

Aug. 27, 1968

B. F. MADSEN

3,399,274

PAGE PRINTER

Filed Oct. 15, 1964

4 Sheets-Sheet 1

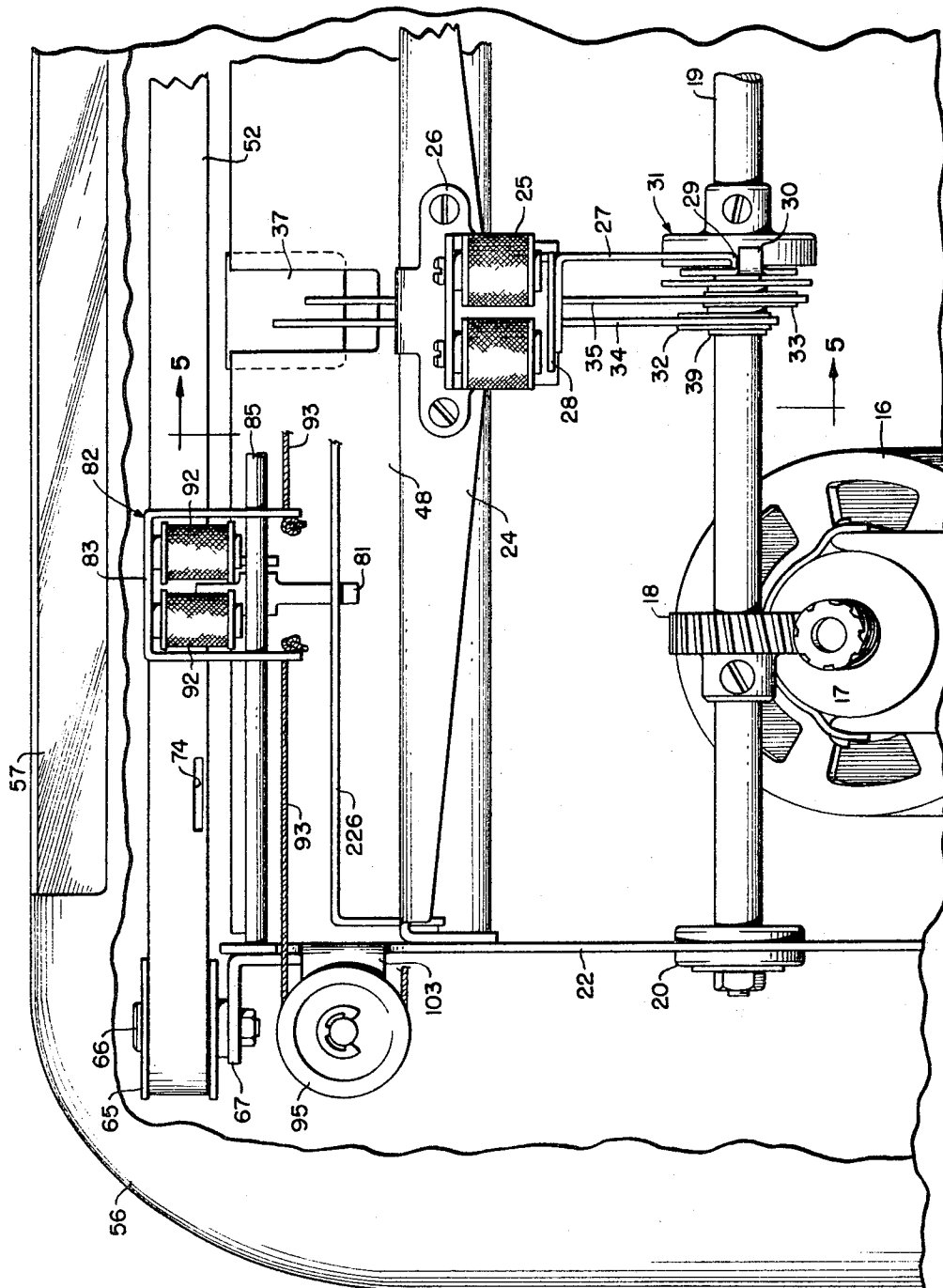


FIG. 1

INVENTOR
BERTHEL F. MADSEN

BY *E. A. Kane*

ATTORNEY

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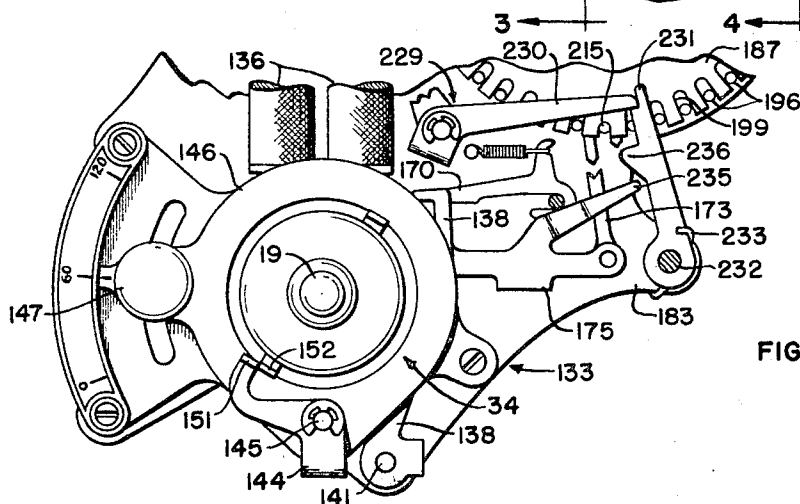
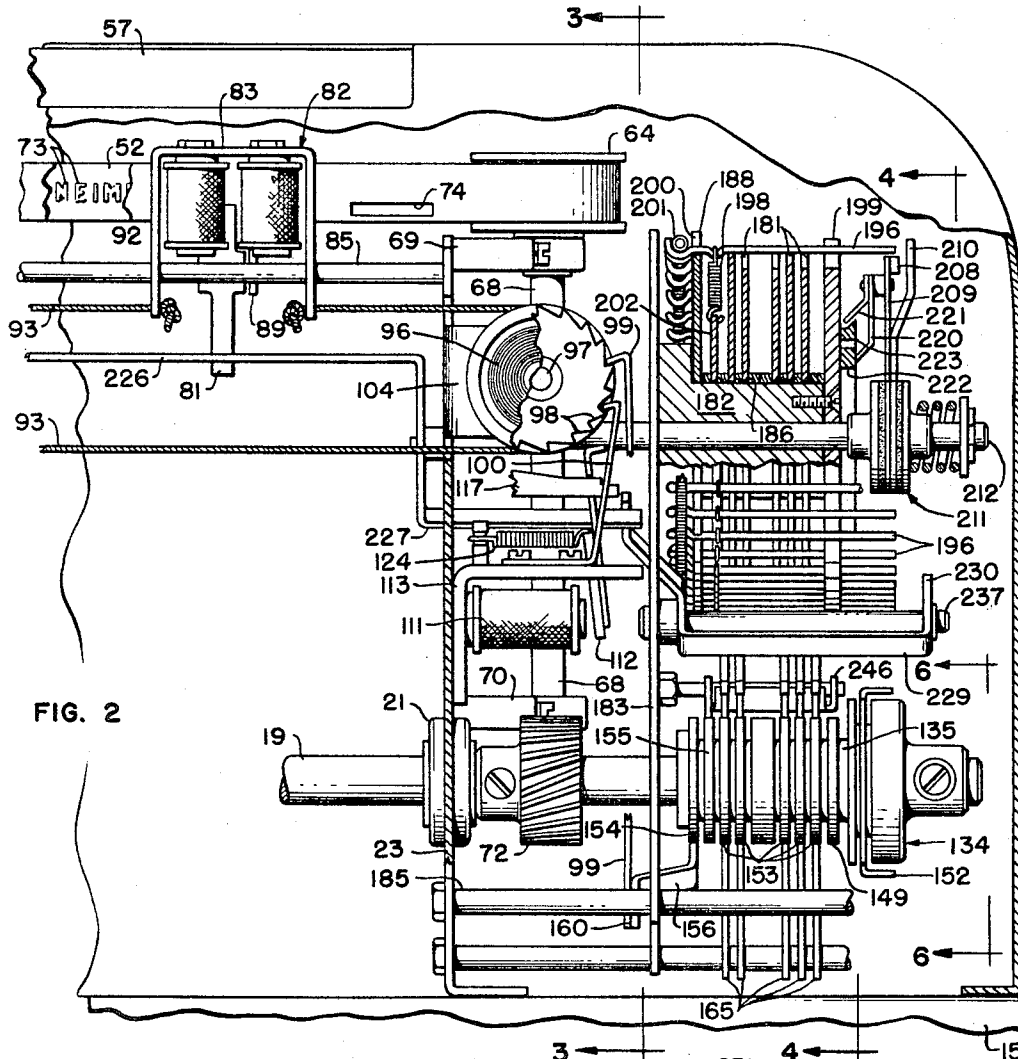
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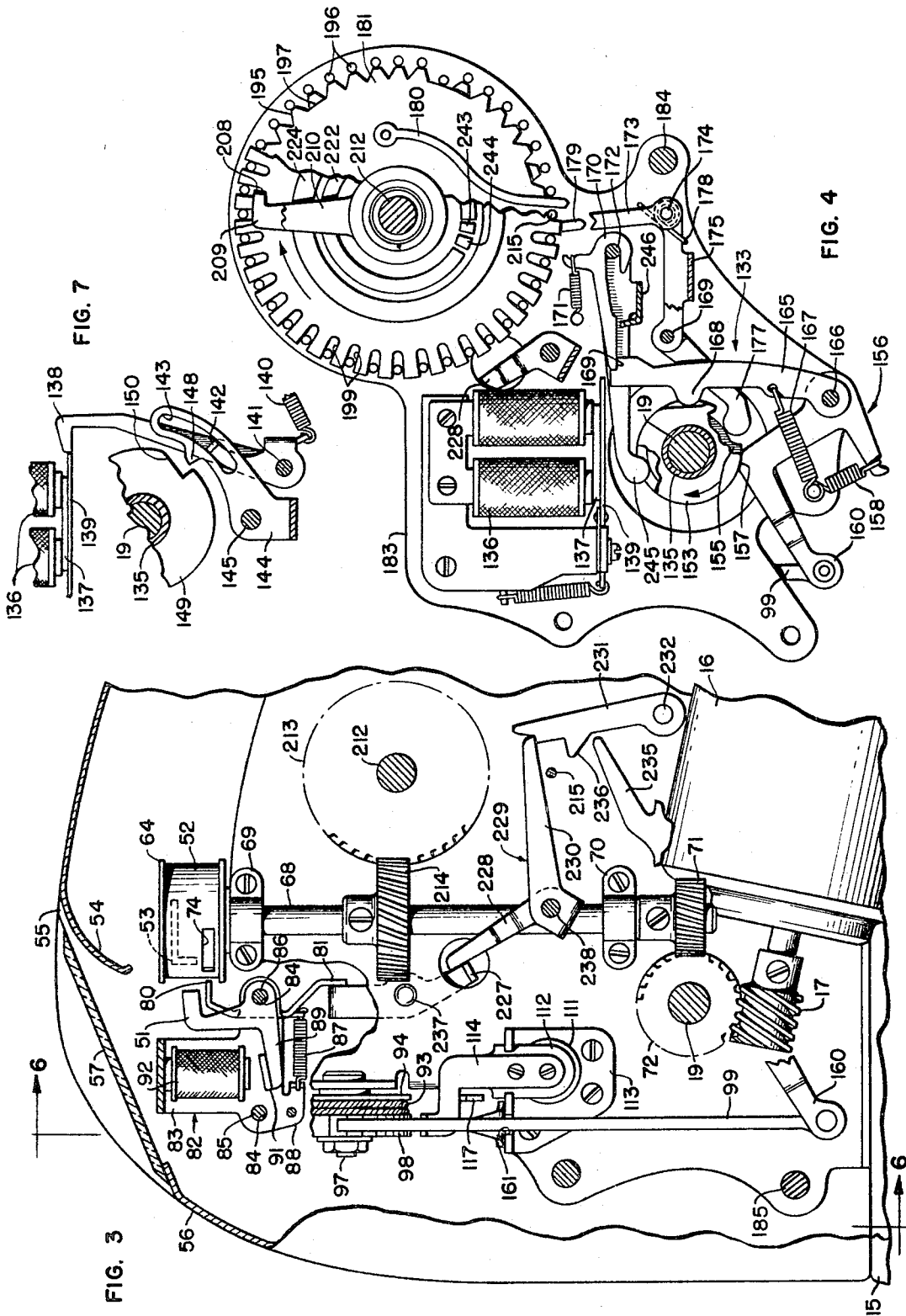
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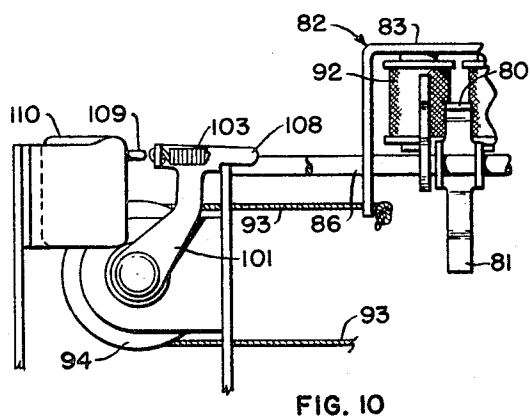
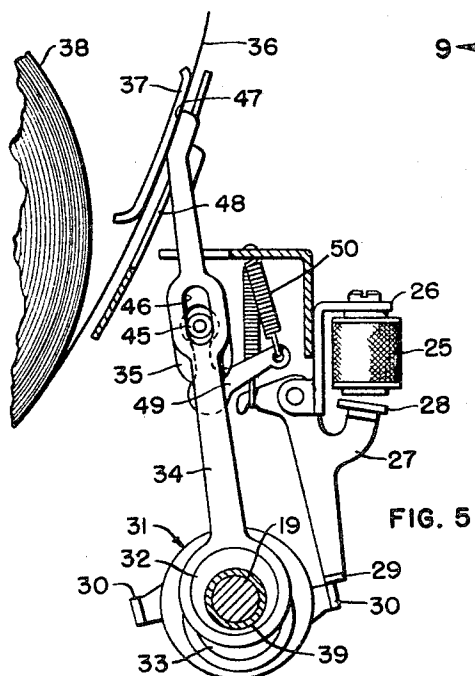
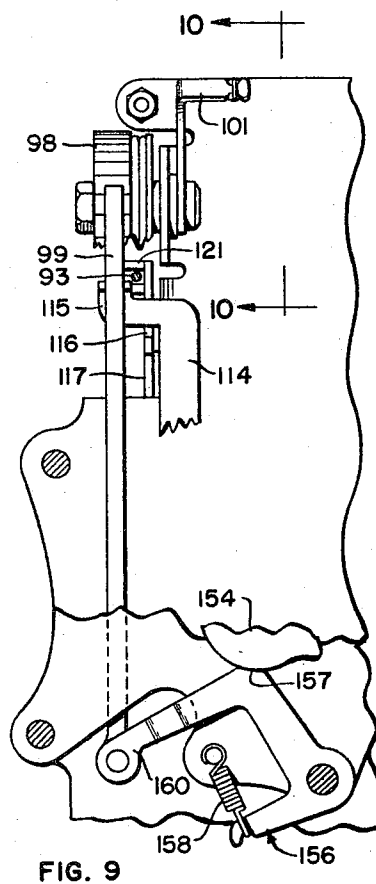
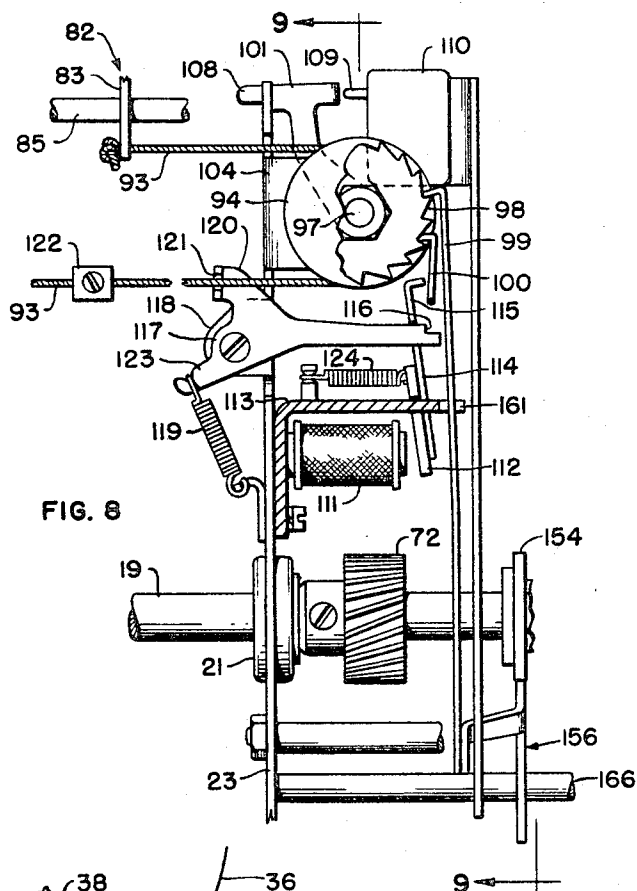
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PAGE PRINTER

Berthel F. Madsen, Arlington Heights, Ill., assignor to Teletype Corporation, Skokie, Ill., a corporation of Delaware

Filed Oct. 15, 1964, Ser. No. 404,013
12 Claims. (Cl. 178—33)

This invention relates to printing telegraph page printers and more particularly to telegraph page printers employing a continuously driven type belt.

It is an object of the present invention to provide a simple high speed page printer responsive to telegraph signals.

Another object of the invention is the provision of a page printer having a continuously driven type belt wherein the selection of a type for printing is set up in a simple mechanism for synchronizing the action of the printing hammer with the continuously driven tape.

A still further object of the invention is to provide a page printer mechanism utilizing a continuously driven type belt which operates under control of a pin barrel set by a receiving selector mechanism.

In accordance with the preferred form of the invention a type belt, having at least one complete set of type on it, is driven continuously past a print hammer carriage mechanism that is stepped across the page to effect character spacing and the type belt controls the synchronization of the print hammer actuating mechanism with a pin barrel mechanism that is set for operation by a telegraph signal receiving selector. The selector mechanism effects the setting of a pin barrel contact device and the type belt trips the pin barrel mechanism each time a set of type moves past the print hammer carriage thereby insuring synchronization of the operation of the circuit controlling pin barrel mechanism with the travel of the type belt past the print hammer.

A more complete understanding of the invention may be had by reference to the following detailed description when considered in conjunction with the accompanying drawings wherein:

FIG. 1 is a fragmentary front elevational view of the left-hand portion of a page printer constructed in accordance with the present invention, parts of the housing of the printer being broken away to reveal the operating mechanism for the printer showing the print hammer mechanism adjacent to the left end of the printer;

FIG. 2 is a fragmentary front elevational view of the right-hand portion of the page printer showing the print hammer mechanism near the extreme right end of its travel and when considered with FIG. 1 illustrates substantially all of the operating mechanism of the printer;

FIG. 3 is a fragmentary vertical sectional view taken substantially along the line 3—3 of FIG. 2 in the direction of the arrows, parts being broken away to reveal other parts of the apparatus and showing particularly the relationship between the print hammer mechanism and the type belt together with the drive for the type belt;

FIG. 4 is a fragmentary sectional view taken substantially along the line 4—4 of FIG. 2 in the direction of the arrows showing the pin barrel mechanism in end elevation (parts being broken away) and also showing portions of the selector mechanism;

FIG. 5 is a fragmentary transverse sectional view taken substantially along the line 5—5 of FIG. 1 in the direction of the arrows and illustrating the mechanism for feeding a web of paper through the apparatus to effect line spacing of the printer copy;

FIG. 6 is a fragmentary detailed view taken substantially along the line 6—6 of FIG. 2 in the direction of the arrows, showing a portion of the mechanism for

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synchronizing the operation of the type belt and the pin barrel;

FIG. 7 is a fragmentary view of a portion of the selector mechanism and illustrating details of the start mechanism for the selector.

FIG. 8 is a fragmentary elevational view showing further details of construction of the character spacing mechanism;

FIG. 9 is a partial sectional view taken substantially along the line 9—9 of FIG. 8 in the direction of the arrows; and

FIG. 10 is a fragmentary view taken, looking from the rear of the apparatus, substantially along the line 10—10 of FIG. 9 showing the further details of the character spacing mechanism.

In the drawings there is shown a base casting 15 in which there is suitably mounted a drive motor 16. The motor 16 is supported at a slight angle as illustrated most clearly in FIGS. 1 and 3 and drives a spiral gear 17 that meshes with a second spiral gear 18 (FIG. 1) fixed to a main drive shaft 19. The shaft 19 is thus continuously driven and is freely rotatable in bearings 20 and 21 that are in turn mounted in main upright plates 22 and 23, respectively. The main plates 22 and 23 are tied together by a cross brace 24 which is suitably fixed to the plates 22 and 23 and serves to support a double coil paper feed magnet 25 (FIGS. 1 and 5).

As may be seen most clearly in FIGS. 1 and 5 the paper feed magnet 25 is mounted on a bracket 26 that is in turn fixed to the cross brace 24. The bracket 26 pivotally supports an armature lever 27 that carries an armature 28 which, upon energization of the paper feed magnet 25, will be attracted toward the magnet 25 to rock a blocking extension 29 on the armature lever 27 out of the path of a clutch release arm 30 of a half-revolution clutch 31. This clutch 31 preferably is of the type shown in the patent to A. N. Nilson, Patent No. 2,568,249 issued on Sept. 18, 1951, except that instead of being a single revolution clutch, it is provided with two release arms 30 so that upon its release it will drive sleeve 39 carrying a pair of eccentrics 32 and 33 through one-half a revolution. The eccentrics 32 and 33 have associated with them eccentric drive members 34 and 35, respectively, which will alternately engage a web of paper 36 and press it against a backstop 37 which is suitably supported between the main plates 22 and 23 to feed paper from a supply roll 38 to printing position. The eccentric drive members 34 and 35 are oscillatably and slidably supported on guide rollers 45 which extend into slots 46 formed in the eccentric drive members 34 and 35.

The upper end of each of the eccentric drive members 34 and 35 is provided with a paper engaging face 47 which extends through a paper guide 48 so that, when the clutch 31 is tripped, one of the two eccentric drive members 34 or 35 will engage its face 47 with the web of paper 36 and push the paper upwardly as viewed in FIG. 5. The guide rollers 45 are mounted on the upper end of a bell crank lever 49 which is urged to rock in a counterclockwise direction (FIG. 5) by a contractile spring 50 suitably attached to a stationary portion of the apparatus. Thus, each time the clutch 31 is tripped one or the other of the drive members 34 or 35 will engage with the paper and drive it upwardly (FIG. 5). The paper in being fed upwardly will move out of the passage defined by the backstop 37 and paper guide 48 and will be directed upwardly past a print hammer 51 and an endless type belt 52 (FIG. 3). Any suitable inking ribbon (not shown) may be fed between the print hammer 51 and the web of paper 36 so that when the print hammer 51 strikes the ribbon it will drive the ribbon against

the paper and the paper will be driven against the type belt 52 or the paper may be of the type that is treated to display characters when struck by type. A suitable backing member 53 is provided for cooperation with the type belt 52 and print hammer 51. The web of paper 36 will be directed over a guide plate 54 (FIG. 3) and out through a slot 55 formed in a housing 56. The housing 56 has a window 57 set into it so that the printing on the web of paper 36 will be visible to an operator.

The type belt 52 is supported and driven by a pair of driving drums 64 and 65 (FIGS. 2 and 1, respectively). The drum 65 is freely rotatable on a stud shaft 66 which is mounted on a bracket 67 fixed to the main plate 22. At the other end of its course the type belt 52 is supported and driven by the drum 64 which is fixed to a belt driving shaft 68. The belt driving shaft 68 is rotatable in a pair of bearings 69 and 70 which extend to the right (FIG. 2) from the main plate 23. At its lower end the shaft 68 has a spiral gear 71 (FIG. 3) fixed to it which meshes with a spiral gear 72 that is in turn fixed to the main drive shaft 19. The shaft 19 thus continuously drives the shaft 68 which in turn continuously drives the belt 52. The belt 52 has type elements 73 fixed to it which comprise a plurality of sets of type characters that extend throughout the length of the belt. The belt 52 is also provided with a series of slots 74, one slot 74 being provided for each set of type on the type belt.

When the type belt is driven by the drum 64, the slots or indentations in it move in a path in direct horizontal alignment with a sensing portion 80 (FIG. 3) of a lever 81 that is pivotally mounted on a hammer carriage 82. The hammer carriage 82 includes a U-shaped bracket 83 which is provided with guide apertures 84 for slidably supporting the carriage on guide rods 85 and 86. The guide rods 85 and 86 are suitably secured in the main plate 22 and 23 and serve to guide the hammer carriage 82 in its travel transversely of the web of paper 36. Two depending legs of the bracket 83 have the apertures 84 formed in them and the legs are disposed on opposite sides of the lever 81 which is pivotally mounted on rod 86. The lever 81 is biased to rotate in a clockwise direction by a contractile spring 87 (FIG. 3) that is attached to the lever 81 and to a projection 88 extending downwardly from one of the legs of the bracket 83. Pivotally mounted on the rod 86 between the upwardly extending legs of the inverted U-shaped bracket 83 is an armature lever 89 in the form of a bell crank which has the hammer member 51 formed on its upper end and an armature 91 on its lower horizontally disposed portion. Fixed to the bracket 83 at its horizontally extending portion are a pair of magnet coils 92 which, when they are energized, attract the armature 91. At the time that printing is to be effected the coils 92 are energized momentarily to cause the armature 91 to be attracted and thereby to rock the armature lever 89 clockwise (FIG. 3). When the armature lever 89 is rocked clockwise the hammer member 51 will drive the ink ribbon (if one is used) to force the web of paper 36 against a type character 73 which is then in alignment with the hammer member.

A cable 93 (FIG. 2) has its ends attached to the hammer carriage 82 and is directed around a driving pulley 94 and an idler pulley 95 (FIG. 1) suitably mounted on bent over portions 103 and 104 of the main upright plates 22 and 23, respectively. The driving pulley 94 is of the usual clock spring type having a driving spring 96 (FIG. 2) which tends to drive in in a counterclockwise direction about a stationary shaft 97 to which one end of the clock spring 96 is attached, the other end of the clock spring 96 being attached to an inner surface of the drum 94. One of the flanges of the drum 94 is provided with ratchet teeth 98 for cooperation with a driving pawl 99 and a retaining pawl 100. In each cycle of the apparatus the driving pawl 99 will be drawn downwardly, as will be more fully described hereinafter, to advance the driving pulley

94 one step, thereby to move the hammer carriage 82 one step to the right where the driving pulley 94 will be held by the retaining pawl 100 until the hammer carriage 82 reaches the end of its travel to the right where it will engage a switch operating level 101 (FIG. 8) and rock the lever 101 clockwise about the shaft 97 against the action of a spring 103 (FIG. 10).

The switch actuating lever 101 has a projection 108 which will be engaged by the right leg (FIG. 8) of the U-shaped bracket 83 and will be rocked thereby to engage the actuator pin 109 of a switch 110. The switch 110 controls the supply of power to a carriage release magnet 111 and when actuated the switch 110 will cause the magnet 111 to be energized and attract its armature 112 which is pivoted on a bracket 113 that also supports the magnet 111 and is in turn mounted on the main upright plate 23. The armature 112 carries a release lever 114 and upon energization of the magnet and consequent movement of the armature 112 clockwise (FIG. 8) the upper end of the release lever 114 will engage the retaining pawl 100 to disengage it from the ratchet 98 and move it over to engagement with the driving pawl 99 to move the pawl 99 out of engagement with the ratchet teeth 98. This will release the drum 94 and permit its clock spring 96 to drive the hammer carriage 82 to its leftmost position. Momentary energization of the magnet 111 and consequent operation of the release lever 114 will move the release lever to a position where a laterally extending portion 115 (FIG. 9) of the lever 114 will pass over a shoulder 116 on a latch lever 117.

The latch lever 117 is pivotally mounted on a bent over portion 118 (FIG. 8) of the main upright plate 23 and is urged to rock counterclockwise by a contractile spring 119 attached to one arm 123 of the latch lever 117 and to the main upright plate 23. Another arm 120 of the latch lever 117 has its end bent over and slotted as shown at 121 to partially surround the lower course of the cable 93. The cable 93 has suitably fixed to it a latch trip member 122 in a position such that the latch trip member will engage the arm 120 of lever 117 and rock lever 117 clockwise against the urging of the spring 119 when the hammer carriage 82 is in its extreme left-hand position, that is, in position to begin a line of type. When the latch trip member 122 thus rocks the lever 117 clockwise (FIG. 8) the shoulder 116 on the lever 117 will be released from the laterally extending portion 115 of lever 114 and a spring 124 will restore the lever 114 to the position shown in FIG. 8, thus to permit the retaining pawl 100 and drive pawl 99 to re-engage with the ratchet teeth 98.

For the sake of simplicity the printer shown herein is of the type that operates under control of five level start-stop permutation code combination signals. In such a system binary signals of current (marking) or no current (spacing) are transmitted over a telegraph line to a selector mechanism which translates these electrical conditions into mechanical movements to control the printing of page copy in accordance with the sequence of marking and spacing conditions received. In the embodiment of the invention shown herein a selector mechanism 133 of the type disclosed in detail in the patent to W. J. Zenner No. 2,595,746 issued May 6, 1952 is used. As shown in that patent a single revolution clutch upon operation releases a cam sleeve for a single cycle whereas in the present invention a half revolution clutch 134 releases a cam sleeve 135 for one-half revolution.

In the start-stop code systems, the normal line condition is marking, so that the receiving selector magnet 136 is normally energized when no transmission is taking place. When the selector magnet 136 is energized as shown in FIG. 7 it will attract an armature 137 toward it to block a start lever 138, the upper end of which is blocked from movement by an armature lever 139 on which the armature 137 is mounted. A spring 140 biases the start lever

in a counterclockwise direction (FIG. 7) about a pivot 141 so that when the selector magnet 136 is energized the upper end of the start lever 138 will bear against the edge of the armature lever 139. Upon release of the armature 137, by the deenergization of the selector magnet 136, due to the receipt over the telegraph line of a spacing or no current signal, the start lever 138 will be rocked counterclockwise (FIG. 7) by the spring 140. Extending from an arm of the start lever 138 is a projection 142 which extends into a slot 143 formed in a clutch trip lever 144. The clutch trip lever 144 is pivotally mounted on a pin 145 (FIGS. 6 and 7) which extends outwardly from an orientation plate 146 that may be adjusted about the shaft 19 and locked in place by a manually operable lock member 147. The orientation plate 146 may be rocked and set to any desired position to synchronize the operation of the selector mechanism 133 with incoming signals and after having once been properly set the plate may be locked by the lock member 147. In any of its adjusted positions, the clutch trip lever 144 will operate under control of the start lever 138 and the clutch trip lever has a camming projection 148 (FIG. 7) for cooperation with a restoring cam 149 on the cam sleeve 135 whereby after having been released by the armature 139, the start lever 138 will be restored to a position slightly to the right of that shown in FIG. 7 and will be held in that position until a low portion 150 of the restoring cam is in alignment with the camming projection 148. Formed on an end of the clutch trip lever is a blocking arm 151 which normally blocks a clutch release lever 152 of the type shown in the afore-mentioned patent to A. N. Nilson.

From the foregoing it is believed to be apparent that, upon the receipt of a spacing signal indicating the start of a code combination, the electromagnet 136 will be released and its release will result in the initiation of a half cycle of rotation of the cam sleeve 135. The cam sleeve 135 carries, in addition to the restoring cam 149, five intelligence cams 153 (1, 2, 3, 4 and 5), a carriage driving cam 154 and a disc driving cam 155.

The carriage driving cam 154 has associated with it a cam lever 156 (FIG. 4) that is pivoted on a stationary shaft 166 and that has a cam follower portion 157 which is urged into contact with the driving cam 154 by a contractile spring 158. The cam lever 156 has a transversely extending portion 159 (FIG. 2) that terminates in a downwardly extending arm 160 to which the driving pawl 99 is pivotally attached. As shown most clearly in FIG. 3, the pawl 99 is guided in a slot 161 formed in the bracket 113 so that, upon oscillation of the cam lever 156, reciprocation will be imparted to the pawl 99 which is biased to operative engagement with the ratchet 98.

Each of the cams 153 has associated with it a selector cam lever 165. These cam levers 165 are pivoted on the stationary shaft 166 and are individually biased to rock in a counterclockwise direction by contractile springs 167. Each of the selector cam levers 165 has a camming projection 168 formed on it intermediate its ends and has a shoulder 169 cut into its upper end.

Individually associated with each selector cam lever 165 is a push lever 170 which normally rests upon the upper end of its cam lever but which may be rocked to the position shown in FIG. 4 by an associated spring 171. The push levers 170 are slidably and oscillatably mounted on a pivot rod 172. Upon receipt of a marked signal by the selector magnet 136, at a time in the cycle of cam sleeve 135 when a low part of the cam 153 is aligned with the camming projecting 168 on that particular selector cam lever 165, the selector cam lever 165 will be rocked counterclockwise (FIG. 4) and the push lever 170 will be moved to the position shown in FIG. 4. When the high portion of the cam 153 cams its cam lever 165 clockwise, the cam lever 165 will push its associated push lever 170 to the right.

Each push lever 170 has individually associated with it a selector member 173 pivotally mounted on an actuator

rod 174 common to all of the selector members. The rod 174 is supported for movement on an actuator bail 175 that is in turn pivoted on a stationary shaft 176 and has extending from it a cam lever 177. The individual selector members 173 are urged to assume the position shown in FIG. 4 by torsion springs 178 individual to them. Those push levers 170 that are not selected for operation and actuated by their respective selector cam levers 165 will remain in the position shown in FIG. 4 and will not actuate their associated selector members 173. Consequently, those selector members 173 that are not selected and actuated by their push levers 170 will remain in alignment with a left-hand disk actuator 179. When the cam sleeve 135 rotates it will present a high portion of the disk driving cam 155 to the cam lever 177 thus to rock the actuator bail 175 counterclockwise about the shaft 176 and drive the selector member 173 upwardly to engage and move the disk actuator 179 upwardly.

Any of the push levers 173 that are selected and actuated, that is, rocked clockwise about the actuator rod 174 (FIG. 4), will be aligned with the right-hand disk actuator 180 to move the disk actuator 180 upwardly when the bail 175 is rocked counterclockwise about the shaft 176. The right-hand disk actuator 180 and a companion left-hand disk actuator 179 are pivotally connected to each disk 181. There are five of the disks 181 provided, one for each code level and individually associated with each selector member 173. These disks 181 are oscillatably mounted on a bearing member 182 (FIG. 2) that is fixed to a plate 183 in turn supported upon posts 184 and 185 suitably attached to the framework of the machine. The disks 181 are held in spaced relation one to the other by a plurality of spacer members 186 and are positioned between notched retainer plates 187 and 188 fixed to the bearing member 182.

The disk actuators 179 and 180 are pivotally attached to their respective disks 181 and will serve to rotate the disk 181 a slight amount when the disk actuators are moved upwardly by the selector member 173. Formed in the outer peripheral surfaces of the disks 181 are a series of coded notches 195. These notches 195 are so arranged that upon the receipt of a given code combination signal in the selector mechanism 133 and the consequent actuation of the selector members 173, some of the disks 181 will be rocked clockwise whereas other of the disks will be rocked counterclockwise as viewed in FIG. 4, to allow a single pin 196 of a plurality of pins 196 to drop into a larger notch as indicated at 197 in each of the five disks 181. Thus, upon the receipt of a given code combination by the selector mechanism 133, one pin and only one pin 196 will be permitted to move toward the axis of rotation of the disks 181. The pins 196, as shown in FIG. 2 are individually urged towards the axis of rotation of the disks 181 by contractile springs 198 individual to them and are held in a series of notches 199 and 200, formed about the periphery of the retainer plates 187 and 188, by the cooperative action of their individual springs 198 and a garter spring 201. Suitable bends are formed in each of the pins 196 to receive the garter spring 201 and individual contractile springs 198. The springs 198 are attached to a spring holding plate 202 which is mounted, between spacers 186, on the outer periphery of the bearing member 182. By reference to FIG. 2 it will be seen that the second and fifth disks 181 from the right-hand side, that is, the disks for levels 4 and 1 have the projection between their notches 195 engaging the top most pin 196 to prevent it from moving inwardly under the influence of its spring 198 and the garter spring 201, whereas the larger notches 197 on the disks 181 for the fifth, third and second levels are aligned with the top most pin 196. If the disks 181 for the first and fourth levels were also positioned to present a large notch 197 to the top pin 196, that pin would rock about the base of the slot 200 in plate 188.

In each code combination that is received in the print

er one pin 196 in the pin barrel arrangement will be moved inwardly toward the axis of the disks 181. The pins 196 in moving inwardly will pivot about the inner end of its associated slot 200 when the projection in that area of the disk is removed to form a larger notch as shown at 197 in FIG. 4. Thus, the right end (FIG. 2) of the selected pin 196 will rock in an arcuate path in a clockwise direction when that pin is selected, and will move its free end into the path of a camming end 208 of that contact actuating spring 209. The contact actuating spring 209 is fixed to a stop arm 210 which is frictionally urged to rotate in a clockwise direction (FIG. 4) by a friction type clutch 211. The clutch 211 (FIG. 2) is mounted on a shaft 212 journaled in the bearing member 182. Power is supplied to drive the shaft 212 through a gear 213 fixed to the shaft 212 and meshing with a gear 214 that is fixed to the constantly rotating shaft 68.

In the drawing, particularly in FIGS. 2 and 4, the stop arm 210 is shown in its "12 o'clock" position although the stop arm never stops in this position but is normally blocked from rotating by a pin 215 which is mounted in the pin barrel in the same manner as pin 196 but which is longer than the pin 196 and extends into the path of the stop arm 210 when no signal is being translated by the pin barrel arrangement. Thus the stop arm 210 normally would be stopped in the position opposite to that shown in FIGS. 2 and 4, that is at the "6 o'clock" position.

A pair of contact springs 220 and 221 are carried by the contact actuating spring 209. The inner one 220 of the contact spring is biased to engage and interrupted commutator ring 222 and the other one 221 of the contact springs is normally held out of engagement with a continuous commutator ring 223. When the camming end 208 of the contact actuating spring 209 engages a pin that has been rocked toward the center of the shaft 212, the contact spring 221 will engage the commutator ring 223 to complete a circuit to momentarily energize the magnet coils 92 thereby actuating the print hammer 51 to effect the printing of a character as represented by a pin 196 in the pin drum arrangement. Since the pin 215, in the normal inactive condition of the pin drum arrangement, is in blocking relation to the stop arm 210, the rotation of the stop arm 210 and the contact actuating spring 209 carried by it will always start at the same position and the pin 215 will be held in blocking position until it is moved outwardly out of the path of the stop arm 210. The time at which contact is made between the commutator ring 223 and spring 221 will control the time at which the print hammer 51 is operated. Consequently, the travel of the type belt 52 and the spring 209 must be synchronized.

As previously described, the type belt 52 is provided with slots 74 into which the sensing portion 80 (FIG. 3) of lever 81 may fall. The lower end of the lever 81 bears against a bail 226 which extends across the area between the plates 22 and 23 and is pivoted thereon. The bail 226 is provided with a laterally extending arm 227 (FIGS. 2 and 3) that extends through the plate 23 and into the path of movement of an arm 228 of a bail type lever 229 which has a horizontally extending arm 230 that normally bears against a latch 231 pivotally mounted on the plate 183 by means of a pivot stud 232. A torsion spring 233 (FIG. 6) normally urges the latch 231 to rock counterclockwise about the pivot stud 232 and into position to hold the bail type lever 229 from rotating in a clockwise direction, thereby, through the bail 226 preventing the lever 81 from moving its sensing portion 80 into contact with the type belt 52 under the influence of biasing spring 87 (FIG. 3).

Just before positioning of the code disks 181 is completed an extension 235 (FIG. 6) of actuator bail 175 will engage a camming surface 236 on the latch 231 to rock the latch 231 clockwise and release the bail type lever 229 which will then move down and engage the pin 215. Since the pin 215 is at this time blocking rotation of the stop arm 210, the stop arm 210 will remain stationary

at its "6 o'clock" position (FIG. 4) until the sensing portion 80 or lever 81, which at this time has been released to bear against the type belt 52, encounters a slot 74 in the type belt. When sensing portion 80 encounters a slot 74 in the type belt, spring 87 will be permitted to rock lever 80 clockwise about the guide rod 86 thereby to rock the bail 226 counterclockwise about its pivot rod 237 which in turn will rock the bail type lever 229 clockwise about its pivot stud 238. When the bail type lever 229 rocks counterclockwise, its arm 230 will engage the pin 215 to rock the pin out of the path of the stop arm 210 thus to insure that the start of a cycle of rotation of the stop arm 210 is exactly synchronized with the position of the type on the type belt 52.

As the stop arm 210 is driven by the friction clutch 211, about the axis of the shaft 212, the camming end 208 of the contact actuating spring 209 will travel with the stop arm 210 and upon encountering the single pin 196 which has been permitted to rock into the bottom of its slot in the retainer plate 187, by the aligned larger notches 197, the contact actuating spring 209 will move contact spring 221 into contact with the continuous commutator ring 223 to complete a circuit momentarily to the magnet coils 92 thereby to effect the printing of the character which at that time is aligned with the print hammer 51. Since the type belt 52 will be driven at a rate of speed to present all of the characters on it to the print hammer 51 while the stop arm 210 makes a single revolution, the particular pin 196 which has been selected by the pin barrel arrangement will cause the printing of the character associated with it. If the signal received in the selector mechanism 133 calls for a line feed operation the pin 196 associated with that function will be selected and will cause the contact spring 221 to engage a segment 243 of the interrupted commutator ring 222 to complete a circuit to the line feed or paper feed magnet 25. Operation of magnet 25 will trip the half revolution clutch 31 to impart a half cycle of rotation to the eccentrics 32 and 33 thereby to cause either one of the eccentric drive members 34 or 35 to feed the web of paper 36 upwardly one step thus to present a new line on the paper to the printing mechanism.

If the signal received in the selector mechanism 133 is a carriage return signal the pin 196 aligned with a segment 244 will be engaged by the common spring 221 to supply an operating pulse to the carriage return or carriage release magnet 111. In the selector mechanism the code combination of signals will control the setting of the push levers 170 and will thus control the setting of the disks 181. Shortly after the time that the selector member 173 has set the disks 181, a cam lever 245 associated with the restoring cam 149 will rock a restoring bail 246 about the pivot rod 172 to engage the under surfaces of the push levers 170 and restore them to position where the under surface of them will rest on top of the selector cam levers 165.

Operation

In the operation of the apparatus, as is usual in start-stop permutation code operated teleprinters, the normal condition of the telegraph signal line is marking. Consequently, the selector magnet 136 in the selector mechanism 133 is normally energized and its armature lever 139 as shown in FIG. 7 is in blocking relation to the end of start lever 138. In the start-stop permutation code the first signal over the telegraph line is a spacing signal which will initiate operation of the selector mechanism by releasing the armature 137 to permit the start lever 138 to rock counterclockwise about its pivot 141 thereby to trip the clutch 134 and initiate a half cycle of rotation of the cam sleeve 135. The cams on the cam sleeve 135 are so arranged that the first operation effected by these cams is the rocking of the cam lever 245 clockwise about the pivot rod 172 to move the restoring bail 246 upwardly thus to trip from their respective selector cam levers 165 any of the push levers 170 which were held in their right-hand

positions. As the cam sleeve 135 continues to rotate the electromagnet 136 of the selector mechanism 133 will either be energized or deenergized sequentially depending upon the code combination of marking and spacing signals received in the selector mechanism. If in the cycle of the cam sleeve 135, which incidentally is one-half revolution of the cam sleeve, marking signals are received, the armature lever 139 will be moved out of the path of the left-hand surface of the selector cam levers 165 at the time that these levers are aligned with low points on their respective intelligence cams 153. This will permit the levers 165, in the levels which are marking, to rock counterclockwise about the stationary shaft 166 to a position where their respective push levers 170 will drop behind the shoulders 169 on the aligned selector cam levers. The lower portions of the cams 153 are relatively small compared to the high portion of the cams and consequently immediately after being selected the cam levers 165 in those levels that are marking will be rocked clockwise to drive their respective push levers 170 to the right (FIG. 4). The cam levers 165 will be maintained in their clockwise position to hold the push levers 170 in their right-hand positions throughout the remainder of the cycle (one-half revolution) of the cam sleeve. Those of the push levers 170 which are moved to the right (FIG. 4) will move their associated selector members 173 over into alignment with the right-hand disk actuator 180 of the disk 181 assigned to that level of the code. Those of the actuator members 173 that are not rocked clockwise about the actuator rod 174 will remain in alignment with left-hand disk actuator 179 at that particular level. Near the end of the half revolution of the cam sleeve 135 which was initiated upon the receipt of a spacing signal, as previously described, the disk driving cam 155 will actuate cam lever 177 to rock the actuator bail 175 counterclockwise about the shaft 176 thus to set the disks 181 in a selected position representative of the code combination received by the selector magnet 136.

Since the actuator bail 175 carries the extension 235 on it, it will, after all of the code disks 181 are set, cam the latch 231 out of the path of the arm 230 of bail type lever 229 thereby to permit the sensing portion 80 of the lever 81 to bear against the constantly moving type belt 52. As soon as the sensing portion 80 engages a slot 74 in the type belt 52 the spring 87 will serve to actuate the lever 81 and through the bails 226 and bail 229 will move the pin 215 out of the path of the stop arm 210 and initiate a cycle of rotation of the stop arm and contact springs carried by it in timed relation to the passage of type past the print hammer 51. Since the lever 81 is carried on the hammer carriage 82, the type will be presented to the hammer 51 in synchronism with the rotation of the contact actuating spring 209 in the pin barrel assemblage.

In setting the disks 181 to their respective rotative positions, one and only one pin 196 will be permitted to fall into five aligned notches 197 on the disks 181 and when the contact actuating spring 209 moves its camming end 208 over a selected pin, a circuit will be completed through the commutator rings 222 and 223 to energize the magnet coils 92 thereby to actuate the print hammer 81.

Each cycle of the cam sleeve 135, that is, each half revolution of the cam sleeve 135 will actuate the letter spacing mechanism including the cam lever 156 and a pawl 99. Similarly, if a line feed or carriage return code combination of signals is received in the selector mechanism 133 these functional operations will be formed in the manner described in the general description of the structure of that portion of the apparatus. If the hammer carriage 82 reaches the end of a page of copy being printed before a line feed signal is received in the selector magnet 133 the carriage 82 will be returned to its starting position as described in connection with that portion of the apparatus.

Although a particular embodiment of the invention is

shown in drawings and described in the foregoing specification it will be understood that the invention is not limited to that specific embodiment, but is capable of modification and rearrangement and substitution of parts and elements without departing from the scope of the invention.

What is claimed is:

1. A device for printing any one of a plurality of characters in any one of a plurality of printing positions including:

10 a set of type elements each bearing a different character; means for moving the set of type elements sequentially past at least a selected one of a plurality of printing positions;

15 means for detecting movement of the start of the set of type elements past the selected printing position;

15 a plurality of character storage elements each individual to one of the type elements in the set, each setttable to a selected condition and each normally in a non-selected condition;

20 means for setting the character storage element corresponding to one of the type elements to its selected condition;

20 means for scanning the character storage elements and for producing an output upon scanning a character storage element in the selected condition;

25 means responsive to the output of the detecting means for causing the scanning means to scan the character storage elements in synchronism with the movement of the set of type elements past the printing position, and

30 means responsive to the output of the scanning means for causing the character on the type element corresponding to the selected character storage element to be printed.

35 2. The device according to claim 1 wherein the set of type elements is supported on a type carrying member and wherein the detecting means includes:

40 means mounted on the type carrying member for indicating the start of the set of type elements,

40 means responsive to the indicating means for producing the output of the detecting means, and

means for positioning the means responsive to the indicating means in the selected printing position.

3. The device according to claim 1 wherein the detecting means and the means for causing the character to be printed are both mounted on a carriage member and further including means for positioning the carriage in any one of a plurality of printing positions.

4. The device according to claim 1 wherein the means responsive to the output of the detecting means includes means driven by the type element moving means for driving the scanning means, blocking means normally preventing operation of the scanning means and means responsive to the output of the detecting means for releasing the blocking means thereby permitting the scanning means to operate in synchronism with the movement of the set of type elements.

5. The device according to claim 1 wherein the means for setting the character storage element includes:

60 means for receiving character representative signals, and

means for setting the character storage element corresponding to the received character to its selected condition.

6. A device for printing characters in accordance with received signals including:

65 a continuously rotating member having a plurality of character bearing type elements affixed to it;

70 a selector for receiving character representative signals and for providing an output in response to each character received;

means responsive to the output of the selector mechanism for storing a representation of each character received by the selector mechanism;

75 means for scanning the storage means and for produc-

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ing an output in accordance with the character stored;
means responsive to the start of each revolution of the
rotating member for initiating operation of the scan-
ning means, and

means responsive to the output of the scanning means 5
for causing the character on an individual type ele-
ment on the rotating means to be printed.

7. The device according to claim 6 wherein the rotating
member carries a set of character bearing type elements
and wherein the means responsive to the start of each 10
revolution of the rotating member initiates operation of
the scanning means at a predetermined point in each rev-
olution of the set of type elements.

8. The device according to claim 7 wherein the storage
means includes a plurality of storage elements one indi- 15
vidual to each type element on the rotating member and
including means for causing the scanning member to scan
the storage means in synchronism with the rotation of
the rotating member so that the scanning member scans 20
each storage element at the same time the type element
corresponding to that storage element passes a printing
position.

9. The device according to claim 7 wherein the means
responsive to the start of each revolution of the rotating
means includes:

means mounted on the rotating means for indicating
the start of the set of type elements;

means for sensing the set indicating means and for ini-
tiating operation of the scanning means whenever the
set indicating means is sensed, and

means for positioning the sensing means in each of a
plurality of printing positions.

10. A mechanism for printing a selected character at
a printing position including:

a plurality of members positioned in a predetermined 35
pattern in a circular array and each corresponding
to a particular character;

means for moving the member corresponding to the
selected character out of the circular array to a
selected position; 40

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means for sweeping around the array and for producing
an output upon engagement with any member which
is out of the array and in the selected position;

a plurality of type elements arranged in the predeter-
mined pattern and each corresponding to one of the
members;

means for constantly moving the type elements past the
printing position;

means for coupling the sweeping means to the moving
means when the pattern of type elements starts to
pass the printing position and for causing the sweep-
ing means to pass each member as the type element
corresponding to the member passes the printing posi-
tion; and

means responsive to the output of the sweeping means
for causing the type element corresponding to the
member in the selected position to print.

11. The mechanism according to claim 10 further in-
cluding a print hammer positioned at the printing position
and means responsive to the output of the sweeping means
for driving the hammer into engagement with the type ele-
ment corresponding to the member in the selected position.

12. The mechanism according to claim 11 wherein the
type elements are mounted on a belt which constantly
rotates the type elements past a plurality of printing po-
sitions and wherein the hammer is selectively positionable
at any of the positions.

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THOMAS A. ROBINSON, *Primary Examiner.*