D. MURRAY.

PRINTER FOR PRINTING TELEGRAPH SYSTEMS.

APPLICATION FILED APR. 16, 1913.

1,114,904.

Patented Oct. 27, 1914

7 SHEETS—SHEET 1.

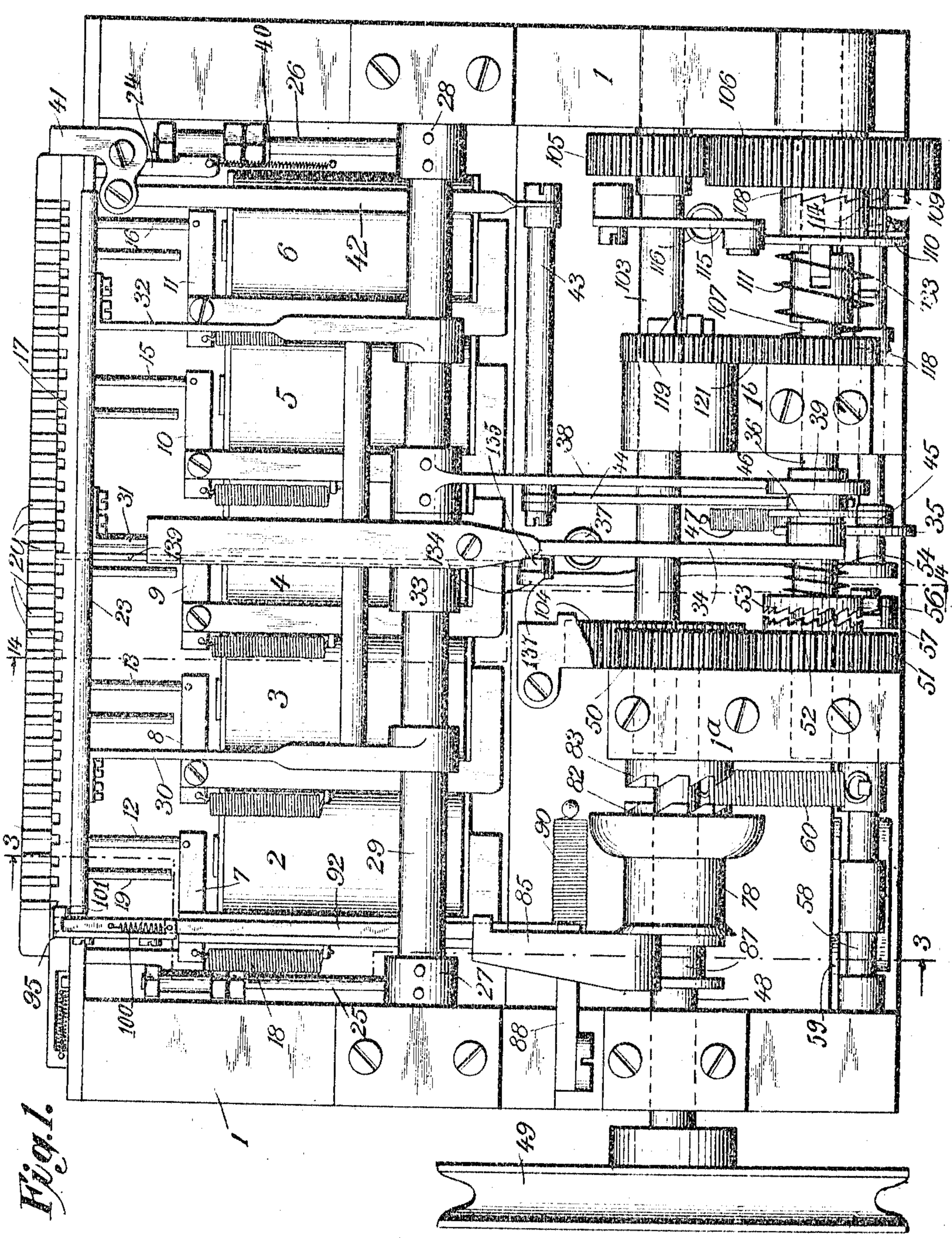

Fig. 1.

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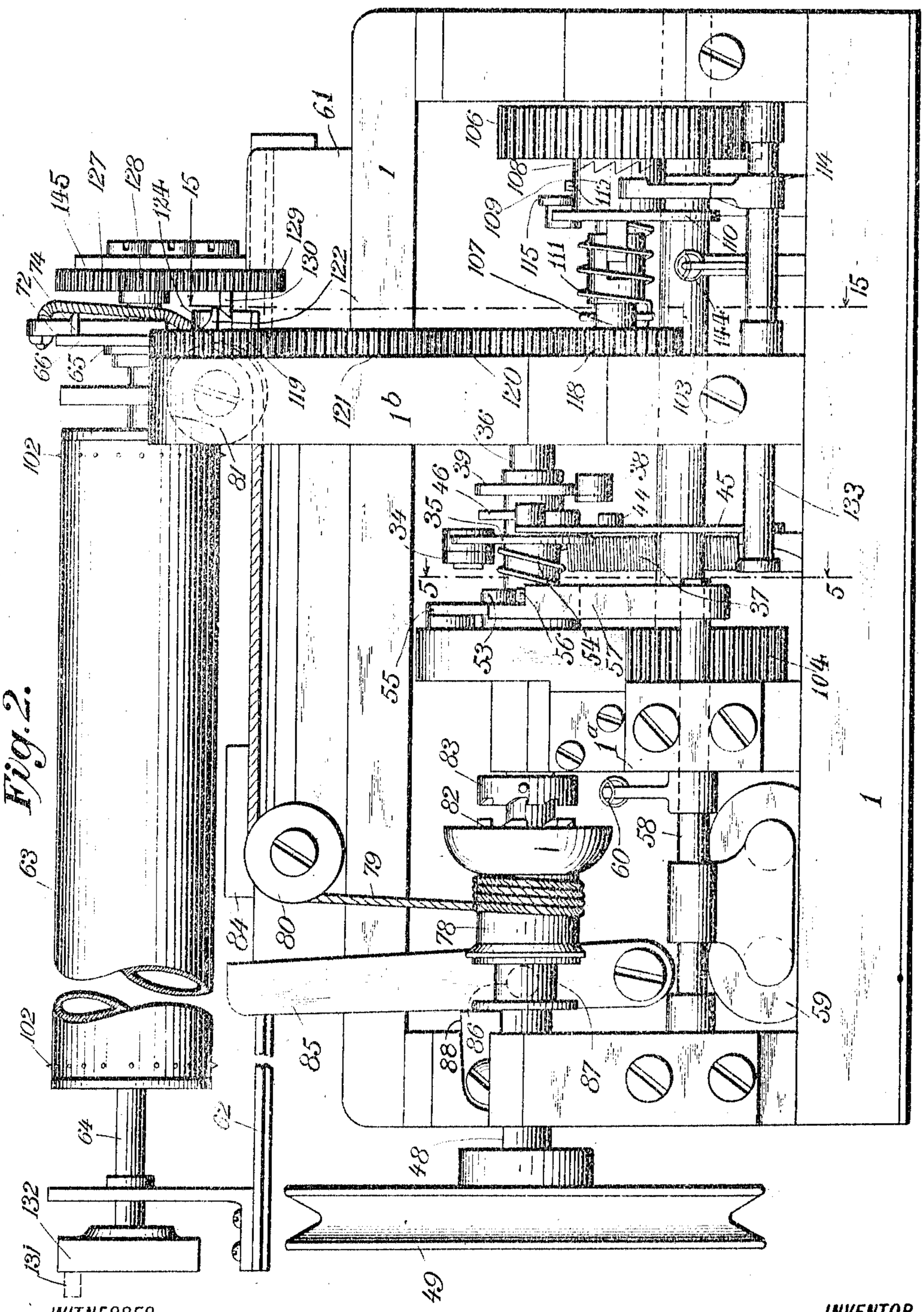

Fig. 2.

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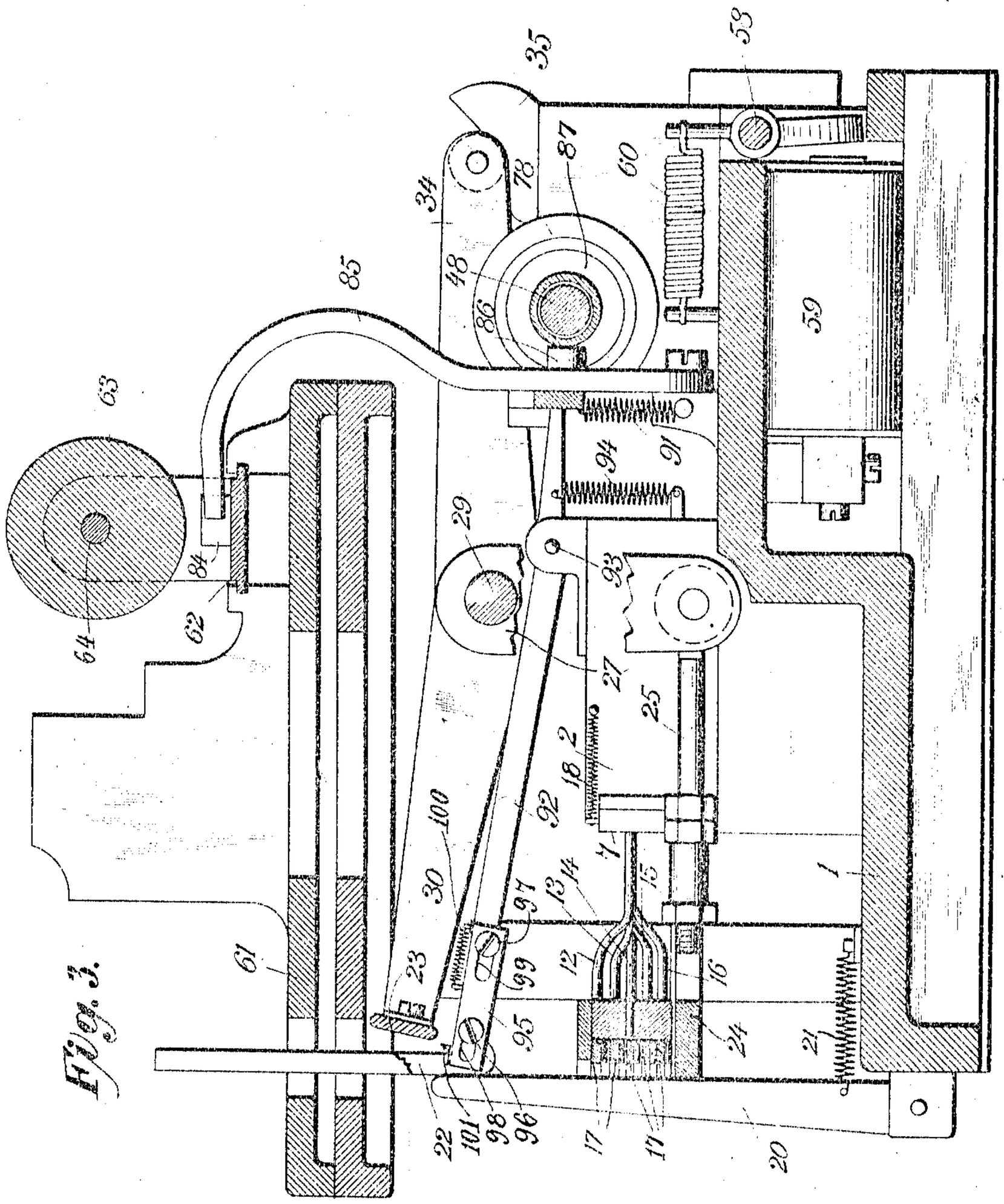

Fig. 3.

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Fig. 4

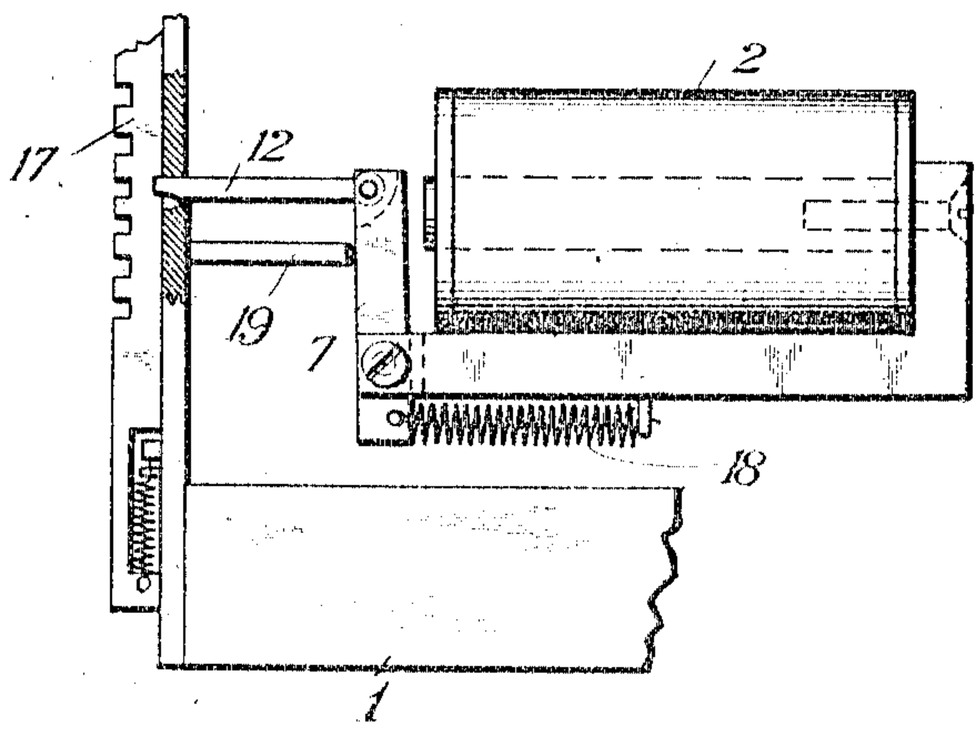

Fig. 5.

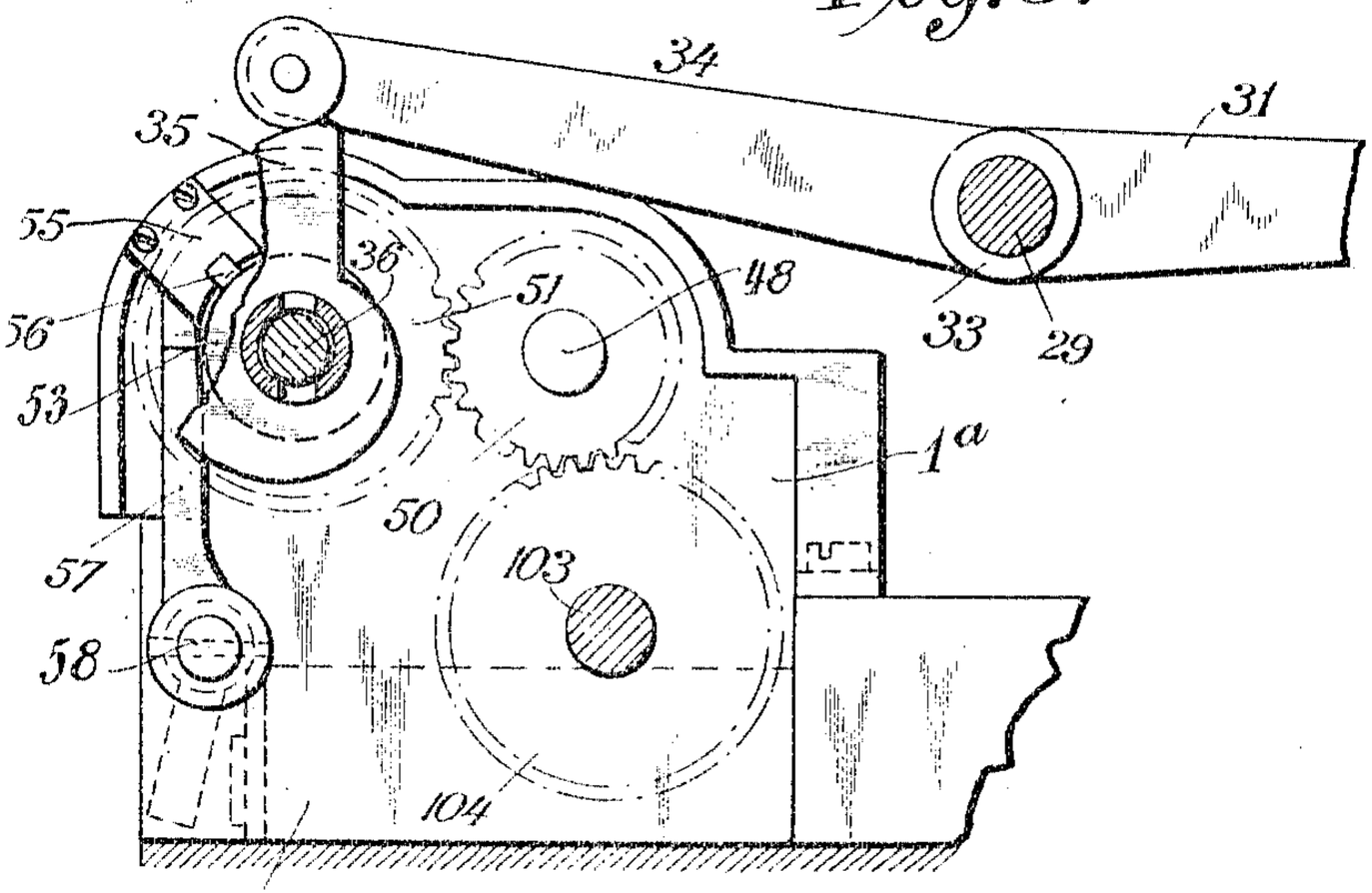

Fig. 6.

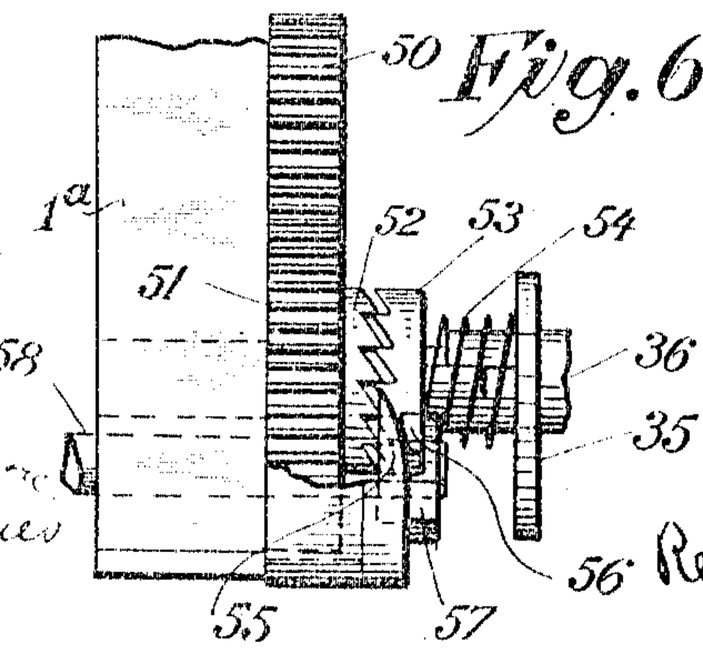

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Fig. 7.

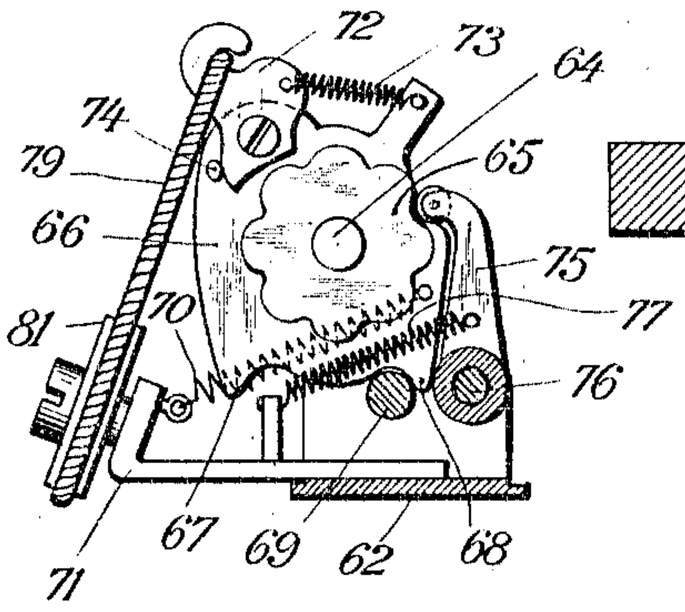

Fig. 8.

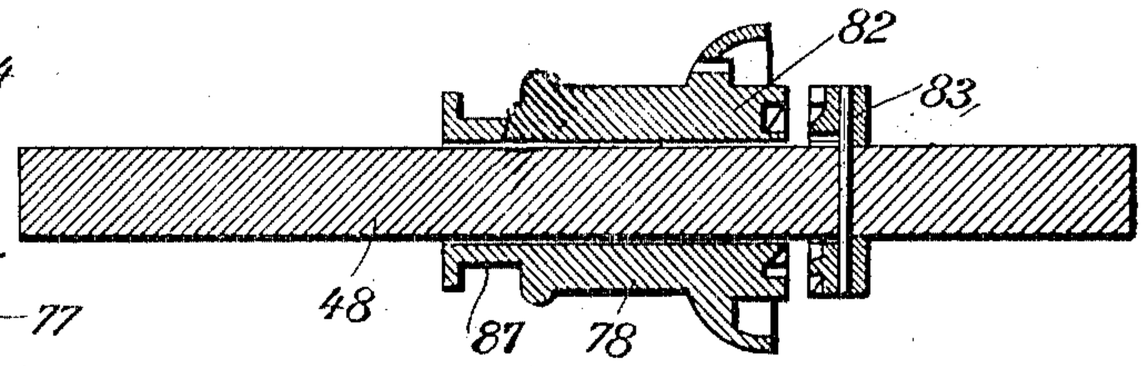

Fig. 9.

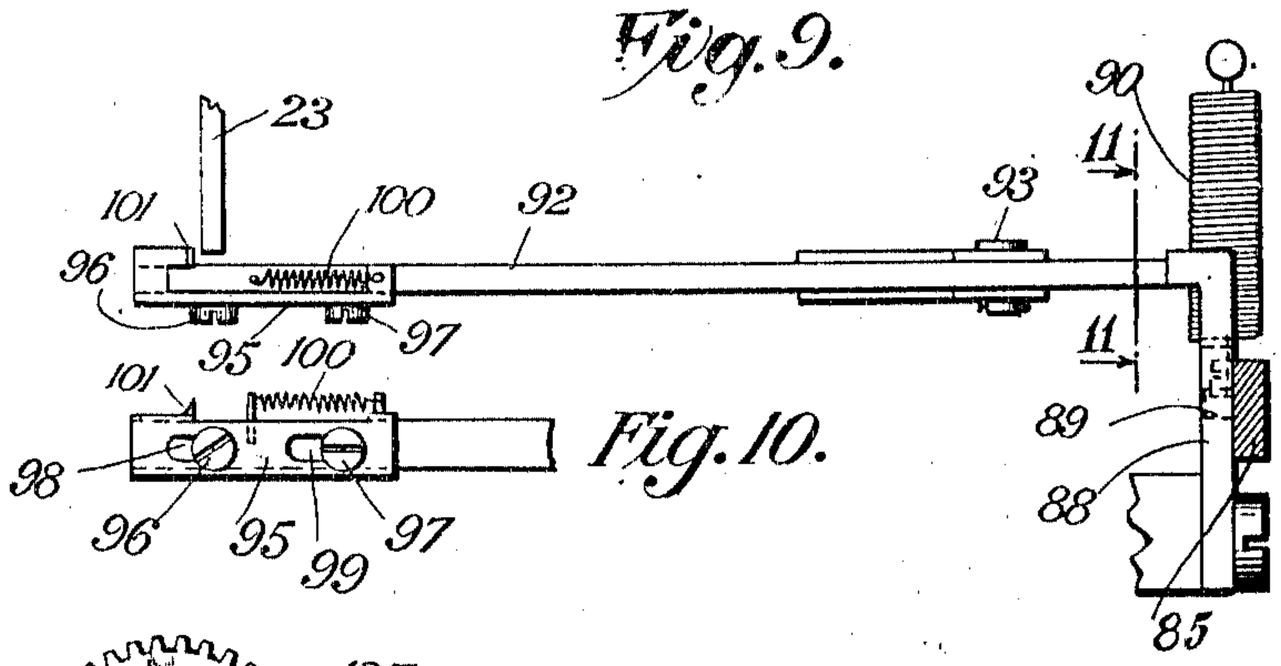

Fig. 10.

Fig. 12.

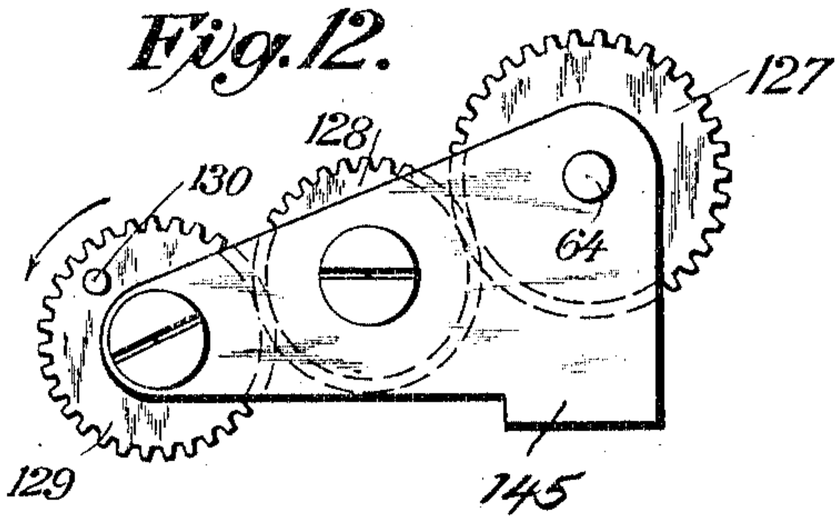

Fig. 11.

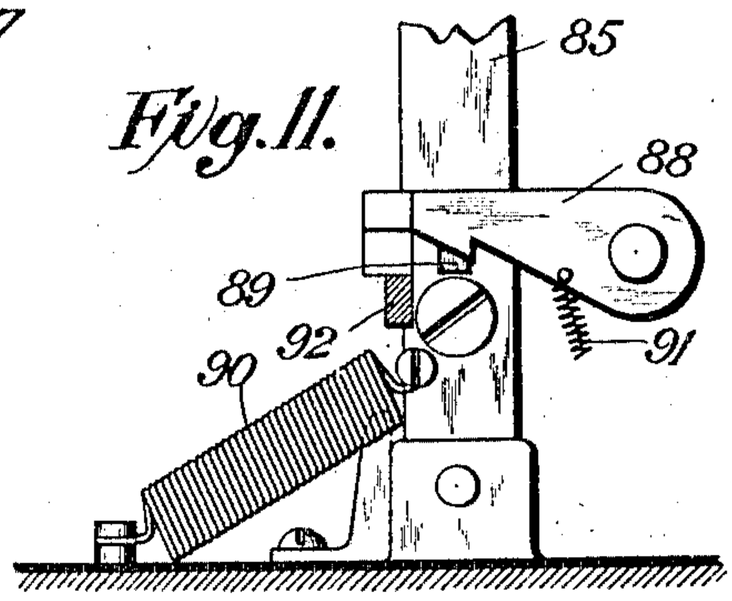

Fig. 13.

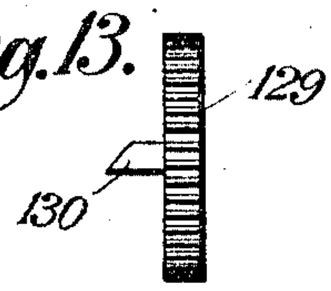

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Fig. 14

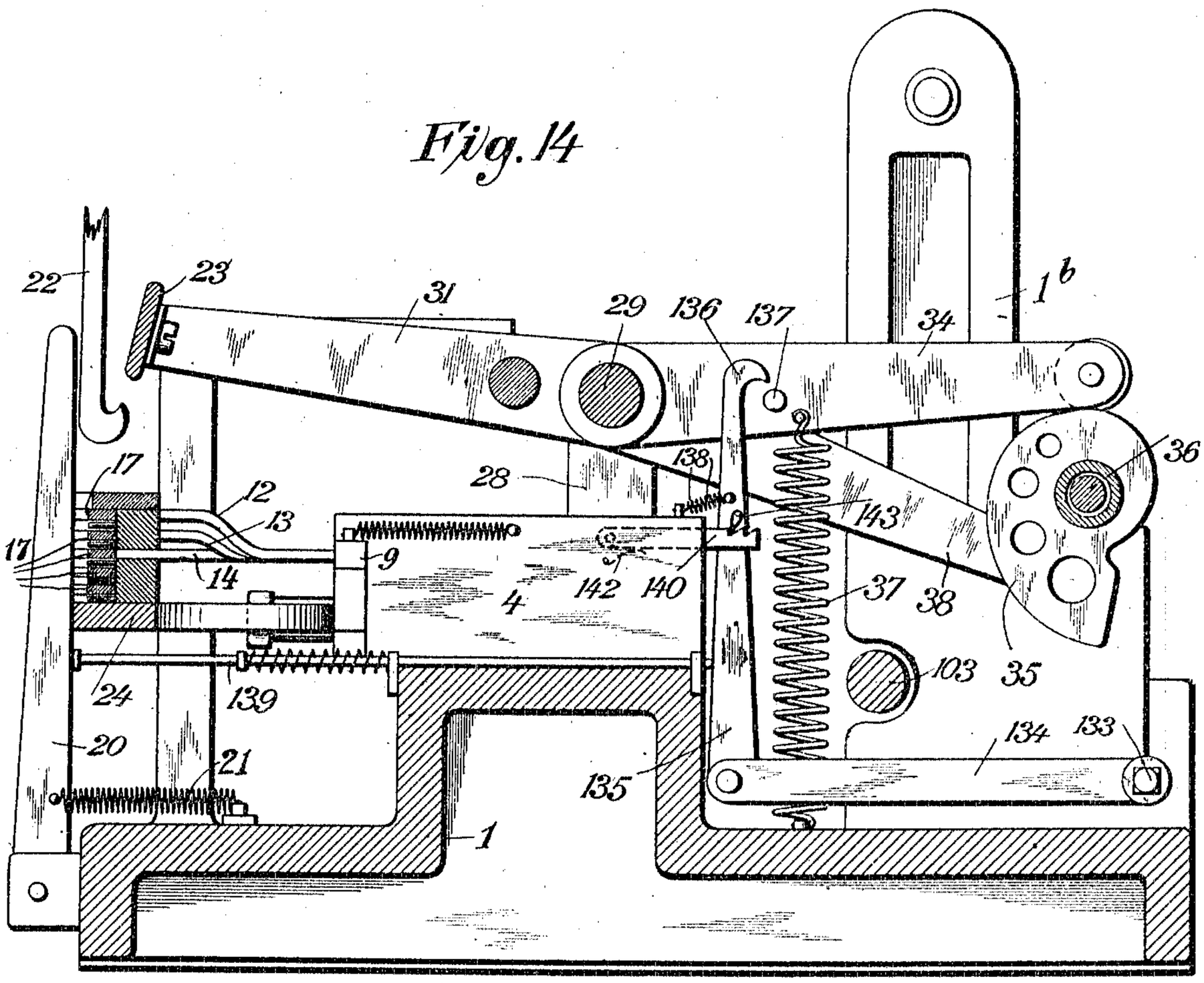

Fig. 15.

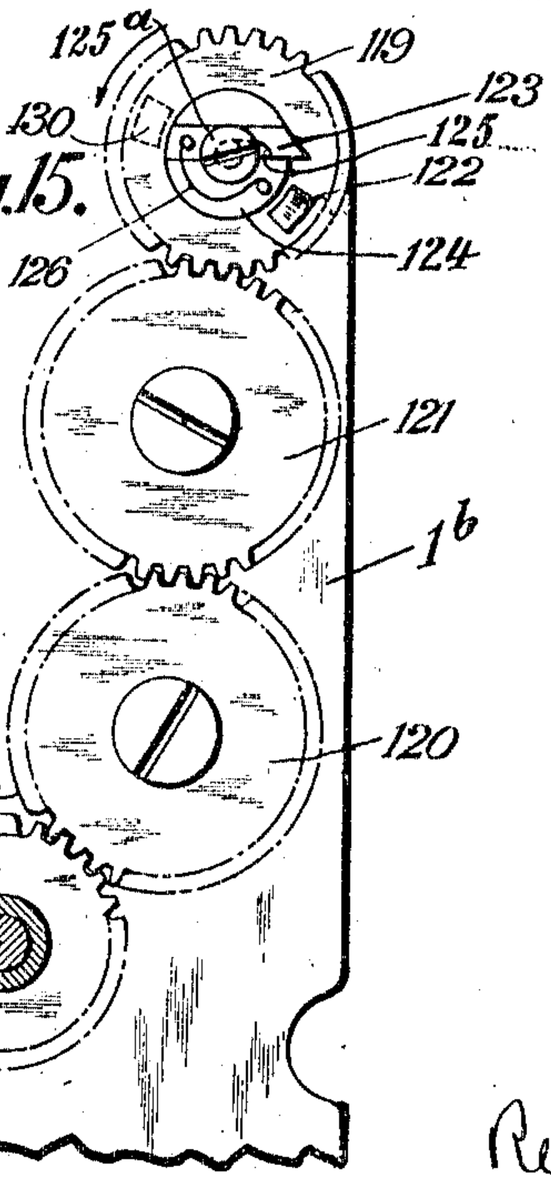

Fig. 16.

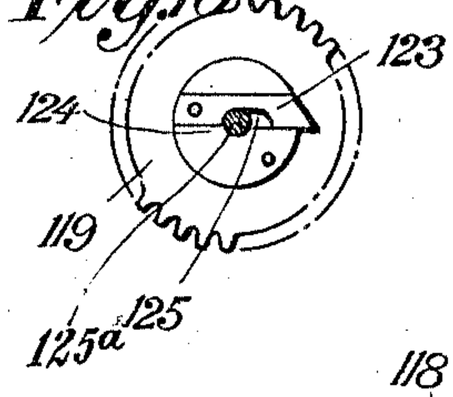

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Fig. 17.

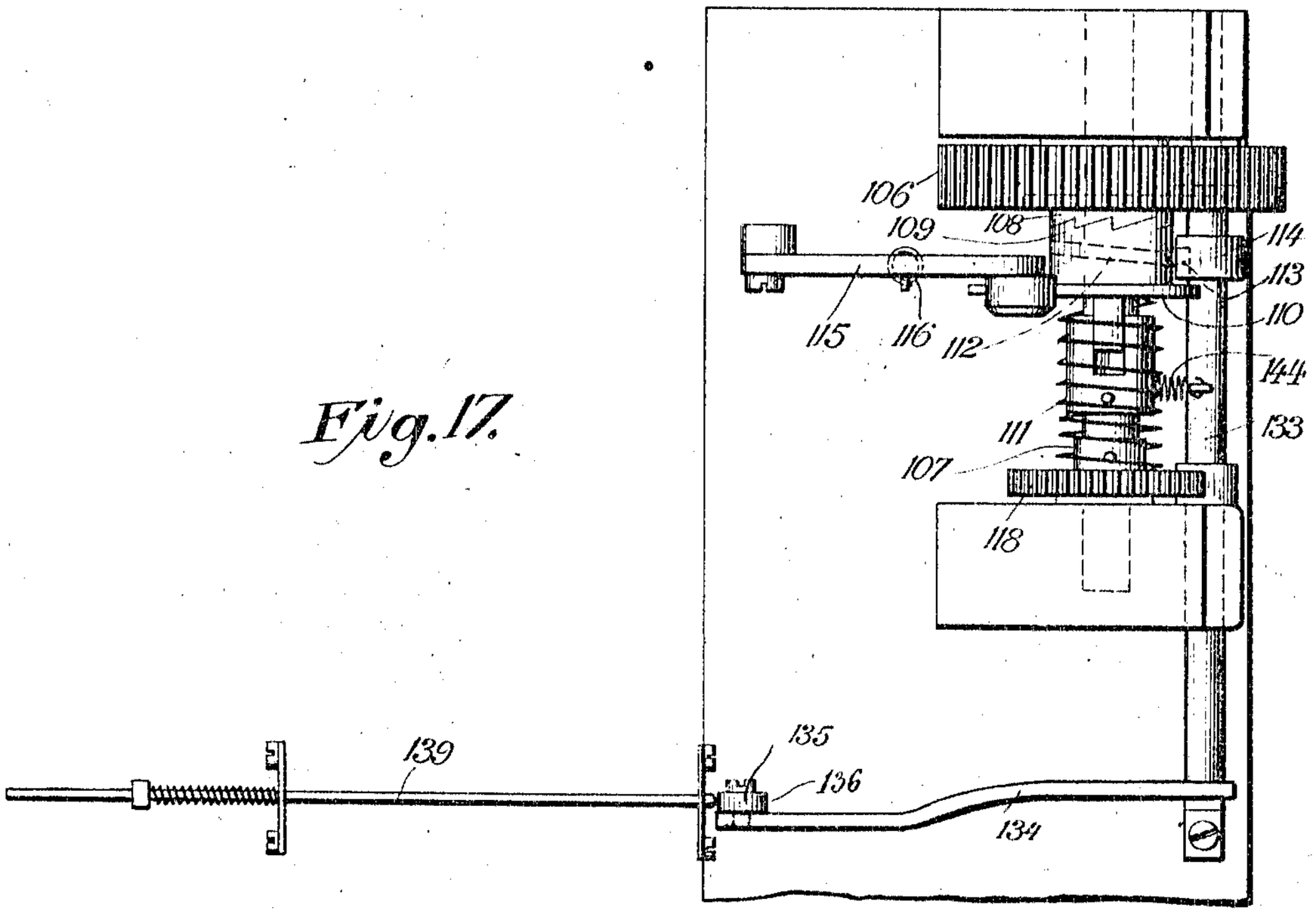
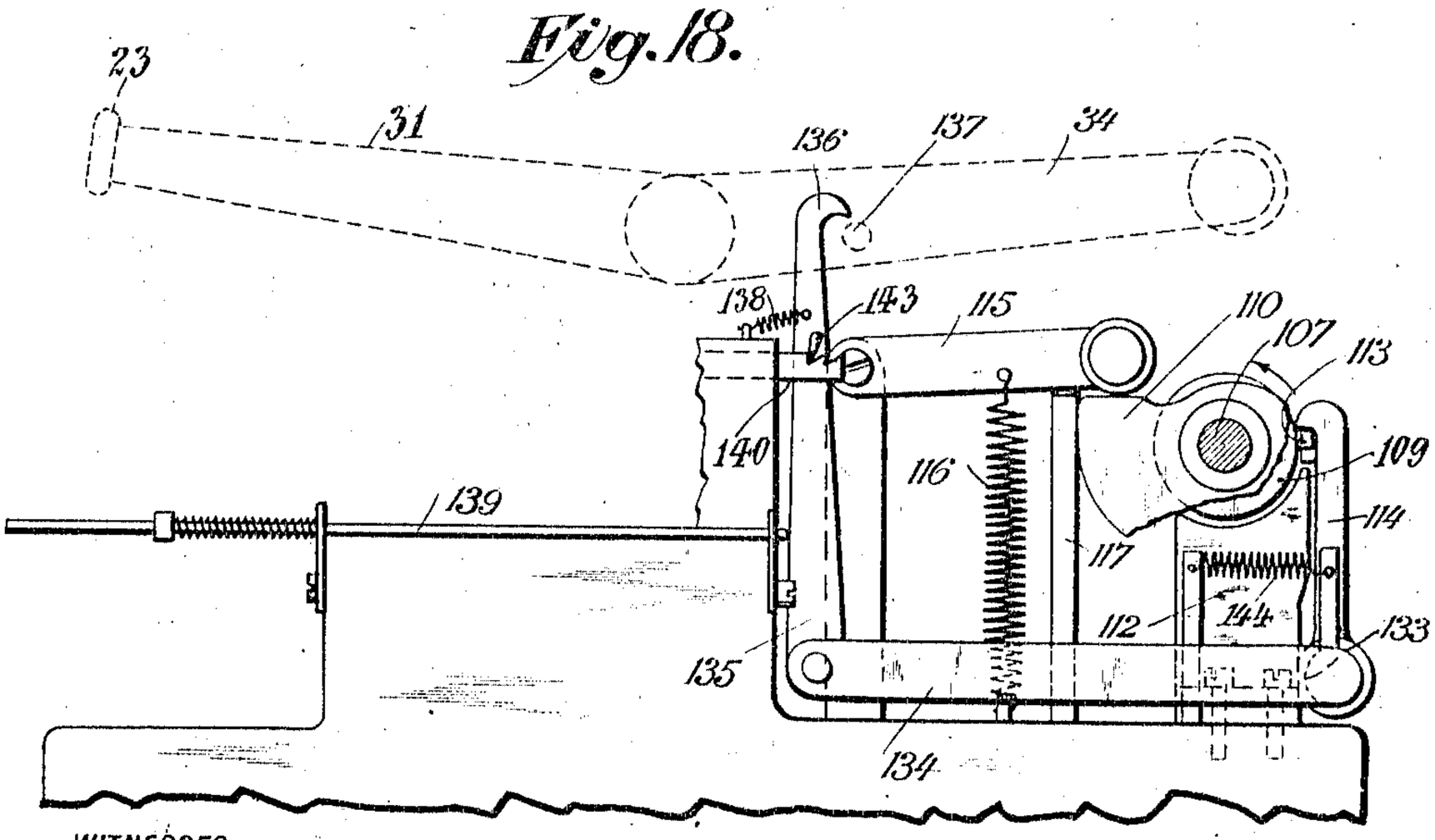


Fig. 18.



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UNITED STATES PATENT OFFICE.

DONALD MURRAY, OF LONDON, ENGLAND, ASSIGNOR TO THE WESTERN UNION TELEGRAPH COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

PRINTER FOR PRINTING-TELEGRAPH SYSTEMS.

1,114,904. Specification of Letters Patent. Patented Oct. 27, 1914.

Application filed April 16, 1913. Serial No. 761,464.

To all whom it may concern:

Be it known that I, DONALD MURRAY, a subject of the King of Great Britain, and residing at 3 Lombard court, in the county of London, England, have invented certain new and useful Improvements in Printers for Printing-Telegraph Systems, of which the following is a specification, reference being had to the accompanying drawings, which form a part hereof.

This invention relates to improvements in printers of the typewriter class, said improvements being primarily adapted and designed for use in printers forming part of a printing telegraph system.

The invention seeks to provide in such a printer mechanism which shall be simple and rugged in structure and rapid and reliable in action for performing the line feed operation, the carriage return operation and the operation of feeding to the printer the blanks which receive the printed messages.

In the embodiment of the invention shown in the drawings, the various mechanisms of the invention are almost wholly mechanical, thereby largely avoiding the delicateness of structure and operation which in general characterize electrical mechanisms heretofore employed to accomplish the paper feed movements in electrically controlled printers.

In the accompanying drawings forming part of this specification, and in which like reference numerals designate corresponding parts in the several figures, the invention is shown in its preferred form.

Figure 1 is a plan view showing the principal parts of the improved printer, the typewriter mechanism being removed. Fig. 2 is a rear elevation of the printer showing the platen of the typewriter in place. Fig. 3 is a sectional elevation on the line 3—3 of Fig. 1 the parts 25 and 92 being added. Fig. 4 is a detail in plan view showing one of the selecting magnets and its comb. Fig. 5 is a sectional elevation on line 5—5 of Fig. 2 and showing the devices for opening and closing the clutch on the cam shaft. Fig. 6 is a plan view of the clutch devices shown in Fig. 5. Fig. 7 is an end elevation of the line feed mechanism mounted on the typewriter carriage. Fig. 8 is a sectional view of the main driving shaft and the cord winding drum and clutch thereon. Fig. 9 is a detail in plan showing the controlling lever and associated devices for throwing the line feed and carriage return mechanisms into action. Fig. 10 is a side elevation of the forward end of this controlling lever. Fig. 11 is a sectional elevation on line 11—11 of Fig. 9. Fig. 12 is a side elevation of gear wheels mounted on the end of the typewriter carriage to connect the blank feed mechanism with the blank carrier or platen. Fig. 13 is a peripheral elevation of the rearmost of said gear wheels. Fig. 14 is a sectional elevation on line 14—14 of Fig. 1 and showing the controlling and operating devices for throwing into action the blank feed mechanism and in association with the selecting devices of the printer. Fig. 15 is a sectional elevation on line 15—15 of Fig. 2 and showing the blank feed mechanism. Fig. 16 is a detail of part of the top gear of this mechanism. Fig. 17 is a detached plan view showing the mechanism for controlling and driving the blank feed mechanism. Fig. 18 is a side elevation of the mechanism shown in Fig. 17.

Referring now to the drawings and first to Figs. 1 to 3 in particular, 1 is the base and frame of the selecting and printing mechanism of the printer. Secured to this frame are five selecting magnets 2, 3, 4, 5 and 6 having spring retracted armatures 7, 8, 9, 10 and 11 carrying pawls 12, 13, 15 and 16, the pawl of armature 9 not being shown. These pawls control five differentially slotted combs 17 arranged in a stack at the front of frame 1 and having lengthwise motion of about $\frac{1}{16}$ of an inch when released from their pawls. One of the selecting magnets and its associated parts are shown in detail in Fig. 4 wherein the armature is shown as normally retracted by a spring 18 against a back stop 19 and with its pawl engaging a notch in its comb 17. The other selecting magnets are similarly arranged and provided with retracting springs and back stops, as shown in Fig. 1. Directly forward of the combs and pivoted to the base is a series of crossbars 20 which are drawn toward the combs by springs 21. When one or more of the selecting magnets is energized by the current of a letter group signal, the

relative position of the combs is altered to select one of the crossbars 20 which thereupon moves into the coinciding slots of the combs to throw the corresponding hook 22 of the series of such hooks rearward and into the path of the descending striker bar 23. Hooks 22 hang in alinement with crossbars 20 and are connected at their upper ends with the keys of a typewriter or other printer which need not be shown fully.

Crossbars 20 are normally held away from the combs by a supporting bar 24 carried on rods 25 and 26 which are moved forward toward the crossbars by connecting arms 27 and 28 rigidly secured to the rock shaft 29. The striker bar 23 is carried by arms 30, 31 and 32 provided with collars which are loose on shaft 29 to permit the striker bar to oscillate up and down. The striker bar is moved up and down by lever 34 rigidly secured to the hub 33 of arm 31, lever 34 being moved upward by a cam 35 carried on the rotatable cam shaft 36 which is supported in bearing blocks 1^a and 1^b fixed on the main frame. A spring 37 connected to the main frame and to arm 34 pulls said arm downward and against its cam 35 and acts to return striker bar 23 to its upper position when such action is permitted by cam 35. Shaft 29 is rocked to move the supporting bar 24 forward against the crossbars by rocking lever 38 rigidly secured to shaft 29 and moved downward by cam 39 on the cam shaft. Springs 40 connected to the rearwardly extending ends of supporting bar 24 and to the main frame act to retract supporting bar 24 when such movement is permitted by cam 39. Only one of these springs 40 is shown for the sake of clearness. After the combs have been shifted in response to the selecting magnets, they are returned to normal position by a lever 41 to which movement is imparted by rod 42 connected with rocking frame 43 which is operated by rod 44 connected with an upright lever 45 pivoted on the main frame. This lever is moved rearward by cam 46 on cam shaft 36. Spring 47 secured to the main frame and to said lever 45 acts to pull this lever forward, when permitted by cam 46, to restore lever 41 to normal position.

In the operation of the parts thus far described, when one of the crossbars 20 moves rearward after having been selected by the combs, and moves the corresponding hook 22 rearward into the path of striker bar 23, the striker bar then descends and thereby pulls the hook downward to print the selected letter or character. Immediately after the striker bar has engaged the selected hook 22, supporting bar 24 moves forward to restore the selected crossbar to normal position. The combs are then restored to normal position by lever 41, ready to be set again in another letter permutation.

48 is a continuously driven shaft having a pulley 49 on one end connected with an electric or other suitable motor and having on its opposite end a gear 50 meshing with a gear 51 loose on cam shaft 36 and carrying clutch member 52 which meshes with clutch member 53 mounted on cam shaft 36 so as to turn with but slide on the shaft. Spring 54 tends to close the coupling 52, 53 and when the coupling is closed the cam shaft is driven from the pulley shaft 48. This coupling is closed during only one rotation thereof, owing to the action of a stationary cam 55 which is met by follower pin 56 fixed to the clutch member 53, thereby opening the coupling and causing said pin 56 to be caught and held by a detent 57. This detent is carried on shaft 58 to which the armature of printing magnet 59 is secured. The armature of the magnet is retracted and the detent is held in engagement with pin 56 by spring 60. Thus, when this magnet 59 attracts its armature cam shaft 36 is geared for one rotation with pulley shaft 48, after which the cam shaft is disconnected by the opening of the coupling 52, 53.

Resting upon the base 1 and rigidly secured thereto is the base 61 of a typewriter or other printing mechanism having a reciprocating carriage 62 carrying the rotating cylindrical blank carrier 63 by which the blanks are fed to the printing point. In the present instance, this blank carrier is intended also to perform the function of the platen. Carriage 62 is provided with any suitable mechanism, not shown, for imparting to it the usual letter feed movement.

The line feed mechanism with which the blank carrier 63 is provided is especially designed and constitutes a part of the present invention. It will now be described. Referring to Figs. 2 and 7, the blank carrier 63 is fixed on a spindle 64 mounted in bearings on the carriage of the printer in the usual manner. Rigidly fixed on one end of spindle 64 is an indented wheel 65. Close against this wheel 65 and loosely mounted on spindle 64 is a rocking pawl carrier 66 having projections 67 and 68 arranged to contact with pin 69 to limit the movement of the pawl carrier. A spring 70 secured at one end to the pawl carrier and at its opposite end to a bracket 71 on the carriage holds the pawl carrier normally with its projection 68 against pin 69. Pivotally mounted on the pawl carrier is a pawl 72 adapted to be rocked into engagement with an indentation of wheel 65 but normally held out of contact with said wheel by spring 73 connected with the pawl and the pawl carrier.

74 is a stop pin secured on the pawl carrier to limit the backward movement of the pawl.

75 is a jockey pivoted on a pin 76 mounted on the carriage. This jockey is held in firm contact against the indented wheel 65 by a spring 77. In the operation of this line feed mechanism, when the pawl 72 is pulled downward, it rocks into locking engagement with wheel 65, the pawl carrier 66 being, at the same time, rocked on spindle 64 against the pressure of its spring 70. A continued downward pull on the pawl rotates the wheel 65 and with it the blank carrier until projection 67 strikes the stop pin 69, at which time the blank carrier will have been carried forward in its travel the distance from one line to the next. Jockey 75 acts to prevent the blank carrier from traveling too far when it is actuated by a sudden vigorous pull on the pawl and pawl carrier. This line feed mechanism may be actuated by any suitable devices. In the present instance, a cord and drum actuated by the pulley shaft 48 is employed for this purpose. It is also preferred to employ the carriage return mechanism as the means for actuating the line feed mechanism. Accordingly, the same cord and drum, as shown in the drawings, for actuating the line feed mechanism is also employed for the carriage return operation.

Referring now to the carriage return mechanism, 78 is a drum loosely mounted on pulley shaft 48 and to which is secured one end of the cord 79 which passes over a stationary pulley 80, thence around a pulley 81 mounted on the carriage 62 and to pawl 72 of the line feed mechanism to which it is secured, see Figs. 2 and 7. The drum is arranged to be coupled and uncoupled with shaft 48 by means of a clutch having one member 82 fixed to the drum 78 and the other member 83 fixed to shaft 48. When the coupling 82, 83 is closed, drum 78 winds up the cord, thereby actuating the line feed mechanism and also returning the carriage and blank carrier to the position for beginning a new line. When the carriage reaches the end of this return movement or thereabout, a block 84 on the carriage comes in contact with a lever 85 which is thereby moved to open the coupling and disconnect the drum from shaft 48. This lever 85 is pivoted on the main frame and carries a pin provided with a friction roller 86 which works in a groove 87 in the drum (see Figs. 2 and 3). The coupling 82, 83 is normally held open by a detent 88 and is provided with a spring which operates to close the coupling when the detent is disengaged. This arrangement may be variously embodied. In the present instance, see Figs. 9 and 11, the detent 88 is arranged to engage a lug 89 on lever 85 and hold the lever over against the retractile pull of the spring 90 secured at one end to the base and at its other end to the lever 85. Detent 88 is held down by a spring 91 so that the detent may engage lug 89. Thus, when detent 88 is lifted out of engagement with lug 89, spring 90 shifts lever 85 so that the latter, by means of its roller 86, moves the drum 78 and clutch member 82 along shaft 48 to close the coupling. When the carriage on its return movement moves the lever 85 backward and thereby opens the coupling, detent 88 engages lug 89 to hold the lever over and thereby retain the clutch in open position.

The closing of the clutch is under the control of the selecting devices. When, therefore, the proper impulse or group of impulses energizes one or more of the selecting magnets, one of the crossbars 20 moves inward to exercise this control. In the arrangement shown in the drawings, the controlling device for the coupling 82, 83 is in the form of a lever 92 pivoted at 93 on top of magnet 2, see Figs. 3, 9 and 11. The forward end of this lever projects in close proximity to one of the crossbars 20 and the rear end projects beneath the free end of detent 88, the forward end of the lever being tilted up and normally held in this position by a spring 94. The forward end of lever 92 is provided with a sliding extension 95. It is secured to the lever 92 by means of pins 96 and 97 which pass through slots 98 and 99 in the extension, thereby permitting the extension to have longitudinal movement on the lever. The extension 95 is held forward by a spring 100, one end of which is secured to a pin on the lever and the other end of which is secured to a pin on the extension. The forward end of the extension is provided with a pin 101. When the proper crossbar moves inward, it pushes the extension 95 backward into the path of the striker bar 23 with the pin 101 back of the striker bar. When, now, the striker bar descends it engages extension 95 in advance of pin 101, tilting the bar downward and thereby lifting detent 88 from engagement with lug 89. During this downward movement of the striker bar pin 101 keeps extension 95 from sliding forward out of engagement with the striker bar. The clutch on the coupling 82, 83 thereupon closes in response to the action of spring 90 which shifts lever 85. When the striker bar moves to its upper position lever 92 returns to its initial position with its extension 95 thrust forward to its initial position. Detent 88 is thus released from lever 92 so that it is ready again to engage lug 89 when lever 85 is moved back to open coupling 82, 83 upon the return of the carriage.

Referring now to the blank feed mechanism, it is proposed to feed the blanks in the form of a web preferably constituted by lightly pasting together separate blank sheets so that the sheets after receiving the printed messages may be readily separated.

The web, however, may be formed in any suitable way desired. For the purpose of positively advancing the blanks with the blank carrier 63, the latter is preferably provided with a series of spaced peripheral pins 102 at each end thereof (see Fig. 2). These pins are designed to engage corresponding perforations in the margins of the blanks. The blank carrier is arranged to have a uniform length of travel from the beginning of one blank to the beginning of the next and the blanks are of uniform length, so that the beginning of each blank, when fed into the machine, may be brought accurately to the printing point. Messages vary in length and therefore contain a varying number of lines of typewriting. Hence, the length of travel of the blank carrier required to bring the beginning of a new blank to the printing point after the last line of the previous message has been completed will vary. The blank feed mechanism of the present invention takes account of this variation, but carries out its operation with despatch and accuracy, by an automatic compensation of the length of travel through which it actually propels the blank carrier. The instrumentalities that may be employed in carrying into effect this part of the invention may vary considerably, but those preferred are shown in the drawings. As herein shown, 103 is a shaft turning in bearings in bearing block 1^a and in the main frame, see Fig. 1, and having a gear 104 driven by gear 50 on shaft 48 and a gear 105 in mesh with a gear 106 loose on shaft 107 and carrying clutch member 108. Shaft 107 turns in bearings in bearing block 1^b and in the main frame and carries clutch member 109 on which is fixed snail cam 110, see Figs. 1, 2, 17 and 18. Clutch member 109 has sliding movement on shaft 107 but turns with the shaft. A spring 111 tends to move this clutch member into engagement with member 108 and thus close the coupling. This coupling, like coupling 52, 53 of cam shaft 36, is a single rotation coupling, its members being separated after one rotation by a stationary cam 112 acting on a follower pin 113 carried by clutch member 109. As the clutch member 109 completes its rotary movement follower pin 113 passes above cam 112 and from one side thereof to the other and into engagement with a trip 114 which catches the pin on its forward face to positively stop further rotary movement of shaft 107. Detent 114 also catches a side face of pin 113 and thereby holds the coupling open against the pressure of spring 111. For the purpose of throwing the clutch members entirely clear of each other when cam 112 is acting on pin 113, a pivoted arm 115 is employed. The free end of this arm is pressed downward on snail cam 110 by spring 116. As the cam rotates the arm is elevated to stretch spring 116 until the offset in the cam passes beneath the end of arm 115, whereupon spring 116 is suddenly released and propels the cam forward with a snap action to complete the separation of the coupling and bring pin 113 to rest against trip 114. Arm 115 comes to rest on its stop pin 117 and also acts to prevent any backward rotation of the cam and its shaft 107. Thus, shaft 107 and gear 118 fixed on it are positively held by arm 115 and trip 114 against false movement in either direction. This is important because the driving element 119 of the blank feed mechanism is thus positively prevented from making any false movement and is brought to rest at the proper point in its travel and is there held, as will presently more clearly appear. This driving element 119 is herein shown in the form of a gear wheel and is driven from gear 118 through two idle gears 120 and 121, all supported by bearing block 1^b. This driving element 119 is suitably provided with means whereby it is adapted to actuate the blank carrier 63 to produce the blank feed movement. As shown in the drawings, see Figs. 2, 15 and 16, these means comprise a stud 122, fixed on one side face of gear 119 near its periphery, and a latch 123 which reciprocates in a slot in a hub 124 on gear 119. This latch has its projecting end beveled and is provided with a slot 125 which works on the screw 125^a to limit the movement of the latch. A spring 126 normally holds the beveled end of the latch in forward position and near stud 122.

Fixed on the carriage at one end is a bracket 145 into which enters one end of the blank carrier spindle 64, see Figs. 2 and 12. Fixed on this spindle is a gear 127 in driving connection with gears 128 and 129 carried by bracket 145. Gear 129 carries on one of its faces near its periphery a stud 130. Gears 119 and 129 are so located that their sides bearing their respective studs face each other. Thus, at a suitable point in the transverse travel of carriage 62, gear 129 is brought in close proximity to gear 119 and stud 130 lies in the path of stud 122. When, thereupon, gear 119 rotates, its stud engages stud 130 and carries around gear 129 and the blank carrier till gear 119 stops. In the preferred arrangement, as shown in the drawings, the two studs are brought into the relative position described at the end of the carriage return movement, as indicated in Fig. 2, following which the blank feed mechanism begins its operation.

It will be seen that gear 119 has a uniform length of rotary travel when driven from shaft 107, owing to the opening of the coupling at the end of a single rotation, and this travel is limited to a single complete rotation of gear 119 by suitably proportioning gears 118, 120, 121 and 119. Hence, stud 122 always begins its travel from the same pre-

determined position and always terminates its travel in this same position. The web of blanks is initially positioned on the blank carrier so that the beginning of the first blank is at the printing point when stud 130 is locked between latch 123 and stud 122 and the blank feed clutch mechanism is in the locked position of rest. A complete rotation of gear 119 will, therefore, feed up a fresh blank so that the beginning of the blank is at the printing point for a new message. When the last line feed movement of the blank carrier has been made in the writing of a given message and the carriage has been returned to starting position for the beginning of a new line on a fresh blank, stud 130 on gear 129 may occupy any one of various angular positions, dependent upon the length of the message just completed. Consequently, when the blank feed mechanism operates to feed in new blanks stud 122 may travel through various distances before it engages stud 130, such distances varying in accordance with the angular position of stud 130. The blank feed travel of the blank carrier may be varied to suit the length of message blanks employed by changing the ratio of gears 129 and 127. But the blank carrier will be always brought back to the same starting position predetermined by the stopping position or limit of travel of stud 122, already described. It will be clear, therefore, that the driving element is arranged to actually propel the blank carrier through variable distances to the end of the blank carrier's travel at which time a new blank will have been fed to bring the beginning of the blank to the printing point.

Latch 123 acts to lock stud 130 against stud 122 so that gear 119 and the blank carrier move together and stop simultaneously. If stud 130 is ahead of stud 122 when gear 119 begins to turn, then when latch 123 meets stud 130 the latch slides back to permit stud 122 to engage stud 130 whereupon the latch springs outward to lock stud 130 in place. At the end of the blank feed movement the transverse letter feed movement of the carriage carries stud 130 laterally from the stud 122 and latch 123 on gear 119, which is ready to repeat its operation at the end of the next carriage return movement.

In the present embodiment of the invention the blank feed mechanism is controlled by the selecting devices, see Figs. 14, 17 and 18. For this purpose trip 114 is fixed on a rock shaft 133, a lever 134 being secured at one end to this shaft and at its other end to an arm 135 having a hook 136 at its upper end designed to be engaged by a pin 137 on lever 34. Arm 135 is normally held forward so that its hook is out of the path of pin 137, when lever 34 is working the striker bar in the printing operation, by a spring 138 and is pushed back to bring the hook into the path of the pin by a spring retracted rod 139 whose forward end extends in a position to be acted upon by one of the crossbars 20 when selected by the combs 17. When arm 135, which controls the coupling 108, 109, has been pushed back, as described, it is retained in its set position, until engaged by pin 137 by a notched lever 140, which is pressed upward by a spring 142 to engage with a pin 143 on arm 135. When lever 34 rises and engages arm 135, rock shaft 133 is actuated to disengage trip 114 from coupling 108, 109 and thereby set the blank feed mechanism in operation. This movement of lever 34 carries pin 143 upward and out of engagement with lever 140. Before this movement has taken place the crossbar and combs have been restored to normal position. When lever 34 moves downward, by the quick action of spring 37 when released by cam 35, pin 137 recedes from hook 136 and spring 138 pulls arm 136 to its forward position so as to be clear of pin 137 on the next upward movement of arm 34. Arm 135 is pulled down to its normal position and shaft 133 rocks trip 114 forward to engage pin 113 by the action of a spring 144 secured to a pin on shaft 133 and to a pin fixed on the main frame. Thus, the parts are restored to normal position.

While the various features of the invention are herein shown in what is believed to be their best form and arrangement, it will be understood that various changes in form and arrangement may be made without departing from the scope of the invention.

What I claim is:

1. In a printer, the combination with printing devices and selecting devices; a main shaft; a cam shaft driven from the main shaft and having connections for operating the printing devices; a carriage and blank carrier; an operative connection between the main shaft and carriage including a coupling to effect the carriage return; and a lever having a movable projection operable by the selecting devices to bring said lever into operative connection with the cam shaft and thereby cause the coupling to close.

2. In a printer, the combination with a carriage and blank carrier; of a rotating shaft; an operative connection between the shaft and carriage including a coupling tending to close to effect the carriage return; a detent to hold the coupling open; a tripping device to release the detent; and a lever in operative engagement with the coupling and arranged to be moved by the carriage on its return to open the coupling and restore it to the control of the detent.

3. In a printer, the combination with a carriage and blank carrier; of a continuously rotating shaft; a drum; a cord attached at one end to the drum and at its

other end to the carriage; means for operatively connecting said drum and shaft to wind up the cord and effect the carriage return, said means including a coupling tending to close to connect the drum and shaft, a detent to hold the coupling open, and a tripping device to release the detent; and a lever in operative engagement with the coupling and arranged to be moved by the carriage on its return to open the coupling and restore it to the control of the detent.

4. In a printer, the combination with printing devices, selecting devices, a striker bar and a carriage and blank carrier; of a continuously rotating shaft; an operative connection between the shaft and carriage including a coupling tending to close; a detent to hold the coupling open; and a tripping device to release the detent, comprising a lever having a movable projection operable by the selecting devices to bring said lever into operative connection with the striker bar.

5. In a printer, the combination with printing devices and a striker bar therefor, selecting devices and a carriage and blank carrier; of line feed mechanism mounted on and traveling with the carriage for actuating the blank carrier; a rotating shaft; an operative connection between the shaft and said line feed mechanism; and a lever controlled by the selecting devices and actuated by the striker bar for operatively connecting said shaft and line feed mechanism to operate the line feed mechanism and the carriage return.

6. In a printer, the combination with printing devices, selecting devices, a striker bar and a carriage and blank carrier; of line feed mechanism mounted on and traveling with the carriage; a rotating shaft; a connection between the shaft and line feed mechanism including a coupling tending to close; a detent to hold the coupling open; and a tripping device to release the detent comprising a lever having a movable projection operable by the selecting devices to bring said lever into operative connection with the striker bar, whereby the line feed mechanism and carriage return may be operated.

7. In a printer, the combination with printing devices, selecting devices and a blank carrier; of line feed mechanism mounted on and traveling with the carriage for actuating the blank carrier and including an operating pawl; a continuously rotating shaft; an operative connection between said shaft and operating pawl; and means controlled by the selecting devices for operatively connecting said shaft and operating pawl.

8. In a printer, the combination with a rotary blank carrier and its spindle; line feed mechanism including an indented wheel fixed on said spindle; a rocking pawl carrier and pawl to engage said indented wheel; and stopping means arranged to engage said pawl carrier and limit its movement in both directions.

9. In a printer, the combination with a rotary blank carrier and its spindle; line feed mechanism including an indented wheel fixed on said spindle; a rocking pawl carrier mounted on said spindle; and a pawl mounted on the pawl carrier to engage said indented wheel and provided with a spring connecting it and the pawl carrier, said spring normally maintaining the pawl out of engagement with said indented wheel.

10. In a printer, the combination with a rotary blank carrier and its spindle; line feed mechanism including an indented wheel fixed on said spindle; a rocking pawl carrier mounted on said spindle; stopping means arranged to engage the pawl carrier and limit its movement in both directions; a spring to hold the pawl carrier normally in retracted position; and a pawl mounted on the pawl carrier to engage said indented wheel and provided with a spring connecting it and the pawl carrier, said spring normally maintaining the pawl out of engagement with said indented wheel.

11. In a printer, the combination with a rotary blank carrier and its spindle; line feed mehanism including an indented wheel fixed on said spindle; a rocking pawl carrier mounted on said spindle; stopping means arranged to engage the pawl carrier and limit its movement in both directions; a spring to hold the pawl carrier normally in retracted position; a pawl mounted on the pawl carrier to engage said indented wheel and provided with a spring connecting it and the pawl carrier, said spring normally maintaining the pawl out of engagement with said indented wheel; an operating cord connected with said pawl; and a drum for winding the cord.

12. In a printer, the combination with a blank carrier having a uniform length of travel from the beginning of one blank to the beginning of the next; of line feed mechanism; and blank feed mechanism separate from the line feed mechanism and including a driving element having a uniform limited operation arranged to propel the blank carrier through variable distances to the end of the travel of the blank carrier.

13. In a printer, the combination with a blank carrier having a uniform length of travel from the beginning of one blank to the beginning of the next; of blank feed mechanism including a driving element arranged to propel the blank carrier through variable distances to the end of its travel; a shaft; and means for operatively connecting the shaft with said driving element

through a single rotation of said driving element for each blank feed operation thereof.

14. In a printer, the combination with a blank carrier having a uniform length of travel from the beginning of one blank to the beginning of the next; of blank feed mechanism including a driving element arranged to propel the blank carrier through variable distances to the end of its travel; a continuously rotating shaft; and intermediate connections between the shaft and driving element including a single rotation clutch whereby the driving element is given a uniform limited operation.

15. In a printer, the combination with a rotary blank carrier having also a transverse letter feed travel and return; of blank feed mechanism including a driving element having a uniform limited operation arranged to engage the blank carrier at a definite point in its transverse travel and at a variable point in its circumferential travel and rotate it to the end of its circumferential travel.

16. In a printer, the combination with a rotary blank carrier having also a transverse letter feed travel and return; of blank feed mechanism including a driving wheel arranged to engage the blank carrier at a definite point in its transverse travel and at a variable point in its circumferential travel and rotate it to the end of its circumferential travel; a shaft; and means for operatively connecting the shaft with said driving wheel through a single rotation of said wheel for each blank feed operation thereof.

17. In a printer, the combination with a blank carrier having a uniform length of travel from the beginning of one blank to the beginning of the next and also having a transverse letter feed travel and return; of blank feed mechanism having a uniform limited operation arranged to propel the blank carrier through variable distances to the end of its travel, said blank feed mechanism including a stationary driving element having a uniform limited operation and a driven element mounted to move transversely with the blank carrier.

18. In a printer, the combination with a blank carrier having a uniform length of travel from the beginning of one blank to the beginning of the next and also having a transverse letter feed travel and return; of line feed mechanism; and blank feed mechanism having a uniform limited operation arranged to propel the blank carrier through variable distances to the end of its blank feed travel; said blank feed mechanism being separate from the line feed mechanism and including a stationary driving gear wheel and a gear wheel mounted to move transversely with the blank carrier.

19. In a printer, the combination with a rotary blank carrier having also a transverse letter feed travel and return; of blank feed mechanism including a driving wheel arranged to engage the blank carrier at a definite point in its transverse travel and at a variable point in its circumferential travel and rotate it to the end of its circumferential travel; a rotating shaft; intermediate connections between the shaft and the driving wheel including a coupling tending to close, a trip to hold the coupling open and a cam and follower to open the coupling and restore it to the control of its detent.

20. In a printer, the combination with printing devices, selecting devices and a blank carrier having a uniform length of travel from the beginning of one blank to the beginning of the next; of line feed mechanism; and blank feed mechanism separate from the line feed mechanism and including a driving element having a uniform limited operation arranged to propel the blank carrier through variable distances to the end of its travel and controlled by the selecting devices.

21. In a printer, the combination with printing devices, selecting devices and a blank carrier; of blank feed mechanism for actuating the blank carrier; a shaft; a coupling for operatively connecting said shaft and blank feed mechanism; mechanical means for closing said coupling controlled by the selecting devices; and means for automatically opening the coupling at the end of a single rotation of said shaft.

22. In a printer, the combination with printing devices, selecting devices and a blank carrier; of line feed mechanism; blank feed mechanism separate from the line feed mechanism for actuating the blank carrier; a shaft; a coupling for operatively connecting said shaft and blank feed mechanism; and mechanical means for operating and controlling said coupling including a coupling controlling device adapted to be set by the selecting devices and temporarily retain its set position, and means for moving said controlling device, when set, to close the coupling.

23. In a printer, the combination with printing devices, selecting devices and a blank carrier; of blank feed mechanism for actuating the blank carrier; a shaft; a coupling tending to connect said shaft and blank feed mechanism; a trip to hold the coupling open; and means for operating the trip to close and open the coupling including a controlling device arranged to control the starting and stopping of the blank feed mechanism through said coupling and trip and adapted to be set by the selecting devices and means for moving said controlling device, when set, to release the trip and for thereafter releasing the controlling device to restore the trip and open the coupling.

24. In a printer, the combination with printing devices, selecting devices and a blank carrier; of blank feed mechanism for actuating the blank carrier; and means for operating and controlling the blank feed mechanism including a controlling device arranged to control the starting and stopping of the blank feed mechanism and adapted to be set by the selecting devices and temporarily retain its set position and means for moving said controlling device, when set, to cause the blank feed mechanism to operate and for thereafter releasing the controlling device to stop the blank feed mechanism.

25. In a printer, the combination with printing devices, selecting devices and a blank carrier; of blank feed mechanism for actuating the blank carrier; and means for operating the blank feed mechanism including a controlling device arranged to control the starting and stopping of the blank feed mechanism and adapted to be set by the selecting devices and temporarily retain its set position; a lever for moving the controlling device, when set to cause the blank feed mechanism to operate and thereafter release the controlling device to stop the blank feed mechanism; and a cam shaft for operating said lever, said cam shaft having connections whereby it also operates the printing devices.

26. In a printer, the combination with a carriage and a rotary blank carrier; blank feed mechanism adapted to rotate the blank carrier only at a definite point in its transverse travel; and means operating to move the carriage transversely to a position for the operative engagement of the blank carrier by the blank feed mechanism.

27. In a printer, the combination with a carriage and a rotary blank carrier having a transverse letter feed travel; of blank feed mechanism adapted to rotate the blank carrier only at a definite point in its transverse travel; and carriage return means operating to move the carriage transversely to a position for the operative engagement of the blank carrier by the blank feed mechanism.

28. In a printer, the combination with a carriage and a rotary blank carrier having a transverse letter feed travel; of blank feed mechanism adapted to rotate the blank carrier; and carriage return means operating to move the carriage transversely to a position for the operative engagement of the blank carrier by the blank feed mechanism, said means including a drum and cord connected with the carriage and an operating shaft therefor.

29. In a printer, the combination with printing devices, selecting devices, a carriage and a rotary blank carrier; of blank feed mechanism controlled by said selecting devices and adapted to rotate the blank carrier only at a definite point in its transverse travel; and means operating to move the carriage transversely to a position for the operative engagement of the blank carrier by the blank feed mechanism.

30. In a printer, the combination with printing devices, selecting devices, a carriage and a rotary blank carrier having a transverse letter feed travel; of blank feed mechanism controlled by said selecting devices and adapted to rotate the blank carrier only at a definite point in its transverse travel; and carriage return means controlled by said selecting devices and operating to move the carriage transversely to a position for the operative engagement of the blank carrier by the blank feed mechanism.

31. In a printer, the combination with printing devices, selecting devices, a carriage and a rotary blank carrier having a transverse letter feed travel; of blank feed mechanism adapted to rotate the blank carrier only at a definite point in its transverse travel; and carriage return means operating to move the carriage transversely to a position for the operative engagement of the blank carrier by the blank feed mechanism, said means including a shaft and connections between the shaft and carriage controlled by the selecting devices.

32. In a printer, the combination with printing devices, selecting devices and a carriage and rotary blank carrier having a transverse letter feed travel; of a shaft; carriage return means and line feed mechanism operated from said shaft and controlled by the selecting devices; and blank feed mechanism separate from the line feed mechanism operated from said shaft and controlled by the selecting devices.

33. In a printer, the combination with printing devices, selecting devices and a carriage and rotary blank carrier having a transverse letter feed travel; of a continuously rotating main shaft; carriage return means and line feed mechanism including a coupling between said shaft and carriage controlled by the selecting devices; blank feed mechanism separate from the line feed mechanism having a connection with said main shaft including a coupling controlled by the selecting devices; and a cam shaft and devices actuated thereby for operating both of said couplings and the printing devices and for restoring the selecting devices.

34. In a printer, the combination with printing devices, selecting devices and a carriage; of a lever controlling the carriage return having a movable attachment; a member adapted to be operated by the selecting devices and by said operation acting to engage and thereby move said attachment; and means to engage said attachment when

so moved to actuate the lever, and thereby throw into action the carriage return mechanism.

35. In a printer, the combination with printing devices, selecting devices, a striker bar and a carriage; of a lever controlling the carriage return having a sliding spring returned extension; and a member operated by the selecting devices to move said extension into the path of the striker bar to allow the latter to actuate the lever.

This specification signed and witnessed this 28 day of March, 1913.

DONALD MURRAY.

Signed in the presence of—
O. J. WORTH,
H. D. JAMESON.