

United States Patent

[11] 3,594,548

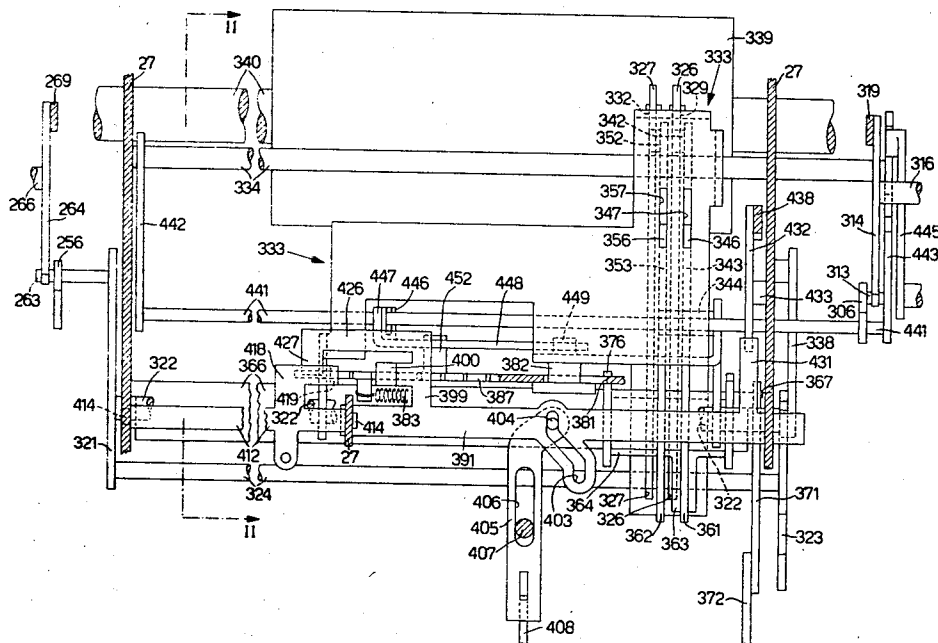
[72] Inventor **Ettore Abbiati**
Ivrea (Torino), Italy
 [21] Appl. No. **833,506**
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 [45] Patented **July 20, 1971**
 [73] Assignee **Ing. C. Olivetti & C., S.p.A.**
Ivrea (Turin), Italy
 [32] Priority **June 28, 1968**
 [33] **Italy**
 [31] **52,214-A/68**

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Primary Examiner—Stephen J. Tomskey
Attorney—Birch, Swindler, McKie and Beckett

[54] DIGITAL PRINTOUT DEVICE 10 Claims, 13 Drawing Figs.

[52] U.S. Cl..... **235/61,**
235/60
 [51] Int. Cl..... **G06c 29/00,**
G06f 5/02
 [50] Field of Search..... **235/61,**
60.38, 60.39, 60.4, 58 P, 60 P, 155, 61 A

ABSTRACT: Printout device comprising a store for storing the values of each order in a code having a plurality of digits and a series of characters corresponding to the different values of an order arranged so that a selected character is brought to a printing position by moving the characters according to a plurality of coordinates, the movement along each coordinate being controlled by a corresponding code digit.



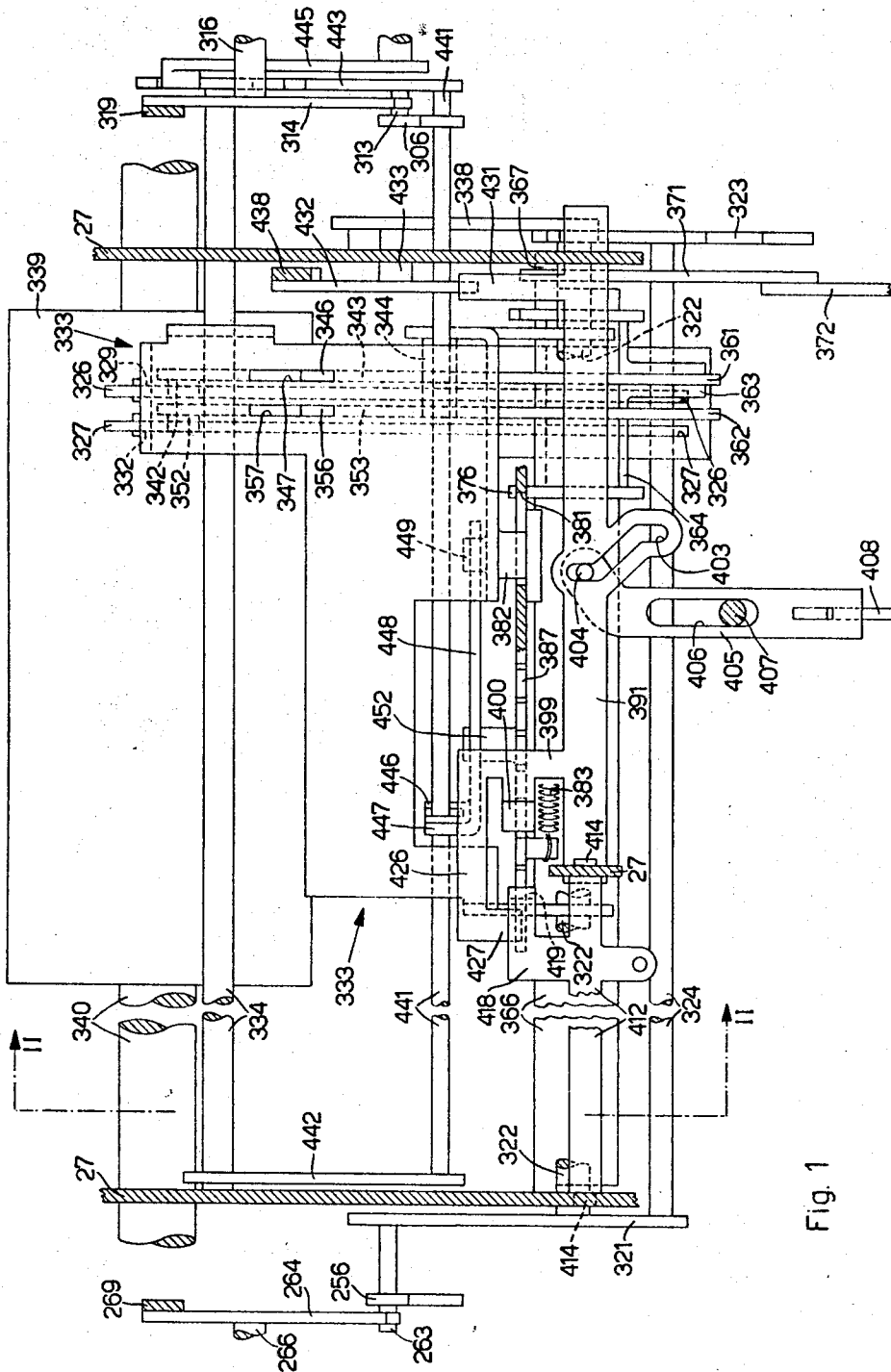
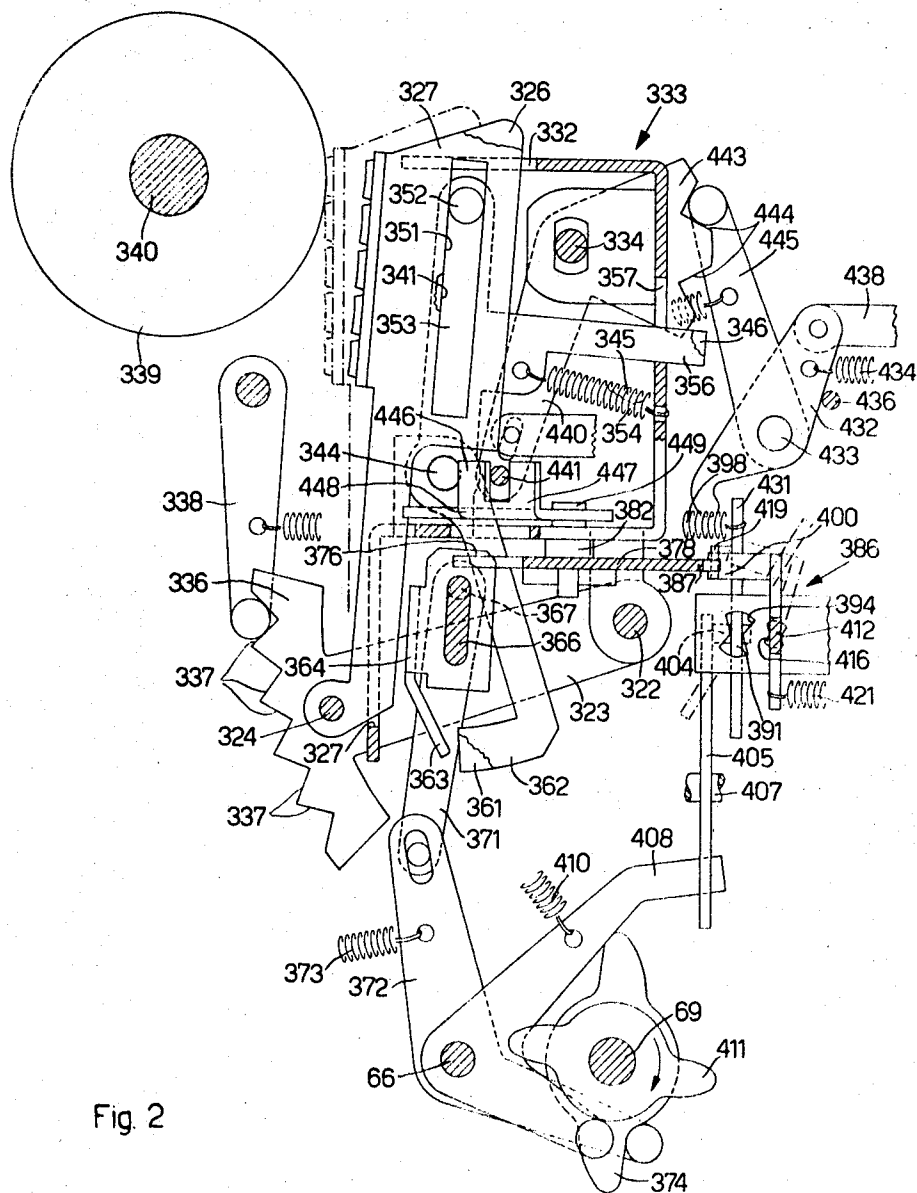


Fig. 1

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ETTORE ABBIATE



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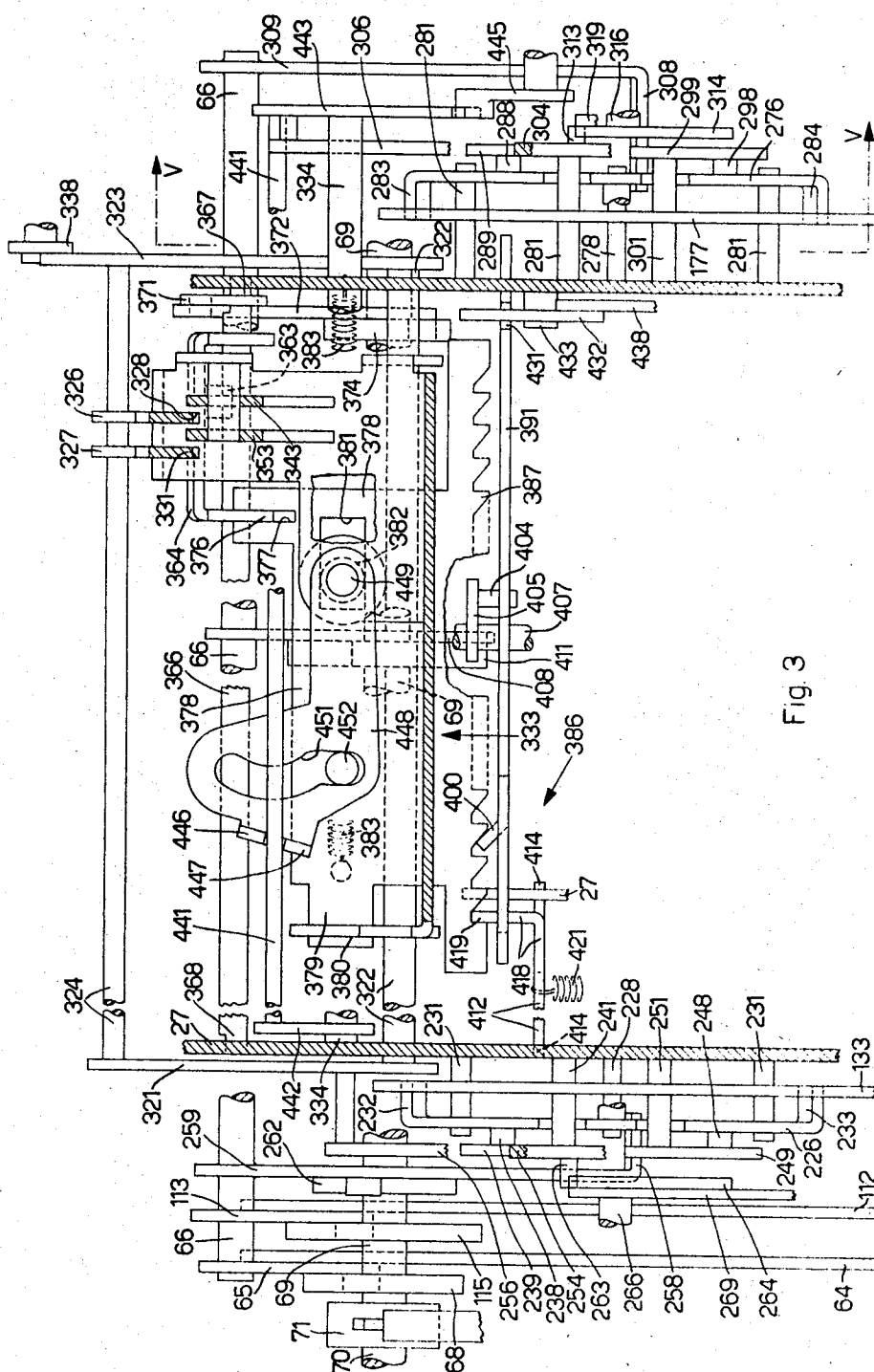


Fig 3

INVENTOR
ETTORE ASSIATE

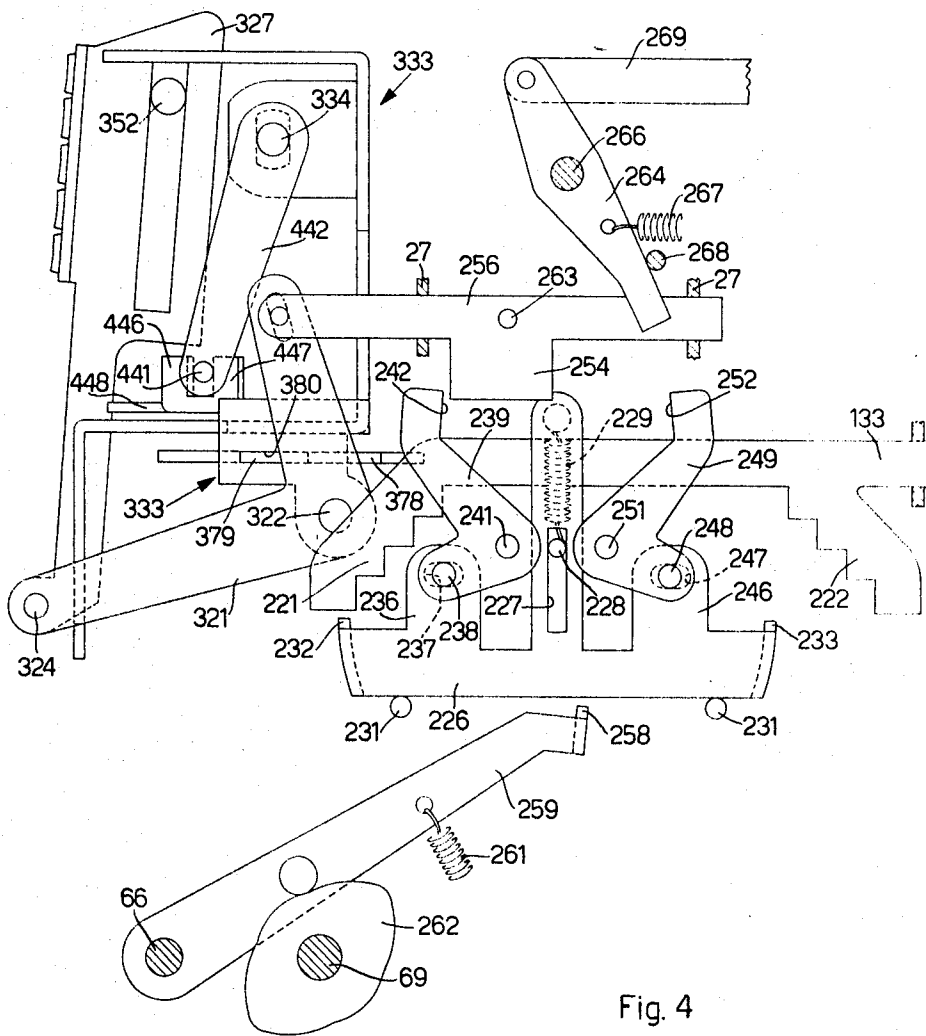


Fig. 4

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ETTORE ABBATE

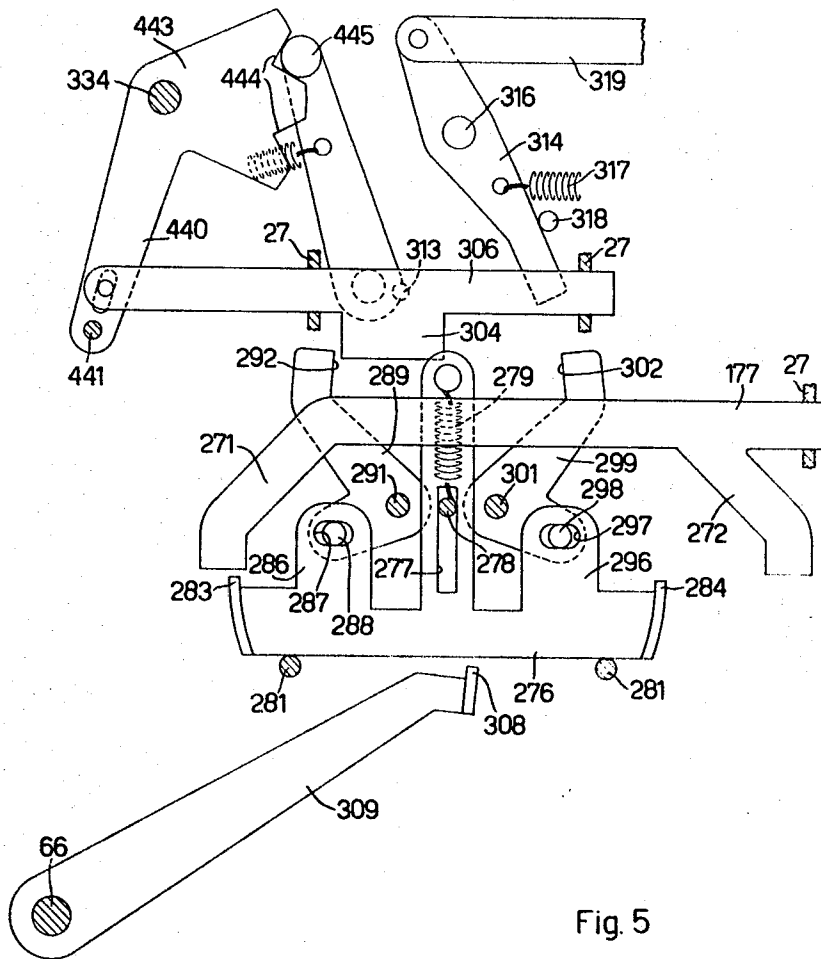


Fig. 5

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ETTORE ABBATE

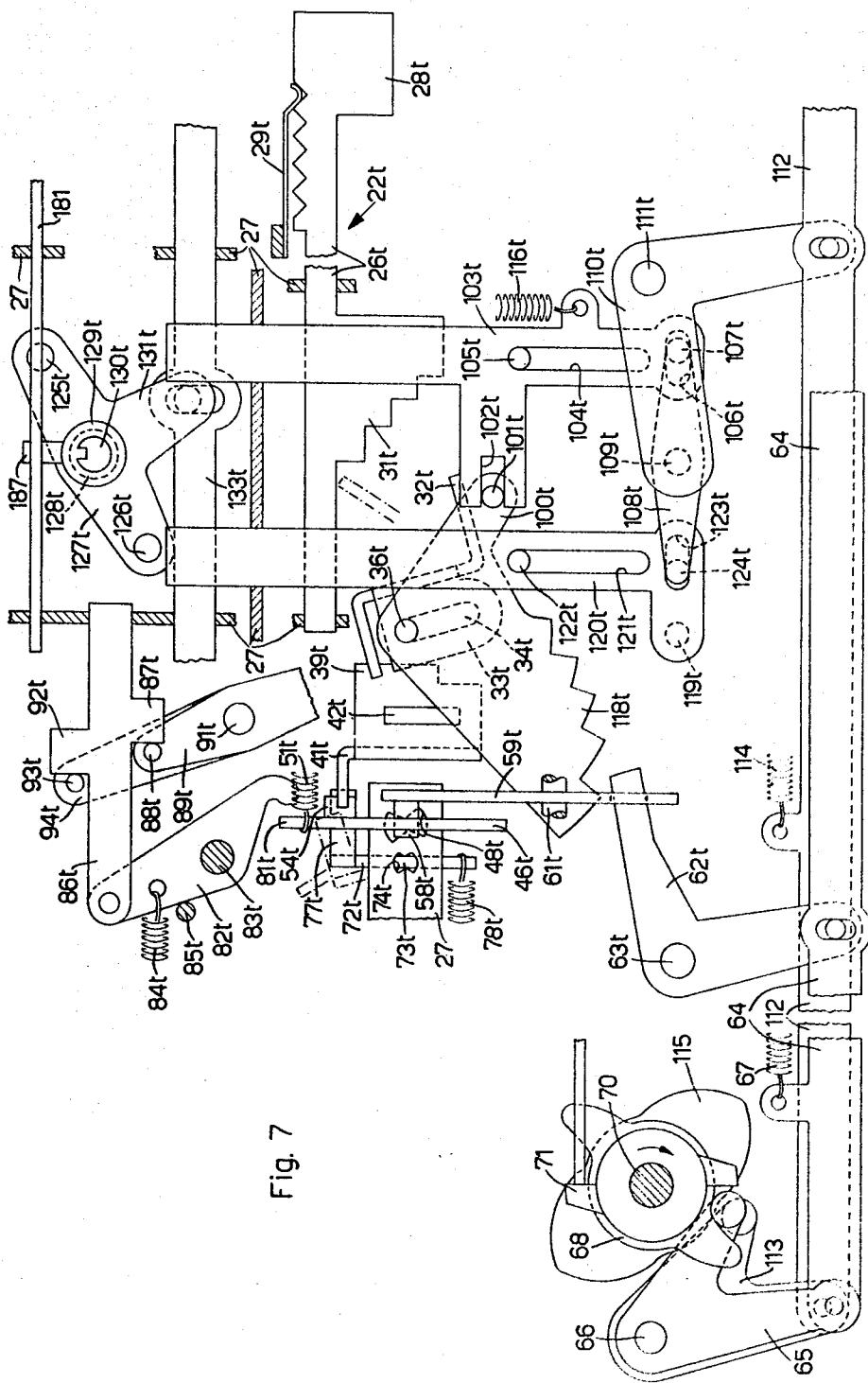


Fig. 7

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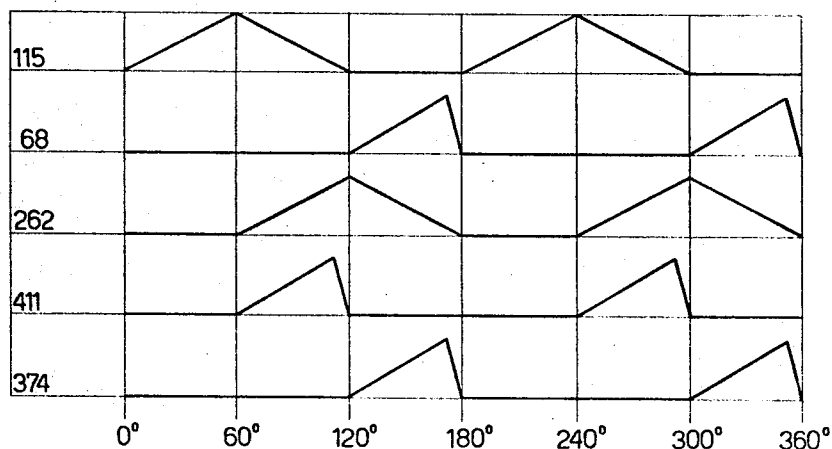
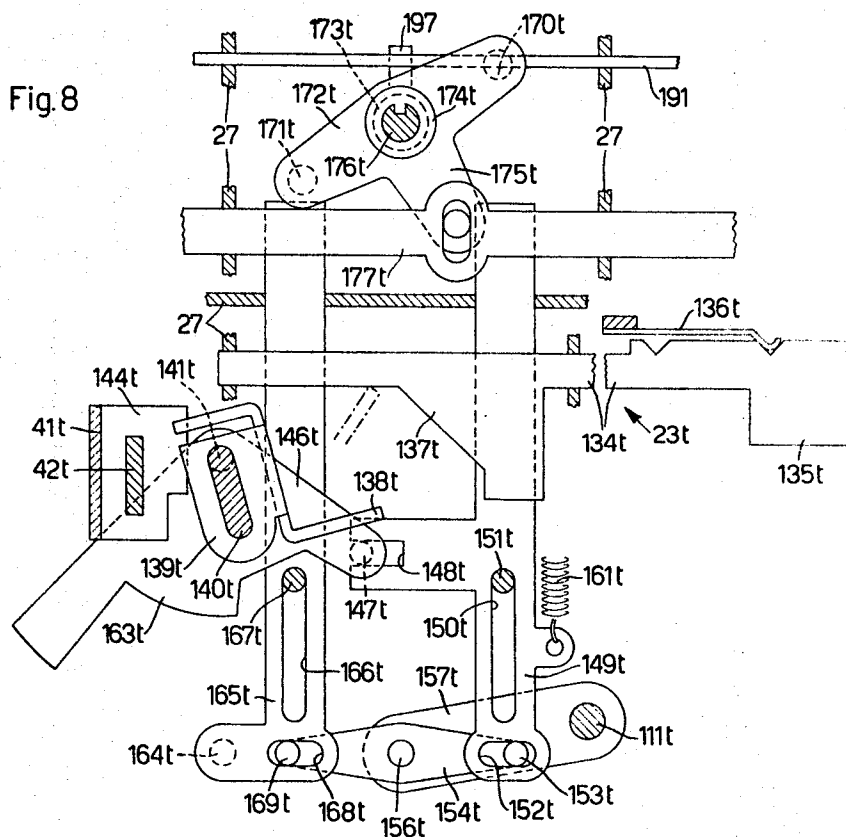
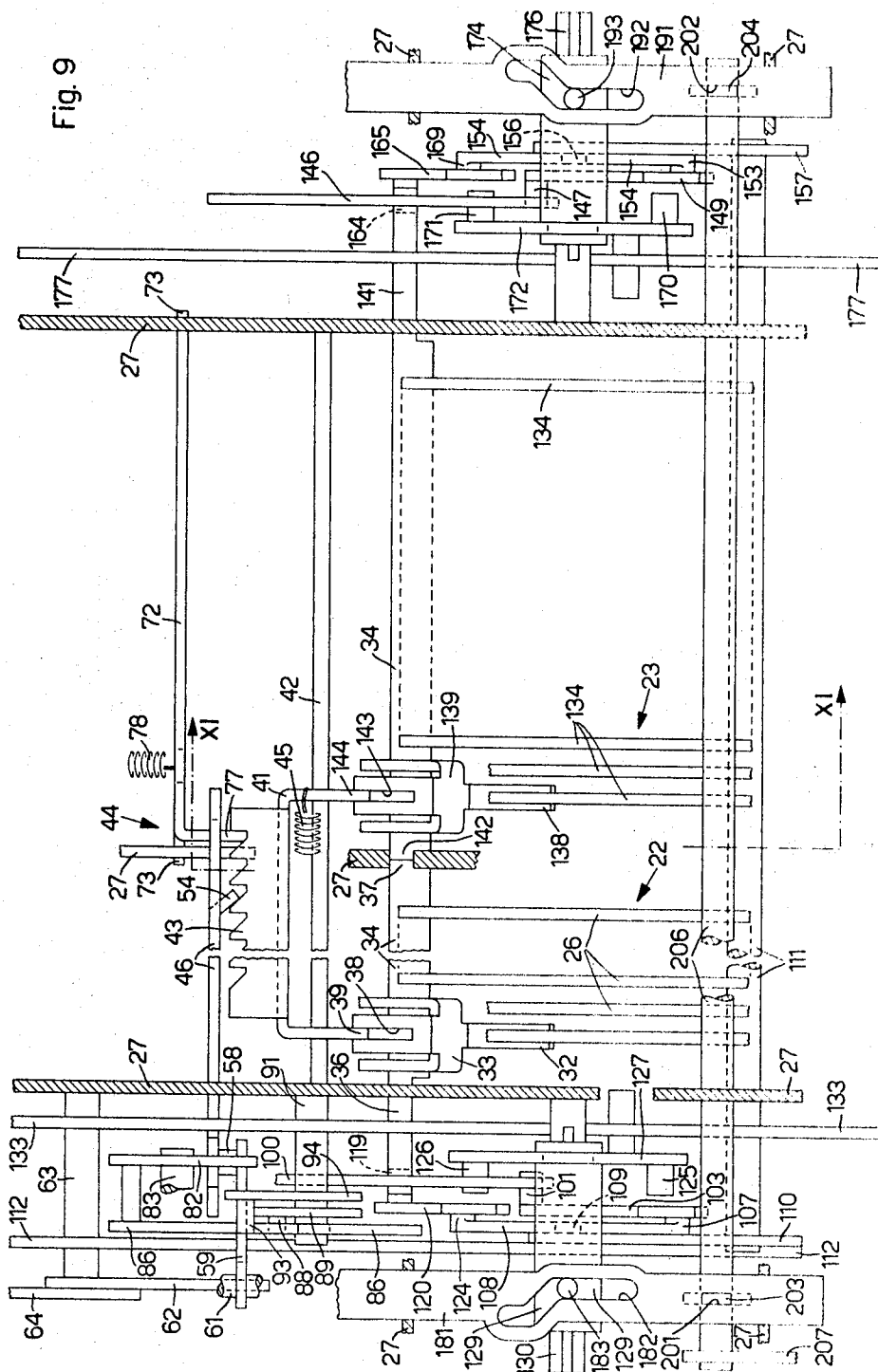


Fig. 13

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ETTORE ABBATI

Fig. 9



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ETTORE ABBIATI**

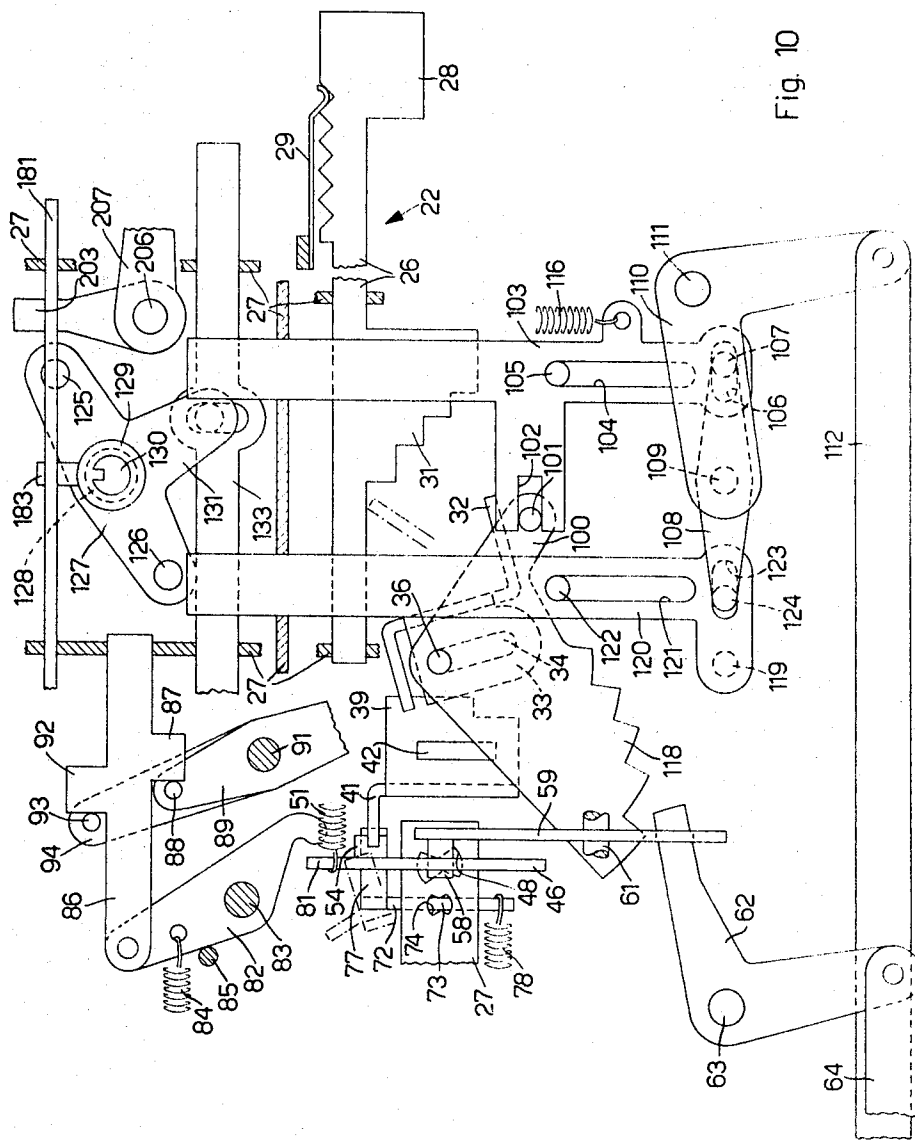


Fig. 10

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ETTORE ABBATI

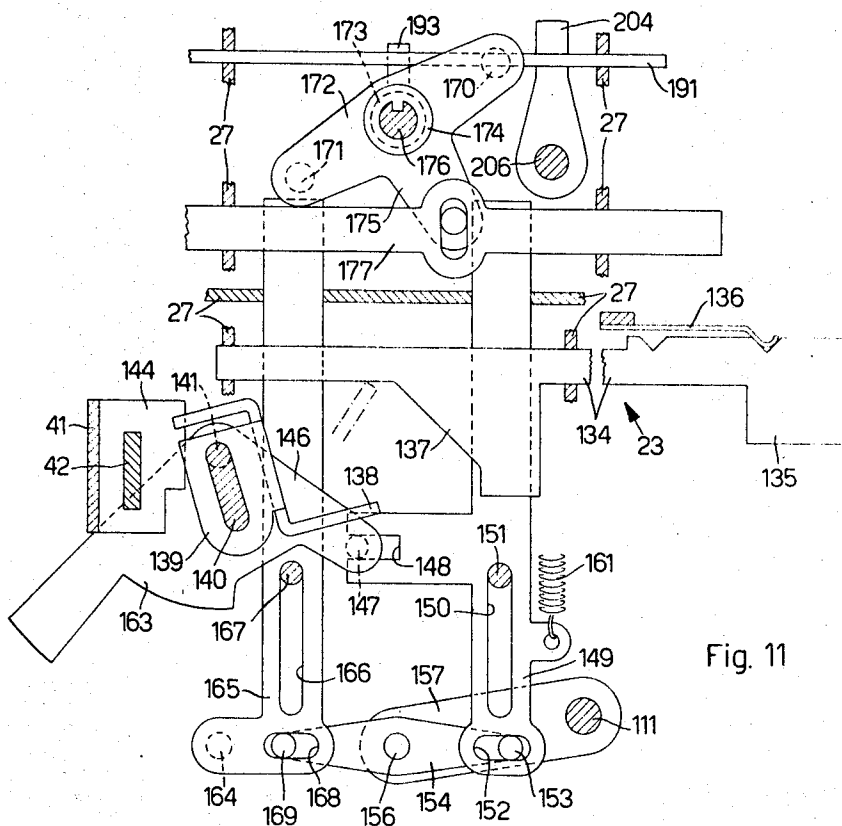


Fig. 11

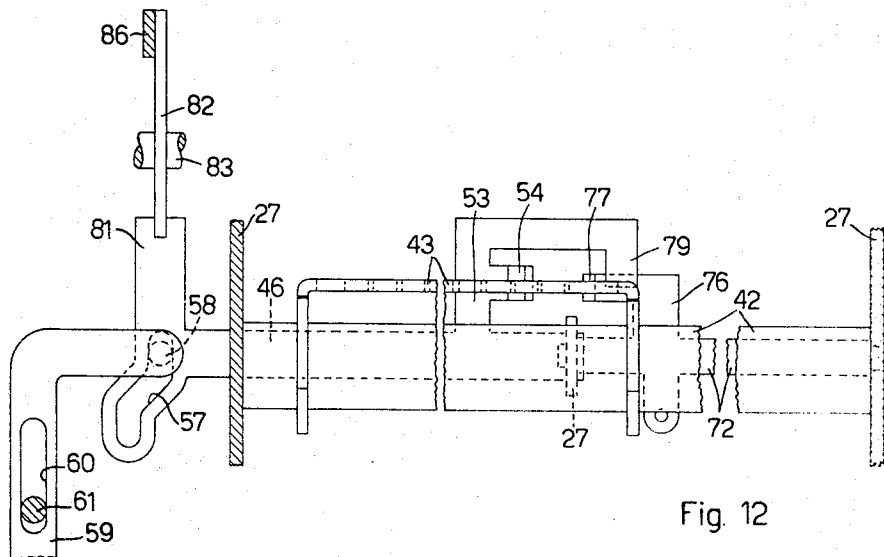


Fig. 12

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ETTORE ABBIATI

DIGITAL PRINTOUT DEVICE

CROSS REFERENCE TO RELATED APPLICATION

Applicants claim priority from corresponding Italian Pat. application Ser. No. 52,214-A 68, filed June 28, 1968 (Now Pat. No. 838,518).

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a digital printout device for a computer or other data processing machine, comprising at least one store for digital amount having a number of orders, each order being represented in code by a plurality of digits which are memorized in a corresponding number of different memory elements.

2. Description of the Prior Art

Various printout devices of this type are known. In one of them the digits to be written are conveyed to the writing element via a decoder and a "character selection system." This device consists of a large number of components and is thus very complicated and expensive. Its reliability is also limited.

SUMMARY OF THE INVENTION

The object of the present invention is to enable digital printout without decoding the data emanating from the store. To make this possible the digits to be printed are arranged on the character-carrying element in such a way that they can be selected by means of a number of movements which corresponds to the number of code digits. Each code digit therefore effects the selection along the coordinate associated with it, in a manner completely independent of the selection effected by other digit (or digits).

Thus according to the invention there is provided a digital printout device comprising a mechanical store for storing a digital amount having a plurality of numerical orders, a plurality of memory elements adapted to store the value of an order in a code comprising a corresponding plurality of digits, stored on the memory elements respectively, and a series of characters for printing out the different values of an order, the characters being so arranged that a selected character is brought to a printing position by moving the characters according to a plurality of coordinates associated with the said digits respectively, each memory element being arranged to control the movement of the characters along the corresponding coordinate.

BRIEF DESCRIPTION OF THE DRAWINGS:

FIG. 1 is a front view of a printout device embodying the invention;

FIG. 2 is a section along the line II-II of FIG. 1;

FIG. 3 is a partial plan view of the device shown in FIG. 1;

FIG. 4 is a partial view of the left-hand side of the device shown in FIG. 3;

FIG. 5 is a section along the line V-V of FIG. 3;

FIG. 6 is a plan view of a detail of the device;

FIG. 7 is a lateral view of the left-hand part of the detail shown in FIG. 6;

FIG. 8 is a partial sectional view along the line VIII-VIII of FIG. 6;

FIG. 9 is a plan view of a further detail of the device;

FIG. 10 is a lateral view of the left-hand part of the detail shown in FIG. 9;

FIG. 11 is a partial sectional diagram along the line XI-XI of FIG. 9;

FIG. 12 is a front view of a detail from FIG. 9;

FIG. 12 is a diagram illustrating the cycle of operation of the device.

DETAILED DESCRIPTION OF THE INVENTION

General Description

The printout device embodying the invention is connected into a computer capable of processing, in series, the digits emanating from an input store and from a total store, this latter being adapted to store the processed data. The printing of the digits is effected in series, starting from the lowest order, and is substantially simultaneous with the processing of the digits.

The printout device comprises an input store (FIG. 9, 10, 11) substantially of the type described in the specification of our U.S. Pat. application No. 820,769 filed May 1, 1969 and capable of storing the keyed-in decimal digits, coded in accordance with the biquinary code described in the specification of our U.S. Pat. application No. 770,555, filed Oct. 29, 1968. The input store consists of a unit 22 (FIGS. 9 and 10) capable of storing the quinary digits, and a unit 23 (FIGS. 9 and 11) capable of storing the binary digits. The unit 22 comprises a series of memory bars 26, corresponding in number to the input capacity of the machine, each bar therefore corresponding to a decimal order. Each bar 26 is guided in its longitudinal displacement in the framework 27 of the machine and is fitted with an extension 28 which can be placed in five different positions in the manner described in the first said specification. Each bar 26 is held in position by a spring-loaded positioning device 29 and is equipped with a stepped extension 31 consisting of five steps representing the five values from zero to four of the quinary digit. The bar stores the number zero if it is moved the whole way forwards (towards the right, as seen in FIG. 10) and the numbers one, two, three and four when it is moved back by one, two, three and four steps respectively. The extension 31 can be read in succession, by a vane 32 of a bridge 33 which can slide transversally on a bar 34 which is of substantially rectangular cross section and is pivotally mounted on the framework 27 of the machine, by means of two spindles 36 and 37 extending from the top part of the said section. The bridge 33 is also provided with an indentation 38 (FIG. 9) engaging a vane 39 of a carriage 41 consisting of a bridge which slides transversally on a bar 42 fixed to the framework 27 of the machine. The bridge 41 is drawn to the left by a spring 45 and is equipped with a rack 43.

The bridge 41 is movable transversally, step by step, under the control of a feed device 44, consisting of a slider 46 guided in two holes 48 (FIG. 10) provided on the framework 27 of the machine. The two holes 48 are shaped generally like a figure eight, so that the slider 46 can also rotate inside them. The slider 46 is kept rotated in a clockwise direction by a spring 51. The slider 46 is also provided with a vane 53 (FIG. 12) having a tooth 54 capable of interacting with the rack 43 (FIG. 9). The slider 46 is provided with a guide slot 57 (FIG. 12) engaged by a lug 58 of a slider 59 guided by means of a guide slot 60 of a fixed pin 61 and connected to a lever 62 (FIG. 10) pivot mounted on a shaft 63. The lever 62 is connected to a slider 64, which, in turn, is connected to a lever 65 (FIG. 7) pivot mounted on a shaft 66. The slider 64 is drawn forwards by a spring 67 by which the lever 65 is normally held against a cam 68 of a main shaft 69 rotatable on the framework of the machine. The main shaft 69 is connected to a motor shaft 70 via a 180° clutch 71 capable of being closed by a mechanism of a known type at the commencement of a digit-series-printing operation and of being reopened at the end of the latter.

The device 44 also includes a bar 72, rotatable on two extensions 73, in two guide slots 74 of the shape of an eight and provided in the framework 27 of the machine. The bar 72 is fitted with a vane 76 (FIG. 12) provided with a tooth 77 which, under the action of the spring 78, normally engages the rack 43 (FIG. 9). The vane 53 of the slider 46 is also provided with an extension 79 (FIG. 12) corresponding in position to the vane 76 of the bar 72. Finally, the slider 46 is fitted with a

vane 81 with which a lever 82 (FIG. 10) can interact, this lever being pivot mounted on a fixed shaft 83 and normally urged, under the action of a spring 84, against a fixed lug 85. The lever 82 is connected to a slider 86 also guided in the framework 27. The slider 86 is fitted with an extension 87 with which a lug 88 of a lever 89 interacts, this lever being pivot mounted on a fixed pin 91 and capable of being controlled, by a mechanism of known type, by the total keys and by a capacity control device for the store itself. The slider 86 is fitted with a second extension 92 with which a lug 93 of a lever 94 interacts, this lever also being pivot mounted on the pin 91 and capable of being controlled, via a mechanism of a kind already known in itself, by a capacity control device for the store. The latter device is not shown in the drawing.

A lever 100 is fixed to the pivot pin 36 of the bar 34 and bears a lug 101 which engages a slot 102 in a slider 103 guided in the framework 27 of the machine and, via a guide slot 104, on a fixed pin 105. The slider 103 is also provided with a guide slot 106 engaged by a lug 107 of a rocker 108 pivot mounted on a pin 109 of a lever 110 fixed to a shaft 111. The lever 110 is connected to a slider 112, which is connected to a lever 113 (FIG. 7). The slider 112 is drawn forwards by a spring 114, so that the lever 113 is normally urged against a cam 115 of the main shaft 69. The slider 103 (FIG. 10) is also pulled up by a spring 116.

The lever 100 is provided with a stepped sector 118 consisting of five steps which can interact selectively with a lug 119 of a slider 120 guided in the framework of the machine and, via a guide slot 121, on a fixed lug 122. The slider 120 is also provided with a guide slot 123 engaged by a lug 124 of the rocker 108.

The upper extremities of the two sliders 103 and 120 are capable of interacting, respectively, with two lugs 125 and 126 borne by two opposite arms of a three-armed lever or rocker 127 rotatable within a groove 128 of a sleeve 129 which can slide on a fixed, grooved pin 130. The rocker 127 is provided with an arm 131 which, by a pin and guide slot, engages a slider 133 which can move longitudinally on the framework 27 of the machine. The quinary digits of a decimal number in the input store can be transferred in succession to the slider 133, as described further on.

The unit 23 (FIGS. 9 and 11) of the input store consists of a series of memory bars 134 corresponding in number to the bars 26. Each bar 134 is guided in the framework 27 of the machine and is equipped with an extension 135 which can be placed in two different positions in the manner described in the specification of the first-mentioned patent application. Each bar 134 interacts with a spring-loaded positioning device 136 and is also provided with an extension 137 forming two steps which represent the two values of the binary digit. In particular, each bar 134 stores the value zero if it is moved forwards (towards the right, as shown in FIG. 11) and the value one if it is moved backwards. The extensions 137 can be read in succession by a vane 138 of a bridge 139 which can slide transversally on a bar 140 which is of a substantially rectangular cross section and is pivot mounted on the framework 27 of the machine, by means of two pins 141 and 142 extending from the top part of the section. The bridge 139 is provided with an indentation 143 (FIG. 9) engaging a vane 144 of the bridge 41. To the pin 141 of the bar 140 is fixed a lever 146 (FIG. 11) equipped with a lug 147 which engages a slot 148 in a slider 149, guided in the framework 27 of the machine and, via a guide slot 150, on a fixed lug 151.

The slider 149 is provided with a guide slot 152 engaged by a lug 153 of a rocker 154 pivot mounted on a pin 156 of a lever 157 fixed to the shaft 111. The slider 149 is also drawn upwards by a spring 161. The lever 146 is provided with a stepped sector 163 consisting of two steps capable of interacting selectively with a lug 164 of a slider 165 guided in the framework 27 of the machine and, via a guide slot 166, on a fixed lug 167. The slider 165 is also provided with a guide slot 168 engaged by a lug 169 of the rocker 154.

The upper extremities of the two sliders 149 and 165 are capable of interacting respectively with two lugs 170 and 171 fixed to two opposite arms of a three-armed lever or rocker 172 rotatable within a groove 173 of a sleeve 174 which can slide on a fixed, grooved pin 176. The rocker 172 is provided with the third arm 175 connected by a pin and guide slot to a slider 177 which can move longitudinally on the framework 27 of the machine, to represent the binary digits of the decimal orders in succession.

The printout device also comprises a total store, which can be seen in FIGS. 6, 7 and 8, is identical with the input store described in the foregoing and is capable of storing the data emanating from the arithmetic unit of the machine. The total store will not be described; in the drawings use has been made of the same reference numbers as for the input store, followed by the letter "t."

The units 22 and 22t of the input memory and of the "total memory" are interconnected by means of a slider 181 (FIGS. 9 and 6) guided in the framework 27 of the machine. The slider 181 is provided with a guide slot 182 (FIG. 9) engaged by a lug 183 of the sleeve 129, which is thus normally held in the right-hand position with the lugs 125 and 126 of the rocker 127 outside the paths of the two sliders 103 and 120. The slider 181 is provided with a second guide slot 186 (FIG. 6) which is symmetrical with respect to the guide slot 182, which is engaged by a lug 187 of the sleeve 129t, this latter being likewise normally held in the right-hand position with the lugs of the rocker 127t outside the paths of the two sliders 103t and 120t.

Analogously, the units 23 and 23t are connected by means of a slider 191 (FIGS. 9 and 6) guided in the framework 27 of the machine and provided with a guide slot 192 engaged by a lug 193 of the sleeve 174, which is thus normally held in the left-hand position with the lugs on the rocker 172 outside the paths of the two sliders 149 and 165. The slider 191 is provided with a second guide slot 196, symmetrical in respect of the guide slot 192, engaged by a lug 197 of the sleeve 174t, which is likewise normally held in the left-hand positions with the lugs of the rocker 172 outside the paths of the two sliders 149t and 165t.

The two sliders 181 and 191 are provided respectively with guide slots 201 and 202 (FIGS. 9, 10 and 11) engaged respectively by a lever 203 and a lever 204. These levers are fixed to a shaft 206 rotatable in the framework of the machine. To the shaft 206 is fixed a lever 207, normally in the position shown in FIG. 10 and capable of being rotated in a clockwise direction by a general operand input key and in an anticlockwise direction by the general total key and by the partial total key, via two different mechanisms of a type known per se. The lever 207 is then restored to the position of rest by the capacity control device of the two input stores and total store via two mechanisms of a type already known per se.

The quinary output slider 133 (FIG. 4) of the input store is fitted with a symmetrical pair of stepped profiled parts 221 and 222, each of which consists of five steps capable of representing the five values of the quinary digit. The two profiles 221 and 222 can be read by a reading device consisting of a rocker 226 guided, via a guide slot 227, on a fixed pin 228, and normally urged against two fixed stops 231 by a spring 229. The rocker 226 is equipped with two extensions 232 and 233 capable of interacting respectively with the profiles 221 and 222 of the slider 133 and situated at the distance required to ensure that two complementary values of the quinary digit can be read on the two stepped profiled parts.

The rocker 226 is also fitted with a vane 236 provided with a guide slot 237 engaged by a lug 238 of a lever 239 pivot mounted on a fixed pin 241. The rocker 226 is fitted with a second vane 246 with a guide slot 247 engaged by a lug 248 of the lever 249 pivot mounted on a fixed pin 251. The two levers 239 and 249 are provided with extensions 242 and 252 respectively, positioned on the same longitudinal plane and capable of interacting with an extension 254 of a slider 256 guided in

the framework 27 of the machine. The rocker 226 interacts with an extension 258 of a lever 259 fixed to the shaft 66 is normally urged, under the action of a spring 261, against a cam 262 of the main shaft 69. finally, the slider 256 is provided with a lug 263 capable of interacting with a lever 264 pivot mounted on a fixed pin 226 and normally urged, under the action of a spring 267, against a fixed lug 268. The lever 264 is connected with a slider 259 which is controlled, via a mechanism of a kind already known in itself, by the capacity control devices of the input store and of the total store.

Analogously, the binary output slider 177 (FIG. 5 of the input store is provided with a symmetrical pair of profiled parts 271 and 272, each of which consists of a pair of steps capable of representing the two values of the binary digit. The two profiles 271 and 272 can be read by a reading device consisting of a rocker 276 guided, via a guide slot 277, on a fixed pin 278 and normally urged by a spring 279 against two fixed stops 281. The rocker 276 is provided with two extensions 283 and 284 capable of interacting, respectively, with the profiles 271 and 272 of the slider 177 and positioned at the distance required to ensure that the two complementary values of the binary digit can be read on the two profiles.

The rocker 276 is provided with a vane 286, having a guide slot 287 engaged by a lug 288 of a lever 289 pivot mounted on a fixed pin 291. The rocker 276 is provided with a second vane 296, having a guide slot 297 engaged by a lug 298 of a lever 299 pivot mounted on a fixed pin 301. The two levers 289 and 299 are fitted with extensions 292 and 302 respectively, positioned on the same longitudinal plane and capable of interacting with an extension 304 of a slider 306 guided in the framework 27 of the machine. The rocker 276 interacts with an extension 308 of a lever 209 affixed to the shaft 66.

Finally, the slider 306 has a lug 313 capable of interacting with a lever 314 pivot mounted on a fixed pin 316 and normally urged by a spring 317 against a fixed lug 318. The lever 314 is connected to a slider 319 which is controlled, via a mechanism of a type already known in itself, by the control devices for the capacity of the input store or of the total store.

The quinary digit slider 256 (FIG. 4) is connected by a pin and guide slot with a lever 321 fixed to a shaft 322 rotatable in the framework 27 of the machine. To the shaft 322 is also fixed an arm 323 (FIG. 2) connected by a bar 324 to the lever 321 and terminating in a sector 336 provided with five indentations 337 with which a spring-loaded positioning device 338 interacts. The lever 321, the shaft 322 and the arm 323 and the bar 324 thus form a rotatable frame. On the bar 324 are pivot mounted two character-bearing bars 326 and 327 guided in two apertures 328 and 329 respectively (FIGS. 1 and 3) and two apertures 331 and 332 of a support 333, which will slide transversely on the shaft 322 and on a shaft 334, rotatable on the framework 27 of the machine. The bar 326 bears five characters, i.e. the figures from zero to four, from the top downwards, while the bar 327 bears the other five characters, i.e. the figures from five to nine, likewise from the top downwards. The two bars 326 and 327 can be selectively struck against a paper platen 339 (FIG. 2) rotatable on a fixed shaft 340.

The character bar 326 is provided with a guide slot 341 engaged by a lug 342 (FIG. 1) of a lever 343 pivot mounted on a shaft 344 fixed to the framework 27 of the machine. The lever 343 is normally urged by a spring 345 so that an extension 346 bears against the extremity of slot 347 in the support 333. Analogously, the bar 327 is provided with a guide slot 351 engaged by a lug 352 of a lever 353 pivot mounted to the shaft 344 and normally urged by a spring 354 so that an extension 356 bears against the extremity of an indentation 357 of the support 333. The two levers 343 and 353 are fitted with extensions 361 and 362 respectively, capable of being selectively engaged by a vane 363 of a bridge 364. In the position of rest the vane 363 corresponds to the extension 361 of the lever 343. The bridge 364 can slide on a transversal bar 366 of rectangular cross section and fitted at the two extremities at the upper part of the section with two pins 367 and 368 rotatable

in the framework of the machine. To the pin 367 is fixed an arm 371 (FIG. 2) connected by a pin and guide slot with a lever 372 pivot mounted on the shaft 66 and normally urged by a spring 373 against a cam 374 of the main shaft 69. The bridge 364 has a vane 376 (FIG. 3) engaged in a slot 377 in a carriage 378 guided, via an extension 379, in a guide slot 380 of the support 333 and, by means of a guide slot 381, on a pin 382 of the support 333. The carriage 378 is drawn by a spring towards the right hand of the machine and is controlled in its transversal displacement by a step-by-step feed device 386 interacting with a saw-toothed rack 387 of the carriage 378.

The device 386 consists of a slider 391 guided in two guide slots 394 (FIG. 2) of the framework 27 of the machine. The two guide slots 394 are substantially in the shape of an eight, so that the slider 391 can also rotate. Normally the slider 391 is urged in an anticlockwise direction, by a spring 398. The slider 391 is also provided with a vane 399 (FIG. 1) having a tooth 400 capable of interacting with the rack 387 (FIG. 3). The slider 391 is also fitted with a cam slot 403 (FIG. 1) engaged by a lug 404 of a slider 405 guided by means of a guide slot 406 on a fixed pin 407 and connected to a lever 408 (FIG. 2) pivot mounted on the shaft 66 and normally urged by a spring 410 against a cam 411 of the main shaft 69. The device 386 also comprises a bar 412 rotatable, by means of two extensions 414, in two guide slots 416 in the shape of an eight and provided in the framework of the machine. The bar 412 is provided with a vane 418 (FIG. 1) provided in its turn with a tooth 419, and a spring 421 keeps it rotated in an anticlockwise direction, (FIG. 2) with the tooth 419 engaging the rack 387. The vane 399 of the slider 391 is also provided with an extension 426 (FIG. 1) with a vane 427 corresponding in position to the vane 418 of the bar 412. Finally, the slider 391 is provided with a vane 431 with which a lever 432 (FIG. 2) can interact, the latter being pivot mounted on a fixed pin 433 and normally urged by a spring 434, against a fixed lug 436. The lever 432 is connected to a slider 438 capable of being controlled, via a mechanism of a type already known in itself, by the capacity control device of the input store and total store.

The slider 306 (FIG. 5) in its turn, is connected by a pin and guide slot with an arm 440 fixed to the shaft 334 and connected via a shaft 441 to a second arm 442 (FIG. 4) likewise fixed to the shaft 334, thus forming a frame rotatable with the shift 334. The arm 440 is fitted with a sector 443 (FIG. 5) with two indentations 444 with which a spring-loaded positioning device 445 can interact. The shaft 441 is engaged between two extensions 446 and 447 of a lever 448 (FIG. 3) pivot mounted on a pin 449 of the support 333 and fitted with a cam guide slot 451 engaged by a lug 452 of the carriage 378.

The device operates as follows.

A printout operation can be controlled by two different types of key: the input keys for the operands and the total keys. In the first case the data stored in the input store is printed while in the second case the data stored in the total store is printed. The digits stored in the input store are printed at the same time as they are accumulated in the total store. The printing operation to be described therefore takes place simultaneously with the accumulation described in the second of the aforementioned U.S. Patent specifications.

When an operand input key is pressed the lever 207 (FIG. 10) is rotated clockwise, thus causing the shaft 206, together with the lever arms 203 and 204 (FIG. 11), to rotate clockwise. The slider 181 is moved forwards and, via the guide slot 182 (FIG. 9) engaging the lug 183, causes the sleeve 129 to be displaced towards the left, and thus the rocker 127 likewise, whose two lugs 125 and 126 are positioned in correspondence with the paths of the two slides 103 and 120 respectively. The straight part of the guide slot 186 (FIG. 6) however, keeps the lug 187 and therefore the sleeve 129 in the position shown in FIG. 6 with the lugs of the rocker 127 outside the paths of the two sliders 103 and 120.

Analogously, the slider 191 is moved forwards and, via the guide slot 192 (FIG. 9) engaging the lug 193, causes the sleeve

174 and therefore the rocker 172 to be moved to the right, the lugs 170 and 171 being placed in the paths of the two sliders 149 and 165. The guide slot 196 (FIG. 6) however, keeps the lug 197 and therefore the sleeve 174t in the position shown in FIG. 6 with the lugs of the rocker 172t outside the paths of the two sliders 149t and 165t.

Furthermore, when an input key is pressed it causes the lever 89t (FIG. 7) to rotate in a clockwise direction and to push the slider 86t forwards, thus causing the lever 82t to rotate clockwise. The lever 82t rests against the vane 81t of the slider 46t, which is rotated in an anticlockwise direction. The tooth 54t is then disengaged from the rack 43t, so that the feed device 44t of the total memory is disconnected.

Finally, when an input key is pressed, this causes the closure of the clutch 71 (FIG. 7), which rotates the main shaft 69 clockwise. The cam 115 (FIG. 7) causes the lever 113 to rotate clockwise, and this lever moves the slider 112 backwards. The lever 110 (FIG. 10), and thus the shaft 111 likewise, are rotated clockwise. The rocker 108 is moved upwards, via the pin 109, thus enabling the spring 116 to move the slider 103 upwards. The rocker 108 performs a first rotation in an anticlockwise direction, around the lug 124. The lever 100 is likewise rotated anticlockwise, causing the bar 34, integral with it, to rotate in an anticlockwise direction. The bridge 33, in its turn, commences to rotate anticlockwise, and its rotation continues until the vane 32 comes to rest against a step of the extension 31 of the first bar 26, belonging to the unit 22 of the input store. The quinary number of the coded decimal number to the units order is stored in this first bar 26.

The slider 103 is thus stopped, while the pin 109 continues its ascent. The rocker 108 now rotates clockwise round the lug 107 and, via the lug 124, pushes the slider 120 upwards. The slider 103 has been moved upwards by a number of steps complementary to the value of the quinary digit fed into the corresponding slider 26 and has caused the sector 118 of the lever 100 to rotate by the same number of steps. After covering a path complementary to that covered by the slider 103, and therefore equal to the value of the quinary digit, the lug 119 of the slider 120 encounters a step of the sector 118, and its upwards displacement is interrupted simultaneously with that of the rocker 108. The upper extremities of the sliders 103 and 120 act on the two lugs 125 and 126 of the rocker 127, which is selectively positioned in accordance with the value of the quinary digit read. In particular, the rocker 127 is in the position shown in FIG. 10 when the digit zero is read, and rotates in a clockwise direction by one, two, three or four steps when the digits one, two, three or four respectively are read. The arm 131 of the rocker 127 acts on the slider 133, selectively positioning it on the basis of the value of the quinary number read. The slider 133 thus positions the two extensions 221 and 222 (FIG. 4) with respect to the reading rocker 226.

The cam 115 (FIG. 10) now enables the lever 113 to rotate clockwise. The slider 112 moves forward and the lever 110 rotates anticlockwise, conveying the pin 109 and thus the rocker 108 downwards, until the pin 109 comes to rest against the two stops 117. The two sliders 103 and 120 are thus returned to the position of rest.

The shaft 111, when rotated clockwise, also causes the lever 157 (FIG. 11) to rotate clockwise, and this lever, via the pin 156, moves the rocker 154 upwards. The spring 161 draws the slider 149 upwards, so that the rocker 154 performs a first rotation in an anticlockwise direction around the lug 169. The lever 146 is likewise rotated anticlockwise, causing the bar 140 and the bridge 139 to rotate anticlockwise. The rotation of the bridge 139 continues until the vane 138 rests against one or other of the two steps of the extension 137 of the first memory bar 134. In this bar is stored the binary digit of the coded decimal number relating to the units order. The slider 149 is thus stopped, while the pin 156 continues its ascent.

The rocker 154 commences a second rotation clockwise, around the lug 153, pushing the slider 165 upwards, via the lug 169. The slider 149 has thus moved upwards by a distance equal solely to the gap prevailing between the vane 138 and

the first step of the extension 137, if the stored digit is one, and by a distance corresponding to the said gap plus the distance between the first and the second step of the extension 137, if the stored digit is zero. The slider 165 covers a stroke complementary to that of the slider 149, after which its lug 164 encounters a step of the sector 163. The upper extremities of the sliders 149 and 165 act on the two arms 170 and 171 of the rocker 172, which is selectively positioned on the basis of the value of the binary figure read. The slider 177 thus positions the two profiles 271 and 272 (FIG. 5) with respect to the reading rocker 276. The rocker 154 is then returned to the position of rest, together with the rocker 108. The two sliders 149 and 165 (FIG. 11) are thus returned to the position of rest, with the upper extremities of the two guide slots 150 and 166 resting respectively against the lugs 151 and 167, together with the bridge 139, while the rocker 172 remains in the position reached.

The movement of the slider 112 towards the rear will also cause the shaft 111t (FIG. 7 and 8) to rotate, and this shaft moves the rocker 108t and the rocker 154t upwards, so that the total store can also be read. The digits read, however, are not transferred to the rocker 127t and on the rocker 172t, because these latter are positioned with their lugs outside the paths of the upper extremities of the two sliders 103t and 120t and the two sliders 149t and 165t.

On the completion of the reading of the data in one order of the store, the cam 262 (FIG. 4) causes the lever 259 to rotate anticlockwise, and this lever, via its extension 258, raises the reading rocker 226. The two extensions 232 and 233 of the rocker 226 rest against the two stepped profiled parts 221 and 222 respectively and, through the action of the two guide slots 237 and 247 on the lugs 238 and 248, cause the levers 239 and 249 to rotate clockwise and anticlockwise respectively by mutually complementary numbers of steps. The extensions 242 and 252 act positively on the extension 254 of the slider 256, positioning it selectively on the basis of the value of the quinary digit. More specifically, the slider 256 is moved the whole of the way back, into the position shown in FIG. 4 if the quinary digit is zero, and is moved forwards by one, two, three and four steps when the quinary digit is one, two, three and four respectively.

The slider 256 causes the lever 321, together with the shaft 322 and thus the arm 323, to rotate clockwise by the same number of steps. The shaft 324 carries the two character bars 326 and 327 upwards, so that the number to be printed and the number which differs from it solely in relation to the binary digit are situated on the writing line.

The cam 262, via the lever 259, causes the shaft 66 and therefore the lever 309 (FIG. 5) to rotate anticlockwise, and this lever, via its extension 308, raises the reading rocker 276 for the binary digit. The two extensions 283 and 284 of the rocker 276 are moved respectively against the two stepped profiled parts 271 and 272 and, via the action of the two guide slots 287 and 297 on the two lugs 288 and 298, cause the levers 289 and 299 to rotate clockwise and anticlockwise respectively, through two mutually complementary strokes. The extensions 292 and 302 act positively on the extension 304 of the slider 306, which is selectively positioned on the basis of the value of the binary digit. The slider 306 is moved towards the rear, into the position shown in FIG. 9, if the digit is zero, and is moved forwards if the digit is one.

The slider 306 acts on the arm 440, which, in accordance with the displacement of the slider 306, is selectively moved into the position shown in FIG. 5 or rotated anticlockwise as far as the second position of the positioning device 445. If the binary number is one, the arm 440, integral with the shaft 334, causes the arm 442 to rotate and thus displaces the shaft 441 (FIG. 3), which engages the extension 447 of the lever 448, which is rotated anticlockwise and, through the action of the cam guide slot 451 on the lug 452, is also moved towards the right by a distance corresponding to that between the two character bars 326 and 327. The lever 448, via the pin 449, moves the support 333 towards the right by the same distance

and moves the bar 327 into the striking position. In addition, the support 333 moves the two levers 343 and 353 towards the right, thus conveying the extension 362 of the lever 353 onto the trajectory of the vane 363 of the bridge 364, while the extension 361 of the lever 343 is moved out of this trajectory.

It is thus obvious that the character to be printed will be selected in exact accordance with the coded data emanating from the store, without any need for a decoding operation.

Simultaneously with the selection of the character to be printed the device 386 causes the carriage 378 (FIG. 1) to move forwards, thus causing the support 333 to move by one step to the left. The cam 411 (FIG. 2) now causes the lever 408 to rotate clockwise, and this lever causes the slider 405 (FIG. 1) to move downwards. The slider 405, through the action of the lug 404 on the cam guide slot 403, causes the slider 391 to move towards the left. The tooth 400 (FIG. 5) of the slider 391 encounters the tooth flank which is perpendicular to the direction of motion of the rack 387 and thrusts the carriage 378 towards the left by a distance corresponding to a printing step. In the displacement towards the left a tooth of the rack 387 acts by the inclined flank on the tooth 419 and causes the bar 412 (FIG. 2) to rotate clockwise. At the end of the feed movement the bar 412, under the action of the spring 421, is rotated anticlockwise, and the tooth 419 falls behind the straight flank of the sawtooth. The cam 411 (FIG. 2) now enables the lever 408 to rotate anticlockwise. The slider 405 (FIG. 1) is moved upwards and, through the action of the lug 404 on the cam guide slot 403, causes the slider 391 to move to the right. The rack 387 and thus the carriage 378 remain in the position reached, in which they are held by the engagement of the tooth 419 with the rack. The tooth 400 (FIG. 3) slides on the inclined flank of the sawtooth following that with which it was engaged, thus causing the slider 391 (FIG. 2) to rotate clockwise, the slider continuing its travel towards the right until the tooth 400 falls behind the straight profile of the sawtooth in question. The displacement of the carriage 378 by one step towards the left causes the lever 448 likewise to move one step towards the left, through the action of the lug 452 on the cam guide slot 451. The lever 448, via its own pin 449, also causes the support 333 and thus the two character bars 326 and 327 to move by one step towards the left. The bridge 364, engaged in the indentation 377 of the carriage 378, is also displaced by one step towards the left.

On the completion of these operations consisting of a movement by one step and the selection of a character, which, as described above, take place simultaneously, the cam 374 (FIG. 2) causes the lever 372 to rotate clockwise and thus, via the arm 371, causes the bar 366 to rotate anticlockwise. The bar 366 causes the bridge 364 to rotate anticlockwise, and the bridge, via the vane 368, acts selectively on the extension 361 of the lever 343 or on the extension 362 of the lever 353. The vane 363 engages the extension 361 if the binary number is zero and the extension 362 if the binary number is one. The selected lever 343 or 353 is rotated anticlockwise and causes the corresponding bar 326 and 327 to make impact on the paper roller 339. The cam 374 now enables the lever 372 to rotate anticlockwise. The bridge 364 therefore returns to the position of rest and also enables the lever 343 or the lever 353, concerned in the striking operation, to return to the inoperative position, under the action of the respective spring 345 or 354. The bar 326 or 327 likewise returns to the position of rest.

Simultaneously with the striking operation the cam 68 (FIG. 7) causes the lever 65 to rotate clockwise, and this lever causes the slider 64 to move back. The slider 64 causes the lever 62 to move clockwise, and this lever causes the slider 59 (FIG. 12) to move downwards and, via the action of the lug 58 on the cam guide slot 57, causes the slider 46 to move towards the right. The tooth 54 (FIG. 9) on the slider 46 encounters the tooth flank perpendicular to the direction of motion of the rack 43 and thus the bridge 41 towards the right by a distance corresponding to that between two successive memory bars 26 and 134. In the movement towards the right a tooth of the

rack 43 acts by the inclined flank against the tooth 77 and causes the bar 72 (FIG. 10) to rotate anticlockwise. On the completion of the feed movement the bar 72, under the action of the spring 78, is rotated clockwise, and the tooth 77 falls behind the straight flank of the sawtooth. The cam 68 (FIG. 7) now enables the lever 65 to rotate anticlockwise. The slider 64 (FIG. 10) moves forwards and causes the lever 62 to rotate anticlockwise. The slider 59 is again moved upwards, and under the action of the lug 58 (FIG. 12) on the cam guide slot 57 it causes the slider 46 to move towards the left. The rack 43 and thus the bridge 41 remain in the position reached, in which they are held by the engagement of the tooth 77 with the said rack. The tooth 54 (FIG. 9) slides on the inclined flank of the sawtooth following that with which it was engaged, thus causing the slider 46 to rotate anticlockwise (FIG. 10), the said slider continuing its movement towards the right until the tooth 54 falls behind the straight profile of the sawtooth concerned. The movement by one step towards the right of the bridge 41 results, via the two vanes 39 and 144, in the movement by one step towards the right of the two bridges 33 and 139 (FIG. 9). The vane 32 of the bridge 33 assumes a position corresponding to the second bar 26 of the store unit 22, and the vane 138 of the bridge 139 assumes a position corresponding to the second bar 134 of the store unit 23.

This completes a first printing cycle, which corresponds to a rotation of the main shaft 69 through an angle of 180°. Each successive printing cycle is carried out substantially on the same lines as the cycle described in the foregoing, with the difference that the selection of the character to be written is effected with the sliders 256 and 306 and thus with the character bars 326 and 327 occupying the position selected in the preceding cycle.

Towards the end of the printing of the complete number, the input store capacity control device causes the lever 94 (FIG. 10) to rotate clockwise, and this lever, under the action of the lug 93 on the extension 92, moves the slider 86 forwards and rotates the lever 82 clockwise. The lever 82 engages the vane 81 and rotates the slider 46 anticlockwise. The extension 79 of the slider 46 (FIG. 12) comes to rest against the vane 80 of the bar 72 and causes the latter to rotate clockwise. The two teeth 54 and 77 are disengaged from the teeth of the rack 43, so that the bridge 41 returns to the position of rest, together with the two bridges 33 and 139. The two teeth 54 and 77 are then rapidly caused to reengage the rack 43.

The input store capacity control device also causes the lever 89 to rotate anticlockwise until it reaches the position of rest shown in FIG. 7. The slider 86 is moved back and the lever 82 rotates anticlockwise, thus enabling the slider 46 to rotate clockwise until it causes the tooth 54 to reengage the rack 43. The capacity control device also causes the slider 43 (FIG. 2) to move towards the rear, and this slider causes the lever 432 to move anticlockwise, until it comes to rest against the vane 431 of the slider 391, which commences a clockwise rotation. The extension 426 engages the vane 418 of the bar 412, which is thus likewise rotated clockwise. The two teeth 400 and 419 are caused to disengage from the teeth of the rack 387, so that the carriage 378, under the action of the spring 383, returns to the position of rest, on the right. The teeth 400 and 419 are then rapidly caused to reengage the rack 387.

The input memory capacity control device also moves the slider 269 (FIG. 4) and the slider 319 (FIG. 5) forwards, and the latter causes the lever 264 and the lever 314 respectively to rotate clockwise. The lever 264 (FIG. 4), via the lug 263, moves the slider 256 backwards and thus, via the lever 321 and the shaft 324, moves the two character bars 326 and 327 downwards into the position of rest. The lever 314 (FIG. 5), via the lug 313 moves the slider 306 to the rear if the latter has been displaced in the forward direction and thus, via the arm 440 and the shaft 441, causes the lever 448 to rotate clockwise (FIG. 3). The cam guide slot 451 engages the lug 452, so that the support 333 is displaced towards the left and causes the bars 326 and 327 to return to the final position of rest.

Finally, the input memory capacity control device causes the lever 207 (FIG. 10) to rotate anticlockwise, returning it to the central position of rest. The lever 207 rotates the shaft 206 and the two arms 203 (FIG. 10) and 204 (FIG. 11), which latter, via the two sliders 181 and 191, move the lugs of the rocker 127 (FIG. 9) out of the paths of the two sliders 103 and 120 and the lugs of the rocker 172 out of the paths of the two sliders 149 and 165. At this point the clutch 71 is reopened, so that the main shaft 69 comes to a stop.

When a total key is depressed, the lever 207 is rotated anticlockwise, together with the shaft 203 and 204. The slider 181 is then moved towards the rear and, via the guide slot 186 (FIG. 6) engaging the lug 187, moves the sleeve 129t towards the left. The rocker 127t is thus moved so that the two lugs 125t and 126t cane to a position corresponding to the two sliders 103t and 120t respectively. The straight part of the guide slot 182 (FIG. 9), however, keeps the lug 183 and the sleeve 125 in the position shown in FIG. 9, with the FIG. 9, of the rocker 127 outside the paths of the two sliders 103 and 120.

The slider 191 is likewise moved towards the rear and, via the guide slot 196 (FIG. 6) engaging the lug 197, causes the sleeve 174t and the rocker 172t to move towards the right, the two lugs 170t and 171t caning to a position corresponding to the paths of the two sliders 149t and 165t. The guide slot 192 (FIG. 9), however keeps the lug 193 and thus the sleeve 174 in the position shown in FIG. 9 with the lugs of the rocker 172 outside the paths of the two sliders 149 and 165.

Accordingly it is now the total store which transfers digits to the sliders 133 and 177 (the sliders 133t and 177t being these same sliders in fact).

Furthermore, the operation of total key causes a clockwise rotation of the lever 89 (FIG. 10), which moves the slider 86 forwards and thus causes the lever 82 to rotate clockwise. The lever 82 comes to rest against the vane 81 of the slider 46, which is rotated anticlockwise. The tooth 54 is thus disengaged from the rack 43, so that the feed device of the input memory is disconnected.

An operation of printing the numbers emanating from the total store is effected from this point onwards in exactly the same manner as described in connection with the input store.

I claim

1. A digital printout device comprising:

a store for storing a multiorde digital number including a plurality of memory elements for each of said orders for storing the value thereof in a multidigit code, each of said memory elements corresponding to a digit of said code; transfer register means coupled to said store and including means for positionally indicating the values of the code digits of a numerical order; reading means for sensing the position of said indicating means; means bearing a plurality of characters for printing out the different values of one of said orders; and selection means controlled by said reading means for moving said character-bearing means according to a plurality of coordinates for bringing a selected character to a printing position, each of said memory elements controlling the movement of said character-bearing means along one of said coordinates.

2. A device according to claim 1, wherein said number is a decimal number, said memory elements each comprising a two-position element and a five-position element for encoding an order of said number in a biquinary code.

3. The device of claim 2 wherein said character-bearing means comprises two members each bearing a portion of said plurality of characters, said selection means being operable to move said members along a first coordinate in accordance with the position of said two-position element and along a second coordinate in accordance with the position of said five-position element for bringing the encoded character into a

printing position.

4. A device according to claim 3, wherein the characters on each of said members are arranged in a five-digit column, said members being disposed with the columns parallel and the corresponding numbers of the columns directly opposite each other and wherein said selection means comprise first selection means for moving said members in a direction transverse to said columns in accordance with the reading of the two-position memory element and second selection means for moving said members in a direction parallel to said columns in accordance with the reading of the five-position memory element.

5. A device according to claim 4, further comprising a carriage movable step by step in a direction parallel to the record member being printed upon, a support for said character-bearing members movable with said carriage and a cam device for selectively moving said support with respect to said carriage under the control of said first selection means.

6. A device according to claim 5, wherein said first selection means comprise a first intermediate element movable to two different positions, corresponding to the reading of the two-position memory element and wherein said cam device comprises a lever pivotally mounted on said support and coupled to said intermediate means, said lever having a cam element operable to move said support to one of two positions with respect to said carriage under the control of said intermediate means, the distance between said character-bearing members being equal to the distance between said two positions.

7. A device according to claim 5, wherein said second selection means comprise a second intermediate element movable to one of five different positions corresponding to the reading of said five-position memory element, said second intermediate element including a shaft disposed parallel to said record member and having said character-bearing members slidably mounted thereon.

8. A device according to claim 7, further comprising means for selectively actuating one of said character-bearing members for printing the selected character on said record member.

9. A device according to claim 7, wherein said indicating means comprise a pair of sliders, the first one of said sliders being displaceable according to the value of the digit read in one of said two-position memory elements, the second one of said sliders being displaceable according to the value of the digit read in the corresponding one of said five-position memory elements, the position of each of said intermediate elements being controlled by the corresponding slider.

10. A digital printout device comprising:

an input store and a total store for storing a multiorde digital number, each of said stores including two memory elements for each of said orders for storing the value thereof in a biquinary code; transfer register means including means for positionally indicating the value of the biquinary code digits of a numerical order of a selected one of said stores; reading means for sensing the position of said indicating means;

means bearing a plurality of characters for printing out the different values of one of said orders; selection means controlled by said reading means for moving said character-bearing means according to a pair of coordinates for bringing a selected character to a printing position, each of said memory elements controlling the movement of said character-bearing means along one of said coordinates;

a pair of elements for each of said stores displaceable according to the value of the biquinary code digits of a numerical order stored therein; and

control means for selectively coupling one of said pairs of elements to said transfer register means for printing the amount stored in the selected one of said stores.