

Oct. 11, 1955

K. J. BRAUN ET AL
DOT PRINTING INTERPRETER

2,720,164

Filed Jan. 26, 1952

7 Sheets-Sheet 1

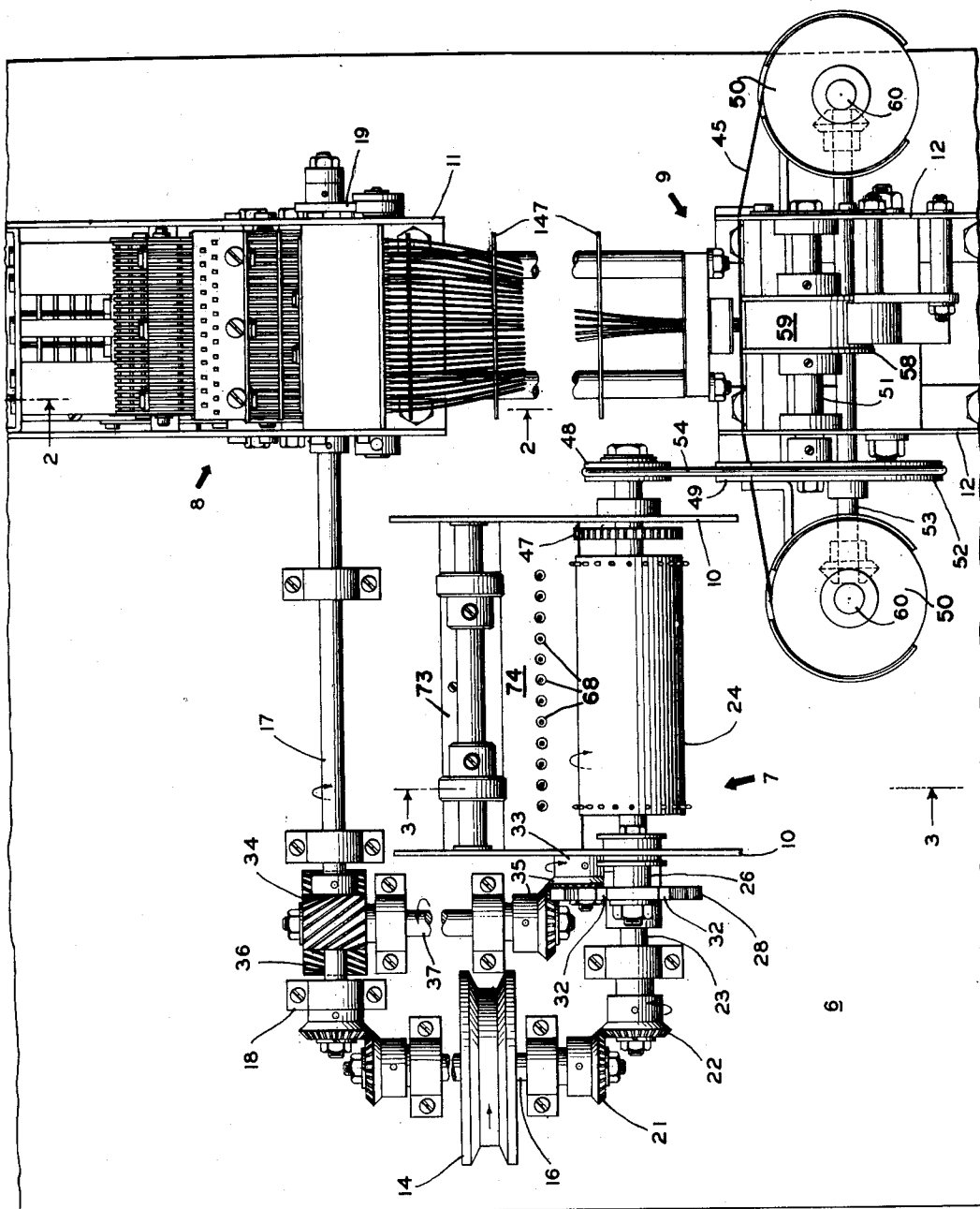


FIG. 1

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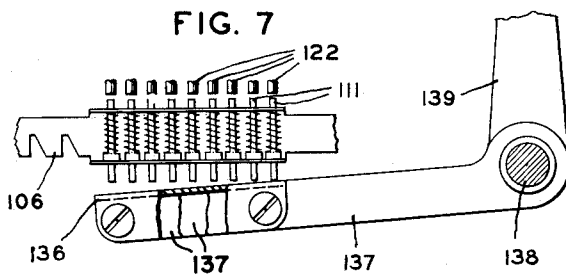
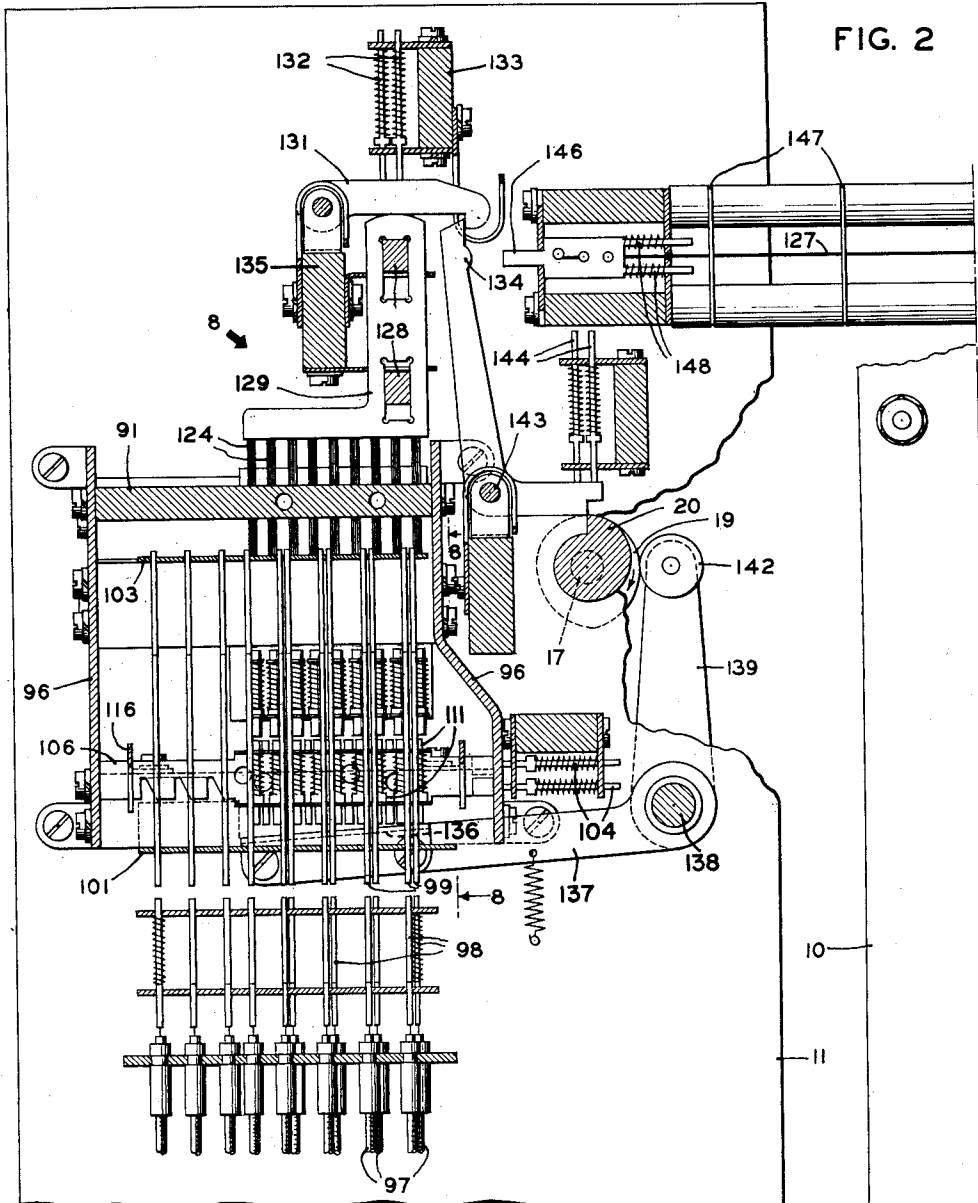
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7 Sheets-Sheet 2



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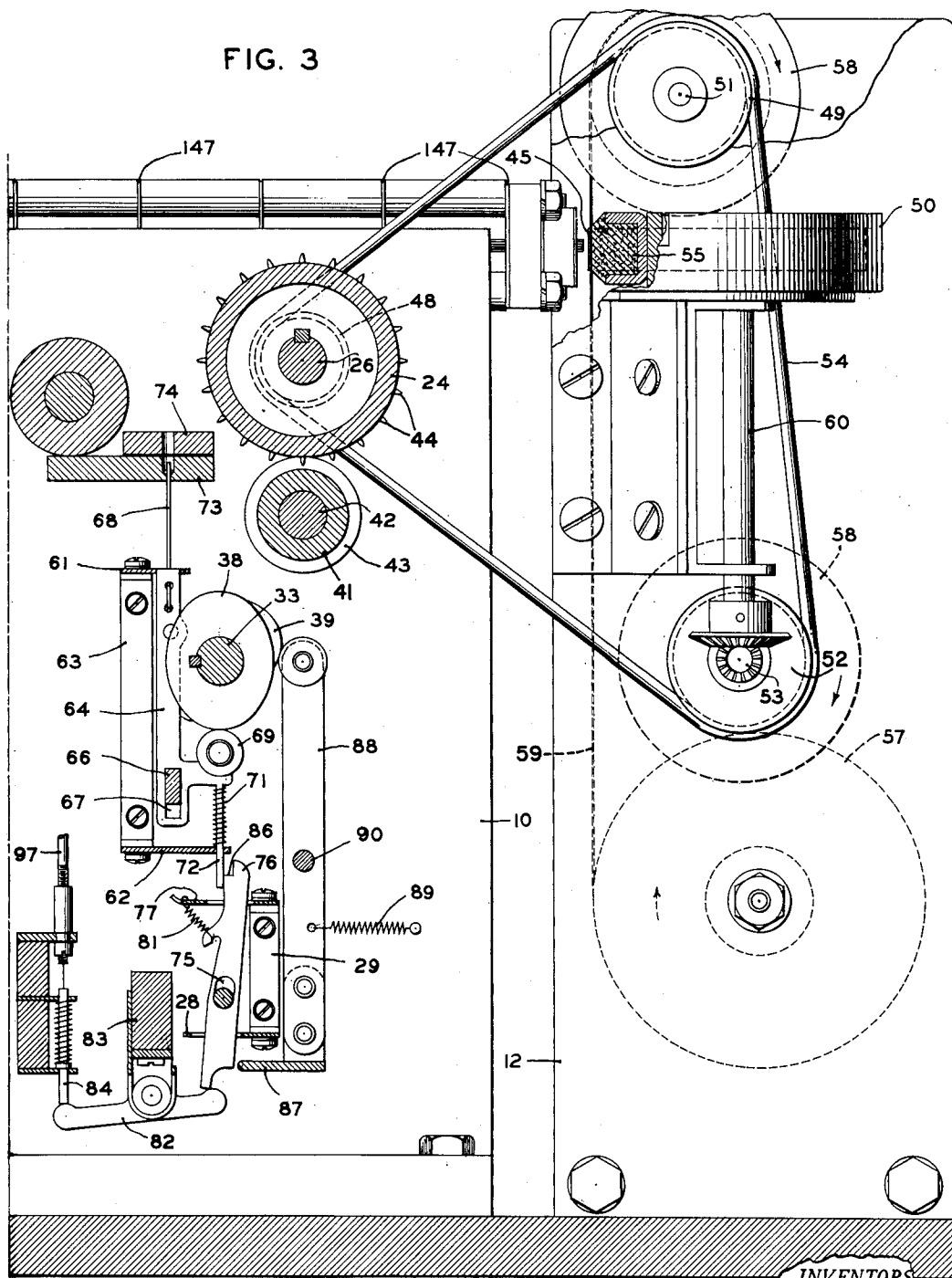
2,720,164

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Filed Jan. 26, 1952

7 Sheets-Sheet 3

FIG. 3



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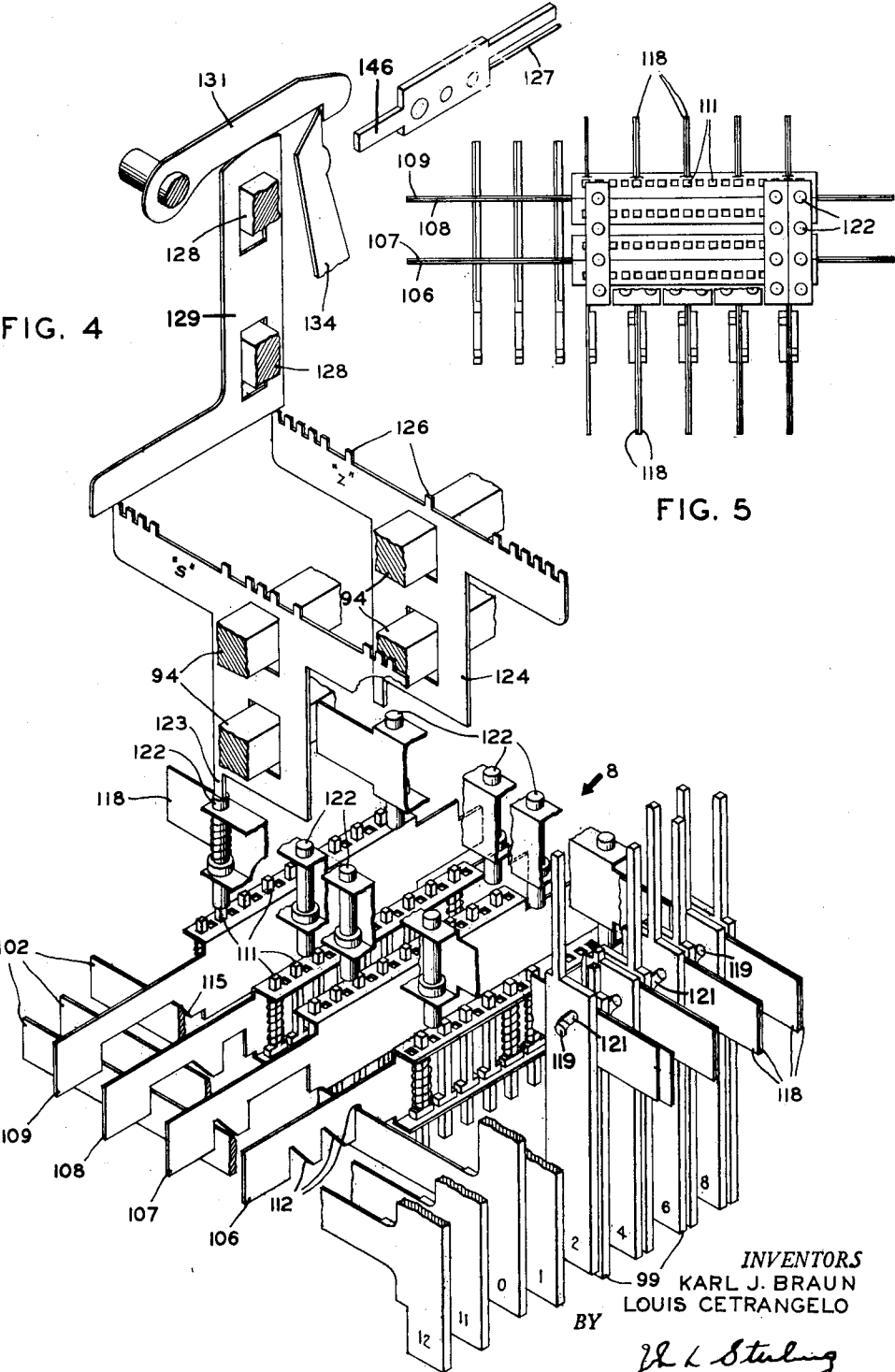
Oct. 11, 1955

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Filed Jan. 26, 1952

7 Sheets-Sheet 4



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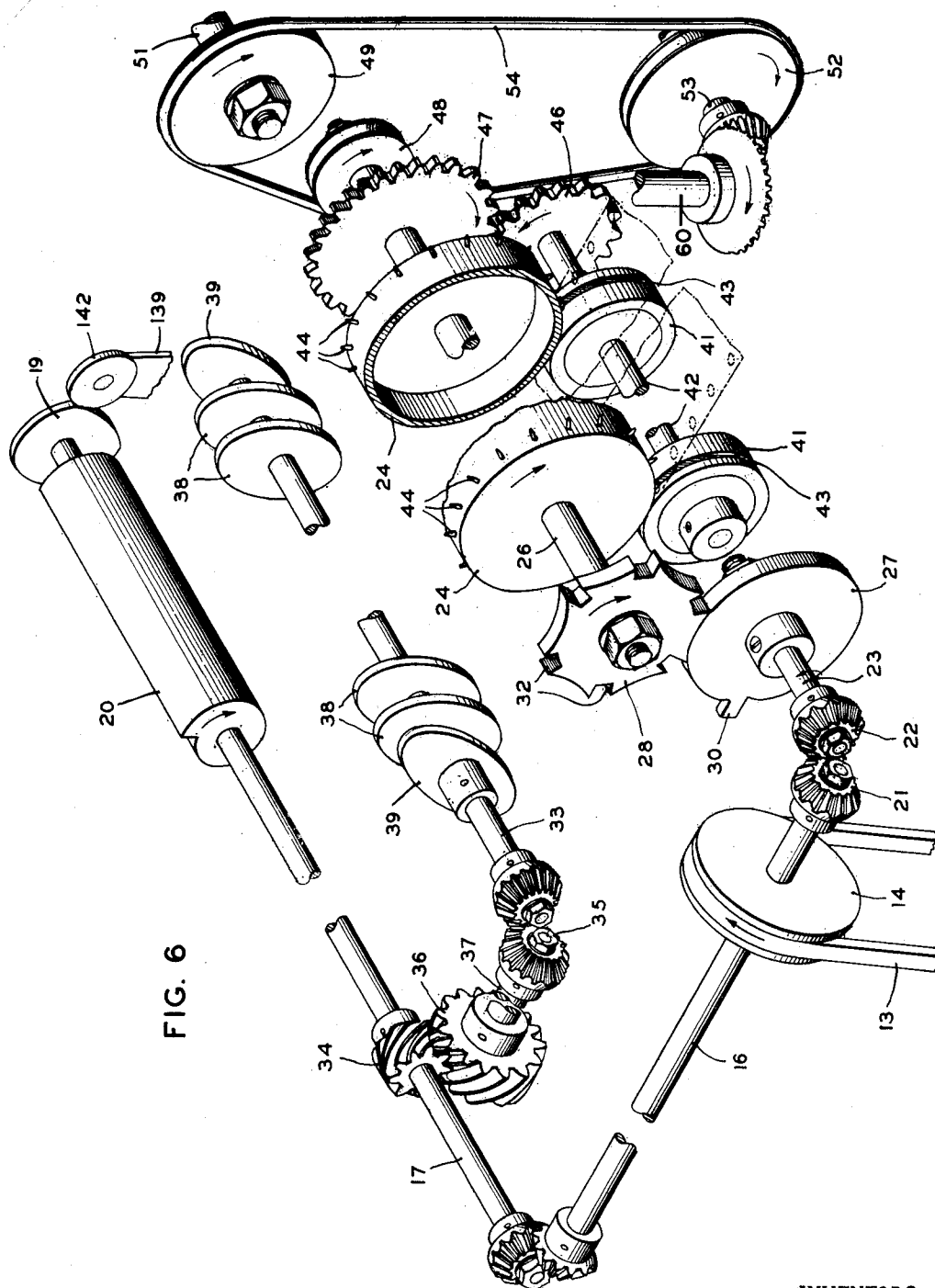


FIG. 6

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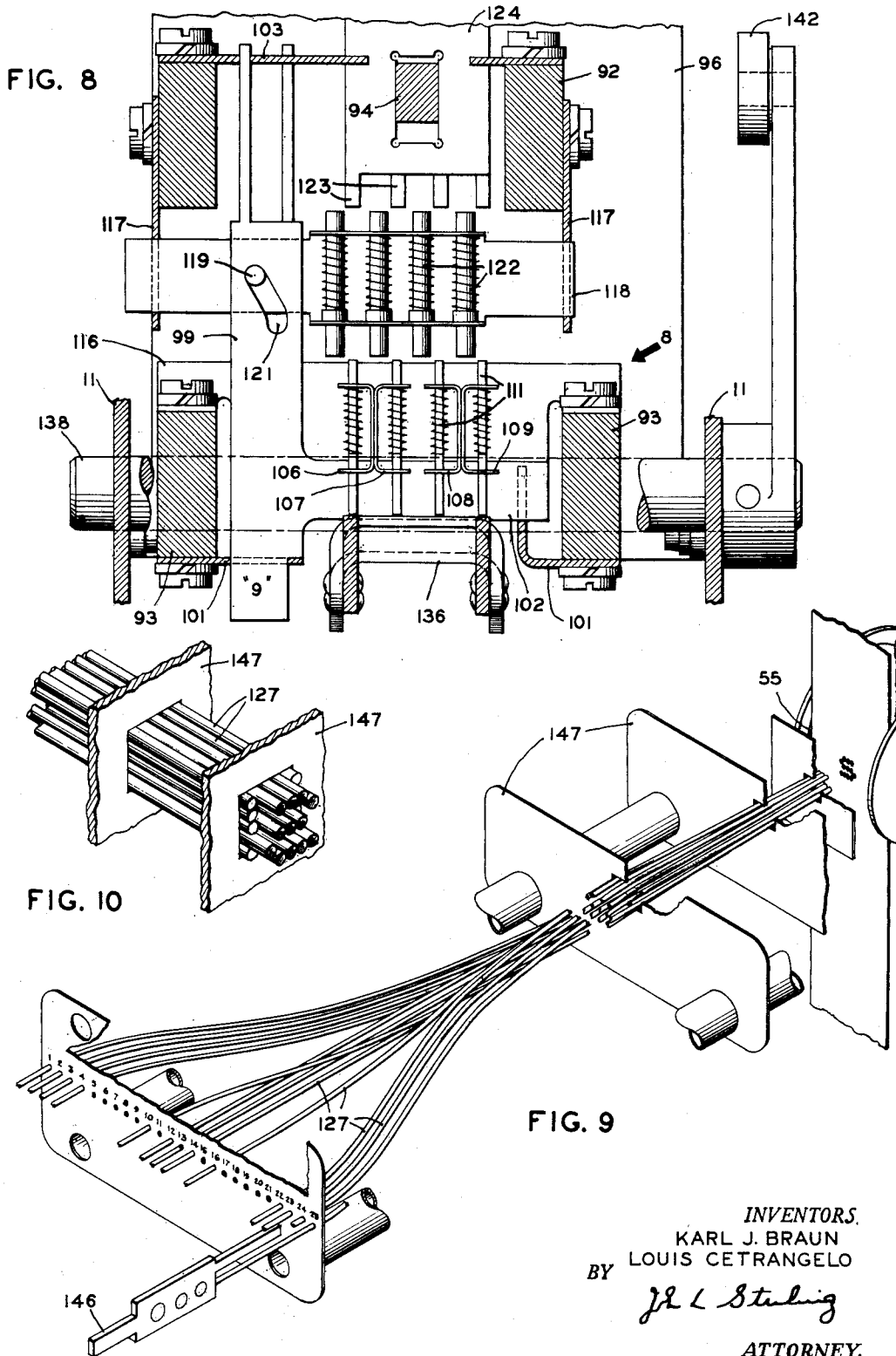
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Filed Jan. 26, 1952

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FIG. 11

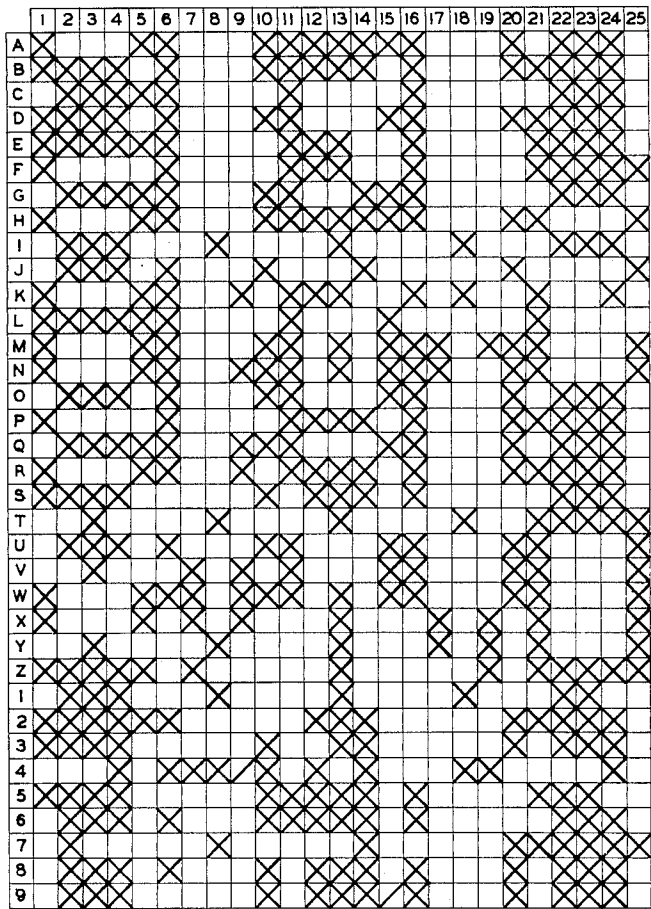


FIG. 12

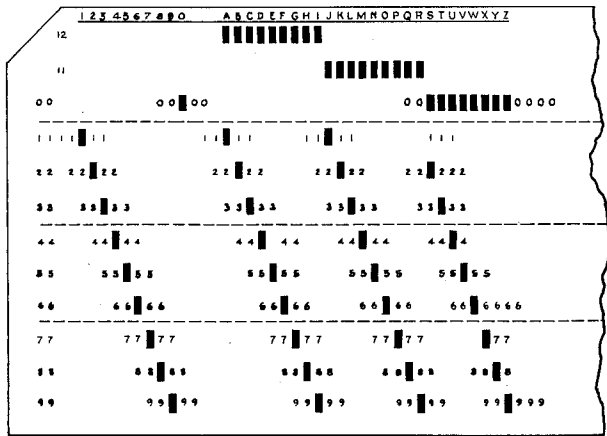
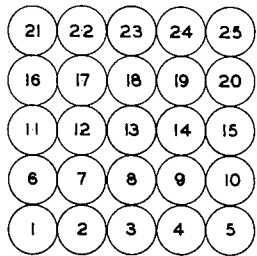


FIG. 13



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DOT PRINTING INTERPRETER

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Application January 26, 1952, Serial No. 268,444

5 Claims. (Cl. 101—93)

This invention relates to a printing interpreter, and more particularly to a machine which reads the information contained in a punched record, and then prints this information on a record.

The present invention resides in the provision of a wire sensing unit, a decoding section where the punched code is translated, a permutation unit representing the thirty-six characters from A to Z and 0 to 9 inclusive, and to a wire printing section where a record is dot printed by wires to indicate the characters sensed.

One of the objects of the invention is the provision of a printing interpreter capable of high speed wire dot printing.

Another object of the invention is to provide a high speed wire sensing mechanism capable of sensing in rapid succession, the data designating columns of a perforated record.

Another object of the invention is to provide a high speed decoding unit capable of translating the sensing of a record to a mechanical movement which may be used by a printing unit.

Another object of the invention is to provide a printing means which has a minimum amount of moving parts.

Another object of the invention is to provide a printing means which eliminates the need of different types for each character.

Another object of the invention is to feed a record at high speed through a sensing mechanism which is simple and yet positive in its action.

Other objects and structural details of the invention will be apparent from the following description when read in connection with the accompanying drawing, wherein

Fig. 1 is a plan view of the machine;

Fig. 2 is a section in elevation taken on the line 2—2 of Fig. 1;

Fig. 3 is a section in elevation taken on the line 3—3 of Fig. 1;

Fig. 4 is an exploded isometric view of the decoding and print hammer mechanism;

Fig. 5 is a plan view showing the arrangement of the pins in the decoding unit;

Fig. 6 is an isometric view showing the complete drive mechanism of the machine;

Fig. 7 is a fragmentary view showing the drive mechanism for the decoding unit;

Fig. 8 is a sectional view of the decoding mechanism taken on the line 8—8 of Fig. 2;

Fig. 9 is an exploded isometric view showing the arrangement of the printing wires;

Fig. 10 is an enlarged fragmentary view in perspective showing how the letter S is formed;

Fig. 11 is a diagrammatic chart showing the combination for each character with reference to the printing wires;

Fig. 12 is a plan view of a business card showing the complete code used in connection with this invention; and

Fig. 13 is a schematic arrangement showing the position of the wires looking toward the platen.

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Referring to the drawings in detail and in particular to Figs. 1, 2 and 3, a main base plate 6 of any suitable type, constituting a table or bench top, supports the entire frame work and driving mechanism of the machine.

The sensing and record feeding mechanism unit 7 is supported by two upright plates 10. The decoding and printing mechanism unit 8 is supported by two upright plates 11, and the ribbon and strip record feeding mechanism unit 9 is supported by a third pair of plates 12. The power supply for driving all of the mechanical units of the machine is derived from a motor (not shown), suitably secured to the underside of said base plate 6 in any known manner for driving a belt 13 which passes through the plate and around a drive pulley 14 fixed to a main drive shaft 16. A transverse front drive shaft 17 utilized for driving the actuating mechanism of the printing, decoding and sensing units 7 and 8 is suitably journaled in bearings mounted on the base plate 6. Said decoding actuating mechanism of unit 8 is driven through a cam 19 mounted on shaft 17 which also carries an elongated restoring cam 20, permitting operation of printing hammers to be later referred to. A sensing unit actuating shaft 33 is driven by the shaft 17 at one half the speed of the latter through helical gears 34 and 36, a short shaft 37, and a miter gear combination 35. Mounted on the shaft 33 is a plurality of cams 38, one for each sensing element. Flanking the set of cams 38 are additional cams 39 which are the retract cams for the sensing unit. As seen in Fig. 3, the cams 38 and 39 are elliptical in shape and operate their associated mechanisms twice in each machine cycle. It is therefore necessary to turn the shaft 33 at one half the speed of rotation of the shafts 16 and 17. A short shaft 23, driven through miter gears 21 and 22 from the main shaft 16, is adapted once in each cycle to drive a shaft 26 with an intermittent rotary motion and with it a record feed drum 24 mounted on said shaft 26. The shaft 26 is intermittently driven by a Geneva movement, comprising a drive wheel 27 fixed to the shaft 23 and a driven wheel 28 fixed to the feed drum shaft 26. A single tooth 30 of the driving wheel 27 engages in the notches 32 of the driven wheel 28 and turns the latter a distance of one notch or indexed position in every revolution of the wheel 27. The record to be sensed is fed between the feed drum 24 and a pair of feed rolls 41 journaled to a shaft 42. The feed rolls 41 are provided with grooves 43 which are adapted to receive gripper pins 44 that protrude from the drum 24. Shaft 42 is driven by a gear 46 which meshes with a gear 47 fixed to the intermittent drive shaft 26 adjacent a similarly mounted pulley 48. The printing ribbon and the record to be printed are intermittently advanced by the friction pulley 48 fixed on the shaft 26 and over which a belt 54 passes to drive a pulley 49 mounted on a paper feed shaft 51, and a pulley 52 mounted on a ribbon feed shaft 53.

Referring to Figs. 1, 3, and 4 the sensing mechanism indicated generally by the numeral 7 comprises an upper guide plate 61 and a lower guide plate 62 mounted on bars 63. Slidably mounted in rectangular holes in the upper plate 61 is a plurality of slides 64 which are guided at their lower ends by a bar 66 passing through a cutout 67 in each slide. Each of the slides 64 has fixed to the upper end thereof a sensing wire 68, each slide being of L-shape and having a roller 69 mounted on a laterally extending leg portion. Each roller 69 is adapted to yieldably engage the periphery of a cam 38, mounted on the shaft 33, and is urged against said cam by a spring 71 encircling a depending leg 72 of the slide 64 which leg is slidably mounted in a suitable opening in the lower guide plate 62. The upper end of each sensing wire 68 is adapted to enter axially aligned bores in plates 73 and 74 which are mounted between the vertical plates 10 and

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between which plates 73 and 74 perforated tape or cards to be sensed are fed by any well known form of card or tape feeding mechanism.

A plurality of pivotally mounted interponents 76, one for each slide 64, guided by upper and lower comb plate 77 and 78 respectively, mounted on a cross bar 79, are positioned below and for engagement with the legs 72. The interponents 76 having a bar and slot mounting 75 between the plates 10 are urged counter-clockwise against the legs 72 by springs 81. The upper end of each interponent 76 has a notch 86 in which the lower end of the leg 72 seats when the wire 68 senses a hole in a record and permits a rising movement of slide 64. Cooperating with the lower ends of the interponents 76 are levers 82 which are pivotally mounted with respect to a cross bar 83, and are adapted to be held in yieldable contact with the lower ends of the interponents 76 by spring loaded pins 84 acting on said levers 82.

Assuming that the sensing wire 68 passes through a hole in a record, then as the slide 64 rises under the influence of spring 71 and control of cam 38, the leg 72 of the slide will rise thereby allowing the interponent 76 to swing counter-clockwise under the action of spring 81 and snap into direct alignment with the leg 72. When the high dwell of the cam 38 pushes the roller 69 down, the legs 72 will push the corresponding interponent 76 down, rocking the bell-crank 82 clockwise, to transmit a signal through the pin 84 and a Bowden wire 97 to a decoding unit which will be hereinafter described. The interponents 76 that have been actuated are restored by a bail 87 mounted between cam roller carrying arms 88 which are pivoted on a shaft 90 mounted in the side plates 10. The bail 87 is actuated by the cams 39 against the action of a spring 89 after a signal has been transmitted through the interponents 76. In the event that a sensing wire 64 does not find a hole and is held down by the record, its leg 72 will not rise and, therefore, its corresponding interponent will remain in its tilted or inoperative position and no impulse will be given to the corresponding wire 97. It will also be understood that the cams 38 can be mounted on the shaft 33 in any of several positions, i. e., they can be so positioned as to successively sense the columnar index positions of a record.

The perforations in the record to be sensed are usually in code form, as is well known, and the interpretation of the code so that it may be used by the printing mechanism is accomplished by the decoding mechanism of the unit 8 as shown in Figs. 2, 4 and 8. The decoding unit 8 is supported between the frame members 11 by a pair of plates 96 having a series of bars 91, 92, 93 and 94 mounted therebetween to form a box-like construction in which the component parts of the decoding unit are located. The impulses from the sensing unit 7 are transmitted through the Bowden wires 97 and pins 98 to a group of signal receiving slides 99 which are slidably mounted at their upper and lower ends in guide plates 103 and 101 respectively. Plate 103 is fixed to bar 92 and plate 101 is fixed to bar 93. In the record to be sensed, a combination of single and two hole, two position code is used (Fig. 12) and one slide 99 is provided for each columnar index position.

The 0, 11 and 12 slides which correspond to the 0, 11 and 12 code hole positions on the record, Fig. 12, are the slides used for the two hole alphabetic code combinations and are each provided with a laterally extending arm 102. The arms 102 are adapted to cooperate with cut-outs in a series of permutation slides which are so positioned as to be contacted by said arms and are guided for transverse movement in comb plates 116 mounted on the cross bars 93. These permutation slides are urged to the left in Fig. 2 by spring loaded pins 104. There are four slides 106, 107, 108 and 109, each being flanged at its upper and lower edges to support nine spring loaded pins 111 which represent the 36 character designations.

Mounted above the permutation slides and slidable at

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right angles thereto, in comb plates 117 secured to cross bars 92, Fig. 8 are nine selector slides 118, one for each of the slides 99 representing the numerical index pins 1 to 9. Each slide 118 is provided adjacent one end with a pin 119 which is normally positioned in the upper end of a cam slot 121 in its corresponding slide 99. The selector slides 118 are similar in construction to the permutation slides 106-109 and each carries four yieldable transfer pins 122 which are normally out of vertical alignment with the pins 111 but can be moved into alignment therewith. Combinational movements of both selector and permutation slides will relatively position the pins so that transfer of movement thereby will depend upon which pins are vertically aligned.

The first or near character slide 106 (Fig. 4) which is the slide used for numerical designations, has three cam faced cut-outs 112 adapted to cooperate with the arms 102 of the slides 99 representing the 12, 11 and 0 index positions used for the alphabetic designations. Thus when an alphabetic combination is used involving any of the slides 12, 11 and 0, the numerical slide 106 is moved by any one of the arms 102 acting in the cam faced cut-outs to shift the pins 111 of said slide to an inoperative position or out of the path of travel of the pins 122. The second slide 107, which is the slide representing the alphabetic characters A to I, has a cam faced cut-out 113 adapted to cooperate with the arm 102 of the slide 99 representing the 12 index position. As seen in Figure 12 all the letters from A to I have the 12 position in common. Thus, when any one of these letters are sensed, only the slide 107 is moved to place its pins in an operative position. The third slide 108, which is the slide representing the alphabetic characters J to R, has a cam faced cut-out 114 adapted to cooperate with the arm 102 of the slide 99 representing the 11 index position. As seen in Figure 12 all the letters from J to R have the 11 position in common. Thus if any one of these letters are sensed only the slide 108 is moved to an operative position. The fourth slide 109, which is the slide representing the alphabetic characters S to Z, has a cam faced cut-out 115 adapted to cooperate with the arm 102 of the slide 99 representing 0 index positions. As seen in Figure 12 all the letters from S to Z have the 0 position in common. Thus when any one of these letters are sensed only the slide 109 is moved to inoperative position as shown in Figure 4. The alphabetic designation slide 107, 108 and 109, as seen in Figs. 4 and 5, have their pins 111 in alternate holes in said slides starting from the left, while the number slide 106 has its pins 111 in alternate holes starting from the right.

Assuming a number is sensed in a record the upward movement of one of the numerical slides 99, representing that number, causes its associated selector slide 118 to be cammed to the left in Fig. 4 through the cam slot 121 and pin 119, thereby aligning the pin 122 with the pin 111 of the numerical slide 106. Due to an alternate arrangement of pins 111 and holes in the alphabetic slides 107 to 109, the other pins 122 of the selector slides 118 will be positioned over holes in said alphabetic slides 107-109. However, if a letter which uses two holes of the record is sensed, one of the arms 102 will be raised, depending on the letter sensed, moving one of the alphabetic slides 107, 108 or 109 to the right, together with the numerical slide 106 due to the cam faced cut-outs on said slides. The pins 122 of the slide 118, which was moved due to the simultaneous sensing of the numerical code hole, will be positioned over a hole in the slide 106 while the selected alphabetic slide moving in combination therewith will have its pin 111 positioned directly under the pin 122 of the slide 118 that has been moved. The operation of this unit will hereinafter be explained in detail with reference to Fig. 4.

The upper ends of the pins 122, when the slides 118 are moved, are adapted to be vertically aligned with the legs 123 of T-shaped permutation plates 124 reciprocally

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mounted for vertical movement on cross bars 94 and guided in comb plates 103 (Fig. 8). There are thirty-six plates 124 mounted in units of four (Fig. 2) each being so positioned so as to provide one leg 123 for each of the pins 122. As seen in Figs. 4 and 8 the upper ends of the permutation slides plates 124 are provided with protrusions 126 providing differentially notched code bar edges, there being a possible combination of twenty-five of said protrusions on any one of said slides 124. Each protrusion corresponds to a printing wire 127 so arranged as to form a group of five wires by five. For example, the permutation plate 124 representing the letter I, will have protrusions in the 2, 3, 4, 8, 13, 18, 22, 23 and 24 positions as diagrammatically shown in the chart of Fig. 11, and which represent the necessary nine wire positions of the five by five terminal printing ends of the wires as shown in Fig. 13, used to make a legible letter I. Reciprocally mounted for vertical movement above and at right angles to the permutation plates 124, on cross bars 128, are twenty-five hammer latch release slides 129, one for each possible protrusion 126. The latch release slides 129 are L-shaped, the base or the leg portion of each being adapted to extend across the thirty-six permutation plates 124. Cooperating with each slide 129 (Fig. 2) is a latching pawl 131 which is urged against the slides 129 by spring loaded pins 132, mounted on a cross bar 133. The pawls 131 are pivotally mounted with respect to a support bar 135 from which the bars 128 are supported. In the normal position the pawls 131 are adapted to prevent their associated print hammers 134 from firing by latching engagement with the latter. A signal is transmitted through the decoding unit 8 by a bail plate 136 mounted between and extending across the ends of two side arms 137 secured to a shaft 138 journaled in the walls 11. Also fixed on the shaft 138 is an arm 139 carrying a follower roller 142 engaging the cam 19 which is fixed to the front drive shaft 17. The bail 136 is arranged to underlie all of the pins 111 so that when the roller 142 rides on the high part of the cam 19, the pins 111 are pushed up. However, motion is transmitted only where a pin 122 is positioned between a pin 111 and a leg 123 of the slides 124 representing the letter or number sensed. This motion, in turn, will raise the slides 129 used in making up the sensed character in accordance with the protrusions 126 on the permutation slides 124. The pawls 131 associated with these slides 129 are thereby raised away from the normal or hammer holding position against action of their spring loaded pins 132.

The print hammers 134 (Fig. 2) are pivotally mounted on a shaft 143 and are held against the hammer actuating cam 20 by a spring loaded pin 144 acting on one leg of each hammer. The latch restrained arm of said hammer is adapted to strike a firing pin 146 which has one end of a print wire 127 secured thereto.

The timing is such that in machine operation the selected pawls 131 are moved out of engagement with the print hammers before the pin urged legs of said hammers ride off the abrupt edge of the cam 20 to cause the hammers to swing about their pivots 143 and strike the firing pins 146 which project their associated printing wires 127. The hammers 134 are restored to latched position by the cam 20 and the wires 127 are retracted automatically by a spring 148 on each pin 146, thereby eliminating the need for any special restoring mechanism. The wires 127 are guided in a series of spaced perforated plates 147 which converge the wires to form a nested rectangular printing arrangement as shown in Figs. 9 and 13.

The ink ribbon and tape feeding mechanism may be of any suitable type and as shown in Fig. 3 includes a frictionally mounted paper supply carrier 57 and a take-up reel 58 for pulling the tape 59 upward between the platen 55 and an inked ribbon 45 whose spools 50 are operated by the auxiliary shafts 60 from the shaft

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53, the latter being driven by the belt 54 which also operates the shaft 51 on which the paper tape winding spool or take-up reel 58 is fixed. The ribbon is suitably guided across the platen and can be automatically reversed in its operation in any well known manner.

Operation

Assuming the letter S, represented by holes in the zero and 2 positions in a record is sensed, the slides 99 corresponding to said zero and 2 positions will be raised as seen in Fig. 4. The arm 102 of the zero slide 99 will cam the permutation slide 109, representing the letters S to Z inclusive, to the right in Fig. 4 through the cam face cutout 115 on 109. At the same time the 2 slide 99 pushes its selector slide 118 to the left thereby bringing the pins 122 of slide 118 over the permutation slides 106 to 109, but so that only one pin 111 of the slide 109 will be under a pin 122 because the combinational movement of the slides 109 and 118 referred to has brought a pin 111 on slide 102 with vertical or axial alignment with a pin 122 on slide 118. At the proper time in the machine cycle, when the bail 136 is actuated, motion will be transmitted through said pin 111 of slide 109 actuated by the sensing of the record perforation in the 0 position, and pin 122 of slide 118 actuated by the sensing of the record perforation in the 2 position, whereby a permutation plate 124 will be raised that has formed on the upper edge thereof the proper combination of code protrusions 126 to lift certain of the slides 129 to release hammers that will project enough wires to print the letter S as shown in Figs. 9 and 10. If the letter Z is sensed in a record which letter is represented in code by perforations in the zero and 9 positions of the record, a slide 99 representing the 9 perforation will be raised and will position a pin 122 on the associated slide 118 in vertical alignment with a pin 111 on the slide 106 which latter has been moved by the raising movement of the zero slide, due to the sensing of the hole in the zero position of the record.

While we have described what we consider to be a highly desirable embodiment of our invention, it is obvious that many changes in form could be made without departing from the spirit of our invention, and we, therefore, do not limit ourselves to the exact form herein shown and described, nor to anything less than the whole of our invention as hereinbefore set forth, and as hereinafter claimed.

What we claim as new, and desire to secure by Letters Patent, is:

1. In a machine of the class described; movable record sensing means; decoding means including signal receiving slides; means operated by said sensing means for moving said slides; integral cam arms extending laterally from one group of said slides; selector slides extending laterally from the other group of signal slides and having camming pin and slot connection therewith for horizontal movement of said selector slides; a transfer pin bank on each selector slide; permutation slides extending over the arms of said signal slides and under the selector slides; a character pin bank on each permutation slide underlying one pin of each of said transfer banks, said permutation slides having cam means for movement by said signal slide arms, the combined movements of said selector slides and the permutation slides being adapted to selectively align a character pin with a transfer pin; permutation plates having serrated upper edges providing code projections and arranged to be vertically moved by said transfer pins; character forming grouped wire printing means including firing pins and hammers biased for striking the firing pins to project the wires for printing; pivoted latch pawls for holding said hammers cocked; latch pawl release slides extending across said permutation plates and adapted to be selectively operated by the code projections when the plates are raised; and bail means

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for lifting said character pins to raise the plates through said transfer pins.

2. In a machine of the class described; record sensing means; decoding means including movable signal receiving slides controlled by the operation of said sensing means; printing means controlled by the operation of said slides, said sensing means including sensing cam means; sensing pins; support means for each of said pins, biased against said cam means for yieldable record sensing advance and positive return movements alternately upon operation of said cam means; a train of parts including a Bowden wire and operating means therefor for moving each signal receiving slide; a spring urged pivoted latch means yieldably engaging each support and adapted to be operatively fitted between a support and a train of parts when the pin advanced by the respective support senses a perforation in the record; said support and latch means coacting to move the train of parts on a positive return movement of said support to operate the signal receiving slides; a pivoted bail for engagement with said latch means; and a retract cam for moving the bail cyclically to move said latch means to inoperative position.

3. A machine as set forth in claim 1 in which said record sensing means includes sensing cam means; sensing pins; supporting means carrying each pin and biased against said cam means for yieldable record sensing advance and positive return movements alternately upon operation of said cam means; a pivoted latch means yieldably engaging each supporting means and adapted to be operatively aligned therewith when the pin advanced by the respective supporting means senses a perforation in the record, said latch means being adapted to operate the signal receiving slides of the decoding unit upon a return movement of said pin supporting means; a pivoted bail; and a retract cam for operating the bail periodically to move said latch to inoperative position out of alignment with said supporting means.

4. In a machine of the class described; movable record sensing means; decoding means including signal receiving slides; means operated by said sensing means for moving said slides; integral cam arms extending laterally

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from one group of said slides; selector slides extending laterally from the other group of signal slides; cam pin and slot connections between said selector slides and said other group of signal slides whereby the selector slides are moved by movement of said signal slides; a transfer pin bank on each selector slide; permutation slides extending transversely over the arms of the signal slides and beneath the selector slides; a character pin bank on each permutation slide underlying one pin of each of said transfer banks, said permutation slides having cam means for movement by said signal slide arms, the combined movements of said selector slides and the permutation slides being adapted to selectively align a character pin with a transfer pin; permutation plates having serrated upper edges providing code projections and arranged to be vertically moved by said transfer pins; and printing means including printing hammer latch release plates controlled by the operation of said permutation plates.

5. A machine as set forth in claim 4 in which said printing means includes a plurality of yieldably retractable wires arranged in a rectangular group at the printing end and in planar form at the opposite end; a firing element to which each wire at the planar end is attached; firing means including a spring urged hammer for striking each firing element to project a wire; cam means presenting a ledge portion off which said hammers ride; and detent means for normally restraining said hammers in cocked position and releasable by said hammer latch release plates.

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