

July 9, 1935.

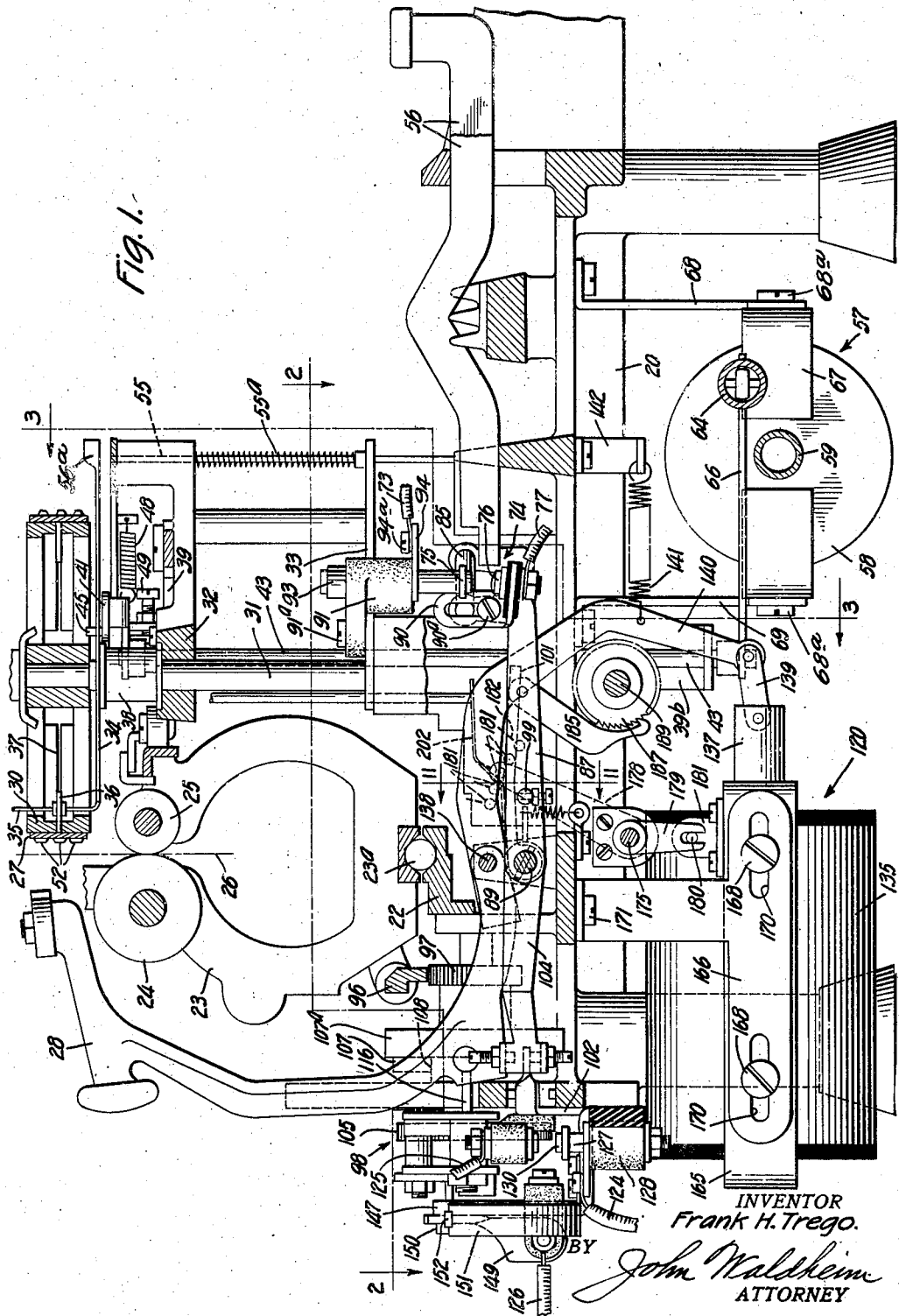
F. H. TREGO

2,007,227

PRINTING INSTRUMENTALITY FOR TYPEWRITING MACHINES

Filed Nov. 15, 1930

6 Sheets-Sheet 1



July 9, 1935.

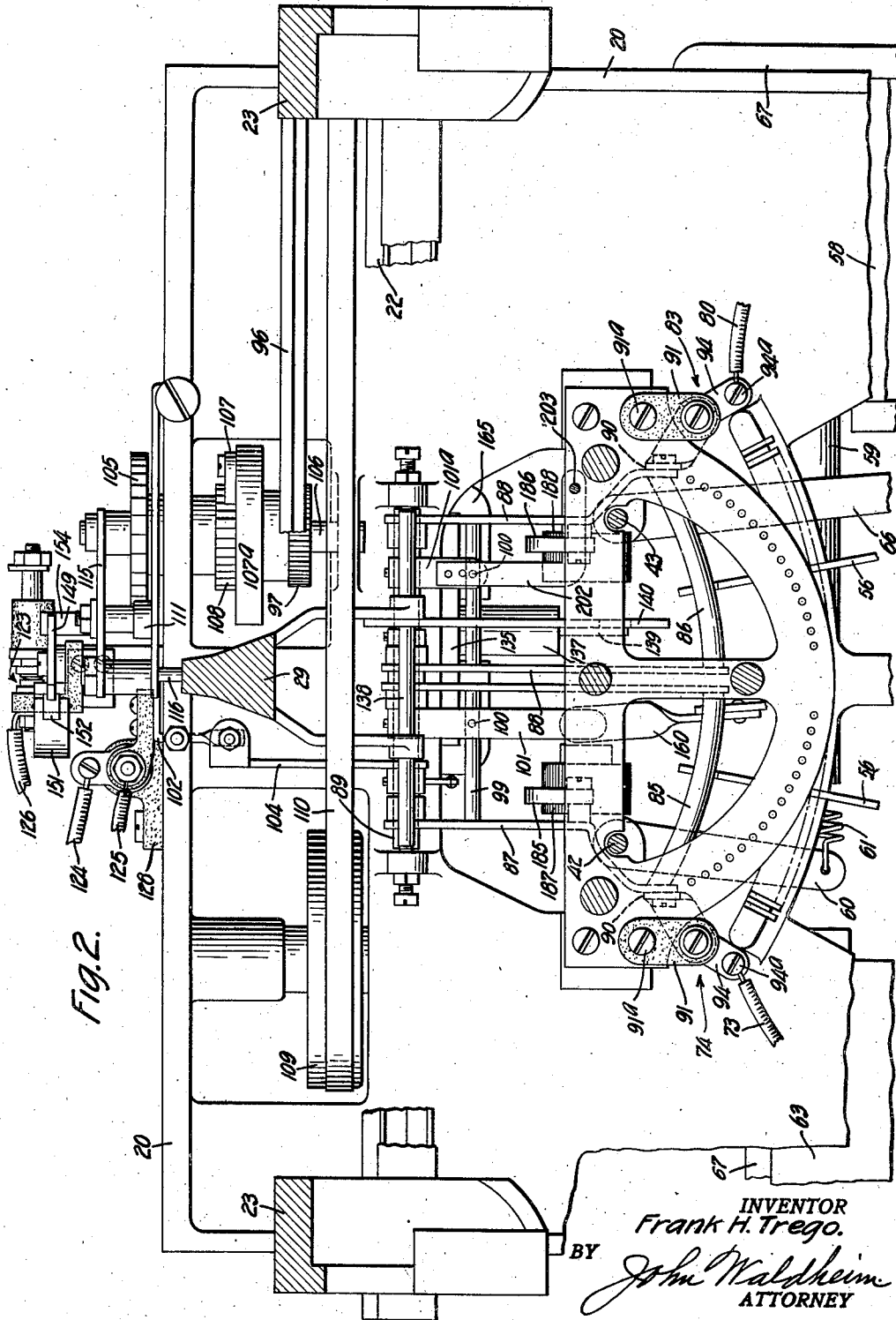
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PRINTING INSTRUMENTALITY FOR TYPEWRITING MACHINES

Filed Nov. 15, 1930

6 Sheets-Sheet 2



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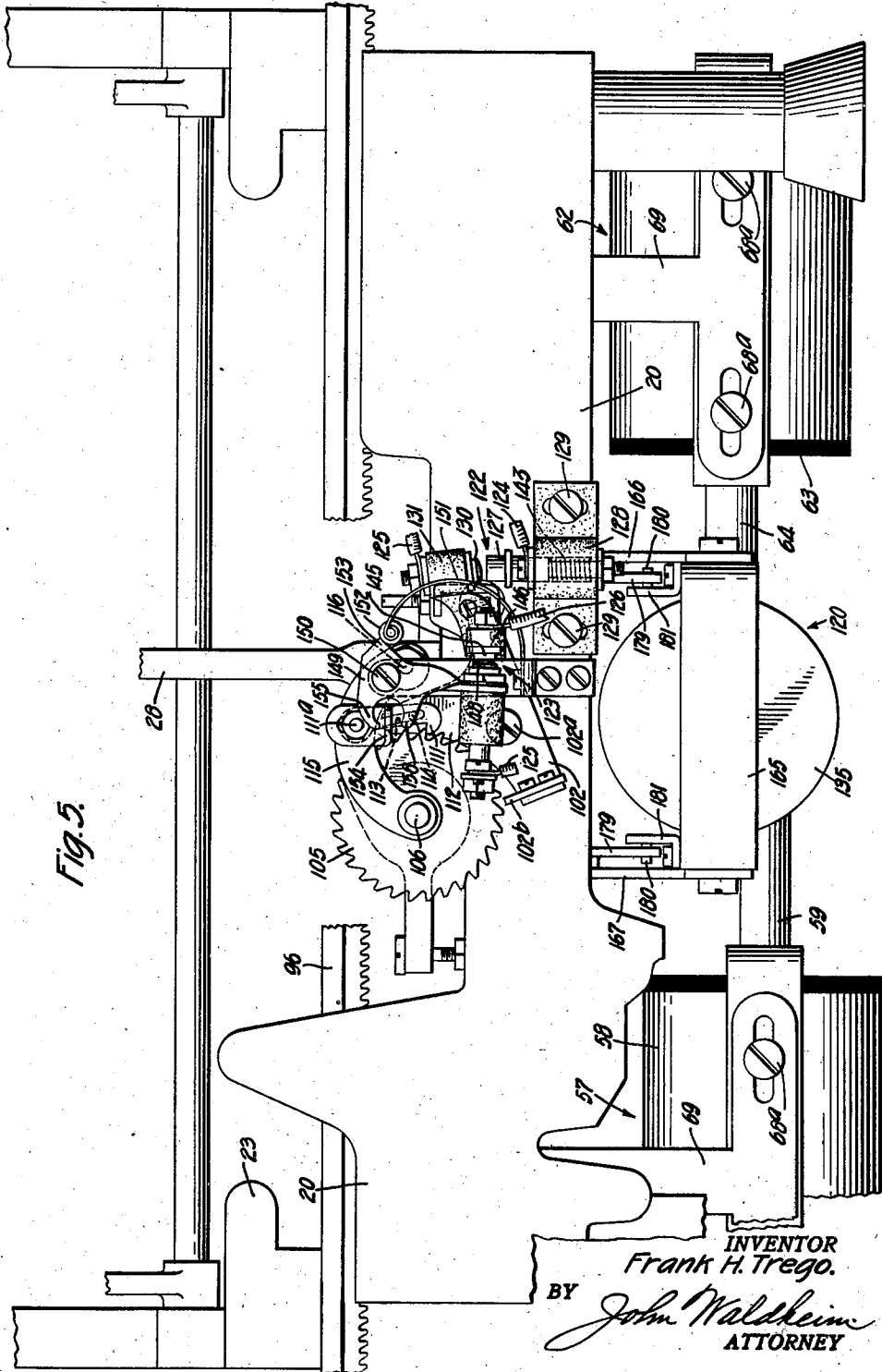
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PRINTING INSTRUMENTALITY FOR TYPEWRITING MACHINES

Filed Nov. 15, 1930

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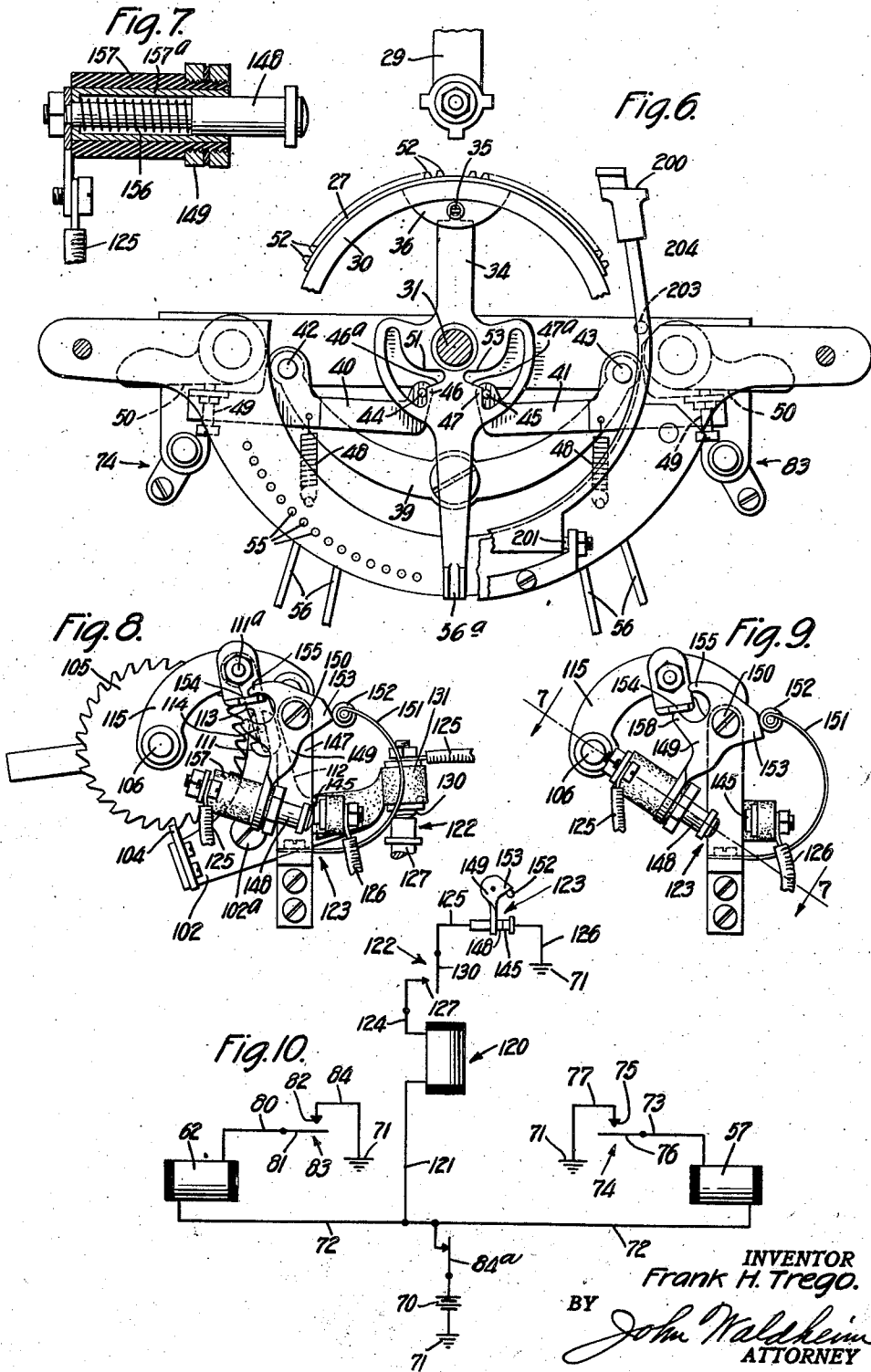
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PRINTING INSTRUMENTALITY FOR TYPEWRITING MACHINES

Filed Nov. 15, 1930

6 Sheets-Sheet 5



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PRINTING INSTRUMENTALITY FOR TYPEWRITING MACHINES

Filed Nov. 15, 1930

6 Sheets-Sheet 6

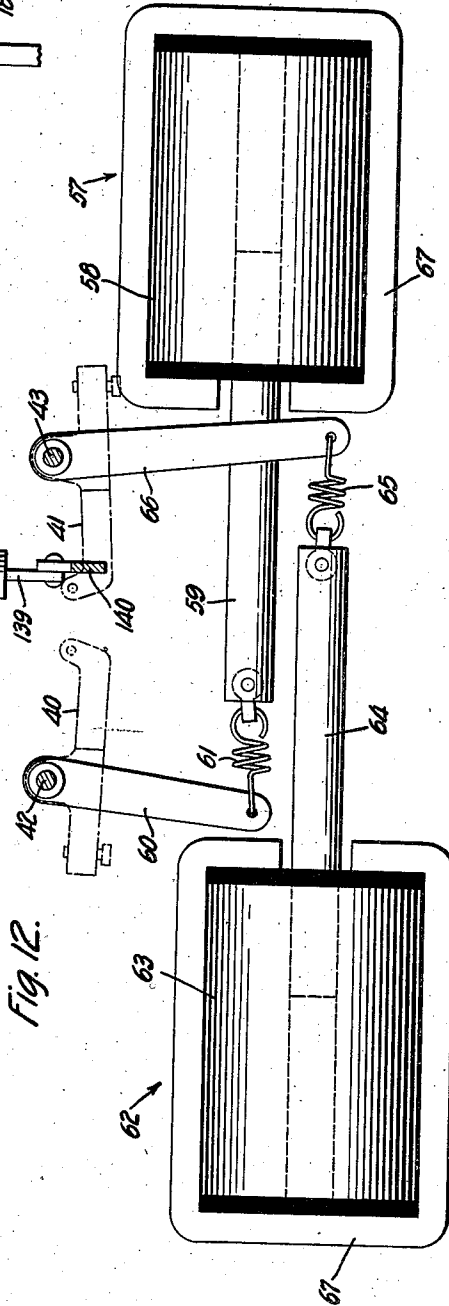
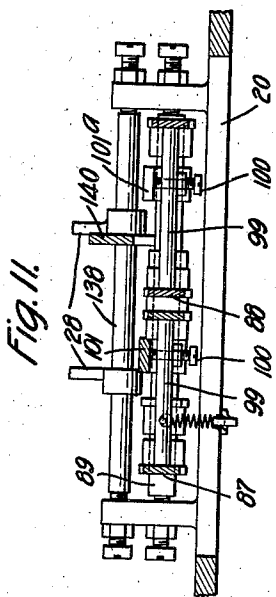
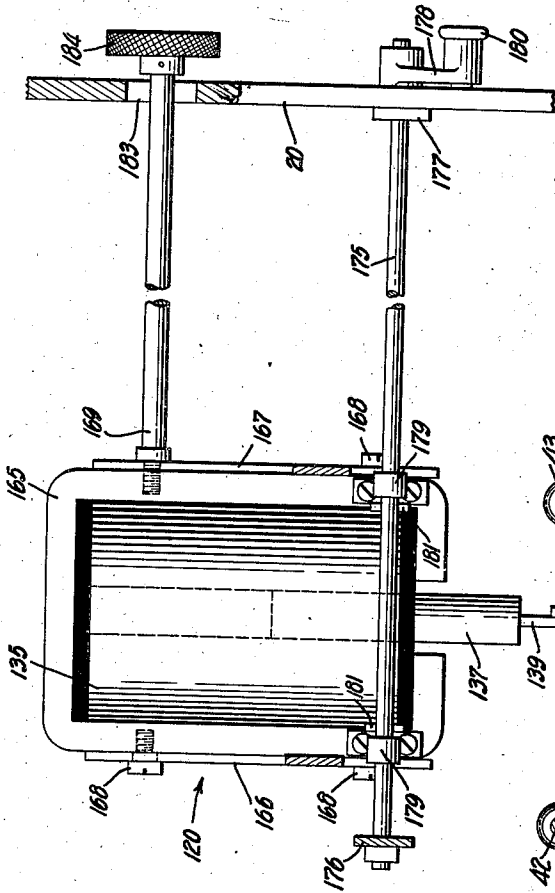


Fig. 11.

Fig. 12.

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2,007,227

PRINTING INSTRUMENTALITY FOR TYPEWRITING MACHINES

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mesne assignments, to Ralph C. Coxhead Cor-
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Delaware

Application November 15, 1930, Serial No. 495,872

27 Claims. (Cl. 197—49)

This invention relates to typewriting machines and more particularly to improvements in printing instrumentalities therefor.

The invention is shown as applied to the machine known as the Varityper in which there is provided a type shuttle which may be rotated through various angular distances, by the key-levers, to select the desired type subsequent to which a hammer is operated to strike against the shuttle to print on a work-sheet disposed between the shuttle and the hammer.

An object of the present invention is to facilitate the operation of the printing instrumentalities and to ease the touch on the keys of the key-levers to thus expedite the operation of the machine.

A feature of the invention relates to means including a pair of electro-magnets or solenoids to actuate the type shuttle; the key-levers being divided into two sets, one set at each side of the middle of the machine, and each set having associated therewith a universal bar to be actuated by any one of the key-levers of the associated set to close a switch in an electric circuit, including a source of power and the solenoid, to energize the latter. Upon the energization of the solenoid the plunger thereof is sucked thereinto and this motion is imparted, through suitable means connected with the plunger, to actuate the shuttle in one direction against the action of a return spring. The other set of key-levers has associated therewith similar devices, including a universal bar and a switch whereby the other solenoid may be energized to actuate the type shuttle in the opposite direction.

The usual indexing devices or stops which are operable by the key-lever are used to accurately position the type-shuttle with the selected types at the printing point.

Another feature of the invention relates to means including an electro-magnet or solenoid to actuate the printing hammer and a spring to cock said hammer.

Another feature of the invention relates to means operable by either universal bar to close a normally open switch in a circuit including the source of power and the hammer solenoid to energize the latter to effect the printing.

A further feature of the invention relates to means whereby a normally closed switch in the circuit of the hammer solenoid may be opened after printing to deenergize the solenoid so as to permit the cocking of the hammer, independently of the key levers, for a subsequent operation. To this end resilient means in the form

of a detent is provided to hold the switch closed; the operation of the switch, to open it, being initiated by the hammer, and the completion of its actuation being effected by the detent.

Still another feature of the invention relates to means for altering the position of the coil of the solenoid relatively to its plunger to thus vary the blow of the hammer against the type shuttle in accordance with the requirements in manifolding, or to compensate for various sizes of types, as pointed out in my application, Serial No. 399,732, filed October 15, 1929, now Patent 1,918,300, July 18, 1933.

Other features and advantages will hereinafter appear.

In the drawings which form part of the specification.

Fig. 1 is a sectional side view of the machine;

Fig. 2 is a sectional top plan view of the machine taken on the line 2—2 of Fig. 1;

Fig. 3 is a sectional front view taken on the line 3—3 of Fig. 1;

Fig. 4 is a detail sectional view of a portion of the switch associated with the shuttle operating electro-magnet or solenoid;

Fig. 5 is a rear view of the machine.

Fig. 6 is a top plan view of part of the type shuttle operating means;

Fig. 7 is a detail sectional view taken on the line 7—7 of Fig. 9;

Fig. 8 is a rear view of the escapement mechanism showing it completely operated, before its return to normal and the switch of the hammer circuit about to be opened;

Fig. 9 is a view similar to Fig. 8 but showing the switch opened;

Fig. 10 is a diagram of the electric circuit;

Fig. 11 is a detail sectional view taken on the line 11—11 of Fig. 1; and

Fig. 12 is a top plan view showing the solenoids for operating the shuttle and the solenoid which actuates the hammer.

Similar reference characters represent similar parts throughout the several views.

The machine includes a main frame 20 provided with tracks 22 upon which is supported a carriage 23 to travel back and forth through the medium of anti-friction balls or rollers 23^a. The carriage is provided with feed rollers 24 and 25 by which a work-sheet 26 may be fed upwardly between a type carrier or shuttle 27 and a hammer 28, the latter being located behind the work-sheet.

The type shuttle 27 is located in front of the work sheet and is supported on an anvil 30 se-

cured to a shaft 31 suitably supported by a cross-bar 32 and a plate 33 on the main frame. The shuttle 27 is actuated by a lever 34 connected thereto by an upwardly extending finger 35 engaging a fin 36 of the shuttle, which fin extends through a slot 37, in the anvil 30, the fin serving also to support the shuttle on the anvil.

The shuttle actuating lever 34 is secured to a sleeve 38 rotatably supported on the shaft 31 and bearing on the cross-bar 32. Said lever may be actuated clockwise and counter clockwise (Fig. 6) from a central position, by means including levers 40 and 41, respectively, secured to the upper ends of vertically disposed rock-shafts 42 and 43 supported at their upper ends by a fixed bracket 39 and at their lower ends by fixed brackets 39^a and 39^b (Figs. 1 and 3); said shafts being actuated by means hereinafter described. The shuttle actuating lever 34 is normally locked in its central position (Fig. 6) by pins 44 and 45, on the levers 40 and 41, which engage shoulders 46 and 47, respectively, of said actuating lever. Springs 48 hold the levers 40 and 41 in their normal positions where they are arrested by adjustable stops 49 abutting against fixed lugs 50.

As the rock shaft 42 is actuated, in a counter clockwise direction (Fig. 6), the pin 44 moves away from the shoulder 46, on the shuttle lever 34, and against a cam 51 to actuate said shuttle lever, in a clockwise direction about the shaft 31, to thus actuate the type shuttle 27 to carry the selected one of the types 52 to the printing point.

When the lever 40 returns to normal the pin 44 engages the face 46^a of the shoulder 46 to swing the lever 34 back to normal. It will be understood that when the lever 41 is actuated the pin 45 engages a cam 53 to actuate the shuttle lever 34 in a counterclockwise direction to select one of the types to the right of the shuttle; said pin engaging the surface 47^a of the shoulder 47 to return the shuttle lever 34.

To accurately register the selected types at the printing point indexing devices or stops 55 are provided, one associated with each key-lever 56, and actuatable thereby, against the action of return springs 55^a, to project the upper ends into the path of an arm 56^a of the shuttle actuating lever 34.

The rock shaft 42 is actuated by a solenoid 57 comprising a sucking coil 58 and a plunger 59; the coil 58 when energized drawing the plunger 59 thereinto to actuate an arm 60, secured to shaft 42, through the medium of a spring 61. The shaft is thus rotated in a counterclockwise direction (Figs. 6 and 12) to effect the actuation of the shuttle actuating arm 34 as previously described. The other rock shaft 43 is actuatable similarly by a solenoid 62 comprising a coil 63 and a plunger 64, the latter being connected, through the medium of a spring 65, to an arm 66 secured to the lower end of the shaft 43. It will be understood that the springs 61 and 65 are provided to eliminate the shock, which would be otherwise occasioned, of the shuttle actuating lever against the stops 55. Each of the solenoids 57 and 62 is provided with a frame 67 of soft iron suitably secured thereto and forming a path for the magnetic flux, and each solenoid is supported by screws 68^a on brackets 68 and 69 secured to the main frame 20.

The solenoid 57 is connected in an electric circuit including a source of energy 70 (Fig. 10) connected to a ground 71 and a conductor 72 which is connected to the solenoid 57. A conductor 73 extends from the solenoid 57 to a normally open

switch 74 comprising a fixed contact 75 and a movable contact 76, the latter being connected by a conductor 77 to the ground 71. The conductor 72 is also connected to the solenoid 62, the latter being connectible to ground 71 by a conductor 80, contacts 81 and 82 of a switch 83 and a conductor 84 extending from the contact 82 to the ground 71. A main switch 84^a is provided for connecting the machine with source of energy 70. Thus it will be understood that by closing either of the switches 74 and 83 the associated solenoid 57 or 62 is energized to operate the rock shaft 42 or 43 and thereby actuate the type shuttle 27 either clockwise or counterclockwise (Fig. 6) from its central position as previously described.

The key levers 56 are divided into two sets, one set at each side of the middle of the machine; said sets having associated therewith universal bars 85 and 86, respectively, said universal bars forming portions of frames 87 and 88 supported for independent movement on a shaft 89 when actuated by the rear ends of the key-levers.

The movable contact 76 of the switch 74 is supported on a bracket 90 (Figs. 1 and 3) and is insulated therefrom, said bracket being adjustably secured to the frame 87 by a screw 90^a. As the frame 87 is actuated, by the key levers, the contact 76 is carried upwardly therewith into engagement with the contact 75 of the switch, thus closing the latter to effect the energization of the solenoid 57 to actuate the type shuttle until it is arrested by the lever 34 contacting with the operated indexing pin or stop 55.

From the foregoing it will be understood that the universal bar 85 is to the left of the machine and that it is operable, by any one of the set of key levers to the left of the middle of the machine, to close the switch 74 to effect the energization of the solenoid 57 whereby the type shuttle is actuated in a clockwise direction (Fig. 6).

When any one of the right-hand set of key-levers is operated the universal bar 86 is actuated thereby to close the switch 83 to effect the energization of the solenoid 62 and thus actuate the type shuttle in a counterclockwise direction.

The contacts 75 and 81 of the switches 74 and 83 are each supported in a block 91 of insulating material secured to the frame of the machine (Figs. 1 and 4) by screws 91^a.

The universal bars 85 and 86 are actuated still further after their respective switches 74 and 83 are closed, and the shuttle actuated accordingly to effect actuation of the carriage escapement and the actuation of the hammer 28 in a manner hereinafter described. To permit this further movement of the universal bars the contact elements 75 and 81, of the switches 74 and 83, are each movable against the action of a spring 92 (Fig. 4) contained within a housing 93 which fits tightly into the block 91. A terminal 94 is secured to the housing 93 to which the conductor 73 or 80 may be attached by a screw 94^a.

The carriage 23 is connected by the usual rack 96 with a pinion 97 of the carriage escapement 98 which is actuatable by either of the universal bars 85 and 86. To this end the frames 87 and 88 of the universal bars (Figs. 1, 2 and 11) have each a cross-bar 99 provided with a set screw 100; the screws 100 engaging arms 101 and 101^a secured to the shaft 89 to rock the latter. Said shaft 89 has secured thereto a rearwardly extending arm 104 which, when actuated, operates a dog-rocker 102 about its pivot 102^a (Fig. 5) to carry a fixed dog 102^b into the path of an escapement wheel 105 supported on the shaft 106, the

escapement wheel having the usual one-way driving connection (Fig. 2) including a spring-pressed pawl 107, on a disk 107^a rotatably supported on the shaft 106; the pawl 107 engaging a ratchet 108 secured to the escapement shaft 106; the carriage being urged leftward in Fig. 2 by the spring drum 109 which is connected to the carriage 23 by the strap 110; the action of said spring drum tending to rotate the escapement wheel, upper and leftwardly (Fig. 2) through medium of the pawl 107 and ratchet 108.

After the dog 102^b has entered the path of the teeth of the escapement wheel a loose dog 111 is swung about its pivot 111^a, out of engagement with said escapement wheel, by an arm 112 having a slot 113 into which extends a pin 114 from said loose dog. Upon the release of the loose dog, from the escapement wheel, it is carried upwardly by a frame 115 pivotally supported on the escapement shaft 106, said frame being actuated by the printing hammer through the connecting pin 116, the hammer being operated in a manner hereinafter described. The pawl 111, after it is carried upwardly, is swung into the path of the next adjacent tooth of the escapement wheel by the return movement of the dog rocker 102. Upon the rotation of the escapement wheel, subsequent to its release from the dog 102^b, the loose dog returns to normal, thus completing a letter feeding movement of the carriage.

The means to actuate the printing hammer 28 includes a solenoid 120 (Fig. 1) which is connected with the source of power 71 (Fig. 10) by a conductor 121 and the conductor 72; the solenoid 120 being also connected in series with a normally open switch 122 and a normally closed switch 123 by conductors 124 and 125, respectively; the switch 123 being connected to the ground 71 by a conductor 126.

The switch 122 includes a relatively fixed contact 127 supported in a block 128 of insulating material adjustably secured (see Fig. 5) to the main-frame 20 by screws 129. The switch 122 further includes a contact 130 supported in a block 131 of insulating material secured to the dog rocker 102 so that when the latter is actuated as previously described the contact 130 is carried downwardly against the contact 127 to close the circuit in which the coil 135 of the solenoid 120 is connected to energize the latter. Upon the energization of the coil 135 a plunger 137 is sucked thereinto to swing the hammer 28 about its fulcrum 138 (Fig. 1); the plunger 137 being connected by a link 139 to an arm 140 secured to the hammer 28. It will thus be understood that the solenoid not only actuates the hammer 28 to print but also assists the actuation of the escapement through the medium of the pin 116. After the printing operation of the hammer 28 the solenoid 120 is de-energized, in a manner hereinafter described, and the hammer is then restored to normal by a spring 141 connected to the arm 140 and a fixed bracket 142. The feeding movement of the carriage, through the medium of the pin 116, which connects the hammer with the dog carrying frame 115 of the escapement mechanism, may assist in returning the hammer to normal. On the other hand the spring 141, through the medium of the hammer 28 and the connecting pin 116, assists in returning the escapement to normal thus relieving the carriage and consequently expediting the operation of the machine.

To insure engagement of the contacts 127 and

130, of the switch 122, one of its contacts (127) may be resiliently supported in its block 128 to yield against the action of a spring 143 so that the contacts 127 and 130 may engage each other before the dog rocker 102 has completed its motion to its operated position.

To de-energize the solenoid 120 after printing, the switch 123 is automatically opened. Said switch 123 includes, for this purpose, a fixed contact 145 on a block 146 of insulating material (Figs. 5, 8 and 9) mounted on a bracket 147 secured to the main frame 20. Co-operating with the contact 145 is another contact 148 supported on a bell-crank lever 149 pivoted by a screw or stud 150 on the bracket 147. A detent spring 151, secured to the bracket 147, acts through the medium of a roller 152 on one side of a nose 153 of the bell crank lever 149 to hold the switch closed as in Fig. 5.

The operation of the switch 123 to open it is initiated by the hammer during its actuation to the printing point, through the medium of the dog carrying frame 115; said frame being provided with a lug 154 which engages a finger 155 of the bell-crank or switch lever 149 to swing the latter about its pivot 150 in a clockwise direction until the point of the nose 153 wipes past the roller 152 of the detent to the position in Fig. 8 where, it will be seen, the switch is still closed although the switch lever 149 has been partially actuated; the contact 148 being slidably supported for this purpose on the switch lever 149 and being urged toward the contact 145 by a spring 156 (Fig. 7). The contact 148 is supported in a housing 157^a supported in a block 157 of insulating material which is attached to the switch lever 149 as indicated in Fig. 7.

It will be understood that the printing of the hammer has completed its operation when the switch reaches the position in Fig. 8, but instantly thereafter the spring 151 acts to complete the operation of the switch lever 149 to open the switch 123 as in Fig. 9, thus preventing a premature return of the hammer.

Upon the return of the hammer to normal the dog carrying frame 115 is returned therewith and the lug 154 engages a finger 158 of the switch lever 149 to start its return stroke, which return stroke is completed by the spring 151 to close the switch. Before the closing of the switch 123 is effected, however, the switch 122, controlled by the dog rocker, is opened.

The space bar (not shown) is effective to actuate the escapement mechanism. To this end a lever 160 (Fig. 2) operated thereby may engage the arm 101 to rock the shaft 89 which, it will be remembered, actuates the escapement through the arm 104. The usual hammer blocking means, (not shown) may also be provided to prevent printing during the actuation of the space bar.

To vary the blow of the hammer 28, in accordance with the thickness of a pack of work-sheets or in accordance with the size of the types of the various shuttles which may be used in the machine, the coil 135 of the hammer solenoid 120 is settable lengthwise or axially of the plunger 137. To this end the coil 135 which has secured thereto a flux conducting frame 165 is supported on brackets 166 and 167 by shouldered screws 168 and a screw 169 extending through slots 170 and threaded into the frame 165; the brackets 166 and 167 being secured to the main frame by screws 171.

To set or regulate the coil 135 and thus vary its effect on the plunger 137 there may be provided a rock shaft 175 supported in brackets 176 and

177 secured to the main frame. Said rock shaft extends in from the right hand side of the main frame and over the solenoid 120 as in Figs. 3 and 12, and it is provided with a handle 178 at its outer end by which it may be rocked to move the coil 135 either forwardly or rearwardly through the medium of bifurcated arms 179 which embrace studs 180 on brackets 181 secured to the coil frame 165.

10 To assist in locating the coil 135 in its various positions the handle 178 is provided with a spring-pressed plunger 180 (Fig. 3) operable by a finger piece 180^a, said plunger being adapted to engage in any one of a plurality of apertures 182 (Fig. 1) 15 in the main frame. Indication marks 182 may be provided at the holes 182, to designate the variations of the hammer blows.

After each adjustment the coil may be rigidly secured by the screw 169 (Fig. 12) which extends through a slot 183 in the main frame and is provided with a finger piece 184 to thus relieve the setting means from the action of the solenoid while printing.

To feed the ribbon (not shown) by either of the universal bar frames 87 and 88 they are provided respectively with pawls 185 and 186 (Figs. 1, 2 and 3) co-operating with ratchet wheels 187 and 188 secured to a shaft 189 to rotate the latter. The shaft 189 is supported in brackets 190 and is provided with the usual bevel gears 193 and 194 adapted to engage gears 195 and 196 to rotate ribbon spools supporting shafts 197 and 198 to feed the ribbon.

The usual ribbon vibrator 200 (Fig. 6) pivotally supported on fixed studs 201, may also be operated by either one of the universal frames 87 and 88. To this end the arm 101^a, which it will be remembered is secured to the rock shaft 89, the latter being actuable by either universal bar frame, is provided with a resilient arm 202 to engage the lower end of a plunger 203 to push the latter upwardly. Said plunger engages under one of the arms 214 to swing the ribbon vibrator upwardly about its pivot 201 to carry the ribbon into the path of the printing hammer 28.

While certain preferred embodiments of the invention have been shown it should be understood that changes in the form, arrangements, proportions, sizes and details thereof may be made without departing from the scope of the invention as defined in the appended claims.

I claim:—

1. In a typewriting machine, the combination of a type hammer, a rotatable type carrier, operable in opposite directions from a central position to select the types, an actuating lever connected to said type carrier, two operating levers to hold the actuating lever in a central position, electro-magnets, means actuable by each electro-magnet to operate the actuating lever through the medium of one of the operating levers, one of said magnets and its associated operating lever being effective to actuate the actuating lever and the type carrier in one direction, the other electro-magnet and its associated operating lever being effective to actuate the actuating lever and the type carrier in the opposite direction, a source of electric power common to both electro-magnets, two sets of key-levers, two switches one associated with each set of keys to be closed upon the actuation of any one of the keys of the associated set to electrically connect the magnet with the source of power, to energize the electro-magnet to actuate the type carrier, and means operable by the key-levers to effect the actuation

of the type hammer, and return springs for said operating levers.

2. In a typewriting machine, the combination of a rotatable type carrier operable in opposite directions from a central position to select the types, an actuating lever connected to said type carrier, two electro-magnets, two switches, one for each electro-magnet, two sets of keys, two universal bars one associated with each set of keys to be operated thereby to close the associated switch to effect energization of the associated electro-magnet, a hammer to strike against the type carrier, a return spring for said hammer, an electro-magnet to actuate the hammer against the action of said return spring, a switch whereby energization of the hammer electro-magnet may be effected, an element operable by either universal bar to close the last named switch, and a normally closed switch connected in circuit with the hammer electro-magnet, switch opening means, means independent of the hammer and operable by the escapement mechanism to initiate the operation of the switch opening means, said switch opening means continuing to operate after the printing operation of the hammer to open the normally closed switch to effect de-energization of the hammer electro-magnet after the printing operation of said hammer to permit said spring to return said hammer to normal after the de-energization of the hammer electro-magnet.

3. In a typewriting machine, the combination of a carriage, escapement mechanism therefor, a rotatable type carrier operable in opposite directions from a central position to select the types, a hammer to co-operate with the type carrier, an actuating lever connected to said type carrier, two electro-magnets, intermediate devices one associated with and actuable by each electro-magnet to operate the actuating lever, one of said magnets and its associated device being effective to actuate the type carrier in one direction, the other electro-magnet and its associated device being effective to actuate the type carrier in the opposite direction, a source of electric power common to both electro-magnets, two sets of key-levers, two switches one associated with each set of keys to be closed upon the actuation of any one of the keys of the associated set to electrically connect the magnet with the source of power, to energize the electro-magnet to actuate the type carrier, escapement mechanism for said carriage means operable by the key-levers to actuate the escapement mechanism, an electro-magnet to actuate the hammer, and a switch operable by the escapement mechanism whereby the hammer electro-magnet may be electrically connected with the source of power.

4. In a typewriting machine, the combination of a type shuttle, a hammer to co-operate therewith, a horizontally disposed lever operable in opposite directions to actuate the shuttle, two horizontally disposed arms one at each side of said lever to actuate said lever in opposite directions to carry the desired type to the printing point opposite the hammer, two vertical shafts each having one of said arms secured to its upper end, two sets of key-levers, and means associated with each set of key-levers and connected with the lower end of one of the rock shafts to be actuated thereby and to effect the actuation of the associated shaft to actuate the type shuttle.

5. In a typewriting machine, the combination of a carriage, escapement mechanism therefor, a

- type shuttle, a hammer to co-operate therewith, key-levers, means operable by the key levers to selectively set the type carrier, a solenoid to actuate the hammer, a source of electric power connected in a circuit with the solenoid, a switch in said circuit and associated with the escapement mechanism, and means operable by said keys to actuate the escapement mechanism to close said switch.
6. In a typewriting machine, the combination of a type shuttle, a hammer to co-operate therewith, key-levers, means operable by the key levers to selectively set the type carrier, a solenoid to actuate the hammer, a source of electric power connected in a circuit with the solenoid, a normally closed switch in said circuit, a normally open switch in said circuit, means operable by the keys to close the open switch after the operation of the shuttle to energize the solenoid to actuate the hammer, means operable by the key levers to initiate the movement of the normally closed switch, and means to complete the actuation of the switch to open it after the printing operation to render the solenoid ineffective.
7. In a typewriting machine, the combination of a type shuttle, arresting means therefor, a hammer to co-operate therewith, key levers, means operable by the key levers to selectively set the type carrier, a solenoid to actuate the hammer, a source of electric power connected in a circuit with the solenoid, a normally closed switch in said circuit, a normally open switch in said circuit, means operable by the key levers to close the open switch after the shuttle is arrested in its printing position to energize the solenoid to actuate the hammer, means independent of the hammer to open the normally closed switch, and means to condition the normally closed switch to be operated upon by the switch opening means.
8. In a typewriting machine, the combination of a type shuttle, a hammer to co-operate therewith, an electro-magnet to actuate the hammer, key-levers, a carriage, carriage escapement mechanism operable by the key levers, a normally open switch, associated with the escapement mechanism which is closed by the operation of the escapement mechanism to effect energization of the electro-magnet to actuate the hammer, a normally closed switch, means to open the closed switch, and means operable by the escapement mechanism to condition the normally closed switch so that it may be acted upon by its opening means.
9. In a typewriting machine, the combination of a type shuttle, a hammer to co-operate therewith, an electro-magnet to actuate the hammer, key-levers, a source of electric energy, means operable by the key-levers to connect the electro-magnet with a source of electric energy to actuate the hammer, a normally closed switch, a spring to hold the last named switch closed, means operable by the key-levers to partially actuate the switch to change its relation with respect to the spring, and resilient means to keep the switch closed after it is partially operated, said spring being subsequently effective to open the normally closed switch to de-energize the electro-magnet to permit the return of the hammer to normal.
10. In a typewriting machine, the combination of a type shuttle, a hammer to co-operate therewith, an electro-magnet to actuate the hammer, key levers, a carriage, carriage escapement mechanism operable by the key-levers, a normally open switch operable by the escapement mechanism to effect energization of the electro-magnet to actuate the hammer, a normally closed switch the opening of which is effected by the hammer to de-energize the electro-magnet to permit the return of the hammer to normal.
11. In a typewriting machine, the combination of a type shuttle, a hammer to co-operate therewith, key-levers, means operable by the key levers to selectively set the type carrier, a solenoid to actuate the hammer, a source of electric power connected in a circuit with the solenoid, a switch in said circuit, means operable by said keys to close said switch, a second switch normally closed in the circuit, means operable by the hammer to initiate the actuation of the normally closed switch, means to complete the actuation of the last named switch to open the circuit, and means to return said hammer to normal.
12. In a typewriting machine, the combination of a type shuttle, a hammer to co-operate therewith, key levers, means operable by the key levers to selectively set the type carrier, a solenoid to actuate the hammer, a source of electric power connected in a circuit with the solenoid, a switch in said circuit, means operable by said keys to close said switch, a second switch normally closed in the circuit, means operable by the hammer to initiate the actuation of the normally closed switch, means to complete the actuation of the last named switch to open the circuit, and a spring to cock said hammer after the switch is opened.
13. In a typewriting machine, the combination of a rotatable type shuttle, a rock shaft, a hammer extending upwardly from said rock shaft and co-operating with said shuttle, an arm extending downwardly from said rock shaft, a sucking coil to actuate said hammer, a plunger in said sucking coil and connected to the downwardly extending arm, said coil and said plunger extending fore and aft of the machine, a frame on said coil, fixed guides with which said frame co-operates, a rock shaft extending transversely of the machine, a finger piece on said rock shaft by which it may be rotated, and an arm on said rock shaft to move the coil back or forth on its guides to vary its effect on the plunger to vary the blow of the hammer.
14. In a typewriting machine, the combination of a carriage, a type carrier, a hammer to co-operate therewith, electric means to actuate said hammer, escapement mechanism for said carriage, key levers, a universal bar operable by said key levers to actuate the escapement mechanism, and a switch operable by the escapement mechanism to effect the actuation of the electrical means to operate the printing hammer.
15. In a typewriting machine, the combination of a carriage, a type carrier, a hammer to co-operate therewith, electric means to actuate said hammer, escapement mechanism for said carriage, key levers, a universal bar operable by said key levers to actuate the escapement mechanism, a switch operable by the escapement mechanism to effect the actuation of the electric means to operate the printing hammer, and a second switch controlled by the escapement mechanism to render the electric means ineffective to permit the return of the hammer to normal.
16. In a typewriting machine, the combination of a carriage, a type carrier, a hammer to co-operate therewith, electric means to actuate said hammer, escapement mechanism for said car-

riage, key levers, a universal bar operable by said key levers to actuate the escapement mechanism, a switch operable by the escapement mechanism to effect the actuation of the electrical means to operate the printing hammer, a second switch controlled by the escapement mechanism to render the electric means ineffective, means to restore the printing hammer to normal position, and means connecting the hammer and the escapement mechanism to assist in restoring the escapement mechanism to normal.

17. In a typewriting machine, the combination of a carriage, an escapement therefor, carriage propelling means, printing instrumentalities including two elements, namely a hammer and a type shuttle, key levers, means independent of the escapement to drive one of said elements against the other, means operable by the key levers to effect the actuation of driving means, means independent of the escapement mechanism to return the operable element to normal, and means connecting the operable element with the escapement mechanism so that the returning means may assist the return of the escapement mechanism to normal.

18. In a typewriting machine, the combination of printing instrumentalities including two elements, namely a type carrier and an element to co-operate therewith, one of said elements being operable towards the other, key levers, an electrical device to actuate the operable element, a normally open switch under the control of the key levers to effect the actuation of the electrical device, a normally closed switch, and means actuable by the operable element of the printing instrumentalities whereby the normally closed switch is opened after the printing operation is completed and whereby the normally closed switch is held open, the operable element being effective on its return to open the normally open switch and again actuate the last mentioned means to effect the closing of the normally closed switch after the other switch is opened.

19. In a typewriting machine, the combination of a main frame, a rotatable type carrier thereon, a hammer to co-operate with said type carrier, a solenoid to actuate said hammer and located at the interior of the machine, said solenoid including a coil and a plunger operating therein and connected with said hammer, means to support the coil on said main frame, and means supported on the main frame and including a finger piece at the exterior of the machine, said means extending into the machine and connected to said coil to adjust the latter on the supporting means and lengthwise of the plunger to vary the force of the solenoid and thus vary the blow of the hammer.

20. In a typewriting machine, the combination of a main frame, a rotatable type carrier thereon, a hammer to co-operate with said type carrier, a solenoid located under said hammer to actuate the latter, said solenoid comprising a coil and a plunger operating therein, means to support said coil on said main frame, said plunger being connected with said hammer, hammer actuating means operable by said plunger, and means supported on the main frame and including a finger piece located at the exterior of the machine, said means being settable to a plurality of positions and connected to said coil to adjust the latter on its support lengthwise of the plunger to vary its effect on said plunger and the hammer actuating means to thus vary the blow of the hammer.

21. In a typewriting machine, the combination of a main frame, a rotatable type shuttle, a rock shaft, a hammer extending upwardly from said rock shaft and co-operating with said shuttle, a sucking coil to actuate said hammer and located thereunder, means to support said coil on the main frame, a plunger in said sucking coil, an arm extending downwardly from said rock shaft and connected to said plunger, and means extending from the exterior of the machine to said coil to set it to various positions on the supporting means to vary the position of the coil axially of and relatively to the plunger to vary the effect of the coil on said plunger and thus vary the blow of the hammer.

22. In a typewriting machine, the combination of a carriage, escapement mechanism therefor, a settable type carrier, two sets of key-levers, two universal bar frames one for each set of key-levers to effect the actuation of the type carrier in opposite directions from a home position, the universal bar frames being operable by their associated key-levers, a lever operable by either universal bar frame to actuate the escapement mechanism, a hammer to cooperate with the type carrier, means to actuate the hammer, and means operable by the escapement to effect the actuation of said hammer actuating means.

23. In a typewriting machine, the combination of a carriage, escapement mechanism therefor, printing instrumentalities including key levers, a universal bar operable by the key levers to actuate the escapement, an electric device, a switch the operation of which is effected by the escapement mechanism upon each actuation of the latter to thus effect the actuation of the electric device, means operable by the electric device to assist the actuation of the escapement mechanism from its normal position, means to render the electric device ineffective while the escapement is out of its normal position, and means to return the operable means to assist in restoring the escapement mechanism to its normal position.

24. In a typewriting machine, the combination of a carriage, escapement mechanism therefor, printing instrumentalities including two elements, namely a type carrier and an element to co-operate therewith, one of said elements being operable towards the other to print, key levers, means operable by the key levers to selectively set the type carrier, an electro-magnet to actuate the operable element, a source of electric power connected in a circuit with the electro-magnet, a switch in said circuit and associated with the escapement mechanism, and means operable by said key levers to actuate the escapement mechanism to close said switch.

25. In a typewriting machine, the combination of a carriage, escapement mechanism therefor, printing instrumentalities including two elements, namely a type carrier and an element to co-operate therewith, one of said elements being operable towards the other to print, electric means to actuate the operable element, key levers, a universal bar operable by said key levers to actuate said escapement mechanism, and a switch operable by the escapement mechanism to effect the actuation of the electric means to actuate the operable element.

26. In a typewriting machine, the combination of a carriage, escapement mechanism therefor, printing instrumentalities including two elements, namely a type carrier and an element to co-operate therewith, one of said elements being

operable towards the other to print, electric means to actuate the operable element, key levers, a universal bar operable by said key levers to actuate said escapement mechanism, a switch operable by the escapement mechanism to effect the actuation of the electric means to actuate the operable element, and a second switch controlled by the escapement mechanism to render the electric means ineffective so that the operable element may be returned to normal.

27. In a typewriting machine, the combination of printing instrumentalities including two ele-

ments, namely a type carrier and an element to co-operate therewith, one of said elements being operable towards the other to print, a solenoid including a coil and a plunger, means connecting said plunger with the operable element, a fixed bracket to support said coil, a rock shaft, one end of said shaft being connected to the coil, and indexing means connected to the other end of the coil to move the coil on said bracket at will to adjust it relatively to said plunger to vary the force of the solenoid.

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