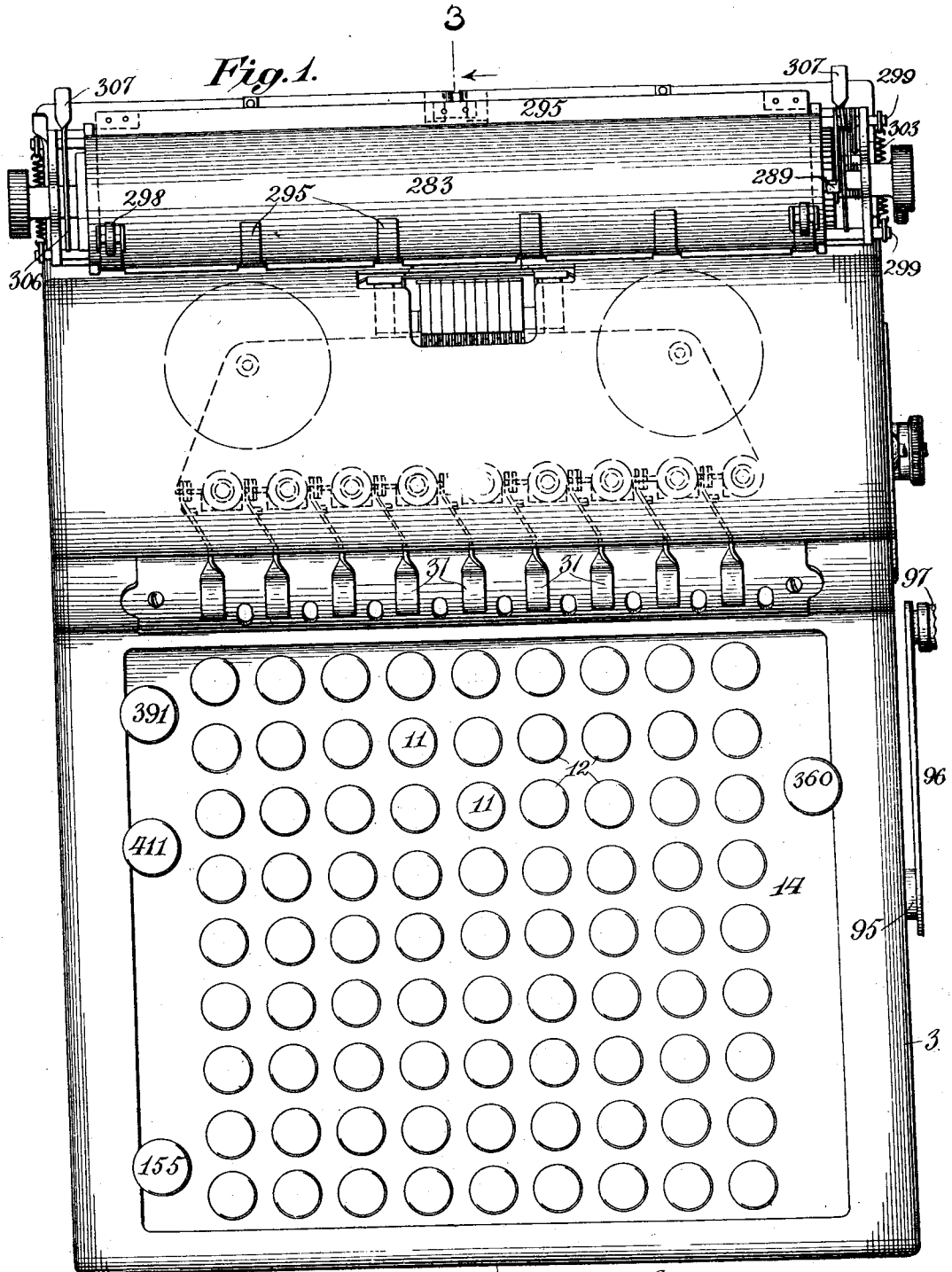


J. C. LOTTERHAND.
 PRINTING MECHANISM FOR ADDING MACHINES.
 APPLICATION FILED JUNE 25, 1908.

Patented Aug. 5, 1913.
 10 SHEETS—SHEET 1.

1,069,152.



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10 SHEETS—SHEET 2.

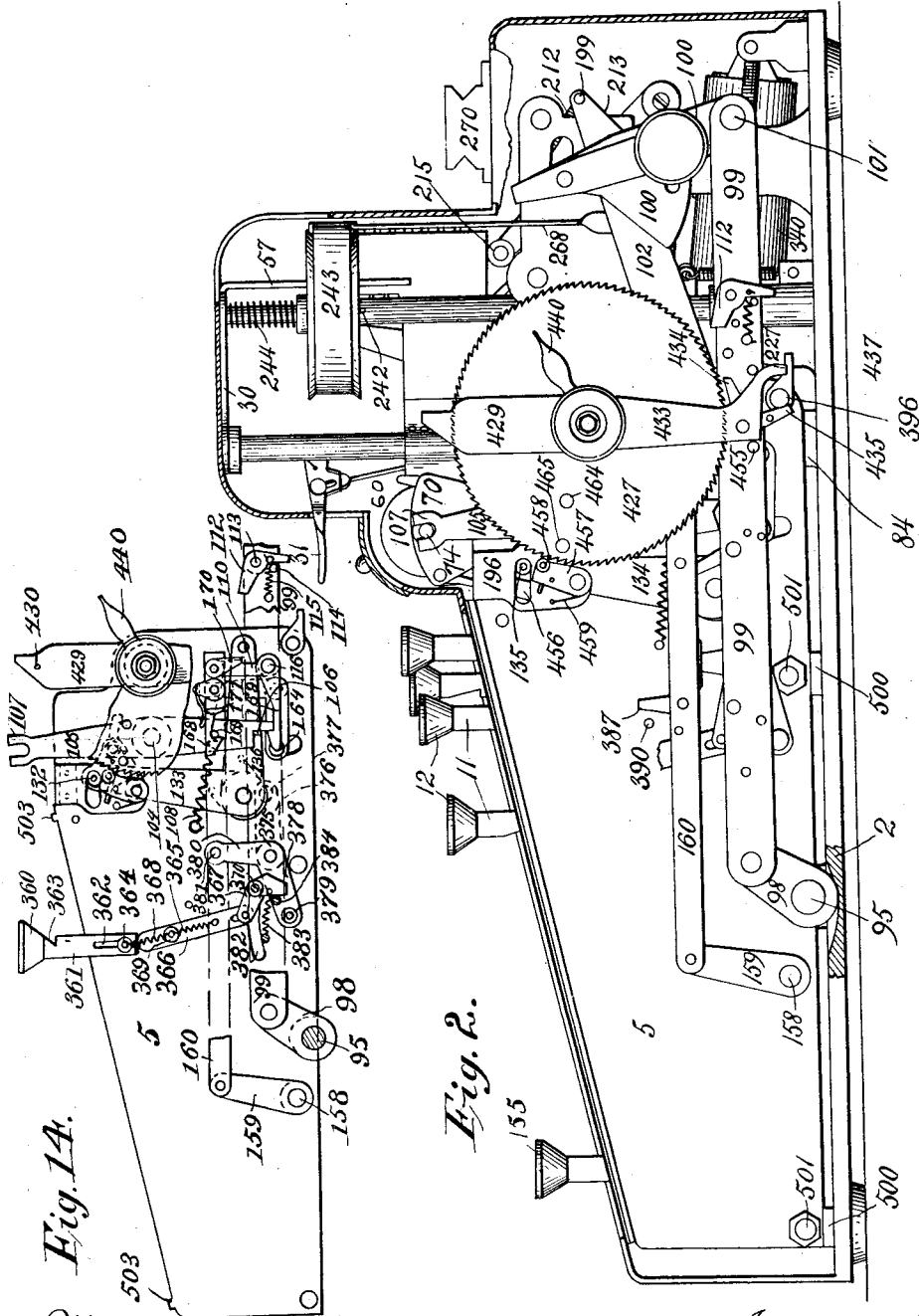
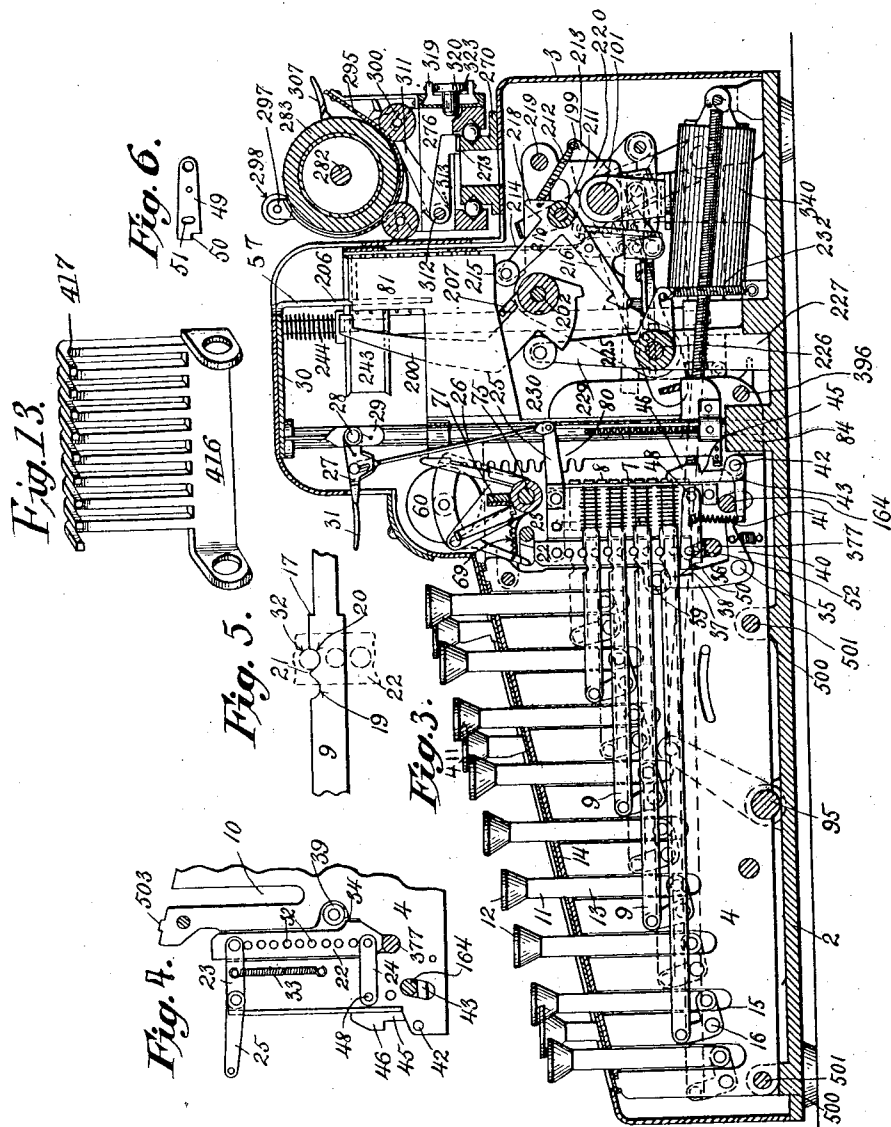


Fig. 14.

Fig. 2.

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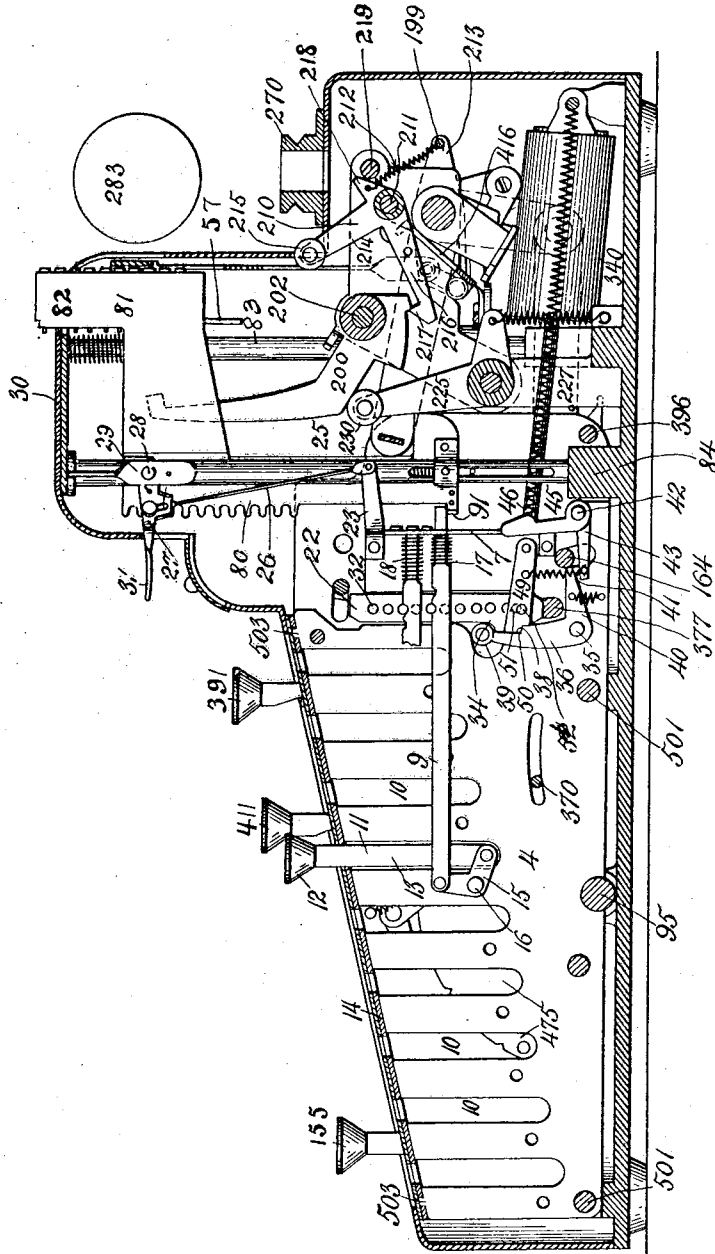
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10 SHEETS—SHEET 4.

Fig. 7.



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Fig. 9.

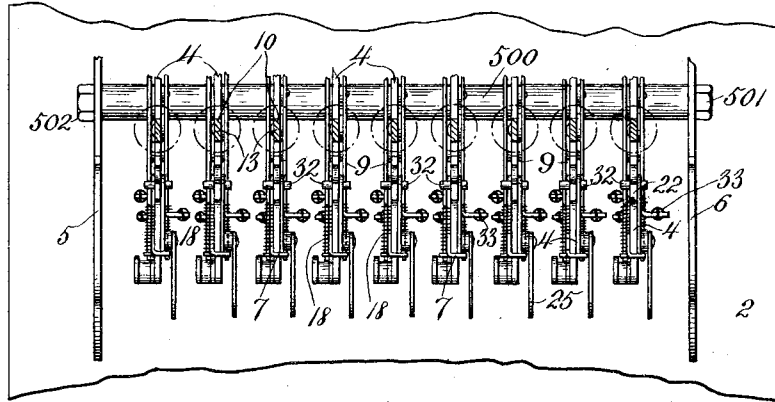


Fig. 10.

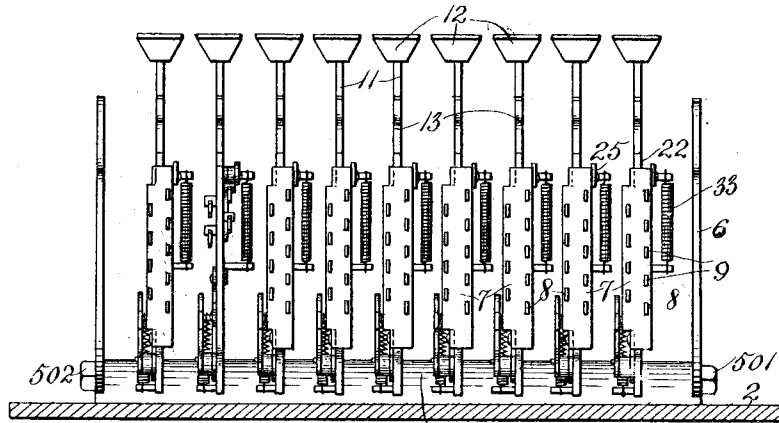


Fig. 11.

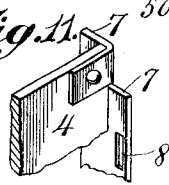
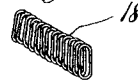
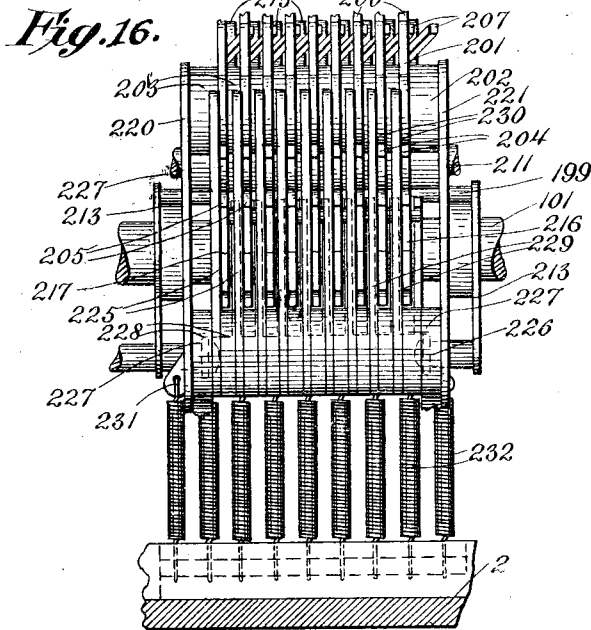
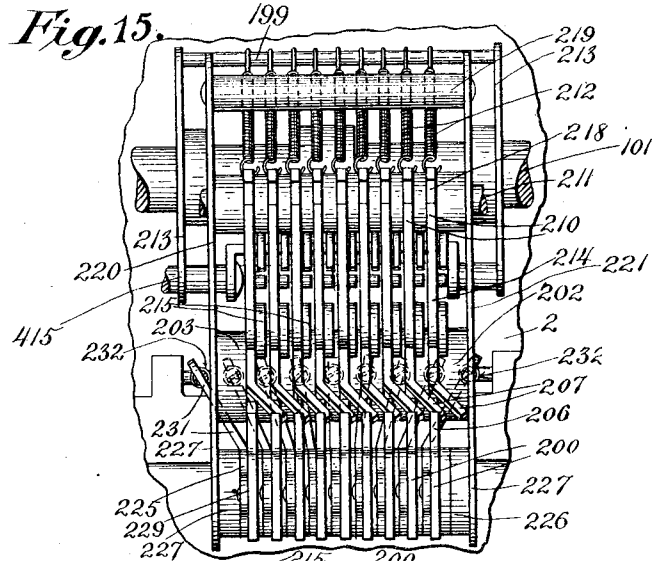


Fig. 12.



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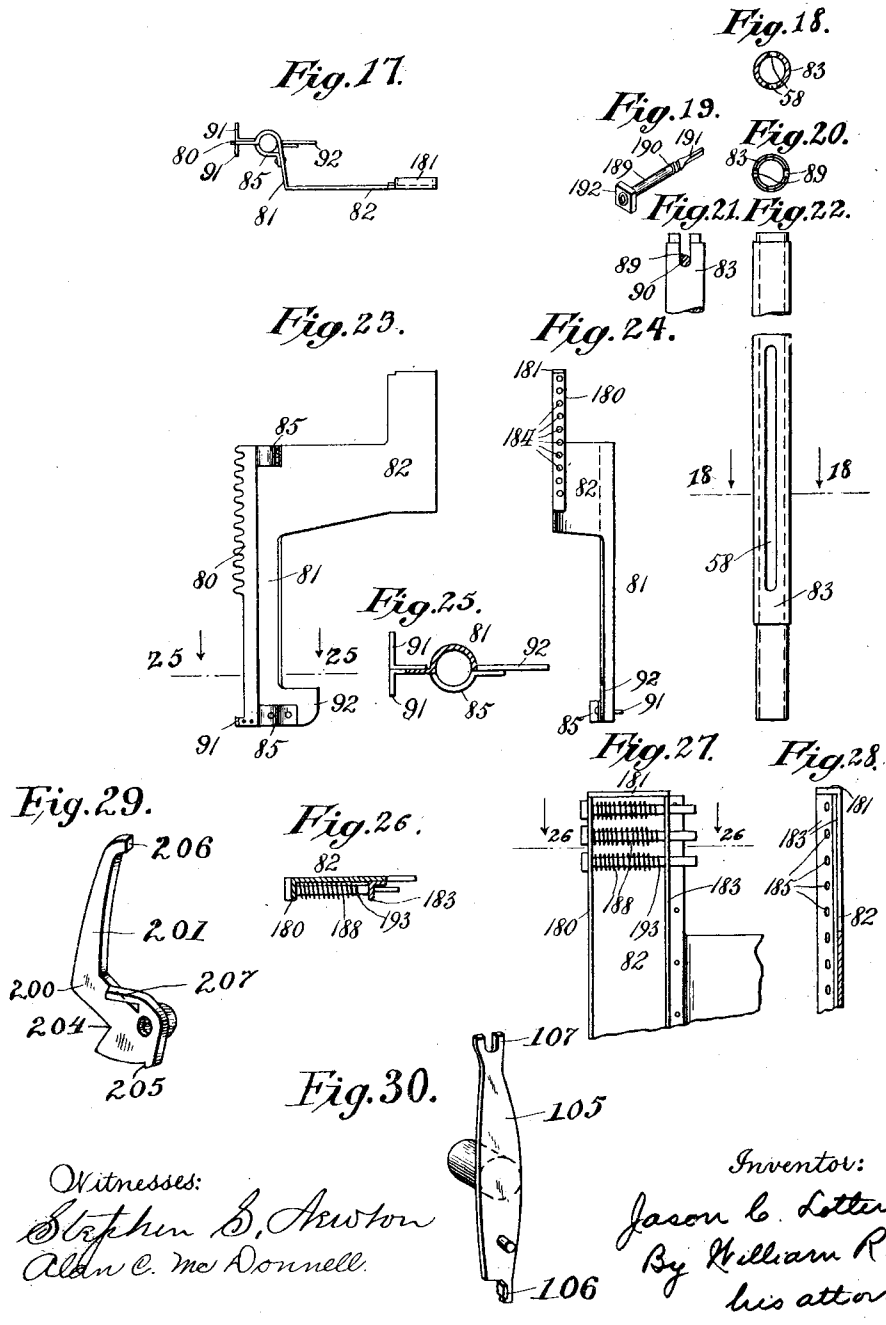


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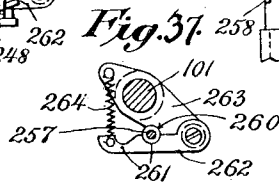
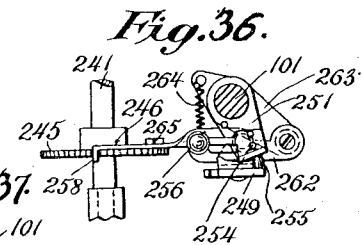
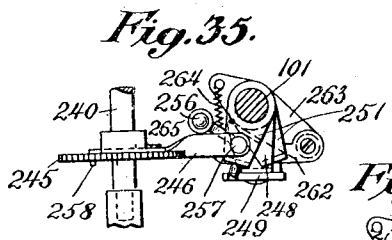
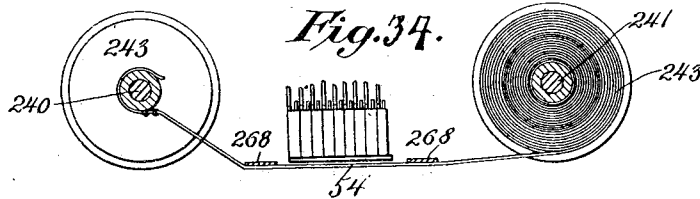
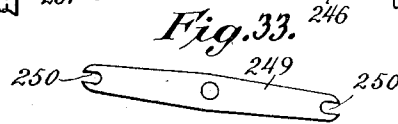
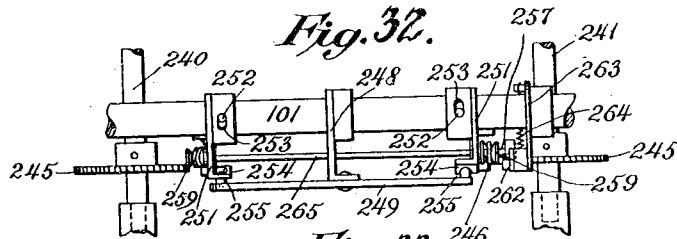
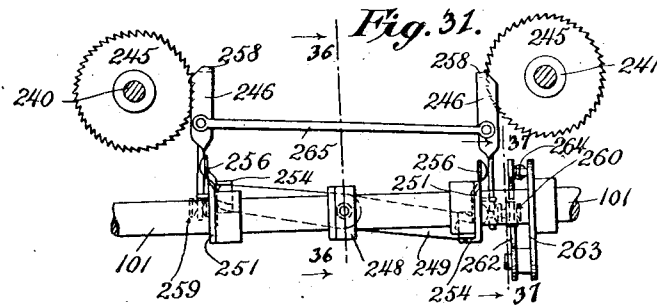
1,069,152.

Patented Aug. 5, 1913.
 10 SHEETS—SHEET 8.



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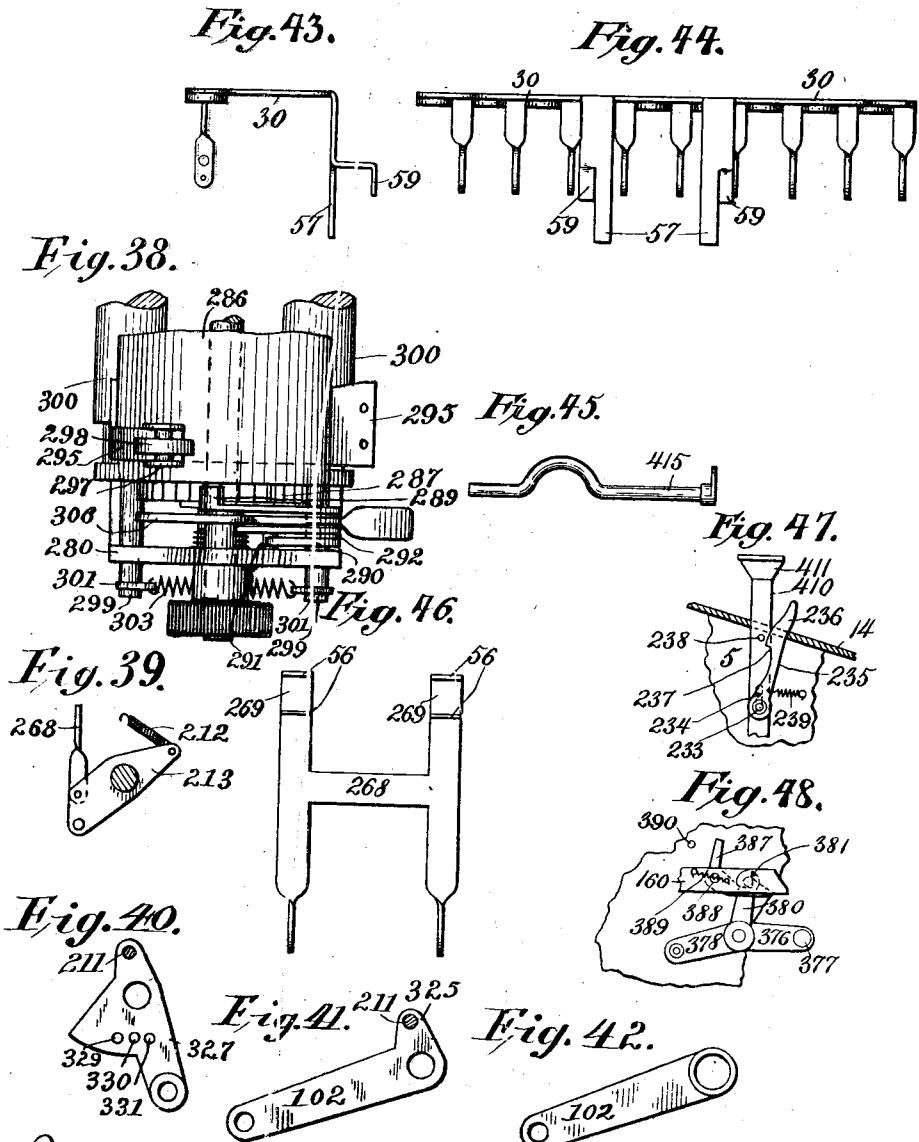
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1,069,152.

Patented Aug. 5, 1913.

10 SHEETS—SHEET 10.



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UNITED STATES PATENT OFFICE.

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PRINTING MECHANISM FOR ADDING-MACHINES.

1,069,152.

Specification of Letters Patent.

Patented Aug. 5, 1913.

Original application filed February 24, 1908, Serial No. 417,352. Divided and this application filed June 25, 1908. Serial No. 440,399.

To all whom it may concern:

Be it known that I, JASON C. LOTTERHAND, a citizen of the United States, and resident of New York, in the county and State of New York, have invented certain new and useful Improvements in Printing Mechanisms for Adding-Machines, of which the following is a specification.

This invention relates to adding machines and more particularly to the printing or recording mechanism thereof and its novelty consists in the construction and adaptation of the parts as will be more fully hereinafter pointed out.

In an application for Letters Patent of the United States filed by me on the 24th of February, 1908, Serial No. 417,352, I have explained the subject matter of this application in connection with the accumulating and calculating mechanism used therewith and this application is divided out of the one referred to at the request of the Patent Office.

In order to understand the construction and mode of operation of the printing mechanism hereinafter described, it is necessary to understand the construction and mode of operation of the cooperating mechanism and therefore there is described in this application much which will be found in the prior application, but such repetition is necessary.

In the drawings in which the same reference characters refer to the same mechanical elements in all of the figures, Figure 1 is a top plan view of the device, some of the concealed parts being shown in dotted outline; Fig. 2 is a side elevation of the parts with the handle omitted, the casing being shown in central section; Fig. 3 is a central vertical section on the plane of the line 3-3 in Fig. 1; Fig. 4 is a detail of the end of the key mechanism supporting plate; Fig. 5 is an enlarged detail of the stop bars; Fig. 6 is a detail of the latch arm 49; Fig. 7 is a view similar to that shown in Fig. 3 with the parts in the proper position when the handle is almost at the end of its forward stroke; Fig. 8 is a plan view of the parts with the casing removed, some of the parts being shown in horizontal section; Fig. 9 is a top plan view of the rear ends of the key plates taken directly beneath the numeral wheels;

Fig. 10 is a rear elevation of the parts shown in Fig. 9; Fig. 11 is a perspective detail, and Fig. 12 is a perspective detail of the key stem restoring spring. Fig. 13 is a detail perspective of the multiple non-printing detent; Fig. 14 is a side elevation of the right hand supporting plate and the parts carried thereon; Fig. 15 is an enlarged top plan view of the printing actuating mechanism; Fig. 16 is a front elevation of the parts shown in Fig. 15; Fig. 17 is a top plan view of a rack and type plate; Fig. 18 is a transverse section of a rack and type plate guide post on the plane of the line 18-18 in Fig. 22; Fig. 19 is a detail perspective of a type; Fig. 20 is a top plan view of the rack and type plate guide post; Fig. 21 is a side elevation of the upper part of the rack and type plate guide post; Fig. 22 is a side elevation of the rack and type plate guide post; Fig. 23 is a side elevation of a rack and type plate; Fig. 24 is a rear elevation of the same; Fig. 25 is an enlarged transverse section on the plane of the line 25-25 in Fig. 23; Fig. 26 is an enlarged transverse section on the plane of the line 26-26 in Fig. 27; Fig. 27 is a side elevation of the upper part of a rack and type plate, and Fig. 28 is a front elevation of the parts shown in Fig. 27; Fig. 29 is a perspective detail of a type actuator; Fig. 30 is a detail perspective view of the numeral wheel lever; Fig. 31 is a top plan view of the ribbon feeding mechanism; Fig. 32 is a rear view of the parts shown in Fig. 31; Fig. 33 is a plan view of the ribbon feed reversing lever; Fig. 34 is a horizontal central section and partial top plan view of the ribbon spools and types prior to the reversing movement; Fig. 35 is a side elevation of the parts shown in Figs. 31 and 32; Fig. 36 is a side elevation of the parts to the right of the line 36-36 in Fig. 31; Fig. 37 is a side elevation of the parts to the right of the line 37-37 in Fig. 31; Fig. 38 is an enlarged plan view of one of the paper platen and its connected parts; Fig. 39 is a detailed side elevation of the bracket 213; Fig. 40 is a detail of the elbow 100; Figs. 41 and 42 are details of the restoring bar elbows; Fig. 43 is a side elevation of the upper plate of the machine and Fig. 44 is a front elevation thereof; Fig. 45 is a detail of the multiple detent cross shaft; Fig. 46 is

a detail of the ribbon lifter and support; Fig. 47 is a modification of the non-numeral key locking device, and Fig. 48 is a detail of the canceling latch elbow.

5 In the drawings, the parts are shown mounted upon and within the framework comprising a base plate 2 and an outer upper casing 3 completely enveloping the machine and suitably apertured to permit of
10 the passage of some of the parts. It is provided with a series of vertically arranged upwardly projecting plates 4 adapted to serve as supports for the key system and with two other similar plates 5 and 6 to support
15 other parts, as hereinafter described. Each of these plates 4, 5 and 6 are mounted in slots formed in transverse ribs 500 made integral with or secured to the base of the machine. Each rib is longitudinally apertured and when the plates are in position a
20 retaining bolt 501 is passed through such aperture and also through apertures in the plates registering therewith and a nut 502 engaging the end of the bolt holds the plates
25 firmly in position. Each of these plates at its upper edge is provided with two projections 503 adapted to engage with suitable slots in the key plates 4 hereinafter referred to. Each plate 4 at its rear end is provided
30 with a transverse guide plate 7 having right angled apertures 8 to permit of the passage of the stop bars 9 hereinafter mentioned. Each plate 4 is also provided with a series
35 of recesses 10 to receive the key stems hereinafter referred to.

Projecting upwardly through the casing 3 are the keys 11, arranged in denominational series in the usual manner, each provided with a finger piece 12 and with a depending
40 stem 13 adapted to reciprocate in one of the recesses 10 of the plate 4 immediately beneath it and guided by an aperture in the upper key plate 14 through which it passes and by its recess 10, the bottom of this recess
45 serving to limit its downward movement. At its bottom, each stem 13 is hinged to one end of an elbow lever 15 pivoted at 16 to the plate 4, the other end of which lever is hinged to a horizontal stop bar 9, the rear
50 end of which passes through the aperture 8 provided for that purpose in the guide plate 7 (see Figs. 10 and 11). Each bar 9 is reduced in cross section at the rear of a shoulder 17 and a retracting spring 18 (see Fig. 12) is placed around the end of the bar and between this shoulder 17 and the transverse
55 guide plate 7. Each bar is provided on its upper edge with two adjacent notches 19 and 20, on each side of a summit 21 common to
60 both. The elbow levers 15 and the stop bars 9 are arranged alternately on opposite sides of the plate 4 common to each series. Each series of keys is provided with a latch bar 22 vertically suspended in a recess in the plate
65 4 on two parallel arms, an upper arm 23 and

a lower arm 24, pivoted to the plate 4 (see Fig. 4). A rearward extension 26 of the arm 23 is hinged to an upwardly projecting release bar 26 pivoted to a release lever 27 hinged at 28 to a suitable bracket 29 projecting from a plate 30 mounted under the upper part of the casing. The lever 27 has a finger piece 31 with which it has a slotted connection.

Each latch bar 22 is provided with projecting studs 32 adapted to engage with the notches 19 and 20 in the stop bars 9 and also with a retracting spring 33 tending to move it downward. It has a cam surface 34 on its lower front edge.

Hinged at 35 to each plate 4 is an elbow lever 36. Its upper arm 37 has a notch 38 and it is also provided with a roller 39. Its lower arm 40 is provided at its rear end with a tip 41. Hinged at 42, also to the plate 4, is a lever 43 adapted to engage with the tip 41 and connected by a hub 44 to an upwardly extending arm 45 having a hook 46.

Hinged to the same pivot 48 on the plate 4 on which the arm 24 is hinged is a latch arm 49 provided with a notch 50 adapted to engage with the notch 38 of the lever 36 and having a slot 51 adapted to engage with a stud 52 projecting laterally from the latch bar 22.

When any one of the numeral keys is depressed its elbow lever 15 is moved and its stop bar 9 is forced forward against the action of its spring 18 until its notch 20 has become disengaged from its stud 32 on the latch bar 22 and its notch 19 has become engaged with this same stud. Supposing that the operator begins pulling the main handle of the machine, as hereinafter described, finds that he should have depressed some other key of the same series. He then depresses such other key and its stop bar 9 is moved forward and its notch 20 engages its stud 32 on the same latch bar 22. When the summit 21 is reached the stop bar 9 of the former key, under the influence of its spring 18, is at once retracted to its original position and its notch 19 again engages with its stud 32. In other words, if any key in a denominational series has been depressed, depressing any other key in the same series, not only positions the stop bar of the second key in its proper place but automatically, and merely as an incident of said depression, restores the key first depressed to its original position. If an item has been enumerated by the depression of a number of keys in different series and it is desired to restore the key in any series, or all the keys in the series in which they have been depressed, to their original positions and thus efface the item, the release lever 27 in any series desired is actuated by depressing its finger piece 31. This moves downwardly the rod

26 which lifts the arm 23 of the latch bar 22 so that the stud 32 on the latch bar which has engaged the notch 20 of the stop bar 9 of the depressed key of that series is disengaged therefrom and the key is restored to its original position. Before any numeral key is depressed the parts are in the position shown in Fig. 3. When the key is depressed, as the engagement of the stud 32 with the summit 21 of the bar 9 occurs, the latch bar 22 is lifted and this raises the stud pin 52 which moves upwardly and elevates the latch arm 49. As the latch arm is raised its notch 50 is raised to permit the notch 38 of the arm 37 to slip under it. This permits the elbow lever 36 to swing on its pivot 35 under the influence of a spring 55 secured to the arm 40 for that purpose. Such movement causes the tip 41 to impinge against the lever 43 and oscillates it on its pivot 42 moving the hook 46 out of the path of a projection on the rack and type plate 81, hereinafter referred to, permitting the latter to rise until such projection contacts with the end of the bar 9, which has been moved rearwardly by the depression of the key referred to.

The accumulating mechanism consists of the numeral wheels and their connections. The numeral wheels are arranged at the rear of the key system and in the upper part of the casing. Each wheel 60 is provided with a disk 67 having peripheral recesses, a pinion 61, and a cam plate 62, each made integral therewith, or secured thereto in any suitable manner. It is centrally apertured and loosely mounted to revolve on a shaft 63 secured to and projecting laterally from an arm 64 which in turn is mounted on a pivot 65 projecting laterally from a supporting plate 66. Each arm 64 has a tail 53, and at its rear end, is provided with a laterally projecting catch 68 made by bending to one side a portion of the arm itself. A spring 69 exerts a constant inward tension on the arm. Each numeral wheel is arranged to display on its periphery the numbers from "1" to "0" in regular order in the manner usual to the art, and it is obvious that there is one numeral wheel for each denominational series of keys.

The supporting plates 66 are arranged in transverse series across the machine, each plate having a right angled aperture adapted to receive a bar 71 common to all of the plates and which holds them together and compels them to move in unison. The plates 66 are spaced apart by means of supplementary bars 72 secured to the bars 71 by screws 73. Each plate is apertured to receive a shaft 75 mounted transversely across the machine and terminating in the plates 5 and 6. The several plates 66 constitute in effect a multiple frame supporting the numeral wheel system. There are two

other plates 70, one mounted at each side of this multiple frame and which are each provided with a square aperture to receive the bar 71 and a round aperture to receive the shaft 75. These plates are provided with projecting pins 74, so that when these pins are moved the numeral wheel system is moved as an entirety and oscillates on the shaft 75. The rotation of the numeral wheels is secured by the engagement of their pinions 61 with movable racks 80 provided for that purpose, and the extent of the movement of which in turn is governed by the keys which have been depressed. The racks 80 are cut in the upper front edges of vertical rack and type plates 81, each provided with a wing 82 which is adapted to carry the types (see Figs. 17, 24 and 23). These wings extend rearwardly and are arranged to converge toward each other so that at the printing zone the spaces between them will correspond to that which usually obtains between successive figures of the font to which the types belong. Vertical rods 83 are arranged to serve as guides and supports for the plates 81, each rod resting in a recess formed in a transverse rib 84 at the base of the machine and at its upper end engaging with the transverse plate 30. Each plate 81 is provided with two guides 85 serving to retain the plate in engagement with its rod. The rods 83 are hollow and each contain a spring 85, the lower end of which is secured to a pin 88 passing through the guide 86 and plate 81 and the upper end of which is secured in a slit 89 by a pin 90. A vertical slot 58 in the rod permits the movement of the pin 88. Each plate 81 is provided at the lower part of its front edge with a projection 91, and at the lower part of its rear edge with another projection 92, the latter being adapted to engage with the restoring bar 103 hereinafter described. The spring 86 normally tends to raise the plate 81 against the force of gravity. The racks 80 consist of teeth of proper size and shape to engage the pinions 61 of the numeral wheels 60.

95 is the main shaft of the machine mounted in suitable bearings in the base 2 and adapted to be oscillated in any suitable manner, but preferably by a handle 96 terminating in a gripping member 97.

The movement of the mechanism thus far described is accomplished from the main shaft in a manner fully described in my prior application before referred to. Suitable springs 122 secured to a rod 123 supported from the base of the machine and suitable connections 124 to the main shaft from such springs serve to retract the parts to their initial positions after actuation.

The adding, carrying, totalizing and resetting operations of the accumulating mechanism being fully described in my prior ap-

plication, and forming no part of this invention, will not be specifically described herein.

The printing or recording mechanism will now be described.

Each wing 82 of the rack and type plates 81 serves as a type carrier. Each wing is bent inwardly at 180 and downwardly at 181 (see Figs. 24 to 28) and is provided with a removable partition 183 forming a housing for the type. The internal member 180 is provided with a series of ten round openings 184 to permit of the passage of the type, and the partition 183 is provided with a similar series of ten oblong openings 185 for the same purpose, the two series of openings registering with each other horizontally.

The types 188 each comprise a round body 189 which is provided with grooves 190, a flattened shank 191 and a head 192, the latter carrying the figure to be printed, (see Fig. 19.) A coiled spring 193, one end of which engages in the groove 190, and the other end of which impinges against the inner side of the member 180 and surrounds the type body, serves to retract the latter to position after actuation. The openings 185 are made with substantially straight vertical sides and the shanks 191 are flattened to correspond therewith in order to prevent the type from turning.

Type actuators 200 are arranged in the front of the types, one for each denominational series. They each comprise a body 201 loosely mounted on a common shaft 202 and are spaced apart by suitable collars 203. Each body is provided with a recess 204, a catch 205, a striker 206 and an arm 207 extending toward the body of the next lower order (see Fig. 7).

Arranged in the rear of and below the type actuators are a series of triggers 210 loosely mounted on a transverse shaft 211 and spaced apart by collars. Each trigger is provided with a spring 212 the other end of which is secured to a cross rod 199 mounted between brackets 213. Each trigger has an upwardly extending arm 214 terminating in a roller 215 adapted to engage with the under surface of the corresponding rack and type plate 81, a downwardly extending arm 216 terminating in a hook 217 adapted to engage with the catch 205 on the type actuator 200, and a projection 218 adapted to strike against a cross rod 219 suitably mounted between two supplementary plates 220 and 221 mounted on and supported from the shafts 101 and 226. The shaft 211 is mounted between the two arms 102. By this construction the triggers 210 can each turn on the shaft 211 but the entire series of triggers and the shaft 211 are adapted to oscillate on the shaft 101 as a whole.

Arranged in front of and below the parts

just described are energizing elbow levers 225 each loosely mounted on a cross shaft 226 supported in brackets 227 from the base of the machine and spaced apart by suitable collars 228. The upper arm 229 of each lever 225 is provided with a roller 230 adapted to fit into the recess 204 of its corresponding actuator 200. Its lower arm 231 is bent away from the center of the machine and is provided with a spring 232 secured at suitably fixed point in the base of the machine.

Supposing an item to have been enumerated by the depression of appropriate keys and the stop bars 9 to have been positioned thereby, the main shaft 95 is then oscillated by means of the handle 96 and the restoring bar 103 is lifted in the manner previously described. This allows the appropriate rack and type plates 81 to rise under the influence of their respective springs and brings into position at the point of print the types corresponding to the keys which have been depressed. All of the remaining plates 81, whose keys have not been depressed, rise a slight distance to bring their respective "0" types to the point of print. Each plate 81 is similarly positioned at the "0" point whenever the main shaft is actuated. In the meantime, as each plate 81 rises its trigger 210 follows under the influence of its spring 212, its roller 215 remaining in contact with the lower edge of the plate 81 until the hook 217 engages with the catch 205, when the trigger 210 ceases to rotate on its shaft 211, and the whole series of such triggers are rotated together on the shaft 101 which movement in turn causes the actuators 200 to swing on their shafts 202 and their recesses 204 to move against the rollers 230 and thus swing the levers 225 against the tension of their springs 232 thereby stretching the latter. As the rotation of each trigger 210 around the shaft 211 continues its projection 218 finally strikes the rod 219 and causes the trigger 210 to swing on its shaft 211 and disengages the hook 217 from the catch 205, whereupon the energizing elbow lever 225 smartly propels the hook 206 of the actuator 200 against the shank 191 of the type immediately in front of it.

The inking mechanism comprises an inking ribbon which is carried upon spools and is brought into position in front of the line of print so that the types when propelled forward strike the ribbon and move it against the recording paper strip carried by the platen, as hereinafter described. The ribbon has a step by step movement from one spool to the other which movement is reversed automatically at the proper time and it has a vertical movement whereby it is elevated to the point of print when required, and depressed when not so required.

At convenient places near the rear of the

machine and on either side of the printing section are two ribbon spool spindles 240 and 241 vertically placed and loosely mounted in suitable bearings in the base 2 and upper plate 30. Each spindle is reduced in cross section at a convenient point to form a flange 242 on which rests a ribbon spool 243 of usual form. A tension spring 244 is interposed between the top of each spool and the plate 30. Near the lower end of each spindle is secured a ratchet disk 245 actuated by a pawl 246, which disk is keyed to the spindle and moves with it. The pawl, when reciprocated, rotates the spindle intermittently against the tension of the spring 244. Centrally placed and rigidly mounted on the shaft 101 is a downwardly projecting arm 248 at the extremity of which is loosely pivoted a reversing bar 249, provided at each end with a fork 250 (see Figs. 32 and 33).

Loosely mounted on the shaft 101 on each side of the arm 248 are two crank arms 251, each prevented from lateral displacement by a pin 252 on the shaft engaging with a slot 253 on each arm. Each crank arm is provided with an inwardly projecting foot 254 having a downwardly projecting pin 255 adapted to engage with the fork 250 of the bar 249. On each crank arm 251 is a lateral projecting small shaft 257 on which is loosely mounted the pawl 246 between two inwardly curved bearings 259 permitting a slight lateral movement of the pawl (see Figs. 32, 35 and 36). The pawl 246 is preferably made of a piece of flat metal twisted to bring its outer extremity into a horizontal position and provided with a downwardly projecting tooth 258 adapted to engage with the teeth of the ratchet disk 245, the pawl 246 resting upon and being supported by this disk. A flat spring 256 is secured to the crank arm 251 and is adapted to engage the side of the pawl 264 to hold the same in engagement with the ratchet disk 245 (see Figs. 31, 35 and 36). Loosely mounted on one of the small shafts 257, in the machine shown in the drawings the one nearest the spindle 241 is a roller 250 adapted to engage in notches 261 formed in the edge of an arm 262 pivoted to a bracket 263 projecting from the shaft 101 (see Fig. 37). A spring 264 secured to the arm 262 and the brackets 263 holds the former under a proper tension. The two pawls 264 are coupled together by a link 265.

Means are provided for raising the ribbon 54 to bring it to the point of print at the proper time. On each side of the arm 248 and between it and the cranks 251 are the two brackets 213, previously referred to, and both rigidly secured to the shaft 101. Pivoted to and arranged between these brackets is a lifting frame 268 provided at its upper edge with two ways 269 with outwardly

turned edges 56 adapted to embrace and guide the ribbon 54 which is wound upon the spools 243. A downward extension 57 of the plate 30 serves as a lateral guide for the rack and type plates 81, and another extension 59 of the same plate serves as a guide for the upper end of the lifting frame 268.

When the main shaft 95 is oscillated, a shaft 101 is also oscillated in the manner previously described, and all of the parts secured to it of course move with it. Referring to Fig. 31 it will be noted that one of the pawls 246 is in an engaging position with the disk 245 on the spindle 241 while the other pawl 246 is not engaged with the disk on the spindle 240 because its tooth 258 projects beyond the periphery of that disk. Therefore when the shaft 95 is oscillated and the shaft 101 is also oscillated an intermittent movement is given to the disk 245 on the spindle 241 through its pawl and the spool on that spindle is consequently rotated to wind up the ribbon 54 thereon as shown in Fig. 34. The spring 256 keeps the pawl in engagement with its disk. When the ribbon has been fully wound on its spool, the further rotation of the disk 245 by its pawl 246 is prevented, due to the tension of the tightened ribbon. The disk 245 therefore holds the pawl at the end of one of the forward strokes of the latter and instead of the disk turning as theretofore, the pawl itself does not move at the next backward oscillation of the shaft 101, but remains stationary while the shaft itself turns. When this takes place, the crank 251 carrying the small shaft 257 also remains stationary and the roller 260 on the end of this shaft is disengaged from one of the notches 261 and moves to the other. This moves the crank 251 to its second position with respect to the shaft 101, and through the pin 255 engaging with the fork 250 moves the reversing lever 249 on its pivot. The movement of the crank 251 relative to the shaft 101 has also moved the spring 256 out of contact with its pawl 246 and no longer tends to hold the tooth of the pawl in engagement with its disk. The oscillation of the reversing lever 249 has, however, moved the other pawl 246 engaging with the disk on the spindle 240 rearwardly to bring its tooth into engagement with said disk and its spring 256 to assist and maintain said engagement. The further oscillation of the shaft therefore moves the disk on the spindle 240 and winds up the ribbon on the spool on that spindle. The link 265 serves to maintain the pawls in their relative positions and to keep one in alternate engagement with its disk.

The purpose of the lifter is to position the ribbon at the point of print each time an item is to be recorded and to remove it out of the way at other times. As above mentioned, the lifter is pivoted to the brackets

213 and is raised and lowered by the shaft 101 at each actuation of the main shaft. The parts are so arranged that the lifter is raised so as to bring the ribbon to the point of print at the extreme end of the forward stroke of the handle and after the actuators 200 have been moved forwardly to be in position to strike, so that the types are propelled forward at the instant when the ribbon is in position. As the rearward stroke of the handle begins the lifter is lowered and the ribbon is thereafter out of the way until the main shaft is again actuated.

The paper carriage is mounted at the rear of the machine on the casing 3 and is provided with suitable actuating mechanism as fully described in my prior application. The machine is also provided with a repeat key, means for absorbing the shock due to the return movement of the operating handle, means for canceling an item enumerated on the key board, a non-adding key, means for automatically counting the number of items accumulated, limiting the items to a predetermined number, interrupting such enumeration and automatically locking the numeral wheels when the last item has been enumerated, means for preventing the actuation of the operating handle when the total key is partially depressed and the numeral wheels out of engagement with the racks or preventing the reversal of the handle after it has been partially moved in the proper direction, but these form no part of the present invention and will not be particularly described herein.

The non-printing key comprises a key stem 410 having a finger piece 411 and a notch 412 (see Fig. 14). It is hinged at its lower extremity to one end of an elbow 413, the other end of which is pivoted to a lever 414 extending longitudinally of the machine and pivoted to a cross shaft 415 which is adapted to oscillate a multiple detent 416 mounted between the two brackets 213. This detent comprises a series of hooks 417 which are so positioned as to engage pins 418 projecting laterally from the arms 216 of the triggers 210. It is obvious that when the key 410 is depressed the hooks 417 are oscillated into the paths of the pins 418 so as to intercept the triggers and detain them against movement (see Fig. 7). When they are so prevented from moving, the type actuators are not moved or energized and no printing operation can take place. The function of the printing mechanism is interrupted so long as the key 410 remains depressed. When the key 410 is released a spring 419 serves to retract it to its original position.

The non-numeral keys, namely the repeat key, the non-adding key, and the non-printing key is each provided with a depending stem having a notch adapted to engage with the edge of the plate 14 for the purpose of

holding such keys in position after depression. It is not, however, always desirable to hold them, or any of them, depressed during more than one oscillation of the main shaft and it sometimes happens that the operator will inadvertently cause the engagement of the key stem by such notch moving under the plate 14 and thus use the key more than once when actually he desires to use it but once. In order to avoid this accidental repeated use of such a key, means are provided whereby the key cannot be accidentally locked in a depressed position, but must be consciously moved by the operator to be so locked and after being so locked must be positively and manually released in order to be restored to its original position. The device referred to is illustrated in Fig. 47, the repeat key being used for that purpose. In this figure, the key stem is designated 410 and the finger piece 411. There is pivoted, however, to the plate 5 a latch 235 comprising a finger piece 236 and provided with a hook 237 adapted to engage a pin 238 projecting laterally from the key stem. There is also a retracting pin 239. The key stem is slotted at 234 to allow it to pass the pivot 233 of the latch. When the key is depressed its stem 410 is moved downward until it reaches the end of its stroke. If nothing further is done, as soon as the downward pressure, due to the finger of the operator, is released, the key will naturally rise under the influence of its retracting spring. If it is to be retained in its depressed position the operator must move the latch 235 so that its hook 237 will engage with the pin 238. This movement is against the tension of the spring 239 and cannot accidentally take place. When it has taken place the key will be held until it is manually released. This is accomplished by tapping the finger piece 411 lightly downward, because as soon as the pin 238 is moved below the plane of the beak of the hook 237, the spring 239 will pull the hook out of the path of the pin 238 and the key will be retracted upwardly by its spring.

It has been explained how at each actuation of the main shaft the restoring bar is lifted and the rack and type plates, corresponding to the denominations in which no key has been depressed, are raised to bring their "0" types opposite the point of print; because the parts are so proportioned that the beak of the hook 46 engages the projection 91 to bring the "0" type at the other end of the same plate 81 to the proper point. It has not been explained, however, how the zeros are automatically printed. This will now be done.

Each actuator 200 is provided with an arm 207, as above described, which extends over toward the body of the actuator of next lower order, so that when an actuator is moved its arm engages with the actuator of much

lower order (provided the latter has not been already engaged by its own trigger 210) and bodily moves the latter to retract its energizer and be propelled toward its type when the trigger 210 of the first named actuator is released. Thus the rack and type plate 81 in each denomination where no key is depressed is automatically moved to bring its "0" type to the point of print and its actuator is automatically energized and propelled forward to print such type. In a similar manner any other actuator of lower order, the rack and type plates of which has been moved to the "0" printing point is actuated by the adjacent actuator of higher order, whether such adjacent actuator has been brought to the "0" point or to a point to print an integer.

It is to be noted that in the above described mechanism, the parts are free from complication in construction and mode of operation; their movement is direct and positive and usually in straight lines; they can largely be made of standard material and without elaborate finishing processes; their operation requires little power, the key touch is light and the handle action does not induce undue fatigue. There is accomplished in this device everything accomplished in much more complicated machines, and in a more economical way, and the cost of its manufacture and use is necessarily less.

The carriage mechanism, the paper feed mechanism, the slidable brackets adapted to support the paper roll and the ribbon feed mechanism above described are, by a requirement of the Patent Office, removed from this application and will be made the subject of other applications for Letters Patent of the United States.

What I claim as new is:—

1. A rack and type plate provided with a projection at a distance from the rack and in substantially the same plane therewith and a second projection on the opposite edge of the rack and substantially in the same plane therewith and a flange adapted to carry types in a different plane.

2. In a machine of the character described, a series of type actuators, a corresponding series of energizing levers, springs therefor, one for each lever, means for moving the actuators against the levers to charge their springs, a trigger between the moving means and each actuator regulating such movement and means for moving the trigger to engage the actuator, comprising a type carrier.

3. In a machine of the character described, a series of type actuators, a corresponding series of energizing levers, springs therefor, one for each lever, means for moving the actuators against the levers to charge their springs, a trigger between the

moving means and each actuator and means for moving the trigger to engage the actuator and regulating such movement, comprising a type carrier, and means for moving the trigger to disengage it from the actuator.

4. In a machine of the character described, a series of type actuators, a corresponding series of energizing levers, springs therefor, one for each lever, means for moving the actuators against the levers to charge their springs, a trigger between the moving means and each actuator and means for moving the trigger to engage the actuator and regulating such movement, comprising a type carrier, and means for moving the trigger to disengage it from the actuator, comprising a permanent stop interposed in its path.

5. In a machine of the character described, a series of type actuators, a corresponding series of energizing levers, springs therefor, one for each lever, means for moving the actuators against the levers to charge their springs and a series of triggers moving with said moving means and adapted to engage with and be disengaged from the type actuators as the moving means move.

6. In a machine of the character described, type carriers arranged in denominational series, each carrying reciprocating types, means for moving the carriers to bring any type carried thereby to a point of print, type actuators adapted to propel the types after they have been brought to the point of print and triggers controlling the actuation of the type actuators adapted to be moved to an actuating position such movement being controlled by the type carriers.

7. A series of type carriers, a series of type actuators one for each carrier, means for moving each actuator to energize it, means for releasing it after such energization and devices, one carried by each actuator, adapted when its actuator is moved to move the adjacent actuator to the right and to hold it until its actuator is released.

8. Two type actuators, one of higher and the other of lower order in denominational relation, each provided with an energizing spring, means for moving the actuator of higher order against the tension of its energizing spring and a device carried by the actuator of higher order for similarly and automatically moving the actuator of lower order against its spring when it has not otherwise been so moved.

9. Two type actuators, one of higher and the other of lower order in denominational relation, each provided with an energizing spring, means for moving the actuator of higher order against the tension of its energizing spring and a device carried by the actuator of higher order for similarly and automatically moving the actuator of lower order against its spring when it has not

otherwise been so moved, comprising an arm on the actuator of higher order projecting over into the plane of the actuator of lower order.

5 10. A series of vertically slidable type carriers, a series of pivoted type actuators, one for each carrier, a series of pivoted triggers, one for each actuator, bearing yieldingly against the under edge of its corresponding
10 type carrier, means for holding the trigger normally out of engagement with its actuator, and means normally tending to produce such engagement automatically when an actuator is moved to engagement with
15 its corresponding carrier.

11. A series of type actuators arranged in denominational order, means for moving each one of them independently, an arm on each actuator extending into the plane of
20 movement of its neighboring actuator of lower order, whereby when any actuator is moved, all of the actuators of lower order are bodily moved.

12. A series of type carriers, a series of
25 type actuators, means for moving all of the carriers automatically to a zero printing position and means for moving any of them to numeral printing position, means for automatically moving the type actuator of any
30 carrier moved to a numeral printing position, an arm on each type actuator extending toward the right into the plane of movement of its adjacent actuator whereby when any type carrier is moved beyond a zero
35 printing position the arm on its actuator bodily moves all of the type actuators to the right thereof to cooperate with the type carriers at a zero printing position.

13. The combination with the printing
40 mechanism adapted to print a plurality of characters side by side, of a paper carriage, manually movable predetermined distances laterally of the machine but longitudinally
45 of the carriage, devices for intermittently and automatically moving the carriage and means for intermittently moving the inking ribbon to position between the printing mechanism and the carriage in unison with the
50 actuation of both of them.

14. The combination with the printing
mechanism adapted to print a plurality of

characters side by side, of a paper carriage, manually movable predetermined distances laterally of the machine but longitudinally
55 of the carriage, devices for intermittently and automatically moving the carriage and means for intermittently moving the inking ribbon to position between the printing mechanism and the carriage in unison with
60 the actuation of both of them and simultaneously moving the ribbon in the direction of its own length.

15. The combination with the printing
mechanism adapted to print a plurality of
65 characters side by side, of a paper carriage, manually movable predetermined distances laterally of the machine but longitudinally of the carriage, devices for intermittently and automatically moving the carriage and
70 means for intermittently moving the inking ribbon to position between the printing mechanism and the carriage in unison with the actuation of both of them, comprising a lifting frame, an oscillating shaft and a
75 hinged connection between them.

16. The combination with the printing
mechanism adapted to print a plurality of
characters side by side, of a paper carriage, manually movable predetermined distances
80 laterally of the machine but longitudinally of the carriage, devices for intermittently and automatically moving the carriage and means for intermittently moving the inking ribbon to position between the printing
85 mechanism and the carriage in unison with the actuation of both of them, comprising an oscillating shaft, a crank, a lifting frame, and a lateral guide to position the frame when lifted.

17. A series of type actuators, a series of
90 triggers one for each actuator, means for moving each trigger separately, means for moving all of the triggers together as a series, a key on a keyboard and means for preventing their movement, including a multiple
95 detent operated by the key.

Witness my hand this 19th day of June 1908, at New York, N. Y.

JASON C. LOTTERHAND.

Witnesses:

WILLIAM R. BAERD,
MAY HUGHES.