine is then operated each working stroke of pawl 47 will be an actuating stroke and the machine, upon successive actuations thereof, will print numbers consecutively.

When the machine is changed to its "duplicate" setting either from the "repeat" or "consecutive" setting thereof, the teeth 66 and 67 of both pawls 30 and 31 will engage control ratchet member 27′, the projection 29 of index member 28 then being positioned between and out of engagement with the ends of said pawls, as shown in Figure 4. The teeth 66 and 67 of pawls 30 and 31 are spaced 45° apart, and are so formed that they will ride over the teeth 41 of member 27′ so as not to interfere with the forward or advance turning movements of the control ratchet which accompany the forward oscillatory movements (clockwise in Figure 4) of the barrel 15, upon the working strokes of pawl 47. At the end of each up or return stroke of head 14 and of the accompanying working stroke of pawl 47, however, one or the other of said pawls will engage the outer edge of member 27′ at a point spaced 10° rearwardly from one of the teeth 41 on said member. Consequently in each down stroke of head 14 and the accompanying 55° oscillatory rearward movement of barrel 15, the control ratchet will be moved rearwardly only through an angle of 10° and the spring-pressed ball 62 will be disengaged from one of the notches 40 in member 27′ and engaged with the next notch 40 in a rearwardly direction (referring to Figure 4); while in each up stroke of head 14 and the accompanying 55° oscillatory forward or advance movement of barrel 15, the control ratchet will be moved forwardly through an angle of 55°. The effective result will be that the control ratchet will be angularly advanced an amount equal to the angular spacing of two adjacent notches 40 in member 27′ upon each complete actuation of the machine, that is upon a complete reciprocatory movement, consisting of a down stroke and an up stroke combined, of head 14. Accordingly, a clearance notch 39 will be positioned opposite the working pawl 47 to thereby permit free engagement of this pawl with the numbering wheels 25, only during every other working stroke of said pawl, and therefore as the machine is operated each number set up therein will be printed twice before any of the numbering wheels is advanced to set up a different number.

As hereinbefore mentioned, my invention is not limited to three-movement numbering machines having a combination of "repeat", "consecutive" and "duplicate" settings, but is also applicable to machines of this character having various other combinations of settings such, for example, as those having a "triplicate", or "quadruplicate", or "quintuplicate" setting, or any of a number of other "multiple" settings, in place of the "duplicate" setting. The number of locking notches 40, ratchet teeth 41 and clearance notches 39 with which the control ratchet 27, 27′ is provided, however, varies according to the combination of movements or settings of the machine. Thus for a machine having a combination of "repeat", "consecutive" and "triplicate" settings, the control ratchet will have nine such locking notches, six such ratchet teeth and three such clearance notches; for a machine having a combination of "repeat", "consecutive" and "quadruplicate" settings, the control ratchet will have eight such locking notches, six such ratchet teeth, and two such clearance notches; etc., etc. In each case the ratchet teeth 41 of the control ratchet will be irregularly spaced, but the locking notches 40 will be equi-spaced. The proper spacing of

the ratchet teeth is obtained by first forming the control ratchet with teeth which correspond in number and spacing to the locking notches 40 and then removing one of said teeth for each of the clearance notches 39 of the control ratchet, the teeth thus removed respectively substantially corresponding in angular location to said clearance notches. Consequently the number of ratchet teeth 41 will always be equal to the difference between the number of locking notches and the number of clearance notches 39. The particular "multiple" setting in a three-movement machine is also dependent upon the ratio between the number of locking notches 40 and clearance notches 39 in the control ratchet. Thus where the ratio of said locking notches to said clearance notches is 2 to 1, or 3 to 1, or 4 to 1, etc., the "multiple" setting or movement of the machine will be "duplicate", or "triplicate", or "quadruplicate", etc., respectively.

In any three-movement machine in accordance with my invention the two pawls 30 and 31 are always arranged so that they are adapted to engage with the peripheral surface of the control ratchet having the ratchet steps 41, at points which are angularly spaced apart the same amount as adjacent locking notches 40, and the said pawls and control ratchet and other parts are so relatively arranged that when either pawl engages the control ratchet and the machine is at the end of any stroke, one of the locking notches 40 will be located opposite to and be engaged by the spring-pressed ball 62 of barrel 15 or other means for resiliently locking the control ratchet to the working pawl to cause such ratchet to partake of the oscillatory movements of the latter. The clearance notches 39 and locking notches 40 of the control ratchet are also so relatively arranged that, dependent upon which of said notches 40 is engaged by the said ball 62, the working pawl 47 will either be entirely free to engage and coact with the numbering wheels 25 or will be held entirely disengaged therefrom by the coaction of its tooth 50 with a smooth peripheral portion of the control ratchet between two of the clearance notches.

In view of the foregoing it will be apparent that when any three-movement machine embodying my invention is in "repeat" setting, only pawl 31 of the two pawls 30 and 31 engages the control ratchet, and upon operating the machine such pawl 31 will idle as it will then ride on a portion of the peripheral surface of said ratchet between two of the teeth 41 and where one of such teeth has been removed. The ball 62 of barrel 15 will also then be engaged with one of the locking notches 40 which corresponds to entire disengagement of the working pawl from the wheels 25 by the control ratchet.

If such a machine is changed to its "consecutive" setting, only pawl 30 of the two pawls 30 and 31 engages the control ratchet. Therefore upon each complete actuation of the machine the control ratchet will be angularly advanced with respect to the working pawl by pawl 30 an amount equal to the angular spacing of adjacent locking notches 40 until said pawl 30 engages a peripheral portion of the ratchet where one of the teeth 41 has been removed. Upon subsequent actuations of the machine no further advancement of the control ratchet with respect to the working pawl will occur as said ratchet will then be in a position relatively to the working pawl 47 where one of its clearance notches is opposite said pawl so as to permit full engagement of the latter with the numbering wheels 25.

Finally if such a machine is in its "multiple" setting, both of the pawls 30 and 31 engage the peripheral toothed surface of the control ratchet and are adapted to bridge those portions of said surface where teeth 41 have been removed. Therefore upon each complete actuation of the machine the control ratchet will then be angularly advanced with respect to the working or stepped pawl an amount corresponding to the angular spacing of adjacent locking notches 40, and upon continued operation the said working pawl will be engaged with the numbering wheels in every second, or third, or fourth, or fifth, etc., complete actuation of the machine and thus each number set up in the latter will be printed two, or three, or four, or five, etc., times (in other words the action will be "duplicate" or "triplicate" or "quadruplicate" or "quintuplicate", etc.) according to whether the ratio between the number of locking notches 40 and the number of clearance notches 39 in the control ratchet is 2 to 1, or 3 to 1, or 4 to 1, or 5 to 1, etc., respectively.

If the machine were constructed so that the angular throw of the working pawl 47 would be less than the 55° oscillatory movement imparted to said pawl in the operation of the machine shown, the number of combinations of settings obtainable can be somewhat increased.

Movement control means of the type disclosed herein may be applied to numbering machines having stepped or working pawls which are externally disposed with respect to the numbering wheels. It is also to be understood that the various features and combinations of elements shown and specifically described herein, are subject to many other modifications, including changes in the form and arrangement of parts, without departure from the spirit of my invention or the scope of the appended claims.

Having now described my invention, what I claim as new and desire to protect by Letters Patent is as follows:

1. In a numbering machine, a main frame, a head carrying the numbering wheels mounted for reciprocatory movement in said frame and having an actuating rod, and means for holding said head in a depressed position in said frame comprising a groove in said rod and a member having a loose connection with said frame, said connection providing for sufficient movement of said member with respect to said frame and in any direction in a plane transverse to the axis of said rod to bring such member into and out of coacting relation with said groove.

2. In a numbering machine, a main frame, a head carrying the numbering wheels mounted for reciprocatory movement in said frame and having a rod connected thereto, and means for holding said head in a depressed position in said frame comprising a groove in said rod and a member having a pivotal and sliding connection with said frame, said connection providing for a sufficient combined pivotal and sliding movement of said member with respect to said frame and in any direction in a plane transverse to the axis of said rod to bring such member into and out of coacting relation with said groove.

3. In a numbering machine, a main frame, a head carrying the numbering wheels mounted for reciprocatory movement in said frame and having a rod connected thereto, and means for holding said head in a depressed position in said frame comprising a groove in said rod extending therearound and a member having a loose connection with said frame and having an opening somewhat larger in area than the cross-sectional area of said rod and through which the latter extends, said connection providing for sufficient movement of said member with respect to said frame and in any direction in a plane transverse to the axis of said rod to bring such member into and out of coacting relation with said groove.

4. In a numbering machine, a series of numbering wheels, oscillatory means adapted in the oscillation thereof to actuate said wheels, and means for controlling the actuation of said wheels by said oscillatory means comprising a device mounted for oscillatory movement and means for yieldingly locking said device and oscillatory means together to cause such device to move with the oscillatory means.

5. In a numbering machine, a series of numbering wheels, actuating means comprising an oscillatory member, and means for controlling the actuation of said wheels by said actuating means comprising a member mounted for oscillatory movement and means for yieldingly locking said members to each other to cause them to oscillate together.

6. In a numbering machine, a series of numbering wheels, wheel actuating means comprising an oscillatory member, and means for controlling the actuation of said wheels by said actuating means comprising a member mounted for oscillatory movement and means for yieldingly locking said members together comprising a spring-pressed device applied to one of said members and a recess provided on the other of said members and with which said device is adapted to coact.

7. In a numbering machine, a series of numbering wheels, wheel actuating means comprising an oscillatory member and means for controlling the actuation of said wheels by said actuating means comprising a member mounted for oscillatory movement and means for yieldingly locking said members together comprising a spring-pressed device applied to one of said members and a series of spaced recesses in the other of said members, said device being adapted to coact with any of said recesses.

8. In a numbering machine, a series of numbering wheels, oscillatory means adapted in the oscillation thereof to actuate said wheels, and means for controlling the actuation of said wheels by said oscillatory means comprising a control ratchet, pawl means adapted to coact with said ratchet, means for yieldingly locking said oscillatory means and control ratchet together and a device adjustable to control the coaction of said pawl means with said ratchet.

9. In a numbering machine, a series of numbering wheels, wheel actuating means comprising an oscillatory member, and means for controlling the actuation of said wheels by said actuating means comprising a control ratchet, a plurality of pawls biased to positions for engagement and coaction with said ratchet, means for yieldingly locking said oscillatory member and control ratchet together and a device adjustable to move any of said pawls to inoperative position with respect to the ratchet.

10. In a numbering machine, a series of numbering wheels, wheel actuating means comprising an oscillatory member, and means for controlling the actuation of said wheels by said actuating means comprising a control ratchet, two pawls biased to positions for engagement and coaction with said ratchet, means for yieldingly locking said oscillatory member and control ratchet together, and a device adjustable to three positions in one of which it maintains one of said pawls inoperative, in a second of which it maintains the other of said pawls inoperative and in the third of which it permits

both of said pawls to assume their operative positions.

11. In a numbering machine, a series of numbering wheels, oscillatory means adapted in the oscillation thereof to actuate said wheels, and means for controlling the actuation of said wheels by said oscillatory means comprising a control ratchet, pawl means adapted to coact with said ratchet, means for yieldingly locking said oscillatory means and control ratchet together, a device adjustable to control the coaction of said pawl means with said ratchet and means adapted to coact with said device to yieldingly lock the same in adjusted position.

12. In a numbering machine, a series of numbering wheels, wheel actuating means comprising an oscillatory member, and means for controlling the actuation of said wheels by said actuating means comprising a control ratchet, two pawls biased to positions for engagement and coaction with said ratchet, means for yieldingly locking said oscillatory member and control ratchet together, a device adjustable to three positions in one of which it maintains one of said pawls inoperative, in a second of which it maintains the other of said pawls inoperative and in the third of which it permits both of said pawls to assume their operative positions and means adapted to coact with said device to yieldingly lock the same in each of said positions.

13. In a numbering machine, a series of numbering wheels, wheel actuating means comprising an oscillatory member, and means for controlling the actuation of said wheels by said actuating means comprising a control ratchet having a series of clearance notches for permitting actuation of said wheels by said actuating means, a series of ratchet teeth and a series of locking notches, pawl means adapted to coact with said ratchet teeth, means adapted to coact with any of said locking notches to yieldingly lock said oscillatory member and control ratchet together, and a device adjustable to control the coaction of said pawl means with said ratchet teeth.

14. Movement control means for numbering machines, comprising a control ratchet having an annular series of equi-spaced clearance notches, an annular series of equi-spaced locking notches and an annular series of ratchet teeth, the number of said ratchet teeth being equal to the difference between the number of said locking notches and the number of said clearance notches.

15. Movement control mechanism for numbering machines designed to be adjusted to a "repeat", a "consecutive" and a "multiple" setting, comprising a control ratchet having a series of clearance notches, a series of locking notches and a series of ratchet teeth, the ratio of the number of said locking notches to the number of said clearance notches, varying in accordance with the particular "multiple" setting of the numbering machine to which such control mechanism is adapted to be applied.

16. Movement control mechanism for numbering machines designed to be adjusted to a "repeat", a "consecutive" and a "duplicate" setting, comprising a control ratchet having a series of clearance notches, a series of locking notches and a series of ratchet teeth, the ratio of the number of said locking notches to the number of said clearance notches being 2 to 1.

17. Movement control mechanism for numbering machines, comprising a control ratchet having an annular series of locking notches equi-spaced angularly, an annular series of clearance notches equi-spaced angularly and an annular series of ratchet teeth, said ratchet teeth corresponding in number and angular spacing to said locking notches except that for each of said clearance notches one of such ratchet teeth is omitted.

18. In a numbering machine, a series of numbering wheels movable about a common axis, means comprising a working pawl mounted for oscillatory movement and adapted in such movement to coact with said wheels to advance the same angularly, and means for controlling the coaction of said pawl with said wheels comprising a control ratchet mounted for rotary movement and having an annular series of locking notches, clearance notches and ratchet teeth, spring-pressed means associated with said pawl and adapted to coact with said locking notches to yieldingly lock the control ratchet in different angular positions respectively relative to the pawl whereby the same are adapted to be oscillated together, said control ratchet in certain of said positions and because of the clearance notches therein permitting said pawl as it oscillates to coact with the numbering wheels, and in certain other of said positions preventing said pawl as it oscillates from coacting with said wheels, and pawl means adapted to cooperate with said ratchet teeth for controlling the angular position of the control ratchet relative to the working pawl.

19. In a numbering machine, a series of numbering wheels, means comprising a working pawl mounted for oscillatory movement and adapted in such movement to coact with and advance said wheels, and means for controlling the coaction of said pawl with said wheels comprising a device mounted for rotary movement and having a clearance notch and means for yieldingly locking said device and pawl together in a number of different relative angular positions whereby when the same are so locked together in any of such relative positions said device will partake of oscillatory move-

ment imparted to the pawl, said device in one of such relative positions, by reason of its said clearance notch, permitting said pawl as it oscillates to coact with said wheels.

20. In a numbering machine, a series of numbering wheels, means comprising a pawl mounted for oscillatory movement and adapted in such movement to actuate said wheels, and means for controlling the actuation of said wheels by the pawl comprising a device mounted for rotary movement and means for yieldingly locking said device and pawl together in a number of different relative angular positions whereby when the same are so locked together in any of such relative positions said device will partake of oscillatory movement imparted to the pawl, said device in certain of such relative positions, preventing said pawl as it oscillates from actuating any of said wheels.

21. In a numbering machine, a series of numbering wheels, means comprising a pawl mounted for oscillatory movement and adapted in such movement to actuate said wheels, and means for controlling the actuation of said wheels by the pawl comprising a device mounted for rotary movement and having a clearance notch and means for yieldingly locking said device and pawl together in a number of different relative angular positions whereby when the same are so locked together in any of such relative positions said device will partake of oscillatory movement imparted to the pawl, said device in one of such relative positions, by reason of its said clearance notch, permitting said pawl as it oscillates to actuate said wheels and in certain other of such relative positions, preventing said pawl as it oscillates from actuating said wheels.

22. In a numbering machine, a series of numbering wheels, means comprising an oscillatory pawl adapted when oscillated to actuate said wheels, and means for controlling the actuation of said wheels by said pawl comprising a control ratchet mounted for rotary movement and having an annular series of locking notches and clearance notches, means associated with said pawl and adapted to coact with said locking notches to yieldingly lock the control ratchet and pawl together in a number of different relative angular positions whereby when the same are so locked together in any of such relative positions the control ratchet will partake of oscillatory movement imparted to the pawl, said control ratchet in certain of such relative positions, by reason of its said clearance notches, permitting the pawl as it oscillates to actuate said wheels and in certain other of such relative positions, preventing the pawl as it oscillates from actuating said wheels.

23. Movement control mechanism for numbering machines, comprising an annular control ratchet having an inner annular surface provided with a series of equi-spaced locking notches, another inner annular surface provided with a series of equi-spaced clearance notches and an annular series of ratchet teeth.

24. Movement control mechanism for numbering machines, comprising an annular control ratchet having an inner annular surface provided with a series of equi-spaced locking notches, another inner annular surface provided with a series of equi-spaced clearance notches and an annular series of ratchet teeth formed on the exterior thereof.

25. In a numbering machine, a barrel mounted for oscillatory movement, a series of numbering wheels loosely mounted on said barrel, a pawl device operable by said barrel when the latter is oscillated for actuating said wheels, and means for controlling the actuation of said wheels by said pawl device comprising a control ratchet mounted on said barrel and means for resiliently locking said ratchet to the barrel.

26. In a numbering machine, a barrel mounted for oscillatory movement, a series of numbering wheels loosely mounted on said barrel, a pawl device operable by said barrel when the latter is oscillated for actuating said wheels, and means for controlling the actuation of said wheels by said pawl device comprising a control ratchet mounted on said barrel and means for resiliently locking said ratchet to the barrel in a plurality of different relative angular positions.

27. In a numbering machine, a series of numbering wheels, wheel actuating means comprising an oscillatory member, and means for controlling the actuation of said wheels by said actuating means comprising a control ratchet having an annular series of locking notches equi-spaced angularly, an annular series of clearance notches equi-spaced angularly and an annular series of ratchet teeth, said ratchet teeth corresponding in number and angular spacing to said locking notches except that for each of said clearance notches one of such ratchet teeth is omitted, two pawls biased to positions for engagement with the annular portion of said ratchet having said ratchet teeth at points which are angularly spaced the same amount as any adjacent pair of said locking notches, means associated with said oscillatory member and adapted to coact with any of said locking notches for yieldingly locking said member and ratchet together, and a device adjustable to a plurality of positions in one of which it maintains one of said pawls inoperative, in another of which it maintains the other of said pawls inoperative, and in still another of which it permits both of said pawls to assume their operative positions.

28. In a numbering machine, a series of

numbering wheels, wheel actuating means comprising an oscillatory member, and means for controlling the actuation of said wheels by said actuating means comprising a control ratchet having an annular series of locking notches equi-spaced angularly, means associated with said oscillatory member and adapted to coact with any of said notches for yieldingly locking said member and ratchet together, and a pair of retaining pawls biased to positions for engagement with said ratchet at points which are angularly spaced the same amount as any adjacent pair of said notches.

29. In a numbering machine, a series of numbering wheels, wheel actuating means comprising an oscillatory member, and means for controlling the actuation of said wheels by said actuating means comprising a control ratchet having an annular series of locking notches equi-spaced angularly, means associated with said oscillatory member and adapted to coact with any of said notches for yieldingly locking said member and ratchet together, a pair of retaining pawls biased to positions for engagement with said ratchet at points which are angularly spaced the same amount as any adjacent pair of said notches, and adjustable means adapted to maintain either of said pawls inoperative or to permit both of said pawls to assume their operative positions.

30. In a numbering machine, a series of numbering wheels, an oscillatory working pawl for actuating said wheels, and means for controlling the actuation of said wheels by the working pawl comprising a control ratchet having an annular series of locking notches equi-spaced angularly, means adapted to coact with any of said notches for yieldingly locking said working pawl and ratchet together for oscillatory movement, and a pair of retaining pawls adapted for engagement with said ratchet at points which are angularly spaced the same amount as any adjacent pair of said notches.

31. In a numbering machine, a series of numbering wheels, an oscillatory working pawl for actuating said wheels, and means for controlling the actuation of said wheels by the working pawl comprising a control ratchet having an annular series of locking notches equi-spaced angularly, means adapted to coact with any of said notches for yieldingly locking said working pawl and ratchet together for oscillatory movement, a pair of retaining pawls adapted for engagement with said ratchet at points which are angularly spaced the same amount as any adjacent pair of said notches, and means for controlling the engagement of said retaining pawls with said ratchet.

32. In a numbering machine, a frame, a head mounted on said frame for reciprocatory movement, a barrel mounted on said head for oscillatory movement, a series of numbering wheels mounted on said barrel, means operable by said barrel upon oscillatory movement thereof for actuating said wheels, means for controlling the actuation of said wheels by said actuating means comprising a control ratchet and means for yieldingly locking said barrel and ratchet together, and means whereby reciprocatory movement of said head effects oscillatory movement of said barrel.

This specification signed this 26th day of June 1930.

VICTOR A. SVENSSON.