C. L. KRUM.

PRINTING TELEGRAPH APPARATUS.

APPLICATION FILED FEB. 4, 1909.

1,137,146.

Patented Apr. 27, 1915.

5 SHEETS—SHEET 1.

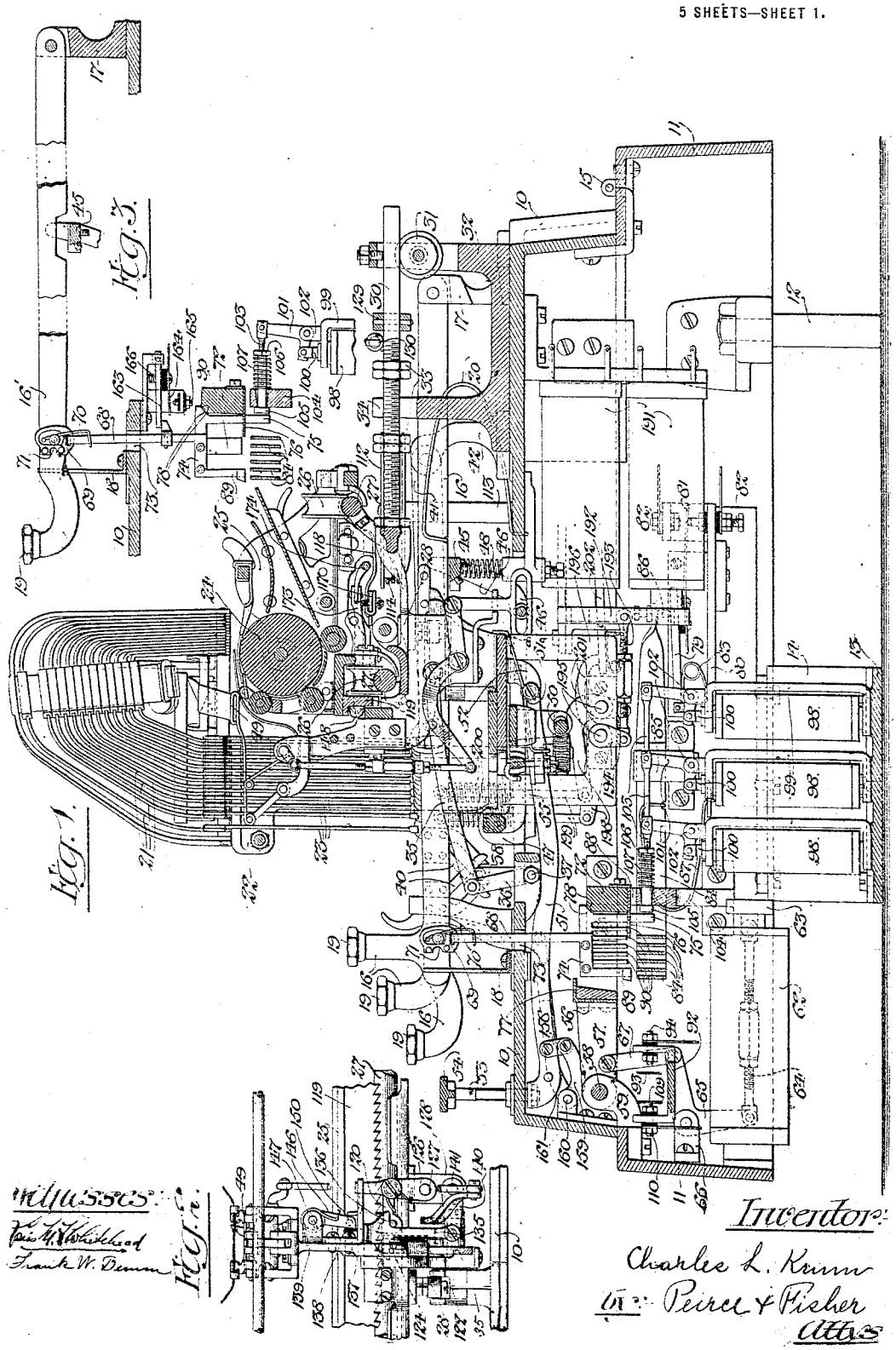


FIG. 1.

FIG. 2.

FIG. 3.

Witnesses:
Paul M. Whitehead
Frank W. Dunn

Inventor:
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5 SHEETS—SHEET 2.

Fig. 5.

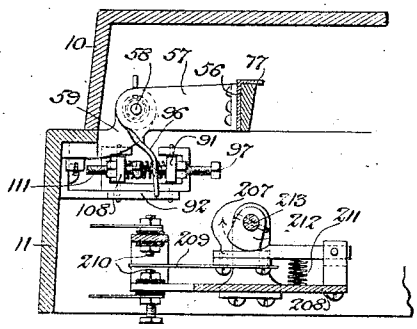


Fig. 4.

Witnesses:-

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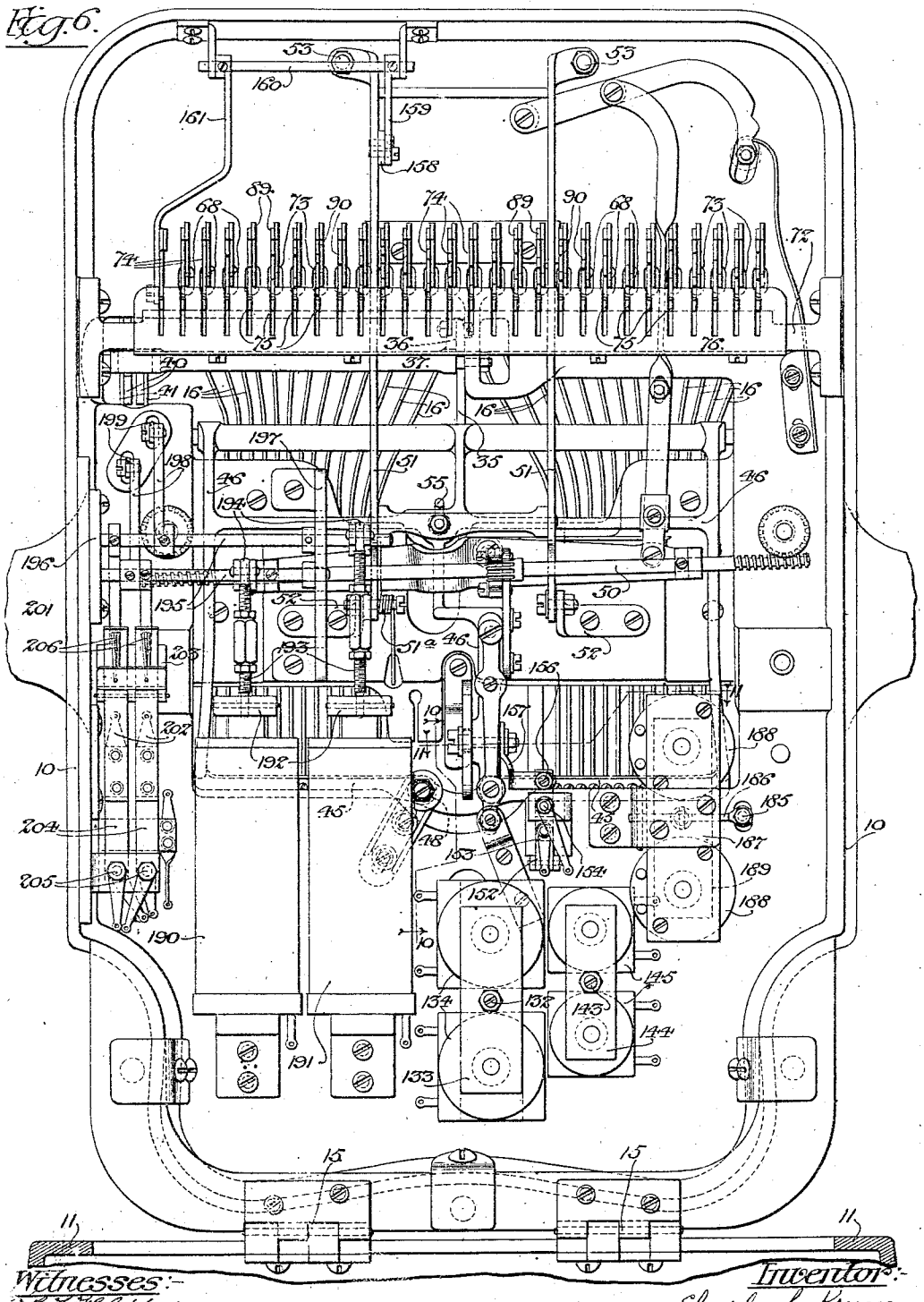
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Patented Apr. 27, 1915.

5 SHEETS—SHEET 3.

Fig. 6.



Witnesses:-

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5 SHEETS—SHEET 4.

FIG. 7.

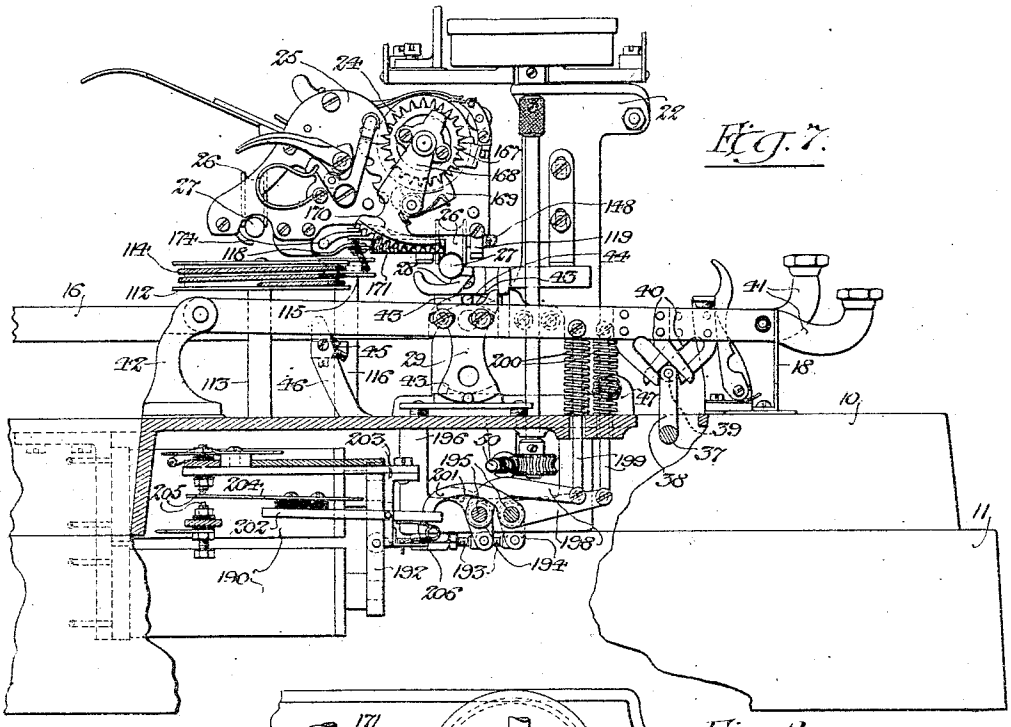


FIG. 8.

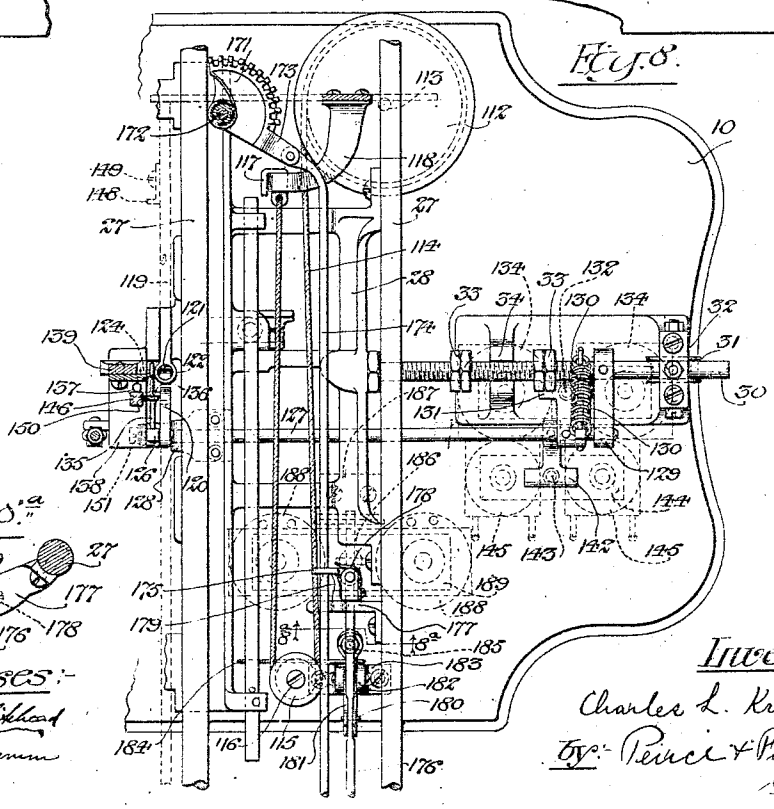
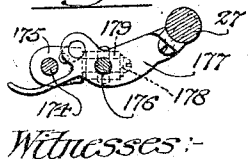


FIG. 8a.



Witnesses:

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5 SHEETS—SHEET 5.

Fig. 9.

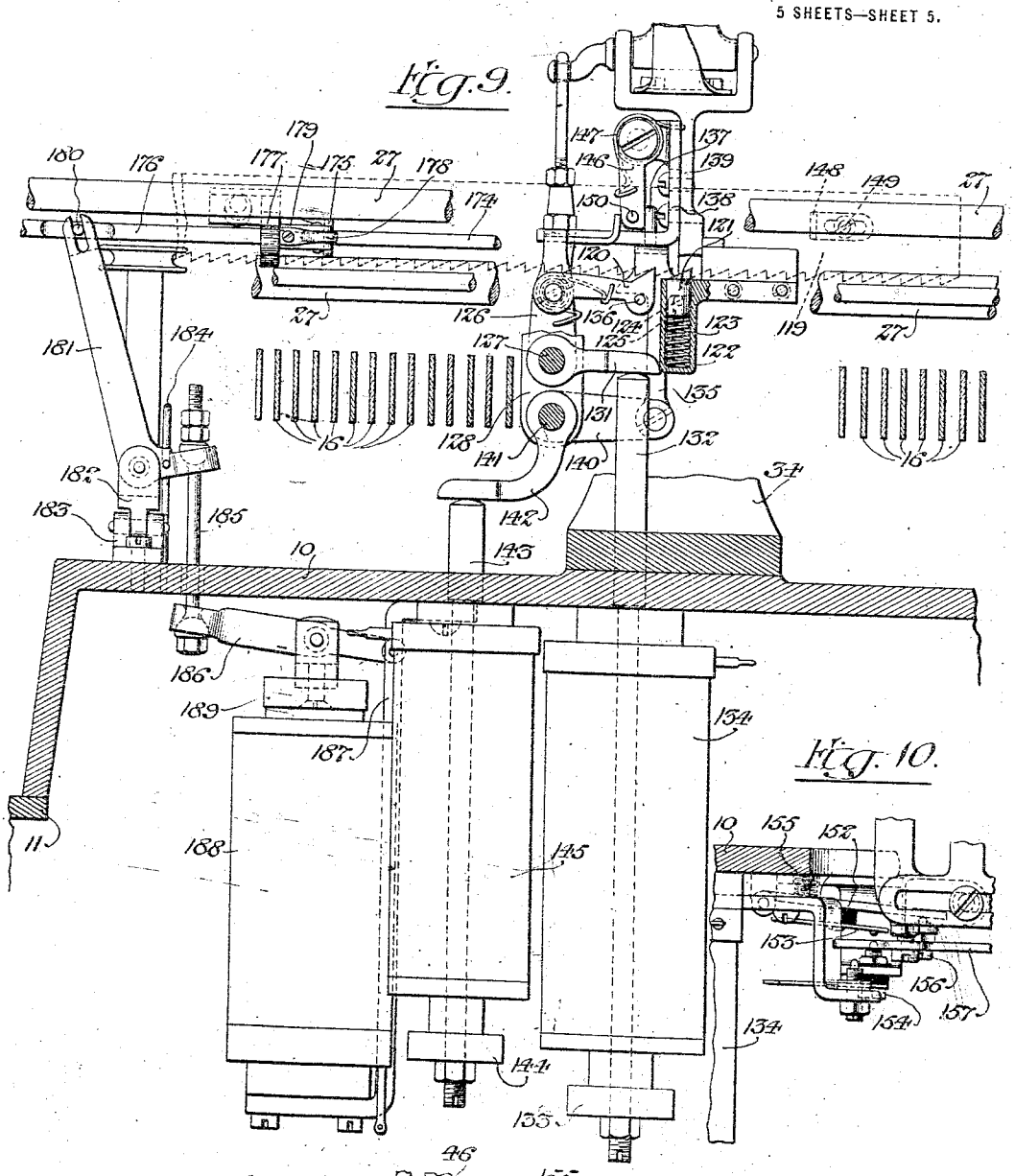
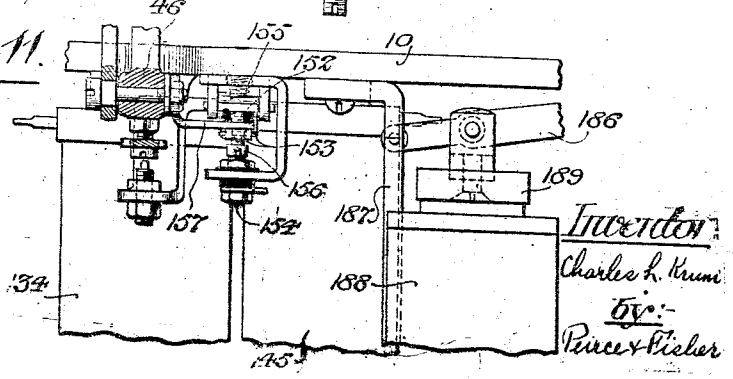


Fig. 10.

Fig. 11.



Witnesses:-

Louis G. Holdsworth

Frank W. Bemm

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UNITED STATES PATENT OFFICE.

CHARLES L. KRUM, OF CHICAGO, ILLINOIS, ASSIGNOR TO MORKRUM COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF MAINE.

PRINTING-TELEGRAPH APPARATUS.

1,137,146. Specification of Letters Patent. Patented Apr. 27, 1915.

Application filed February 4, 1909. Serial No. 475,998.

To all whom it may concern:

Be it known that I, CHARLES L. KRUM, a citizen of the United States, and a resident of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Printing-Telegraph Apparatus, of which the following is a specification.

The invention seeks to provide a suitable printing mechanism which may be quickly and effectively operated by a set of electrical devices, which in turn can be controlled and selectively actuated by signals transmitted from a distant point.

The invention also seeks to provide in connection with the printing mechanism a set of controlling keys, together with means actuated by the keys for transmitting signals over the line.

A further object of the invention is to provide a printing telegraph apparatus which may be employed either as a transmitter or as a receiver and which, in either case, will print a copy of the transmitted message.

With these and other objects in view, the invention consists in the features of improvement hereinafter set forth, illustrated in the accompanying drawings and more particularly pointed out in the appended claims.

The invention is shown as applied to the well-known "Oliver" typewriter, although it will be understood that other forms of printing mechanism could be employed.

In the drawings, Figure 1 is a view in longitudinal section through the combined transmitter and receiver; Fig. 2 is a detail elevation on an enlarged scale of the escapement mechanism; Fig. 3 is an elevation of one of the special keys; Fig. 4 is a plan view of the base upon which the typewriter is mounted, together with the parts carried by the base frame; Fig. 5 is a detail section on the line 5—5 of Fig. 4; Fig. 6 is an inverted plan view of the typewriter frame; Fig. 7 is a view in elevation of one side of the apparatus with a portion of the typewriter frame shown in section; Fig. 8 is a detail plan view illustrating the carriage feed mechanism and the line-space mechanism; Fig. 8ª is a detail section on the line *a*—*a* of Fig. 8; Fig. 9 is an enlarged view in elevation of the carriage feed and line-space mechanism, parts of the frame being shown in section; Figs. 10 and 11 are detail sections on the lines 10—10 and 11—11 respectively of Fig. 6.

The frame 10 of the "Oliver" typewriter is mounted upon a rectangular base frame 11. This frame is supported at its rear end upon legs 12 and adjacent its forward end upon a transverse support or plate 13 which is provided with upturned ends 14 secured to the lower edges of the sides of the base frame 11. The typewriter frame is connected at its rear edge to the rear portion of the base frame 11 by a pair of hinges 15, so that the typewriter frame may be raised to afford access to the electrical controlling apparatus when desired.

The "Oliver" typewriter illustrated is of well-known form. It is provided with a set of character keys or levers 16 that are pivoted at their rear ends to an upright 17 upon the typewriter frame. The forward ends of the keys extend through a comb bar 18 and their upturned forward ends are provided with finger-pieces 19 arranged in banks. U-springs 20 extend between the typewriter frame and the keys or levers 16 and normally hold them in elevated position. A set of U-shaped type-bars 21 are pivoted upon uprights 22 on opposite sides of the typewriter frame and are connected by links 23 to the separate keys 16. The type on these bars are arranged to strike upon the top of a paper supporting platen 24 when the corresponding keys are depressed. The platen 24 is rotatably mounted upon a carriage 25. This carriage is provided with rollers 26 that engage guide-rods 27 and is longitudinally movable to effect the letter-space movement of the platen and the paper carried thereby. Each of the type-bars is provided with three type, one of which is normally in position to strike at the printing point on the platen. By shifting the platen transversely either forwardly or backwardly from normal position, the other type on the type-bars will be brought to the printing point by the depression of the corresponding key. To effect the transverse shift of the carriage and platen, the guide-rods 27 are mounted upon a transversely shiftable frame 28. The ends of this frame are mounted upon rockers 29 (see Fig. 7) and it is also provided with a cen-

tral, rearwardly-extending guide-rod 30 that engages a roller 31 carried by an upright 32 on the typewriter frame. A pair of stops 33, adjustably threaded upon the guide-rod 30 are arranged on opposite sides of an upright 34 and are adapted to engage the same to limit the back and forth shift of the frame 28 and paper carriage mounted thereon. The shifting frame is connected by a forwardly extending link 35 to a rock-arm 36 on a shaft 37 that is journaled at the forward portion of the type-writer frame. At one side, this shaft is provided with an upwardly projecting arm 38 which carries a roller 39 that is engaged by a pair of oppositely inclined slotted cams 40 upon a pair of shift-keys 41 (see Fig. 7). These shift keys are pivoted at their rear ends to an upright 42 on the typewriter frame and intermediate their ends are provided with lugs 43 which normally engage a pin or lug 44 on the transversely shiftable frame to hold it in central position. When either key is depressed, this lug 43 is moved out of the path of the lug 44 and the transversely movable frame and carriage mounted thereon is moved either forwardly or backwardly. In the normal central position of the carriage, the "lower case" letters are printed. When the carriage is moved rearwardly, capitals are printed and when the carriage is moved forwardly, figures and punctuation marks are printed.

The universal bar 45 extends beneath the keys or levers 6 in position to be operated thereby when any one of the keys is depressed. This universal bar is carried upon the upturned, rear end of a frame 46 that is pivoted at its front end to lugs 47 on the typewriter frame. A spring 48 beneath the universal bar holds it in normal uplifted position and this universal bar and frame operates the ribbon shift 49 and the ribbon feed shaft 50 in the usual manner. A frame 51 is pivoted at its rear end to lugs 52 on the typewriter frame and at its forward end is provided with upwardly-extending posts 53 which carry a space bar 54. This frame is upheld by a spring 51[a] and is connected to the universal frame to operate the same by a hook 55. The parts thus far described are similar to those of the ordinary "Oliver" typewriter and need not be more fully set forth in this specification.

Each of the keys and the type-bars connected thereto is arranged to be operated by a common actuator in the form of a transverse, universal bar 56. This bar is fixed to the rear end of a pair of arms 57 that are fixed at their forward ends to a shaft 58. This shaft is journaled on a pair of lugs 59 fixed to the forward end of the base 11 and a spring 60 coiled about the shaft is arranged to hold the actuator bar 56 normally in uplifted position against a stop 61 (see Fig. 4). The actuator bar is operated by a magnet 62 mounted in horizontal position in the forward part of the base 11 and the armature 63 of which is connected by a link 64 to a bell-crank 65. This bell-crank is pivoted on a lug 66 fixed to the forward part of the base 11 and is connected by a link 67 to one of the arms 57 whereon the actuator bar 56 is mounted. A set of connectors are arranged to couple any of the keys of the machine, except the shift-keys 41, to the common actuator. These connectors are preferably in the form of links 68 that pivotally engage clips 69 fixed to the forward ends of the keys 16. A spring 70 is coiled about a stud 71 on the side of each key and engages the corresponding connector link and normally holds it with its lower end against a transverse bar 72 that extends between and is fixed to the side of the typewriter frame 10. The connector links extend downwardly through openings 73 as shown in the typewriter frame 10 and at their lower ends are provided with heads 74, each of which has a long depending finger 75 at its rear edge that extends through a guiding comb bar 76 fixed to the cross-bar 72. As shown, the connector links are normally out of engagement with the common actuator bar 56 but any one may be swung forwardly against the tension of its spring 70 until the head 74 on its lower end is brought beneath a horizontally projecting lip 77 on the upper edge of the bar 56. The heads 74 and the cross-bar 72 are provided with coöperating inclined cam faces 78 so that, when any key is initially depressed, the head 74 on the corresponding connector link will be moved forwardly and brought beneath the lip 77 on the actuator bar 56. The initial shift of any key will also close the circuit of the operating magnet 62 so that the actuator bar will be depressed to complete the movement of any key. At the same time, the actuator bar moves down in front of the heads 74 on the connector links of the other keys and locks them against movement, so that, after one key is depressed it is impossible to depress another until the actuated key has been restored to its normal position.

The keys of the machine are arranged to control a set of switch arms 79 that are pivoted upon supports 80 at opposite sides of the base 11. Each arm carries a spring contact 81 which is arranged to engage one or the other of a pair of contact pins 82 located above and below the same, as shown in Fig. 1. Springs 83 engaging the switch-arms 79 tend to lift the latter and bring the contact springs 81 into engagement with the upper contact pins 82. In the particular apparatus illustrated, there are six of these switch-arms, three on each side, and they are con-

trolled by a set of six switch shifters in the form of U-bars or bails 84 that are pivoted at their ends to inwardly-projecting lugs 85 upon the sides of the base 11 (see Fig. 4). One of the side arms of each bail is extended, three being extended on one side and three on the other side as clearly shown in Fig. 4. These extensions carry adjustable pins 86 that engage the switch-arms 79. Springs 87 normally uphold the forward parts of the bails 84 against a pair of stop-lugs 88 that are fixed to and extend inwardly from the sides of the base 11. The springs 87 are stronger than the springs 83 and the pins 86 upon the rear ends of the bails normally hold the switch-arms 79 depressed with the contact springs 81 thereon in engagement with the lower set of contact pins 82. Upon depressing the forward part of any bail against the tension of its spring 87, its rear end will be lifted and the corresponding switch-arm 79 will be raised by its spring 83 to bring the contact spring 81 thereon into engagement with its upper contact pin 82. The forward, transverse parts of the switch-shifting bails 84 extend beneath the heads 74 upon the connector links 68 in position to be operated thereby. The switch controlled by the outer bail is arranged to close the circuit through the actuator operating magnet 62 and each of the heads 74 is provided with a finger or tooth 89 which is arranged to engage and operate the outer switch-shifting bail 84. By this means, the circuit of the magnet 62 will be closed upon the initial depression of any of the keys, so that the actuator bar 56 will then be depressed to complete the movement of any selected key and lock the other keys against movement.

The switches controlled by the other bails select the different code signals or combination of impulses that are to be transmitted to the line, and these bails are selectively operated by a set of character type formed upon the heads 74 of the connector links 78. These character type are in the form of teeth 90 variably arranged upon the different heads 74, so that each of the switch-shifting bails is operated by a number of the keys and type but each key and type is arranged to operate a particular combination of the switch-shifting bails so that a characteristic combination of code impulses will be transmitted to the line. Any suitable means may be employed, such as a sunflower or the like, for transmitting the code combinations selected by the switches 81 to the line. Preferably, however, the different characters are represented by permutations of five impulses of opposite polarity. For this purpose, the switches 81 are in the form of pole changers. The transmission to the line is preferably effected by a set of automatically acting relays as set forth in my prior U. S. Letters Patent No. 929,602 and No. 929,603, both dated July 27, 1909.

In the present construction, the operation of the printer or actuator magnet initiates the operation of the set of transmitter relays which impart the selective permutation of impulses of opposite polarity to the line. For this purpose, the actuator 56 that is controlled by the printer or actuator magnet 62 is arranged to close a normally open switch. This switch comprises an arm 91 pivoted to a support 92 at the front of the base 11 and having a spring contact 93 arranged to engage a contact pin 94. A spring 95 tends to shift the switch to closed position but the switch is normally held open by an arm 96 that is fixed to and depends from the rock-shaft 58. This arm as shown, engages an adjustable pin 97 on the end of the switch arm 91 and normally holds the spring contact 93 thereon out of engagement with the contact pin 94. When the magnet 62 is energized, and the actuator bar 56 is operated, the arm 96 is moved away from the pin 97 and the spring 95 will bring the contacts 93 and 94 into engagement to initiate the operation of the transmitter means. As set forth in Patent No. 929,603, above referred to, the circuit through the actuator magnet will remain closed until the transmission of the selected combination of impulses is completed, so that it is impossible by the depression of another key to cause one signal to overlap another. As soon as a selected signal is completed, the circuit of the magnet 62 will be opened as set forth in the patent referred to and the combined actuator and lock-out bar 56 will be returned to normal position by the spring 60 so that the next signal to be transmitted can be selected.

When the apparatus is used for transmitting, the message is printed by the operation of the type-bars effected by the movement of the keys 16 and actuator bar 56, the keys being coupled to the actuator bar by the initial shift thereof. When the apparatus is used to receive a message, electrical means are employed for selectively connecting the actuator bar to the keys and type-bars. This electrical means comprises a set of selector magnets or solenoids 98 which are compactly arranged in rows upon the supporting plate 13. Each of the magnets or solenoids comprises a single spool, the poles of which are connected by a U-bar 99 of soft iron to complete the magnetic circuit. The core 100 of each selector magnet is pivoted to the horizontal arm of a bell-crank 101 that is pivoted on a lug 102 on the U-bar or frame 99 of the magnet. The upwardly-extending arms of the bell-crank 101 are pivoted to the rear end of a set of plungers 103 that extend forwardly through openings in a transverse bar 104. This bar is fixed at its ends to the arms 88, as shown in Fig. 4. The

plungers 103 are provided with headed end portions 105 that are adjustably threaded thereon and held in place by lock-nuts 106. These heads are arranged to engage the long depending fingers 75 on the rear portions of the heads 74 to shift the latter into engagement with the actuator bar 56. The plungers are normally held in retracted position by springs 107 coiled about the bar and extending between the bar 104 and the lock-nuts 106. The circuits of the magnets 98 may be controlled by any suitable selective apparatus, such for example, as set forth in my prior U. S. Letters Patent No. 1,004,038, September 26, 1911. In the construction shown in said patent, the selector magnets directly operate the type bars, whereas in the present construction, as stated, they control the coupling links which connect the type bars to the common actuator 56 operated by the magnet 62. The circuit of this magnet is arranged to be closed whenever the circuit is closed through one of the selector magnets. This could be effected, if desired, by arranging the actuator magnet in a series with all of the selector magnets, as shown for example in the U. S. Letters Patent to Himrod, Serial No. 624,487, dated May 9, 1899. In the present construction the actuator or printer magnet, like the actuator or printer magnet set forth in my prior U. S. Letters Patent No. 682,402, dated August 6, 1907, is arranged to open the circuit of the selector magnets. For this purpose, the arm 96 on the rock-shaft 58 is arranged to open an unlocking switch. This unlocking switch comprises a switch-arm 108 pivoted on the support 92 and having a spring contact 109 arranged to engage a contact pin 110 (see Figs. 4 and 5). The spring 95 normally holds the contacts 109 and 110 in engagement but whenever the magnet 62 is operated, and the shaft 58 rocked thereby, the arm 96 will engage a pin 111 on the outer end of the push-arm 108 and will move the contact spring 109 out of engagement with the contact pin 110 to open the circuit through the selector magnets 98.

The longitudinal letter-space feed of the paper carriage and its return to initial position are effected by a spring drum and selectively operated pawl-and-ratchet mechanism. The spring drum 112 (see Figs. 7 and 8) is journaled upon the upper end of a post 113 that is fixed to the typewriter frame 110. A cord 114 coiled about the drum extends across the machine frame and around a guide pulley 115 journaled upon an upright 116 on the typewriter frame. Thence, the cord extends back and its end is provided with a hook 117 that detachably engages a lug 118 upon the carriage. A rack 119 (see Figs. 2 and 9) is fixed to the carriage and is provided with ratchet teeth which are engaged by a feed pawl 120 and a retaining pawl 121. The retaining pawl is mounted in a socket or casing 122 that is fixed to the transversely shifting frame 28. A spring 123 in the socket normally presses the retaining pawl outwardly. A pin 124 fixed to the pawl extends through a vertical slot 125 in the side of the casing and tends to limit the vertical movement of the pawl and also to hold the same against twisting. The spring-pressed feed pawl 120 is pivoted to the upper end of an arm 126. This arm is fixed on the forward end of a shaft 127. The shaft 127 is journaled at its forward end in a lug 128 fixed to the transversely movable frame 28. At its rear end it is journaled in a lug 129 that is fixed to and projects laterally from the guide-rod 30 of the transversely shifting frame (see Figs. 8 and 9). A spring 130, extending between the pins or arms on the rod 30 and shaft 127, normally holds the latter and the feed pawl connected thereto in the position shown in the drawings. An arm 131 fixed to the shaft 127 is provided with a T-shaped head that is held by the spring 130 into engagement with the upper end of a shifter rod 132. This vertical shifter rod extends through an opening in the typewriter frame 10 and is connected at its lower end to the armature 133 of a magnet 134 which is mounted upon the under side of the typewriter frame 10. Whenever the magnet 134 is energized, the armature and the shifter rod 132 are raised and the shaft 127 is rocked against the tension of the spring 130 until the feed pawl 120 engages the next tooth on the rack 119. When the magnet is deënergized the spring 130 rocks the shaft 127 back to normal position and the dog 120 moves the rack 119 and paper carriage ahead one step. During the movement of the feed pawl the carriage is held stationary by the retainer pawl 121.

As the carriage is fed in letter space direction by the pawl 120, the spring of the drum 112 is wound up or placed under tension and the carriage is returned to initial position by the spring drum when the feed and retainer pawls 120 and 121 are disengaged from the rack 119. The disengagement of these pawls is effected by a link 135 which is provided at its upper end with a T-shaped head arranged to engage the pin 124 on the retainer pawl and a pin 136 fixed to the feed pawl. At its upper end, the releasing link 135 is provided with a pin 137 that extends upwardly through the horizontal arm of an L-shaped piece 138 that is fixed to an upright 139 on the transversely movable frame 28. The releasing device 135 is connected to an arm 140 on a rock-shaft 141. This shaft is arranged below the shaft 127 and is journaled at its ends in the lugs 128 and 129. At its rear end, it is provided with an offset arm 142 having a T-

shaped head that engages a vertical shifter rod 143. This shifter rod extends through an opening in the twpewriter frame 10 and is connected at its lower end to the armature 144 of a magnet 145. When this magnet is energized, the shifter rod 143 is raised to rock the shaft 141, and the pawls 120 and 121 are pulled by the link 135 out of engagement with the rack 119 so that the carriage may be returned to its initial position by the spring drum 112.

A latch 146 is pivoted upon the vertical arm of the L-shaped piece 138 and is provided with a spring 147 which presses it against the side of the pin 137 upon the upper end of the releasing device 135. When this device is operated to release the pawls, the spring 147 brings the latch over the upper end of the pin 137 and holds the releasing device in shifted position and the pawls out of engagement with the carriage rack until the carriage has completely returned to initial position. At the end of the return movement of the carriage, a lug 148 adjustably connecteed to the carriage rack 119 by a screw 149 is arranged to engage a pin 150 upon the latch 146 and shift it back to the position shown in the drawings so that the rock shaft 141 and releasing device 135 may be returned to normal position. This return shift of the releasing device is effected by a spring 151 (see Fig. 8), which is coiled about the front end of the shaft 141. The pin 137 then engages the side face of the latch 146 and holds it in position with its spring 147 under tension in readiness to again lock the releasing device 135 when it is next shifted. As soon as the lug 148 on the carriage rack strikes the latch 146 to permit the return movement of the releasing device 135, the pawls 120 and 121 are of course returned into engagement with the rack 119 by their springs, and the carriage feed mechanism is then in condition to be operated by the magnet 134 to feed the carriage one step at a time in letter space direction. It should be noted that the carriage feed mechanism and feeding device are mounted upon the transversely movable frame, while the operating magnets 134 and 135 and shifter rods 132 and 143 are mounted upon the main frame of the machine. By reason of the T-shaped heads, however, upon the arms 131 and 142, and which are engaged by the upper ends of the shifter rods 132 and 143, the shafts 127 and 141 and the feed and releasing devices connected thereto can be properly operated in any one of the different positions of the transversely movable frame and carriage mounted thereon.

The circuit of the feed operating magnet 134 is controlled by a switch comprising an arm 152 (see Figs. 10 and 11), which is pivoted upon the under side of the typewriter frame 10. This arm carries a spring contact 153 which is arranged to engage a contact pin 154. A coiled spring 155 engages the arm 152 and tends to shift the contacts into engagement but the latter are normally held disengaged by a screw 156 which is carried by an arm 157 and engages the switch arm 152. The arm 157 is fixed to the frame 46 whereupon the universal bar is mounted. When any key is operated, the universal bar is depressed and the arm 157 and the screw 156 are moved away from the switch arm 152, so that the spring 155 can move the contact spring 153 into engagement with the contact pin 154 to close the circuit of the feed magnet 134. In this way, the carriage is advanced one step in letter-space direction whenever a type-bar is operated both when the apparatus is used for transmitting and receiving. It should be noted that the magnet 134 when energized, draws the feed pawl 120 back against the tension of the spring 130 and the feeding movement of the pawl and carriage is effected by the spring 130 after the magnet 134 is deënergized. In this way, the feeding movement of the carriage does not occur until after the type have been operated to make the impression on the paper carried by the carriage platen.

The shifting frame 51 that is connected to the space bar 54, operates the universal frame 46 through the medium of the hook 55 as described, to thereby close the circuit of the feed operating magnet 134. Means are provided for coupling the space bar to the actuator bar 56 so that the carriage may be advanced one step, either when transmitting or receiving, to leave spaces between words. For this purpose, the spacing frame 51 (see Figs. 1 and 6) is connected by a link 158 to an arm 159 upon one end of a rock-shaft 160. This rock-shaft is journaled in lugs secured to the inner face of the front portion of the typewriter frame 10. The opposite end of this shaft is provided with a rearwardly-projecting arm 161 which carries one of the connector links 68 so that the space bar, like the keys 16, can be coupled to the actuator bar 56. The connector link of the space bar is provided with a special switch operating type which is arranged to transmit a special signal over the line. At the retaining station this special signal will energize the proper selector magnet 98 to couple the space-bar to the actuator 56 so that the carriage will be fed one space without printing.

The circuit of the magnet 145 which controls the return of the carriage to normal position is opened and closed by a switch that is controlled by a special key 16' (see Fig. 3). The connector link 68 of this special key is provided with a rearwardly projecting lug which is arranged to engage

a switch-arm 163 that is pivoted upon the under side of the typewriter frame 10. This switch-arm carries a spring contact finger 164 which is arranged to engage a contact pin 165. A spring 166 engaging the switch-arm, tends to shift the contact into engagement. The latter are, however, normally held out of engagement by the lug 162 on the connector link 68 of the special key 16'. When the apparatus is transmitting, the operation of the special key 16' will send a special carriage return signal over the line and will also close the switch contacts 164 and 165 at the local station to return the carriage to initial position. When the instrument is receiving, the key 16', like the other keys of the machine, can be connected to the actuator 56 by the operation of the proper selector magnet 98 to effect the return of the carriage to initial position. The special key 16' is cut out over the universal bar 45 as shown in Fig. 3, so that the latter is not operated thereby.

The carriage platen is provided with the usual paper-feed rolls and guides. To effect the line-space movement of the platen, it is provided on one end (see Fig. 7) with a ratchet wheel 167. An arm 168 pivoted to the shaft of the platen carries a spring pawl 169 which engages the teeth of the ratchet wheel. The lower end of the arm 168 is provided with a beveled gear segment 170 that meshes with the teeth of a gear segment 171. The gear segment 171 is journaled on a stud 172 on the carriage and is provided with an extension 173 that is pivoted to the end of a longitudinally extending shifter rod 174. This rod normally slides loosely through a clamp plate 175 as the carriage moves longitudinally back and forth upon the frame 28. The clamp 175 is pivoted to the end of a rod 176 which extends through an opening in a guide lug 177 fixed to the rear guide rod 27 of the transversely movable frame 28. A spring 178 holds the clamp 175 against a stop 179 fixed to the guide lug 177. The rod 176 is provided with a pin 180 engaging slots in the upper, forked end of a bell-crank 181. The bell-crank is connected to the typewriter frame 10 by a universal joint comprising a knuckle 182 to which the bell-crank is pivoted, and a supporting lug 183 upon which the knuckle is pivoted, the pivots of the bell-crank and knuckle being at right angles to each other. The short arm of the bell-crank is engaged by a spring 184 and is connected by a link 185 to a lever 186, ball and socket joints being provided between the links and the parts connected thereby. The lever 186 is arranged below the top plate of the typewriter frame 10 and is pivoted upon a supporting frame bar 187 which carries a magnet 188. The lever 186 is pivotally connected to the armature 189 of this magnet.

The spring 184 normally holds the parts connected to the armature 189 in the position shown in Figs. 8 and 9 with the clamp 175 against the stop 179. In this position, the shifter rod 174 is free to slide through the clamp as the carriage moves longitudinally in letter-space direction and back to normal position. When the magnet 188 is energized, the lever 186 will be drawn down and the rod 176 will be moved longitudinally by the bell-crank 181 so as to move the clamp 175 away from the stop 179. The spring 178 then moves the clamp 175 to an inclined position so that it will grip and shift the rod 174 to oscillate the gear segments 171 and 170 and thereby rotate the platen 24 to effect the line-space movement of the paper thereon. As soon as the magnet is deënergized, the spring 184 restores the parts connected thereto to normal position and brings the clamp back against the stop 179. On its return movement, the clamp slides loosely over the shifter-rod 174. The pivoting of the support 182 which carries the bell-crank 181 and the ball and socket connections between the link 185 and the parts connected thereby, permit the backward and forward shift of the bell-crank with the transversely movable frame 28 when the latter is moved from normal position for printing capitals or figures and the line-space mechanism may be properly operated in any position of the shifting frame 28 or of the carriage mounted thereon. The circuit of the line-space magnet 188 is controlled by a special key which is entirely similar to the key 16' which controls the operation of the carriage return magnet and the key is operated in a similar manner when the apparatus is used for transmitting or receiving to effect the line-space movement of the paper whereon the message is written. In transmitting, the line-space movement of the platen could be mechanically effected if desired. In the use of the present apparatus, however, the special key provided will be depressed to close the circuit through the magnet 188, so that at the same time a special signal will be transmitted over the line to operate the companion key of the machine at the receiving station to thereby effect the line-space movement of the machines at the transmitting and at the receiving station.

When the apparatus is used for transmitting, the transverse shift of the frame 28 and carriage mounted thereon for printing capitals or figures is effected mechanically by the shift keys 41. When the apparatus is used for receiving, these shift keys are electrically operated by a pair of magnets 190 and 191 mounted upon the under side of the typewriter frame 10. The armatures 192 of these magnets are connected by adjustable links 193 to arms 194 on a pair of

rock-shafts 195. These rock-shafts are journaled in suitable supports 196 and 197 upon the under side of the typewriter frame, and adjacent their outer ends are provided with arms 198 that are connected to the shift keys 41 by links 199 that extend upwardly through the top plate of the typewriter frame. A pair of cushion springs 200 are coiled about the links 199 and extend between the top plate of the typewriter frame and the shift keys 41 to hold the latter and the parts connected thereto in normal position.

Each shift key controls switch mechanism which in turn controls the transmission of the special signals over the line. For this purpose, the rock-shafts 195 are provided with a pair of arms 201 which engage the ends of a pair of switch-arms 202 that are pivotally mounted upon a support 203. These switch-arms carry spring contacts 204 each of which is arranged to shift between a pair of contact pins 205 (see Figs. 6 and 7). Springs 206, engaging the switch-arms 202, tend to hold the spring contact switches 204 into engagement with the lower contact pin 205; but the arms 201 on the rock-shafts 195 hold the switch-arms 202 in the position shown in the drawings against the tension of the springs 206 and with the contact switches 204 normally in engagement with the upper set of contact pins 205.

The shift of the switch contacts controlled by the shift keys is arranged to effect the transmission of one special signal over the line when the key is depressed and another when the key is released and the circuits of one or the other of the shift-operating magnets is closed by the selective apparatus when one special signal is received and is held in closed condition until the releasing signal is received. In this way, the shift mechanism of the machines at the transmitting and receiving station act in unison and the operator of the machine at the transmitting station merely holds one or the other of the shift keys depressed as long as he desires to print capitals or figures.

A set of switch-arms 207 are pivoted on a support 208 at the front side portion of the base 11. These switch-arms carry spring contacts 209 which are arranged to shift between upper and lower sets of contact pins 210. Springs 211 engaging the switch-arms tend to hold the contact springs in engagement with the upper set of contact pins. A series of cams 212 mounted on a shaft 213 are arranged to engage the switch-arms when the shaft is rotated and depress the contact springs into engagement with the lower set of contact pins. This set of switches is arranged to connect the local and line circuits and the circuit of the printer or actuator magnet 62 either to the transmitting or the receiving circuits.

The operating magnets 62, 134, 188, 190 and 191 are all preferably double spool solenoids, the armatures thereof being connected to cores that are movable through the spools or coils.

It is obvious that any suitable transmitting and selecting means could be employed in connection with the apparatus herein set forth.

It is also obvious that changes could be made in the details of construction set forth without departure from the essentials of the invention.

I claim as my invention:—

1. In a printing telegraph apparatus, the combination with a set of finger-keys, and a set of variably-toothed, switch-operating type controlled by said keys, of a common actuator for said keys, a set of connectors for coupling the selected key to said actuator, said connectors being normally spring-held in inoperative position, and a stationary cam-bar for shifting said connectors to operative position upon the initial depression of said keys.

2. In a printing telegraph apparatus, the combination with a set of finger keys, and a set of switches, of a set of variably-toothed, switch-operating type connected to said finger keys, said type being arranged to directly engage and operate said switches, a common actuator for said keys and switch-operating type, and means controlled by the initial shift of any selected key and switch-operating type for coupling said actuator thereto.

3. In a printing telegraph apparatus, the combination with a set of finger keys, a set of variably-toothed, switch-operating type and printing mechanism actuated by said keys, of a common actuator for said keys, a set of connectors for coupling said keys to said actuator, said connectors being normally spring-held in inoperative position, and a stationary cam-bar for shifting any connector to operative position upon the initial movement of the corresponding key.

4. In a printing telegraph apparatus, the combination with a set of finger keys and a set of variably-toothed, switch operating type actuated by said keys, of a common actuator for said keys, a set of connector links pivoted to said keys and normally spring-held out of engagement with said actuator, and means for shifting any of said connector links into engagement with said actuator upon the initial depression of the corresponding key.

5. In a printing telegraph apparatus, the combination with a set of switch-controlling finger keys, of a common actuator for said keys, a set of connector links pivoted to said keys to swing into and out of operative rela-

tion with said actuator, springs normally holding said connector links in inoperative position, and means for positively shifting any connector link to operative position upon the initial movement of the corresponding key.

6. In a printing telegraph apparatus, the combination with a set of switch-controlling finger keys, of a common actuator bar for said keys, connector links pivoted to said keys to swing into and out of engagement with said actuator bar and a stationary cam-bar for positively shifting any connector link into engagement with said actuator bar upon the initial depression of the corresponding key.

7. In a printing telegraph apparatus, the combination with a set of switch-controlling finger keys, of a common actuating and lock-out bar for said keys, a set of connector links pivoted to said keys and normally spring-held out of engagement with said actuator bar, and a stationary cam bar for shifting any of said connector links into engagement with said actuating bar upon the initial depression of the corresponding key.

8. In a printing telegraph apparatus, the combination with a set of switch-controlling finger keys, of a common actuating and lock-out bar for said keys, a set of connector links pivoted to said keys and normally spring-held out of engagement with said actuator bar, a stationary cam bar for shifting any connector link into engagement with said actuating bar upon the initial depression of the corresponding key, and means controlled by the initial depression of any key for operating said actuating bar to complete the shift thereof and lock out the remaining keys.

9. In a printing telegraph apparatus, the combination with a set of switches, and a set of variably-toothed, switch-operating type, each of said switches being directly operated by a number of said type, and each type being arranged to directly operate a different combination of switches, of a set of finger keys for shifting said switch-operating type, a common actuator for said keys and type and a set of connectors spring-held in inoperative position and controlled by the initial shift of any selected key and type for connecting said actuator thereto.

10. In a printing telegraph apparatus, the combination with a set of switches, and a set of variably-toothed, switch-operating type, each of said switches being operated by a number of said type, and each type being arranged to operate a different combination of switches, of a set of finger keys for shifting said switch-operating type, a common actuator and lock-out for said keys and type, a set of connectors, a cam-bar for throwing said connectors upon the initial shift of any key to couple said actuator thereto, and means controlled by the initial shift of any key for operating said actuator to complete the shift of the selected key and type and to lock out the other keys and type.

11. In a printing telegraph apparatus, the combination with a set of switches, and a set of variably-toothed, switch-operating type, each of said switches being directly operated by a number of said type, and each type being arranged to directly operate a different combination of switches, of a set of finger keys for shifting said switch-operating type, printing mechanism operated by said keys, a common actuator for said keys, and a set of connectors pivoted to said keys, spring-held in inoperative position and controlled by the initial shift of any selected key for connecting said actuator thereto.

12. In a printing telegraph apparatus, the combination with a set of switches, of a set of variably-toothed, switch-operating type, each of said switches being operated by a number of said type and each of said type being arranged to operate a different combination of switches, of a set of finger keys, a common actuator therefor, a set of connectors pivoted to said finger keys and whereon said switch-operating type are mounted, and means for shifting said connectors to couple any selected key to said actuator.

13. In a printing telegraph apparatus, the combination with a set of switches, of a set of variably-toothed, switch-operating type, each of said switches being operated by a number of said type and each of said type being arranged to operate a different combination of switches, of a set of finger keys, a common actuator therefor, a set of connectors pivoted to said finger keys and whereon said switch-operating type are mounted, springs normally holding said connectors and type out of engagement with said actuator, means for shifting any of said connectors and type into engagement with said actuator upon the initial shift of the corresponding key, and means controlled by the initial shift of any key for operating said actuator to complete the shift of the selected key and type and lock the other keys and type against movement.

14. In a printing telegraph apparatus, the combination with a set of switches, of a set of variably-toothed, switch-operating type, each of said switches being operated by a number of said type and each of said type being arranged to operate a different combination of switches, of a set of finger keys, a common actuator therefor, a set of connectors pivoted to said finger keys and whereon said switch-operating type are mounted, said connectors and switch-operating type being normally out of engagement with said actuator, means for shifting any of said connectors and type into engagement with said

actuator upon the initial shift of the corresponding key, and printing mechanism operated by said keys.

15. In a printing telegraph apparatus, the combination with printing mechanism, of a set of operating members therefor, a common actuator for said members, a series of connector links pivoted to said members to shift into and out of engagement with said actuator, springs for normally holding said connectors out of engagement with said actuator, a corresponding set of selector magnets, and a set of shifters connected to the armatures of said magnets and arranged to engage and positively move said connector links into engagement with said actuator.

16. In a printing telegraph apparatus, the combination with printing mechanism, of a set of operating members therefor, a common actuator for said members, a series of connector links pivoted to said members to shift into and out of engagement with said actuator, springs for normally holding said connectors out of engagement with said actuator, a corresponding set of plungers arranged to engage and shift said connector links into engagement with said actuator, a corresponding set of selector magnets, one for operating each of said plungers and a magnet for operating said actuator.

17. In a printing telegraph apparatus, the combination with a set of printing type, of a set of operating members for said type, a universal actuator bar for said members, a set of connector links pivoted to said members, springs normally holding said connector links out of engagement with said actuator bar, a corresponding set of selector magnets, a shifter operated by each of said magnets arranged to engage and move one of said connectors into engagement with said actuator, and an operating magnet for said actuator bar.

18. In a printing telegraph apparatus, the combination with a set of finger keys, of printing mechanism and a set of transmitter switches controlled by said keys, an actuator for said keys normally disconnected therefrom, means controlled by the initial movement of said keys for coupling said actuator thereto and a set of selector magnets for coupling any of said keys to said actuator.

19. In a printing telegraph apparatus, the combination with a set of finger keys, of printing mechanism and a set of transmitter switches operated by said keys, a common actuator for said keys, a set of connectors for coupling said keys and actuator, said connectors being normally in inoperative position, means for shifting any of said connectors to operative position upon the initial depression of the corresponding key, and a set of selectors independent of said keys for shifting said connectors to operative position.

20. In a printing telegraph apparatus, the combination with a set of finger keys, of printing mechanism and a set of transmitter switches operated by said keys, a common actuator for said keys, a set of connectors for coupling said keys and actuator, said connectors being normally in inoperative position, means for shifting any of said connectors to operative position upon the initial depression of the corresponding key, a set of selectors independent of said keys for shifting said connectors to operative position, a set of operating magnets for said selectors and an operating magnet for said actuator.

21. In a printing telegraph apparatus, the combination with a set of finger keys, of printing mechanism and transmitter switches controlled by said keys, a universal actuating and lock-out bar for said keys, a set of connector links pivoted to said keys and normally spring-held out of engagement with said bar, means for shifting any of said connector links into engagement with said actuator bar on the initial movement of the corresponding key, and a set of electrically-operated selectors independent of said keys for shifting said connector links into engagement with said bar.

22. In a printing telegraph apparatus, the combination with a set of finger keys, of printing mechanism and transmitter switches controlled by said keys, a universal actuating and lock-out bar for said keys, a set of connector links pivoted to said keys and normally spring-held out of engagement with said bar, a stationary cam bar for shifting any of said connectors into engagement with said actuator bar, a set of selectors independent of said keys for shifting any of said selectors into engagement with said bar, a set of magnets for operating said selectors and a magnet for operating said actuator bar.

23. In a printing telegraph apparatus, the combination with printing mechanism and selector magnets controlling the operation thereof, of a carriage, a transversely movable frame whereon the carriage is mounted, spring mechanism for returning said carriage to initial position, pawl and ratchet mechanism mounted on said frame and carriage for feeding the latter longitudinally against the pull of said spring mechanism, means for releasing said pawl and ratchet mechanism, and a pair of operating magnets for said feed mechanism and said releasing means.

24. In a printing telegraph apparatus, the combination with printing mechanism and selector magnets controlling the operation thereof, of a carriage, a transversely movable frame whereon the carriage is mounted, a spring drum connected to said carriage for returning the same to initial position, a feed rack on said carriage, feed and retaining

pawls mounted on said transversely movable frame and engaging said rack, operating means for said feed pawls, releasing means for disengaging said pawls from said rack, said operating and releasing means being mounted on said movable frame and a pair of magnets mounted on the main fixed frame of the machine arranged to actuate said operating and said releasing means respectively.

25. In a printing telegraph apparatus, the combination with printing mechanism and selector magnets controlling the operation thereof, of a carriage, a transversely movable frame whereon the carriage is mounted, a spring drum connected to said carriage for returning the same to initial position, a feed rack on said carriage, feed and retaining pawls mounted on said transversely movable frame and engaging said rack, a pair of spring-held rock shafts journaled on said movable frame, operating connections between one of said shafts and said feed pawl, a releasing shifter for said feed and retaining pawls connected to the other of said shafts, a pair of arms on said shafts, a pair of magnets on the main frame of the machine and a pair of shifter rods arranged to engage said arms to operate said rock shafts in all positions of said movable frame.

26. In a printing telegraph apparatus, the combination with printing mechanism and selector magnets controlling the same, of a carriage, a spring drum connected to said carriage to return the same to initial position, a rack fixed to said carriage, feed and retainer pawls engaging said rack, a releasing shifter for disengaging said pawls from said rack, operating magnets for said feed pawl and said releasing shifter, and a spring-latch for holding said pawls in disengaged position, said carriage having a lug for releasing said latch to permit the reengagement of said pawls with said rack.

27. In a printing telegraph apparatus, the combination with printing mechanism and selector magnets controlling the same, of a longitudinally movable carriage, a paper platen journaled on said carriage, a line-space feed for said platen, a longitudinal rod connected to said line-space feed, an operating shifter having a clamp for gripping said rod, a stop for normally holding said clamp in disengaging position and a magnet for operating said shifter.

28. In a printing telegraph apparatus, the combination with printing mechanism and a series of selector magnets controlling the same, of a longitudinally movable carriage, a transversely shiftable frame whereon said carriage is mounted, a platen journaled on said carriage, a line-space feed for said platen, a longitudinal rod connected to said line-space feed, an operating shifter connected to the main frame of the machine by a universal joint, a spring-held, pivoted clamp on said shifter arranged to grip said rod, a fixed stop for normally holding said clamp in disengaged position, and a magnet mounted on the main frame of the machine and having an armature connected to said shifter.

29. In a printing telegraph apparatus, the combination with a printing mechanism, of finger keys and a set of selector magnets for operating said printing mechanism in transmitting and receiving respectively, a set of transmitter switches controlled by said finger keys, a carriage, a transversely shiftable frame whereon said carriage is longitudinally movable, a shift key for moving said frame, a magnet for shifting said frame, and a special transmitting switch controlled by said shift key.

30. In a printing telegraph apparatus, the combination with a printing mechanism, of finger keys and a set of selector magnets for operating said printing mechanism in transmitting and receiving respectively, a carriage, a transversely shiftable frame whereon said carriage is longitudinally movable, said frame being normally held in central position, a pair of shift keys, means operated by said keys for shifting said frame and said carriage transversely in opposite directions from normal, a pair of magnets having armatures connected to said shifting means to move said carriage frame in opposite directions, a set of transmitter switches controlled by said finger keys, and special transmitter switches controlled by said shift keys.

31. In a printing telegraph apparatus, the combination with a printing mechanism, of a series of finger keys and a series of selector magnets for controlling said printing mechanism in transmitting and receiving respectively, a set of transmitter switches controlled by said finger keys, a shift key for said printing mechanism, and a special transmitter switch controlled by said shift key.

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