April 16, 1957 M. E. GOULD 2,788,878

AUTOMATIC CODING SYSTEM

Filed Aug. 28, 1953 7 Sheets-Sheet 1

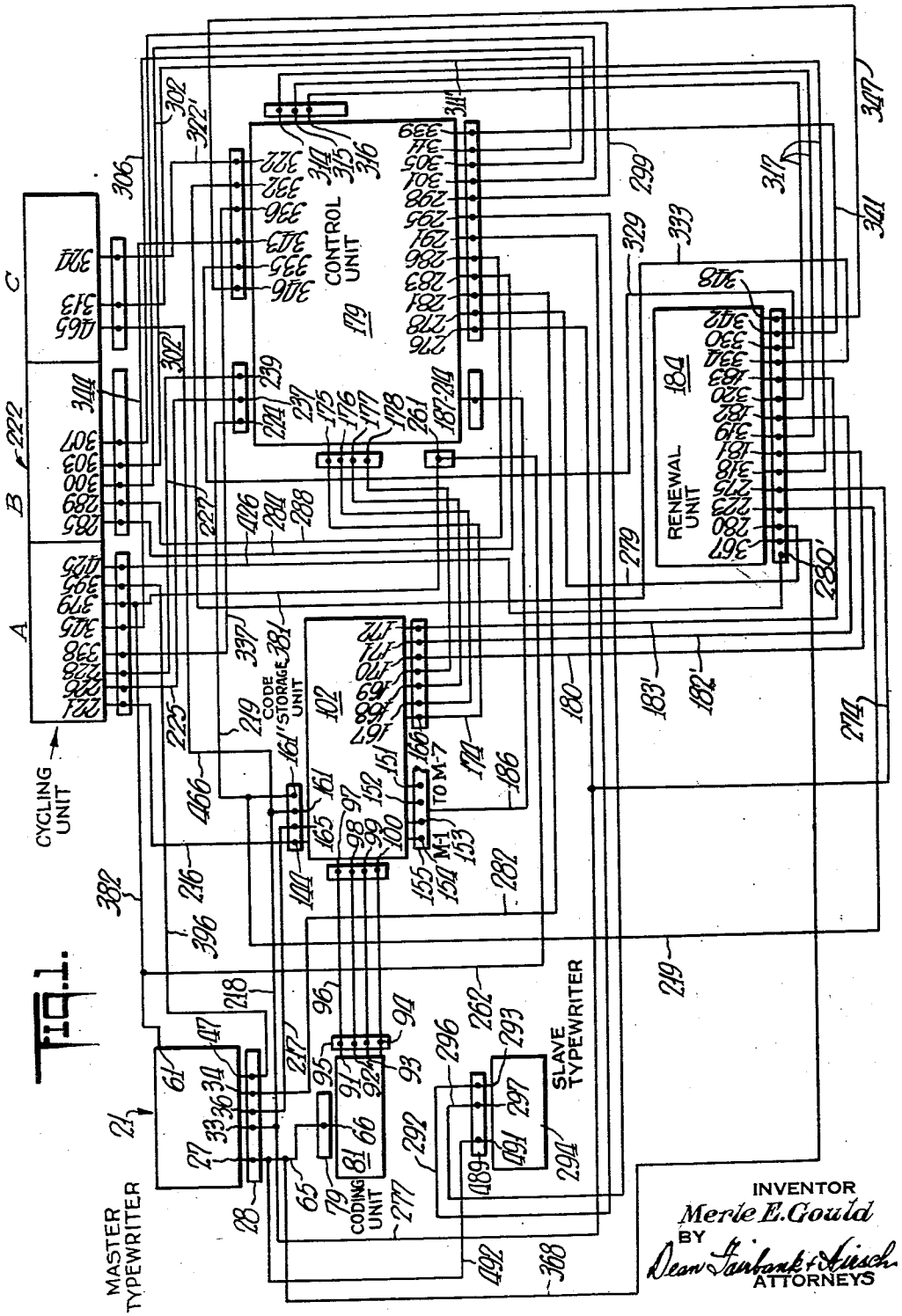


Fig. 1.

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AUTOMATIC CODING SYSTEM

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Fig. 2.

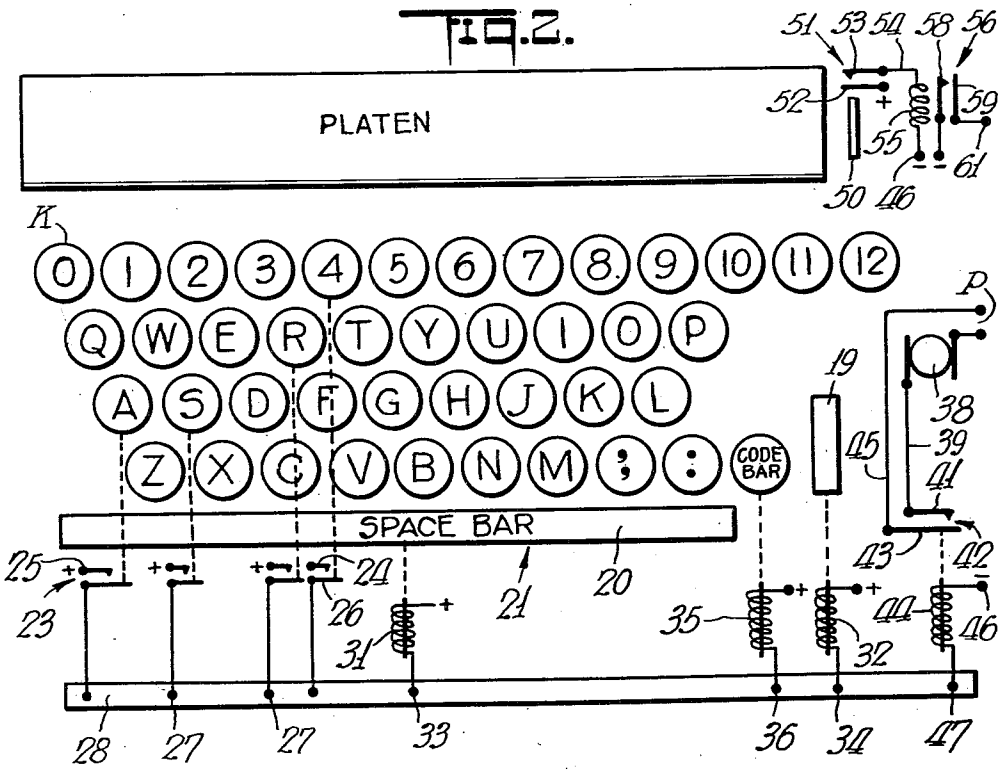
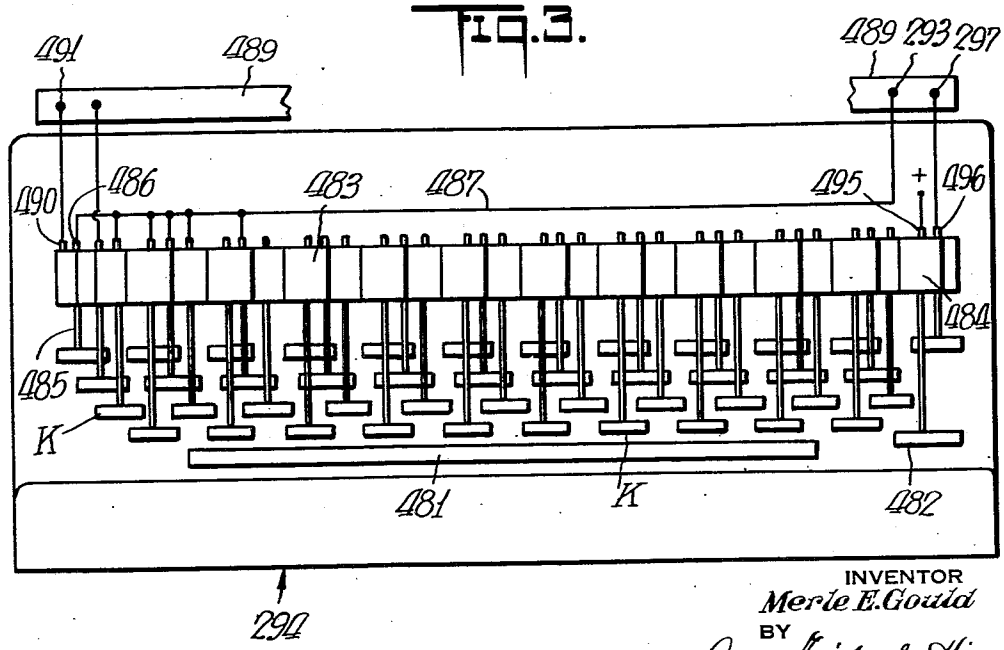


Fig. 3.



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Fig. 4.

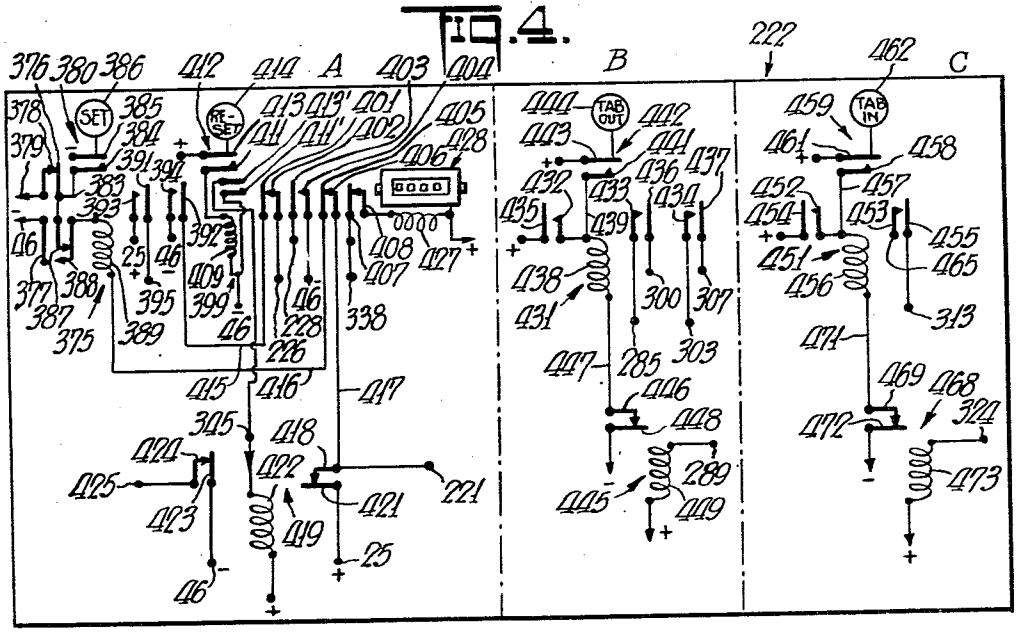
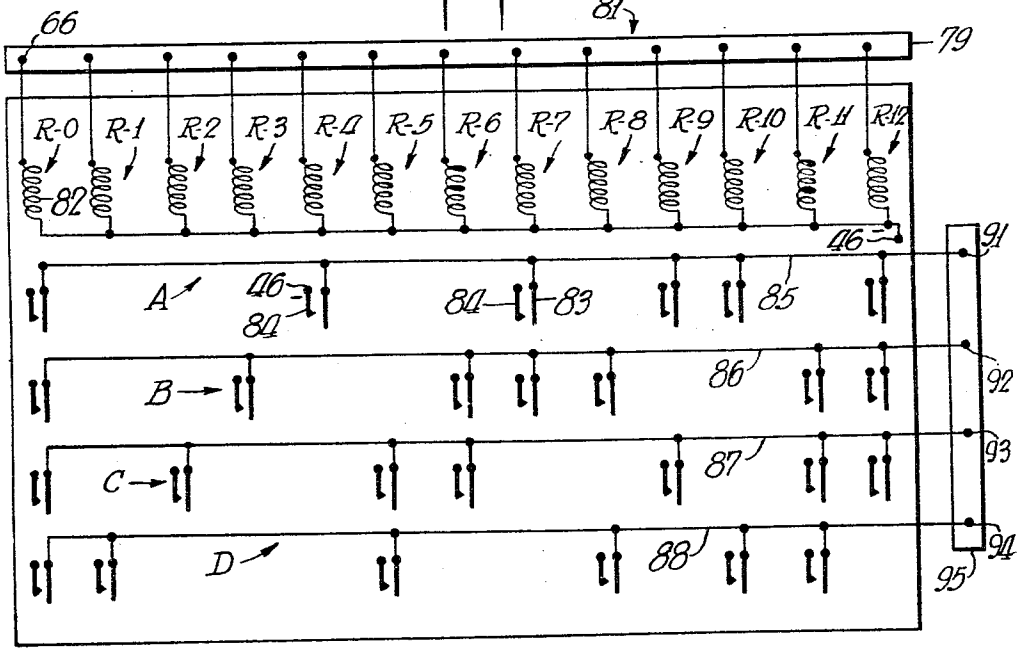


Fig. 5.



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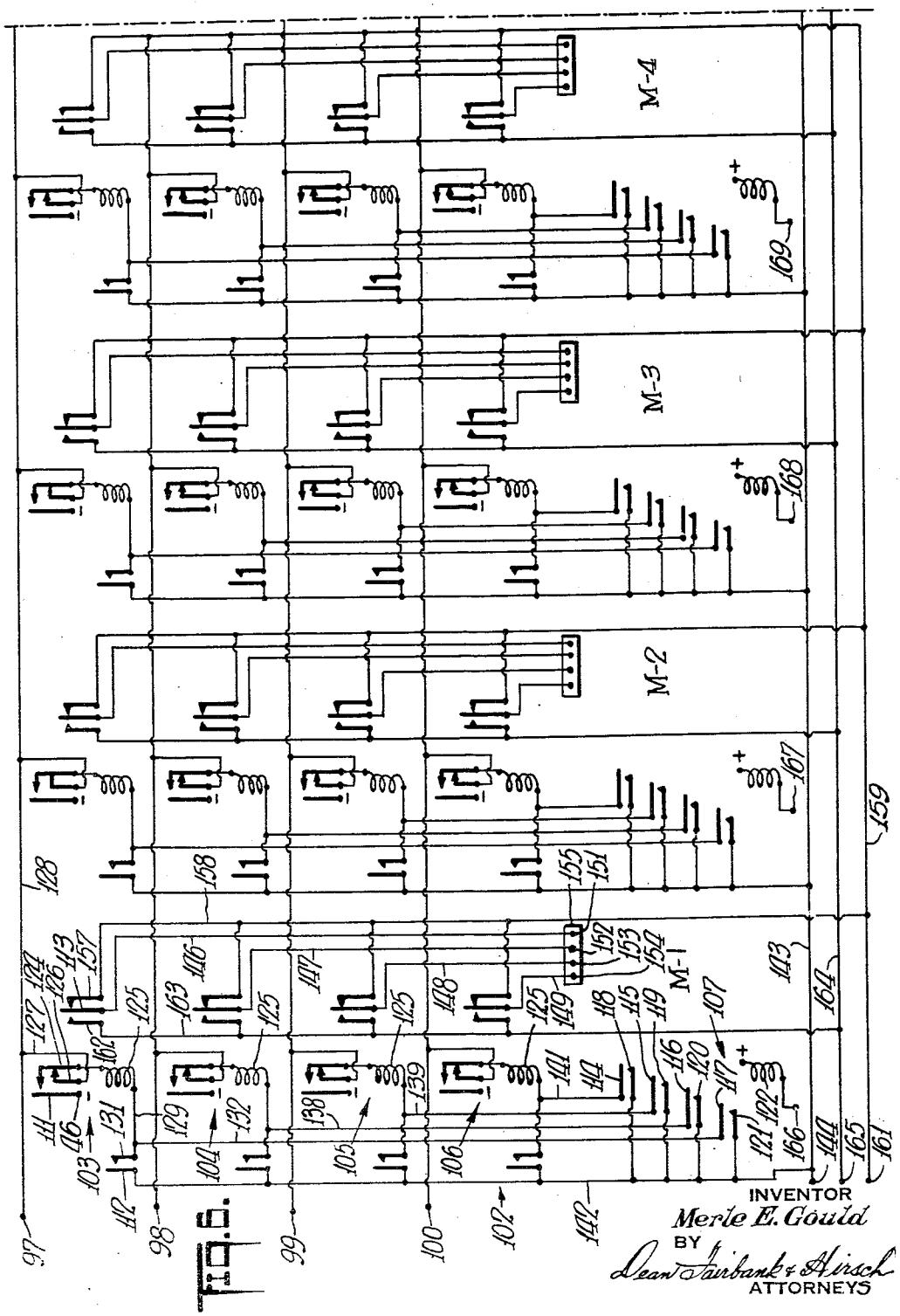


Fig. 6.

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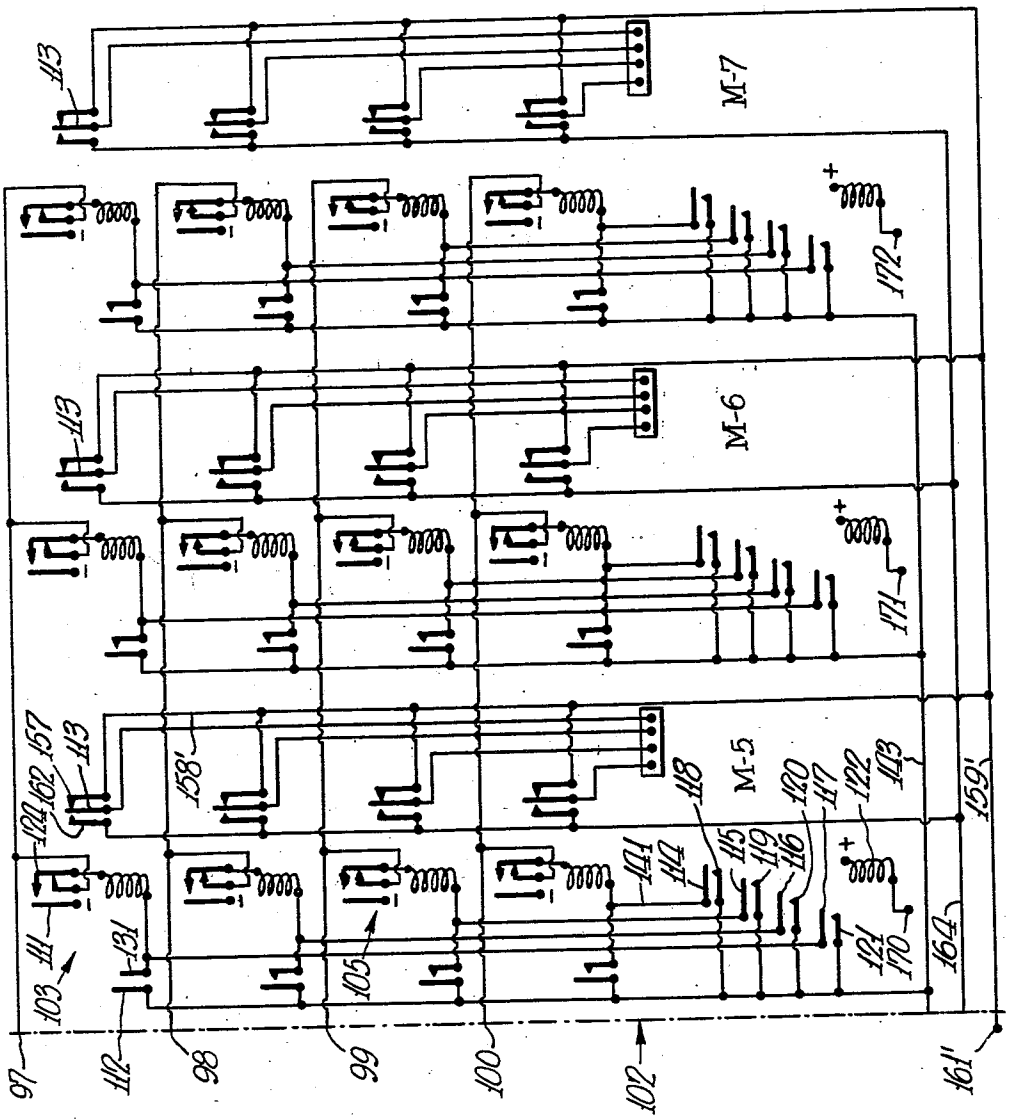


FIG. 7.

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AUTOMATIC CODING SYSTEM

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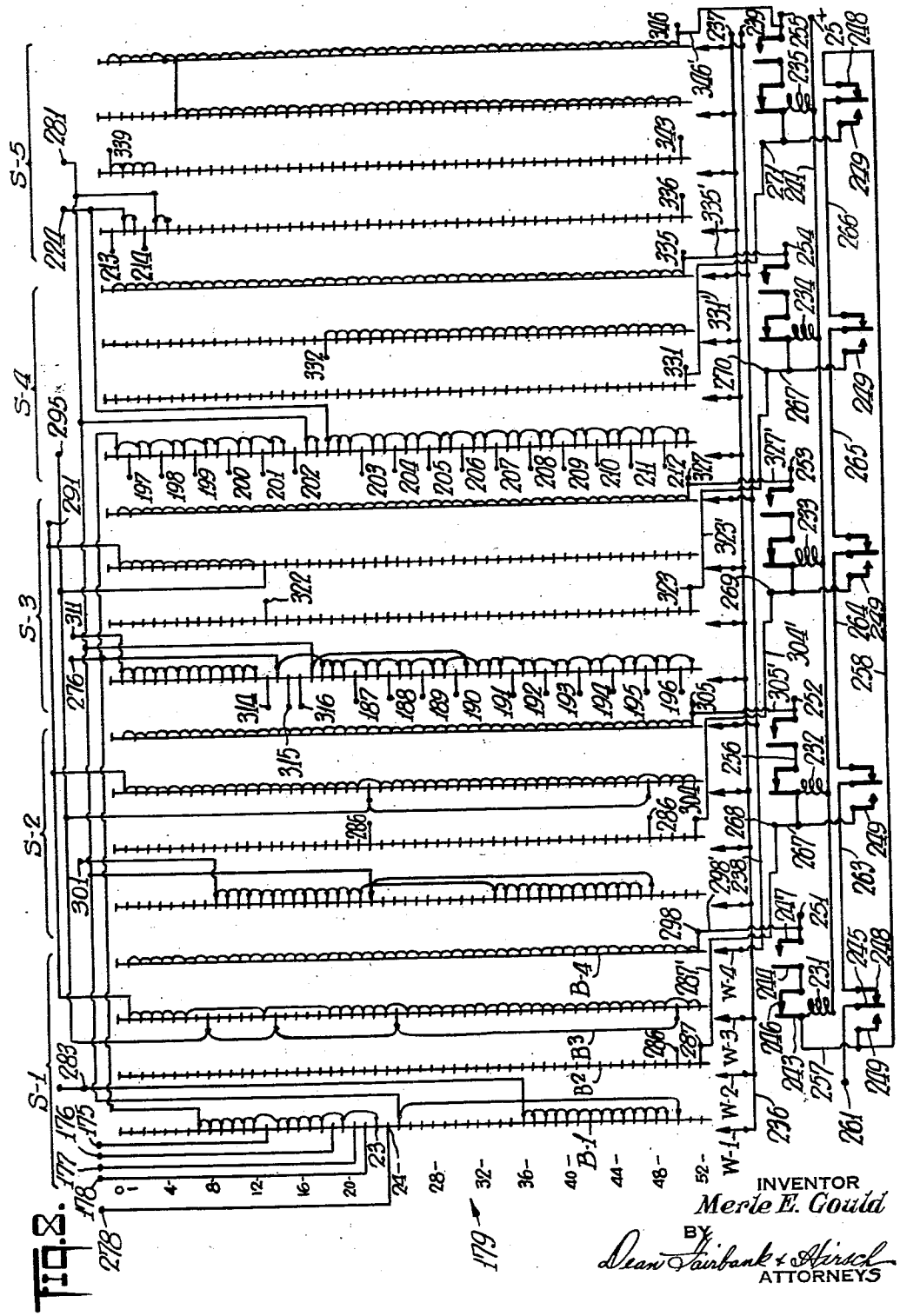


FIG. 8.

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FIG. 9.

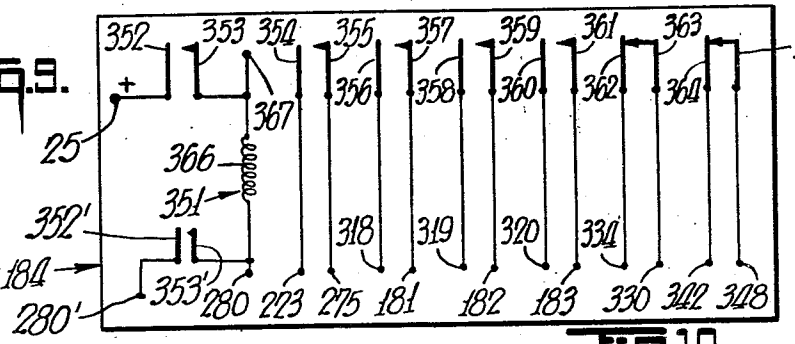


FIG. 10.

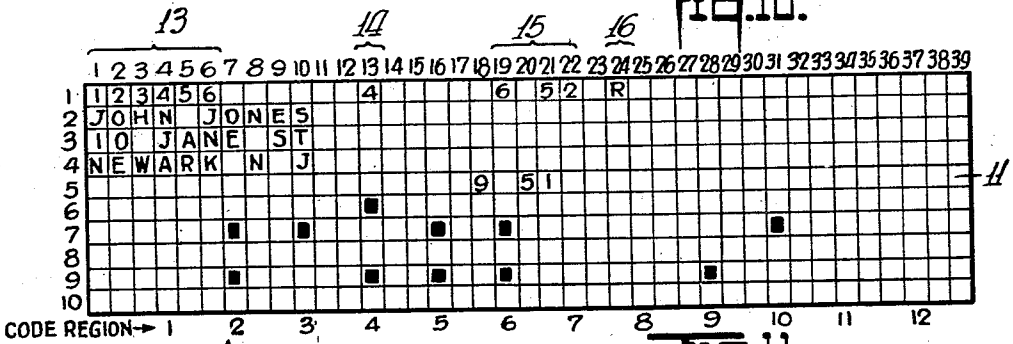


FIG. 11.

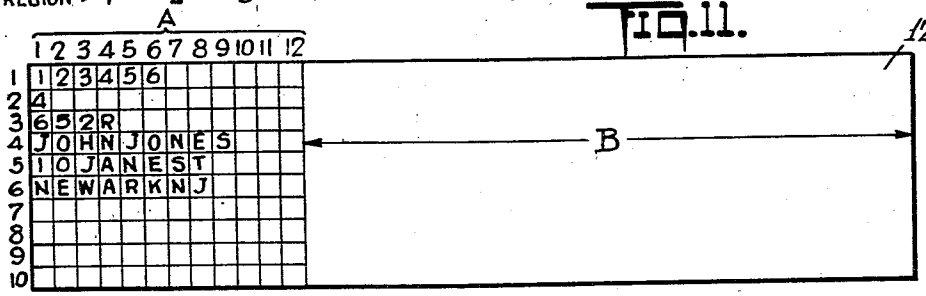
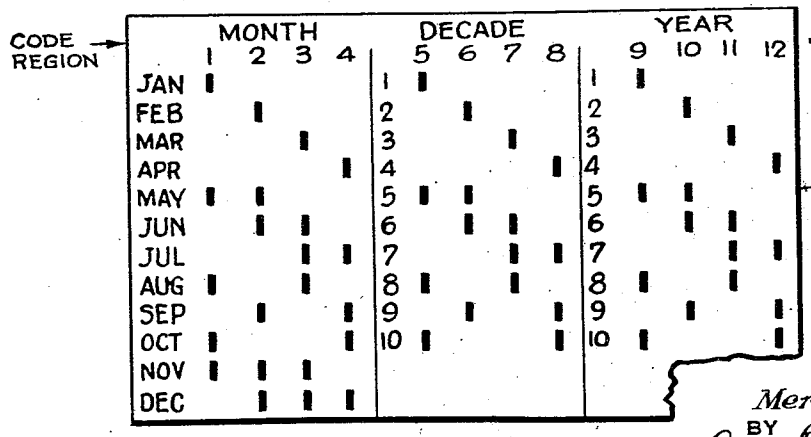


FIG. 12.



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United States Patent Office 2,788,878 Patented Apr. 16, 1957

2,788,878

AUTOMATIC CODING SYSTEM

Merle E. Gould, Stamford, Conn., assignor to Self Winding Clock Company, Inc., a Delaware corporation

Application August 28, 1953, Serial No. 377,091

22 Claims. (Cl. 197—1)

The present invention relates to the art of automatic coding of recorded data.

Where a multiplicity of sequences of recorded data must be read and interpreted before they can be translated to a code, such as one to be used in automatic classifying equipment, the operation is time-consuming and requires much personnel with the likelihood of error (*a*) in the reading, (*b*) in the interpretation and (*c*) in the recording of the code designations. Checking to minimize such error entails further time consumption and necessitates further personnel.

Where the data is recorded on a carrying medium, as for instance by a typewriting machine and thereupon it must be transferred to a second machine for application of the code designations, the difficulties previously referred to are aggravated with regard to time consumption and personnel.

Where some or all of the recorded data must be reproduced as for instance by manual operation of typewriters on various carrying media in various arrangements to suit particular requirements, the foregoing difficulties would be still further aggravated.

It is accordingly among the objects of the invention to provide a system by which sequences of data may be recorded upon a suitable medium, while automatically and selectively setting up for subsequent recording in code, so much only of the data as is desired and upon completion of the recording of at least the data that is to be encoded, automatically recording such data in code, all at high speed, with a minimum of personnel, without likelihood of human error, even though checking is dispensed with and by resort to equipment relatively compact in size, the operation of which may be effected manually from a substantially standard typewriter keyboard, without need on the part of the operator manually to handle or transfer the medium from one machine to another or to interpret or even to read data for subsequent recording as code.

Another object is to provide a system by which, in addition to the master record of all data concerned with a particular item, there are automatically prepared one or more additional records for each item, each additional record having selected portions only and in distinctive arrangements of data to suit requirements.

According to the invention, the medium upon which a sequence of data is to be recorded preferably may comprise a substantially rectangular card which, when originally positioned in the master typewriter will be in a predetermined starting position, so that all of the cards on which information is to be recorded will have corresponding items within the same areas or fields on successive cards.

With each movement of the carriage of a typewriter, preferably of conventional electric type, caused by actuation of a typewriter key, the conventional space bar or the carriage return key for example, an impulse will be delivered to a suitable control unit pulsed in timed relation with the movement of the typewriter carriage.

Only when the card is in position to receive data to be encoded, will the control unit ready a code storage unit, to be thereupon actuated by impulses from a coding unit that is controlled by actuation of predetermined selected keys only, of the typewriter.

The code storage unit will thus set up for subsequent recording in code, the data transmitted thereto and after at least the data that is to be encoded has been recorded on the card, the storage unit will be actuated from the control unit to deliver impulses at intervals to cause a single code typing member in the typewriter to type at corresponding predetermined positions of the card.

The system may include one or more auxiliary or slave typewriters actuated simultaneously with the actuation of the keys of the master typewriter to type any desired portion of the data recorded by the master typewriter, the portions of the data typed by the slave typewriter and the position of such data on the card in the slave typewriter being determined by such control unit.

In the accompanying drawings in which are shown one or more of various possible embodiments of the several features of the invention,

Fig. 1 is a block diagram of the system,

Fig. 2 is a diagrammatic view of the master typewriter,

Fig. 3 is a view similar to Fig. 2 of the slave typewriter,

Fig. 4 is a circuit diagram of the cycling unit,

Fig. 5 is a circuit diagram of the coding unit,

Figs. 6 and 7 are circuit diagrams of the memory unit,

Fig. 8 is a diagrammatic view of the control unit,

Fig. 9 is a circuit diagram of the renewal unit,

Figs. 10 and 11 illustrate the cards used in the master and slave typewriters respectively, and

Fig. 12 is a chart of the code utilized on the card.

To facilitate understanding of the invention, a general description of one particular embodiment shown in the drawings, especially adapted for use in subscription fulfilment, will first be made followed by the more particularized description under various headings thereafter.

As a purely illustrative example, each of the subscription cards in the electric master typewriter is to be typed illustratively with the number of the salesman, a number representing the geographical location in which the sale was made, the date of expiration of such subscription, and an indication, such for instance as the letter "R" may be typed after the date if the subscription is a renewal.

The second, third and fourth lines of the subscription card may be typed with the name, street address and town respectively of the subscriber and if a renewal subscription, the previous date of expiration may be typed on the fifth line.

After the salesman's number has been typed on the subscription card, a control unit governed by each typing operation will be pulsed, automatically to effect advance of the typewriter carriage until the position or field on the card at which the geographical location number is to be typed is at type head striking position.

After the month, decade and year numbers have been typed, the control unit will ready a renewal unit. The letter "R" key to be pressed only for renewal subscriptions, actuates the previously readied renewal unit to set suitable circuits in order to permit subsequent encoding of the previous expiration date.

After the desired information has been typed on line 1 of the subscription card, the control unit will automatically effect actuation of the conventional carriage return mechanism of the master typewriter in order to bring the platen in position for typing at the beginning of line 2.

The name, street address and town may then be typed on lines 2, 3 and 4 respectively, a tabulating key desig-

nated "Tab Out" being manually actuated, after the typing on each line has been completed in order to bring the platen in position for typing at the beginning of the next line.

If the subscription is a renewal, a tabulating key designated "Tab In" is then manually pressed to effect advance of the typewriter carriage to bring the platen to that position on line 5 determined by the control unit, at which typing of the previous expiration date is to commence.

After such date has been typed, the control unit will effect actuation of the carriage return mechanism of the master typewriter for typing on the card at the beginning of the next, that is the sixth line.

Under control of certain keys of the master typewriter, illustratively the numeral keys, are circuits to energize relays of a coding unit arranged in permutations and combinations uniquely corresponding to the several keys. The coding unit is connected to a code storage unit having relays which are readied by the control unit when and only when the platen is in position for the card thereon to receive data to be encoded. Typing of the geographic location, the expiration date and the previous expiration date of a renewal subscription would thus actuate the previously readied storage unit relays thereby to store solely such data for subsequent release.

Subsequently, the control unit by completing circuits from the actuated relays of the storage unit to a solenoid in the master typewriter, effects the typing of designations desirably in the form of uniform bars within predetermined regions on the card, which regions correspond to the stored code.

The multiplicity of distinct cards thus prepared by the master typewriter may be automatically classified by running them through suitable equipment.

The setting of the control unit may determine both the selection and arrangement of data to be typed by one or more slave typewriters. Thus, each slave typewriter may, according to requirements, serve to type only selected portions of that which is typed by the master typewriter and may so type such selected portions on a greater or lesser number of lines than does the master typewriter. More particularly, the control unit selectively readies solenoids by which type heads of the slave typewriter are operated under control of the corresponding master typewriter keys. The control unit may also be set to effect actuation of the slave typewriter carriage return mechanism upon completion of such typing as is to be effected by the slave typewriter on any one line.

Having thus briefly described the equipment, there will now be described one particular embodiment of the invention under various headings.

Cards (Figs. 10 and 11)

In the illustrative embodiment herein shown, the cards are of two distinct types, i. e., subscription cards **11** which are prepared by the master typewriter **21** (Fig. 2) and billing cards **12**, for example, which are prepared by one or more slave typewriters **294** (Fig. 3).

As shown in Fig. 10, the subscription card desirably is to have data typed thereon in a number of distinct fields on different lines. The first field **13** on line 1 may be for a group of numbers representing a salesman, for example; the second field **14** for a number representing geographical location; the third field **15** for the date of expiration of the present subscription and the fourth field **16** for a letter "R" if the present subscription is a renewal.

The fields on the second, third and fourth lines may be for the name, street address and town and state respectively and the field on the fifth line for the date of expiration of the previous subscription if the present subscription is a renewal.

A plurality of lines of the subscription card, illustratively lines six, seven and nine are designed to receive

code designations, preferably in the form of bars corresponding to geographical location and dates respectively.

To this end, line six illustratively has four equal regions, the first of which is three type spaces from the beginning of the line with two type spaces desirably intervening between adjacent regions. Each of the lines seven and nine illustratively has twelve equal regions, the first region also being three type spaces from the beginning of the line and with two spaces intervening between adjacent regions.

The code bars on lines **7** and **9** corresponding to date are arranged in three sets of from one to three bars each. The first set of designations may be the code for the month, the second set for the decade and the third set for the year. As shown in chart **10** in Fig. 12, the months of January, February, March and April may be represented by a bar at regions **1**, **2**, **3** and **4** respectively which are at the fourth, seventh, tenth and thirteenth spaces on the card **11** respectively. The months of May through October may be represented each by two bars respectively at regions **1**, **2**; **2**, **3**; **3**, **4**; **1**, **3**; **2**, **4**; and **1**, **4**. The months of November and December may be represented by three bars respectively at regions **1**, **2**, **3** and **2**, **3**, **4**. Similarly, the decades from 1 to 10 and the years 1 to 10 may be represented by one or two bars at regions **5** to **8** inclusive and **9** to **12** inclusive respectively.

With respect to the code designation in the four regions on line **6** which refer to geographical location, the character "0" may be represented by bars at regions **1**, **2**, **3** and **4**; the numbers from 1 to 10 inclusive by bars in the same position as those related to decades, and the numbers 11 and 12 by bars at regions **1**, **2**, **3** and **2**, **3**, **4** respectively.

The card **12** which is typed by the slave typewriter has two sections A and B and only section A is to contain typed data. Thus, the card has six lines on which are to be typed respectively the salesman's number, the geographical location, the date of expiration of the subscription, the subscriber's name, street address and town and state.

Master typewriter (Fig. 2)

The master typewriter shown in detail in Fig. 2 prepares the cards **11** for use in classification equipment and is manually operated to type the desired data on the subscription card **11** and is automatically operated to code selected portions of the typed data. This typewriter is desirably of conventional electric type such as that sold by Underwood Corporation, which has been modified for use in the present system.

Thus, the typewriter has conventional mechanism attached thereto (not shown) by means of which the subscription card **11** placed therein may be aligned so that a type head may strike at the first position on line 1 of the card. The typewriter also has the conventional keys K for the letters of the alphabet, the period and comma symbols and the numerals 0 to 12 inclusive, and a plurality of switches **23** operated through the lever transmissions (not shown) from such keys K. As shown in Fig. 2, each of the switches **23** has a fixed contact **24** connected to positive main **25** and a contact arm **26** actuated by the associated key K.

The contact arms associated with the keys K are connected respectively to a plurality of terminals **27** on a terminal strip **28**. In the illustrative embodiment shown, the conventional space bar **20** which controls the carriage spacing mechanism, and the carriage return key **19** which controls the carriage return mechanism are actuated by solenoids **31** and **32**, one side of each of which is connected to the positive main **25** and the other sides of which are connected to terminals **33** and **34** respectively on terminal strip **28**. The typewriter has an additional type head (not shown) illustratively designed to print a code bar and the key which normally would control such type head is actuated by a solenoid **35**, one end of which

is connected to positive main 25 and the other end of which is connected to terminal 36 on terminal strip 28.

One side of the standard motor 38 of the typewriter is connected to one side of the power line P, and the other side of said motor 38 is connected by lead 39 to fixed contact 41 of a relay 42, the contact arm 43 of which is normally spaced from said fixed contact 41 when the coil 44 of said relay is not energized, and connected by lead 45 to the other side of the power line. One side of coil 44 of relay 42 is connected to negative main 46 and the other side of said coil is connected to terminal 47 on terminal strip 28 of the typewriter.

The conventional platen and escapement mechanism of the typewriter is modified by the addition of a cam 50 which controls a normally open switch 51, the cam 50 being rotated one complete revolution by motor 38 after each release of a key K, actuation of the space bar 20 or carriage return to the beginning of a line. Each revolution of cam 50 brings the switch contact arm 52 which is connected to positive main 25 against fixed contact 53, connected by lead 54 through coil 55 of relay 56 to the negative main 46. The relay 56 desirably has a fixed contact 58 connected to the negative main 46 and a contact arm 59 normally spaced therefrom and connected to terminal 61.

The terminals 27 on terminal strip 28 of the typewriter 21 shown in Fig. 2 associated with the numbers 0 to 12 are connected respectively by lead 65 (Fig. 1) to a plurality of terminals 66 on terminal strip 79 of a coding unit 81 shown in Fig. 5.

Coding unit (Fig. 5)

The coding unit is designed to set up circuits uniquely corresponding to particular portions of the data typed on the subscription card 11.

Each of the terminals 66 of the coding unit is connected respectively to one side of the coil 82 of an associated relay R–0 to R–12 respectively, the other side of said coils being connected to negative main 46. Each of the relays has one or more pairs of contacts 83, 84 arranged in four rows A, B, C and D, the fixed contacts 84 of all of said relays being connected to negative main 46. Relays R–0, R–4, R–7, R–9, R–10 and R–12 have their contact arms 83 connected to common main 85 of row A. Relays R–0, R–3, R–6, R–7, R–8, R–11 and R–12 have their contact arms 83 connected to common main 86 of row B. Relays R–0, R–2, R–5, R–6, R–9, R–11 and R–12 have their contact arms 83 connected to common main 87 of row C and relays R–0, R–1, R–5, R–8, R–10 and R–11 have their contact arms 83 connected to common main 88 of row D. The common mains 85, 86, 87 and 88 of rows A, B, C and D are connected to terminals 91, 92, 93 and 94 of terminal strip 95 and such terminals are connected by associated leads 96 (Fig. 1) to terminals 97, 98, 99 and 100 respectively of a code storage unit 102 shown in Figs. 6 and 7.

Code storage unit (Figs. 6 and 7)

The storage unit which retains the coded information of predetermined portions of the data until it is utilized in subsequent functioning of the equipment, illustratively comprises a plurality of banks M–1 to M–7 which are identical and hence only one bank, i. e., bank M–1 will be described. Bank M–1 has five relays 103, 104, 105, 106 and 107. Each of the relays 103 to 106 has three contact arms 111, 112 and 113 and the relay 107 has four contact arms 114, 115, 116 and 117 and associated fixed contacts 118, 119, 120 and 121 from which the contact arms are normally spaced when the coil 122 of the relay 107 is not energized. The contact arm 111 of each of the relays 103 to 106 is connected to negative main 46 and normally spaced from an arm 124 connected to one side of the coil 125 of the associated relay. The arm 124 which also is movable, normally engages fixed contact 126 connected by lead 127 to common main 128 which is connected to terminal 97. The other side of coil 125 is connected by lead 129 to fixed contact 131 associated with contact arm 112 from which it is normally spaced and by leads 129 and 132 to contact arm 117 of relay 107. The coils 125 of relays 104, 105 and 106 are connected by leads 138, 139 and 141 respectively to contact arms 116, 115 and 114 respectively of relay 107. The fixed contacts of said relay 107 are all connected to common main 142 to which is also connected the contact arms 112 of all of said relays 103 to 106 and main 142 is connected to common main 143 which is connected to terminal 144.

The contact arm 113 of each of the relays 103 to 106 is connected by an associated lead 146, 147, 148 and 149 to terminals 151, 152, 153 and 154 on a terminal strip 155. Arms 113 of banks M–1 to M–4 normally engage associated fixed contacts 157 connected to common main 158 which in turn is connected to common main 159 connected to terminal 161. Arms 113 of banks M–5 to M–7 (Fig. 7) normally engage associated fixed contacts 157 connected to common main 158′ which in turn is connected to common main 159′, connected to terminal 161′. The fixed contacts 162 associated with arms 113 of banks M–1 to M–7, which are normally spaced therefrom, are connected to common main 163 which in turn is connected to common main 164 connected to terminal 165.

One side of each of the coils 122 of relays 107 of each of the seven banks M–1 to M–7 is connected to positive main 25 and the other side of each of said coils is connected to terminals 166 to 172 respectively.

Terminals 166 to 169 of the storage unit 102 are connected respectively by associated leads 174 (Fig. 1) to terminals 175 to 178 of control unit 179 shown in Fig. 8. Terminals 170, 171 and 172 (Fig. 7) are connected by associated leads 180, 182′ and 183′ (Fig. 1) to terminals 181, 182 and 183 of a renewal date control unit 184 shown in Fig. 9. Terminals 154 to 151 of each of the seven banks M–1 to M–7 in Figs. 6 and 7 are connected respectively by associated leads 186 to terminals 187 to 214 of the control unit 179 (Fig. 8). Terminals 144, 165, 161 and 161′ of the storage unit (Figs. 6 and 7) are connected by leads 216, 217, 218 and 219 respectively (Fig. 1) to terminal 221 of section A of the cycling unit 222 shown in Fig. 4; to terminals 36 and 33 of the typewriter shown in Fig. 2; and to terminal 223 of renewal unit 184 shown in Fig. 9 as well as to terminal 224 of control unit 179.

Control unit (Fig. 8)

The primary function of the control unit is to discriminate those portions of the data which are to be coded from the remaining portions by regulating the operation of the coding unit and storage unit and to regulate the recording of the code on the cards. Although any suitable means could be used, illustratively stepping switch means are utilized in the control unit and although a single stepping switch could be used, in order to provide sufficient contacts, in the illustrative embodiment herein, the control unit desirably comprises a plurality of stepping switches illustratively five in number designated S–1 to S–5 which may be of the type "45" switch put out by the Automatic Electric Company of Chicago, Illinois. Each switch illustratively has a plurality of banks, at least four in number designated B–1 to B–4, each having a "0" or home contact and 52 additional contacts as well as four ganged wiper arms W–1 to W–4, each stepping switch being of the type in which the wiper arms advance in unison only upon de-energization of the associated coils 231 to 235 respectively. Although the banks of each stepping switch are arranged in an arc, they are illustratively shown in a straight line for facility of description.

The wiper arms W–1, W–2 and W–3 of banks B–1, B–2 and B–3 of each stepping switch are connected together by common main 236 which is connected to ter-

minal 237 and such terminal is connected by leads 225 (Fig. 1) to terminal 226 of section A of the cycling unit 222 (Fig. 4). The wiper arms W–4 (Fig. 8) of each of the stepping switches are connected together by common main 238 which is connected to terminal 239 and by lead 227 (Fig. 1) to terminal 228 of section A of the cycling unit 222.

One end of each of the coils 231 to 235 of stepping switches S–1 to S–5 (Fig. 8) is connected to common main 241 and to positive main 25. Each coil controls three contact arms 243, 244 and 245, the arm 243 normally engaging fixed contact 246, arm 244 normally being spaced from fixed contact 247 and the arm 245 normally engaging fixed contact 248 and being spaced from fixed contact 249. The fixed contact 247 of each of the coils 231 to 235 is connected to an associated terminal 251 to 255 respectively. Each arm 244 is connected to the associated fixed contact 246; the arm 243 is connected to the other side of the associated coil 231 to 235 and by lead 257 to fixed contact 249.

The fixed contact 249 of coil 231 is connected by lead 258 to fixed contact 248 of coil 235. The arm 245 of coil 231 is connected to terminal 261 which is connected by lead 262 (Fig. 1) to terminal 61 of the master typewriter 21. The fixed contact 248 of coil 231 is connected by lead 263 to arm 245 of coil 232; fixed contact 248 of coil 232 is connected by lead 264 to arm 245 of coil 233; fixed contact 248 of coil 233 is connected by lead 265 to arm 245 of coil 234, and fixed contact 248 of coil 234 is connected by lead 266 to arm 245 of coil 235. Each of the arms 243 of coils 232 to 235 is connected by leads 267 to an associated terminal 268 to 271 respectively.

The stepping switches are so designed that arm 243 will move into and out of engagement with contact 246 with each energization and de-energization of the associated coil. After the first energization and de-energization of the associated coil which moves its wiper arms from "0" or home position, arms 244 and 245 will move into engagement with contacts 247 and 249 and even though the associated coil is again energized and de-energized, not until the wiper arms have again returned to "0" or home position will arms 244, 245 move away from said contacts 247, 249.

The connections hereinafter to be described of the contacts of the stepping switch to control the coding of selected data are merely illustrative and it is to be understood that they could be connected in any suitable manner depending upon the output desired.

Thus, as shown, the contacts 7 to 12, 14 to 18, 20 and 23 of bank B–1 of stepping switch S–1 are connected to terminal 276 which in turn is connected by lead 277 (Fig. 1) to terminal 33 of the typewriter to actuate the space bar solenoid 31 (Fig. 2) and by lead 274 to terminal 275 of renewal unit 184 (Fig. 9). Contacts 13, 19, 21 and 22 are connected respectively to terminals 175, 176, 177 and 178 which as heretofore described are connected by leads 174 to terminals 165 to 169 of the storage unit. Contact 24 is connected to terminal 278, which is connected by lead 279 to terminal 280 of renewal unit 184 shown in Fig. 9.

Contacts 25 and 50 are connected to terminal 281 which in turn is connected by lead 282 (Fig. 1) to terminal 34 of the typewriter 21 (Fig. 2) to actuate the carriage return solenoid 32. Contacts 36 to 49 are connected to terminal 283 which is connected by lead 284 to terminal 285 of section B of cycling unit 222.

The contacts 50 and 52 of bank B–2 of stepping switch S–1 are connected to the terminals 286 and 287 respectively, the terminal 286 being connected by lead 288 (Fig. 1) to terminal 289 of section B of the cycling unit 222 and the terminal 287 being connected by lead 287′ to terminal 268 of stepping switch S–2. Contacts 1 to 6, 13, 19 to 24, 26 to 49 and 51 and 52 of bank B–3 of stepping switch S–1 are connected to terminal 291 which is connected by lead 292 (Fig. 1) to terminal 293 of slave typewriter 294 shown in Fig. 3 which will hereinafter be described. Contacts 8, 14, 25 and 50 of bank B–3 are connected to terminal 295 which is connected by lead 296 (Fig. 1) to terminal 297 of the slave typewriter shown in Fig. 3. Contacts 1 to 52 of bank B–4 of switch S–1 are connected together and the 52nd contact of bank B–4 is connected to terminal 298 which in turn is connected by lead 298′ to terminal 251 of coil 231 of stepping switch S–1 and by lead 299 (Fig. 1) to terminal 300 of section B of cycling unit 222.

Contacts 9 to 22 and 34 to 47 of bank B–1 of stepping switch S–2 are connected to terminal 301 which is connected by lead 302 (Fig. 1) to terminal 303 of section B of cycling unit 222. Contacts 23 and 48 of bank B–1 of switch S–2 are connected to terminal 281 which, as previously described, is connected to terminal 34 of typewriter 21.

Contacts 23 and 48 of bank B–2 of stepping switch S–2 are connected to terminal 286 which, as previously described, is connected to terminal 289 of section B of the cycling unit 222. Contact 52 of bank B–2 is connected to terminal 304 and by lead 304′ to terminal 269 of stepping switch S–3.

Contacts 1 to 22, 24 to 47 and 49 to 52 of bank B–3 of stepping switch S–2 are connected to terminal 291, and contacts 23 and 48 of bank B–3 are connected to terminal 295. The contacts 1 to 52 of bank B–4 of stepping switch S–2 are connected to terminal 305 which is connected by lead 305′ to terminal 252 of stepping switch S–2 and by lead 306 (Fig. 1) to terminal 307 of section B of the cycling unit 222.

Contacts 1 to 13 of bank B–1 of stepping switch S–3 are connected to terminal 311 and thence by lead 311′ (Fig. 1) to terminal 313 of section C of cycling unit 222. Contacts 14, 16 and 17 are connected to terminals 314, 315 and 316 respectively which in turn are connected by associated leads 317 (Fig. 1) to terminals 318, 319, 320 of the renewal code unit 184 shown in Fig. 9. Contacts 22, 25, 28, 31, 36, 39, 42, 45, 48 and 51 of bank B–1 of stepping switch S–3 are connected to terminals 187 to 196 respectively and by associated leads 186 (Fig. 1) to the storage unit 102 as previously described. Contacts 15, 19, 20, 21, 23, 24, 26, 27, 29, 30, 33, 34, 35, 37, 38, 40, 41, 43, 44, 46, 47, 49, 50 and 52 of bank B–1 of stepping switch S–3 are connected to terminal 276 and contacts 18 and 32 of bank B–1 are connected to terminal 281.

Bank B–2 of stepping switch S–3 has its contacts 14 and 52 connected to terminals 322 and 323 respectively. Terminal 322 is connected by lead 322′ (Fig. 1) to terminal 324 of section C of the cycling unit 222 and terminal 323 is connected by lead 323′ to terminal 270 of coil 234 of stepping switch S–4. Contacts 1 to 13 inclusive of bank B–3 of stepping switch S–3 are connected to terminal 291 and contact 14 of bank B–3 is connected to terminal 295. Contacts 1 to 52 of bank B–4 are connected to terminal 327 which is thence connected by lead 327′ to terminal 253 of coil 233 of stepping switch S–3.

Contacts 2, 5, 8, 11, 14, 17, 23, 26, 29, 32, 35, 38, 41, 44, 47 and 50 of bank B–1 of stepping switch S–4 are connected to terminals 197–212 respectively and thence by associated leads 186 to corresponding terminals of the storage unit 102 as previously described.

Contacts 1, 3, 4, 6, 7, 9, 10, 12, 13, 15 and 16 of bank B–1 are connected to terminal 276; contacts 18 and 19 are connected to terminal 281 and contacts 20, 21, 22, 24, 25, 27, 28, 30, 31, 33, 34, 36, 37, 39, 40, 42, 43, 45, 46, 48, 49, 51 and 52 are connected to terminal 224 which is connected by lead 219 (Fig. 1) to terminal 223 of renewal unit 184.

Contact 52 of bank B–2 of stepping switch S–4 is connected to terminal 331 and thence by lead 331′ to terminal 271 of coil 235 of stepping switch S–5. Contacts

20 to 52 of bank B–3 are connected together and thence connected to terminal 332 which is connected by lead 333 to terminal 334 of renewal unit 184. Contacts 1 to 52 of bank B–4 of stepping switch S–4 are connected to terminal 335 which is connected by lead 335' to terminal 254 of coil 234 of stepping switch S–4 and by lead 329 (Fig. 1) to terminal 330 of renewal unit 184.

Contacts 1 and 4 of bank B–1 of stepping switch S–5 are connected to terminals 213 and 214 which in turn are connected by leads 186 to associated terminals of the storage unit as previously described. Contacts 2 and 3 of bank B–1 are connected to terminal 224 and contacts 5 and 6 are connected to terminal 281. Contact 52 of bank B–1 is connected to terminal 336 and by lead 337 (Fig. 1) to terminal 338 of section A of cycling unit 222. Contacts 1 to 5 of bank B–2 of stepping switch S–5 are connected to terminal 339 and thence by lead 341 to terminal 342 of renewal unit 184. Contact 52 of bank B–2 is connected to terminal 343 and by lead 344 to terminal 345 of section A of the cycling unit. Contacts 7 to 52 of bank B–3 and contacts 1 to 52 of bank B–4 are connected together and thence connected to terminal 346 which is connected by lead 346' to terminal 255 of coil 235 of stepping switch S–5 and by lead 347 to terminal 348 of renewal unit 184.

Renewal unit (Fig. 9)

The renewal unit 184 shown in Fig. 9 which sets up circuits to encode the date of expiration of a previous subscription, desirably comprises a relay 351 having eight pairs of contacts 352, 353; 352', 353'; 354, 355; 356, 357; 358, 359; 360, 361; 362, and 363 and 364, 365, the first six pairs being normally open and the last two pairs being normally closed when the coil 366 of the relay is not energized. The contact arm 352 is connected to positive main 25 and the fixed contact 353 is connected to one side of the coil 366, as is terminal 367, the other side of said coil being connected to terminal 280. The contact arm 352' is connected to terminal 280' and contact 353' is connected to contact 280. The terminal 367 is connected by lead 368 (Fig. 1) to the terminal 27 of the typewriter 21 shown in Fig. 2 associated with the letter "R."

The contacts 354 to 365 are connected respectively to terminals 223 ,275, 318, 181, 319, 182, 320, 183, 334, 330, 342 and 348 all of which have been previously described.

Cycling unit (Fig. 4)

The cycling unit 222 shown in Fig. 4 is provided to set the equipment for operation and to provide various tabulating operations as well as to count the number of cards typed by the system.

Section A of the cycling unit desirably has a relay 375 with movable contact arms 376 and 377, the latter being connected to negative main 46. Arm 376 normally engages fixed contact 378 connected to terminal 379, which is connected by lead 381 (Fig. 1) to terminal 261 of the control unit 179 of Fig. 8 and by lead 382 to terminal 61 of the typewriter shown in Fig. 2. The movable arm 376 is also connected by lead 383 to fixed contact 384 of switch 380 which may be engaged by movable arm 385 connected to negative main 46 when the "Set" pushbutton 386 is pressed. The arm 376 is also connected to fixed contact 387 normally engaged by movable arm 388 connected to one side of coil 389 of relay 375.

The relay 375 also has two additional contact arms 391, 392 normally spaced from their associated fixed contacts 393, 394 when relay 375 is not energized, said fixed contacts 393 and 394 being connected to positive and negative mains 25 and 46 respectively. Arm 391 is connected to terminal 395 which is connected by lead 396 to terminal 47 of the typewriter 21 shown in Fig. 2.

Section A of cycling unit 222 has a second relay 399 which desirably has four pairs of contacts 401, 402; 403, 404; 405, 406; 407, 408. Arms 401, 405 and 407 normally engage their associated fixed contacts 402, 406 and 408 and arm 403 is normally spaced from its fixed contact 404 when the coil 409 of the relay 399 is not energized. One end of coil 409 is connected to fixed contact 411 of switch 412 and the movable arm 413 of said switch is connected to positive main 25. The arm 413, which may be moved into engagement with contact 411 upon pressing of "Reset" button 414, completes a circuit from positive main 25 through coil 409 to negative main 46 to which the other side of the coil is connected. The switch 412 has a second pair of contacts 411', 413' connected respectively to negative main 46 and terminal 345, the contact 413' being ganged with arm 413 and also controlled by "Reset" button 414.

Contact arm 401 is connected by lead 415 to contact arm 392 of relay 375. Fixed contact 402 is connected to terminal 226. Arm 403 is connected to terminal 228. Fixed contact 404 is connected to negative main 46. Arm 405 is connected by lead 416 to the other side of coil 389 of relay 375. Fixed contact 406 is connected by lead 417 to fixed contact 418 of relay 419, which is connected to terminal 221 and which is normally engaged by contact arm 421 connected to positive main 25. One side of coil 422 of relay 419 is connected to positive main 25 and the other side is connected to terminal 345. Relay 419 also has a contact arm 423 connected to negative main 46 and normally engaging fixed contact 424 connected to terminal 425 and by lead 426 (Fig. 1) to terminal 280' of renewal unit 184. Contact arm 407 of relay 399 is connected to terminal 338 and fixed contact 408 is connected to one side of coil 427 of counter 428, the other side of said coil being connected to positive main 25.

Section B of cycling unit 222 desirably comprises a relay 431 having fixed contacts 432, 433 and 434 and contact arms 435, 436 and 437 respectively, normally spaced from the associated fixed contact when the coil 438 of the relay 431 is not energized.

One end of coil 438 is connected to fixed contact 432 and by lead 439 to fixed contact 441 of switch 442, which has a normally spaced contact arm 443 connected to positive main 25 and adapted to be moved into engagement with fixed contact 441 when the tabulating pushbutton 444 designated "Tab Out" is pressed. Contact arm 435 of relay 431 is connected to positive main 25. Contact arms 436 and 437 are connected to terminals 300 and 307 respectively and fixed contacts 433 and 434 are connected respectively to terminals 285 and 303.

Section B has an additional relay 445 with a fixed contact 446 connected by lead 447 to the other side of coil 438 of relay 431 and normally engaged by contact arm 448 connected to negative main 46. One end of coil 449 of relay 445 is connected to positive main 25 and the other end is connected to terminal 289.

Section C of cycling unit 222 has a relay 451 having fixed contacts 452 and 453 and contact arms 454, 455 respectively, normally spaced from the associated fixed contacts when the coil 456 of the relay is not energized. Fixed contact 452 is connected to one side of coil 456 and by lead 457 to fixed contact 458 of switch 459. The contact arm 461 which is connected to positive main 25 is normally spaced from fixed contact 458 and moved thereagainst when the tabulating pushbutton 462 designated "Tab In" is pressed.

The contact 453 of relay 451 is connected to terminal 465 which is connected by leads 466 and 218 (Fig. 1) to terminal 33 of the typewriter 21 (Fig. 2) and the arm 455 of said relay is connected to terminal 313.

Section C also has a relay 468 having a fixed contact 469 connected by lead 471 to coil 456 of relay 451 and a contact arm 472 connected to negative main 46 and normally engaging fixed contact 469 when coil 473 of

the relay is not energized. One side of coil 473 is connected to positive main 25 and the other side of said coil is connected to terminal 324.

Slave typewriter (Fig. 3)

If desired, one or more slave typewriters may be used in conjunction with the equipment above described. The slave typewriter may also be a standard electric typewriter such as that sold by Underwood Corporation, modified as indicated for use in the system and provided with card aligning mechanism similar to that on the master typewriter and modified for use in the present system.

To this end, as shown in Fig. 3, each of the keys K of the slave typewriter 294 has a solenoid 483 associated therewith, and the carriage return key 482 has a solenoid 484 associated therewith, the terminals 495 and 496 of which are connected respectively to positive main 25 and to terminal 297 on terminal strip 489. The core of each of the solenoids has a plunger rod 485 affixed thereto to actuate the associated key.

One of the terminals 486 of each of the solenoids 483 is connected by common main 487 to terminal 293 on terminal strip 489. The other terminal 490 of each of the solenoids is connected to an associated terminal 491 on terminal strip 489 and the terminals 491 are connected by leads 492 (Fig. 1) to the respective terminals 27 on the typewriter shown in Fig. 2 associated with the corresponding letter, numeral or symbol.

Operation

In the operation of the equipment, cards 11, 12 are positioned in the master typewriter 21 and the slave typewriter 294 respectively, said cards desirably being aligned at the same position with respect to the type heads by the conventional mechanism attached to the machine so that a type head actuated may strike at the first position on line 1 of each card.

The "Set" button 386 of section A of cycling unit 222 (Fig. 4), is pressed to ready the equipment for the subsequent manual typing operation. As a result, a circuit will be completed from negative main 46, through closed contacts 385, 384, lead 383, contacts 387, 388, coil 389 of relay 375, lead 416, closed contacts 405, 406 of relay 399, lead 417, closed contacts 418, 421 of relay 419 to positive main 25. Thus, the coil 389 of relay 375 will be energized and a holding circuit provided from negative main 46 through closed contacts 377, 388. In addition, contacts 376, 378 will open and contacts 391, 393 and 392, 394 will close. Closing of contacts 391, 393 will connect terminal 395 to positive main 25 and through lead 396 (Fig. 1) and terminal 47 of the typewriter 21 (Fig. 2), the coil 44 of relay 42 will be energized, closing its contacts 41, 43 to energize motor 38 thereby readying the typewriter 21 for operation.

The initial pressing of the "Set" button 386 (Fig. 4) will also momentarily connect negative main 46 through contacts 385, 384, lead 383, contacts 376, 378 to terminal 379 and thence through lead 381 (Fig. 1) to terminal 261 of control unit 179 (Fig. 8) and through the series connected, closed contacts 245, 248 of stepping switches S–1 to S–5, lead 258 to one side of the coil 231 of stepping switch S–1 and through lead 241 to positive main 25.

Energization of coil 231 (Fig. 8) will open the associated normally closed contacts 243, 246. As terminal 379 (Fig. 4) is only momentarily connected to negative main 46, coil 231 will only be momentarily energized and upon deenergization, contacts 243, 246 will immediately close. Upon the de-energization of coil 231, the four ganged wiper arms W–1 to W–4 of stepping switch S–1 will move from "0" or home position to engage the associated contacts 1 of banks B–1 to B–4. The contacts 244, 247 will also close and the contact arm 245 will engage fixed contact 249. The contacts 244, 247 and 245, 249 will remain closed through the entire cycle of operation of the associated stepping switch until its wiper arms return to home position, through a mechanical spring action (not shown) which is a conventional part of the stepping switch.

After the "Set" button 386 is pressed, and the equipment is ready for operation, data may be typed on the card 11 in the master typewriter 21. As illustratively set up, information typed in the first six positions on the first line of the card 11 (Fig. 10) effects no control action by the control unit. Assuming that a key K associated with any one of the numbers from 0 through 12 is pressed to type such number on the subscription card 11, after the key is released and the key arm moves back to normal position, the carriage will move one space and the conventional escapement mechanism of the typewriter will rotate the cam 50 one revolution momentarily to close the contacts 52, 53 of switch 51. When contacts 52, 53 are closed, a circuit will be completed through such contacts from positive main 25 through lead 54 and coil 55 of relay 56 to negative main 46. Energization of relay 56 will close its contacts 58, 59 momentarily to connect the negative main 46 to terminal 61.

As terminal 61 of typewriter 21 is connected by lead 262 (Fig. 1) to terminal 261 of control unit 179, as previously described, coil 231 (Fig. 8) will be energized but this time through contacts 245, 249 which have previously been closed when the "Set" button 386 was pressed. Energization of coil 231 will have no effect on contacts 244, 247 or 245, 249 but will momentarliy open contacts 243, 246. Upon de-energization of coil 231 when relay 56 (Fig. 2) is no longer energized, the wiper arms W–1 to W–4 of stepping switch S–1 will move to engage the contacts 2 of banks B–1 to B–4.

As the keys K of typewriter 21 associated with five additional numbers are pressed and released or if the space bar 20 of the typewriter 21 is pressed and released, the operation above described will be repeated and the wiper arms W–1 to W–4 of stepping switch S–1 will advance from contact to contact of banks B–1 to B–4.

The operation of any of the keys K of the typewriter 21 (Fig. 2) will also close the associated switch 23 to complete a circuit from positive main 25 through such switch to the associated terminal 27. Each time such terminal 27 is connected to positive main 25, a circuit will be completed through lead 492 (Fig. 1) to terminal 491 of slave typewriter 294 (Fig. 3) which is connected to one side 490 of a solenoid 483 which controls the corresponding key of the slave typewriter.

As the wiper arms W–1 to W–3 of stepping switch S–1 which have been connected to negative main 46, are advanced, and as wiper arm W–3 successively engages contacts 1 to 6 of bank B–3 of said stepping switch S–1, which are connected to terminal 291 (Fig. 8), the negative main 46 will be connected from said terminal 291 through lead 292 (Fig. 1) to terminal 293 of the slave typewriter 294 (Fig. 3) which is connected to the other sides of all of the solenoids 483.

Consequently, if any of the keys K representing the numbers 0 through 12 are pressed on the master typewriter to type such number on line 1 of the subscription card 11, the related keys in the slave typewriter 294 will be actuated at the same time to type the corresponding numbers on line 1 of the card 12 in the slave typewriter.

As the terminals 27 associated with the keys K representing the numbers 0 through 12 are connected to positive main 25, a circuit will also be completed from such terminals 27 through leads 65 (Fig. 1) to the associated terminals 66 of coding unit 81 (Fig. 5) and thence through the coil 82 of the associated relay R–0 to R–12 to negative main 46. Energization of the relays in the coding unit will close the associated contacts 83, 84 so that one or more of the terminals 91 to 94 will be connected to negative main 46. Consequently, the corresponding terminals 97 to 100 of the storage unit 102

(Figs. 6, 7) will be connected to the negative main 46. As none of the terminals 166–172 of the storage unit 102 has as yet been connected to any potential, none of the coils of the banks M–1 to M–7 of the storage unit 102 will be energized at this time.

When the wiper arm W–1 of stepping switch S–1 engages contact 7 of bank B–1, a circuit will be completed from negative main 46 through wiper arm W–1 to terminal 276 and thence through lead 277 (Fig. 1) to terminal 33 of typewriter 21 to energize space bar solenoid 31 (Fig. 2) to advance the carriage of typewriter 21 one space and at the same time rotate cam 50.

Rotation of cam 50 will again cause the ganged wiper arms W–1 to W–4 of stepping switch S–1 to be advanced one contact as previously described to engage contact 8. As shown in Fig. 8, contacts 7 to 12 of bank B–1 of stepping switch S–1 are connected to terminal 276 and hence the carriage of typewriter 21 will automatically be advanced step by step as above described until the wiper arms W–1 to W–4 engage contacts 13 of stepping switch S–1 at which time the striking position of the type heads of typewriter 21 will be aligned with type space 13 on card 11.

When the wiper arm W–3 of stepping switch S–1 engaged contact 8 of bank B–3, the negative main 46 was connected through wiper arm W–3, contact 8 to terminal 295 and thence through lead 296 (Fig. 1) to terminal 297 of the slave typewriter 294 (Fig. 3) to energize solenoid 484 controlling the carriage return key 482. As a result, the platen of the slave typewriter will be rotated one space to the second line and the carriage of the slave typewriter will be moved back to the beginning of such second line so that the striking position of the type keys will be aligned with the first position on such line.

As the thirteenth contact of bank B–1 of stepping switch S–1 is connected to terminal 175, the negative main 46 will be connected through wiper arm W–1 to terminal 175 and through lead 174 (Fig. 1) to terminal 166 of storage unit 102 (Fig. 6). As a result, the coil 122 of relay 107 of memory bank M–1 will be energized to close its four pairs of contacts 114, 118; 115, 119; 116, 120 and 117, 121, the relay 107 remaining energized only as long as the wiper arm W–1 of stepping switch S–1 is engaging contact 13.

The thirteenth position on the card 11 represents a field 14 at which a number indicating the geographical location or source of a subscription, for example, is to be placed. Assuming that the number is "4," the corresponding key K of typewriter 21 (Fig. 2) is now pressed to type such number at the thirteenth type space on line 1 of card 11.

Referring to Fig. 2, this will close the associated switch 23 connecting the related terminal 27 to positive main 25. As a result, through lead 65 the corresponding terminal 66 of the coding unit 81 (Fig. 5) associated with relay R–4 related to the number "4" will also be connected to positive main 25 to complete a circuit through the coil 82 of the relay to negative main 46. In addition, through lead 492 (Fig. 1) and terminal 491, one side of the solenoid 483 of the slave typewriter associated with number "4" will be connected to positive main 25.

By the connection of terminal 66 of the coding unit 81 (Fig. 5) to positive main 25, relay R–4 will be energized to close its associated pair of contacts 83, 84 which will connect terminal 91 to negative main 46 and through the associated lead 96 (Fig. 1), terminal 97 of the storage unit 102 (Fig. 6) will also be connected to negative main 46.

As a result, a circuit will be completed (Figs. 6, 7) from negative main 46 through main 128, lead 127, contacts 126, 124, coil 125 of relay 103 of bank M–1, leads 129, 132, contacts 117, 121 of relay 107 which were closed when contact 13 of bank B–1 of stepping switch S–1 was engaged by wiper arm W–1, lead 142, main 143 to terminal 144 which is connected by lead 216 (Fig. 1) to terminal 221 of section A of unit 222 (Fig. 4) and thence through closed contacts 418, 421 of relay 419 to positive main 25.

Coil 125 of relay 103 of bank M–1 will thus be energized and a holding circuit is provided for such relay through contact arm 111 connected to negative main 46 and contact 124 connected to coil 125; contacts 112, 131 will close and contact arm 113 will engage contact 162.

As wiper arm W–3 of stepping switch S–1 (Fig. 8) is engaging contact 13 of bank B–3, terminal 291 of stepping switch S–1 will be connected to negative main 46 and through lead 292 (Fig. 1) to terminal 293 connected to terminal 486 of all of the solenoids 483 of slave typewriter 294 (Fig. 3). As the other side of the solenoid 483 associated with key number "4" has been connected to positive main 25, such solenoid will be energized and the key associated with number "4" of the slave typewriter will be actuated to type number "4" at the first position on line 2 of the card 12 in the slave typewriter as shown in Fig. 11.

When key K associated with the number "4" of the master typewriter 21 is released, cam 50 will again be rotated momentarily to close switch 51 thereby energizing relay 56 to connect terminal 61 to negative main 46, and through lead 262 and terminal 261, the coil 231 of stepping switch S–1 will momentarily be energized to move its wiper arms W–1 to W–4 to engage contacts 14. As a result, coil 122 of relay 107 of bank M–1 of the storage unit 102 will be de-energized, but due to the holding circuit for relay 103 of such bank, relay 103 will remain energized to retain the number "4."

As the wiper arm W–1 of the stepping switch S–1 is now engaging the contact 14, which is connected to terminal 276, the negative main 46 will be connected through the wiper arm W–1 and contact 14 to terminal 276 and by lead 277 (Fig. 1) to terminal 33 of the typewriter 21 to energize solenoid 31 to actuate the space bar. As a result, the carriage of the typewriter 21 will move one space to position 15 of the card 11 and cam 50 will again rotate to cause a negative pulse to be delivered by relay 56 as previously described, to terminal 261 of the stepping switch S–1. Consequently, coil 231 of stepping switch S–1 will again momentarily be energized so that upon de-energization of said coil, wiper arms W–1 to W–4 will move to engage contacts 15. As contacts 14 to 18 of bank B–1 are connected to terminal 276, the stepping operation will automatically be repeated and wiper arms W–1 to W–4 will step to engage contacts 19 at which time the carriage of typewriter 21 will have advanced so that when a key is pressed the type head will strike the nineteenth position on row 1 of the card 11 in the master typewriter.

When wiper arm W–3 of stepping switch S–1 engages contact 14, terminal 295 will be connected to negative main 46 as will terminal 297 of slave typewriter 294 through lead 296 (Fig. 1). Consequently, as previously described, solenoid 484 will be actuated to operate the carriage return key 482 to cause the platen of the slave typewriter to rotate the card to line 3 and the carriage to be moved to the beginning of such line.

As contact 19 of bank B–1 of stepping switch S–1 is connected to terminal 176 (Fig. 8), the negative main 46 will be connected through the associated lead 174 (Fig. 1) to terminal 167 of storage unit 102 to energize coil 122 of relay 107 of bank M–2 and close its four pairs of contacts. At this time a date can be typed on the card 11 in the master typewriter such as, for example, June '52 represented by the numerals 6 5 2.

The key K associated with the number "6" is pressed to type the number "6" at the nineteenth position on line 1 of card 11 and to close the associated switch 23 thereby connecting the associated terminal 27 to positive main 25. As previously described, this will connect positive

main 25 through lead 65 to the terminal 66 associated with relay R–6 of the coding unit 81 and through lead 492 to the terminal 491 of the slave typewriter 294 associated with the solenoid 483 controlling the number "6" key.

Energization of relay R–6 (Fig. 5) will close the two pair of contacts 83, 84, to connect mains 86, 87 and terminals 92, 93 to negative main 46 and through the associated leads 96 the terminals 98 and 99 (Fig. 1) of the storage unit 102 (Fig. 6) will be connected to negative main 46. As a result, relays 104, 105 of bank M–2 related to the number "6" will be energized, as previously described with respect to relay 102 of bank M–1, and by reason of the holding circuits for such relays through contacts 111, 124 they will remain energized with their contacts 112, 131 and 113, 162 in engagement.

When terminal 491 of the slave typewriter associated with the solenoid 483 controlling the number "6" key is connected to positive main 25, as wiper arm W–3 of stepping switch S–1 is engaging contact 19, through terminal 291 and lead 292, the terminal 293 of the slave typewriter connected to the terminals 486 of all of the solenoids 483 will be connected to negative main 46. The solenoid 483 controlling the key associated with number "6" will be actuated to type such number at the first position on row 3 of card 12 in the slave typewriter.

When the key K (Fig. 2) for number "6" is released, the carriage will move one space to position 20 on the card 11 and cam 50 will rotate as previously described to cause a negative pulse to be delivered from terminal 61 through lead 262 to terminal 261 of the control unit 179 to advance the wiper arms of stepping switch S–1 to engage contacts 20. The contact 20 of bank B–1 is connected to terminal 276 and through lead 277, terminal 33 of the typewriter 21 will be connected to negative main 46 to energize solenoid 31 to advance the carriage one space to position 21 and cam 50 will again cause a pulse to be delivered to terminal 261 of the stepping switch S–1 to advance its wiper arms to engage contacts 21. Consequently, the negative main will be connected from contact 21 of bank B–1 to terminal 177 and thence through the associated lead 174 to terminal 168 of the storage unit to energize relay 107 of bank M–3 to close its four pairs of contacts.

The key K of typewriter 21 associated with the number "5" is then pressed to type the number "5" at position 21 on line 1 and by reason of the closing of switch 23 as previously described, the solenoid 483 of the slave typewriter associated with the number "5" will be energized to type such number at the second position on row 3 of the card 12 and the relay R–5 of coding unit 81 will be energized to close its two pairs of contacts and connect terminal 93 and 94 to negative main 46.

As a result, the terminals 99 and 100 of the memory unit will also be so connected through the associated leads 96 and the relays 105, 106 of bank M–3 related to number "5" will be energized and retained by the associated holding circuit with contacts 112, 131 and 113, 162 in engagement.

Release of the key K associated with number "5" will cause the carriage of the master typewriter to move one space to position 22 on card 11 and cam 50 will again rotate to cause a negative pulse to be delivered through lead 262 to terminal 261 of stepping switch S–1 to move its wiper arms to engage contacts 22. As a result, terminal 178 will be connected to negative main 46 and through lead 174, terminal 169 of storage unit 102 will also be connected to negative main 46 thereby energizing relay 107 of memory bank M–4 to close its contacts.

The key K of typewriter 21 associated with the number "2" is then pressed to type such number at position 22 of the card 11 and by reason of the closing of switch 23 as previously described, the relay R–2 of coding unit 81 will be energized to close its pair of contacts 83, 84 and connect terminal 93 to negative main 46 and the solenoid 483 of the slave typewriter associated with the number "2" will be energized to type such number at the third position on line 3 of card 12.

When terminal 93 of the coding unit is connected to negative main 46, the terminal 99 of the storage unit will also be so connected through the associated lead 96 and the relay 105 of bank M–4 related to the number "2" will be energized and retained by the associated holding circuit with contacts 112, 131 and 113, 162 in engagement.

Release of key K associated with number "2" will cause the carriage of the master typewriter to move one space to position 23 on the card 11 and cam 50 will again rotate to cause a negative pulse to be delivered through lead 262 to terminal 261 of stepping switch S–1 to move its wiper arms to engage contacts 23. As result, terminal 276 of the control unit 179 will be connected to negative main 46 and through lead 277, terminal 33 of the typewriter 21 will also be connected to negative main 46 to energize solenoid 31 to advance the carriage one space to position 24 on the card 11. Cam 50 will again cause a pulse to be delivered to terminal 261 of control unit 179 to advance the wiper arms of stepping switch S–1 to engage contacts 24. Consequently, the negative main will be connected from contact 24 of bank B–1 to terminal 278 and thence through lead 279 (Fig. 1) to terminal 280 of renewal unit 184 (Fig. 9) which is connected to one side of coil 366 of relay 351.

If the subscriber for whom the cards are being prepared had a previous subscription, it may be desired to record the fact that the present subscription is a renewal and also to record the date of expiration of the previous subscription.

For this purpose, that key K which is associated with the letter "R" on the master typewriter 21 is pressed, and will type such letter at the twenty-fourth position on line 1 of card 11. This results in closing the corresponding switch 23 and the terminal 27 associated with the letter "R" will accordingly be connected to positive main 25 and such positive main through leads 492 and 368 (Fig. 1) will be connected to the terminals 491 and 367 of the slave typewriter 294 and the renewal unit 184 respectively. As terminals 486 of all the solenoids 483 of the slave typewriter are connected to negative main 46 from contact 24 of bank B–3 of stepping switch S–1 through terminal 291, lead 292 and terminal 293 (Fig. 3) and as the terminal 491 of the solenoid 483 which is associated with the letter "R" is connected to positive main 25 by reason of the pressing of the key K of the master typewriter associated with the letter "R," the letter "R" will be typed on the card 12 at the fourth position immediately after the date 6 52.

As one side of coil 366 of relay 351 of renewal unit 184 is connected to negative main 46 from contact 24 of bank B–1 of stepping switch S–1 as previously described, when terminal 367 is connected to positive main 25, relay 351 will be energized to close its contacts 352, 353; 352′ 353′; 354, 355; 356, 357; 358, 359; 360, 361; and to open its contacts 362, 363 and 364, 365. Closed contacts 352, 353 afford a holding circuit for relay 351 from positive main 25 and closed contacts 352′, 353′ afford a holding circuit for relay 351 from negative main 46 (Fig. 4–A), closed contacts 423, 424 of relay 419, terminal 425, lead 426 (Fig. 1) to terminal 280′ (Fig. 9).

When the second date is now typed it will be coded as a result of the energization of relay 351 in the manner hereinafter to be described.

Upon release of the key K associated with the letter "R," the carriage will move to position 25 and the cam 50 will rotate as previously described to deliver a negative pulse to terminal 261 of control unit 179 momentarily to energize coil 231 of stepping switch S–1 so that its wiper arms will move to engage contacts 25.

If the present subscription is an original subscription, instead of pressing the letter "R" key, the space bar of

the master typewriter is pressed and the carriage will move one space with resultant rotation of cam 50 so that a negative pulse will be delivered to coil 231 of stepping switch S–1 also to move its wiper arms to engage contacts 25.

In the illustrative embodiment herein, only 24 spaces on line 1 of the card 11 in the master typewriter are utilized and hence when the wiper arm W–1 of stepping switch S–1 engages contact 25 on bank B–1, terminal 281 will be connected to negative main 46. As a result, through lead 282, terminal 34 of typewriter 21 will also be connected to negative main 46 and the associated solenoid 32 will be energized to operate the conventional carriage return mechanism of the typewriter 21. Thus, the platen will be rotated one line and the carriage will be returned so that the type head next to be actuated will strike the first position on line 2 of card 11. Cam 50 will also rotate momentarily to energize coil 231 of stepping switch S–1 to advance its wiper arms to engage contacts 26.

When wiper arm W–3 engages contact 25 of bank B–3 of stepping switch S–1, terminal 295 will be connected to negative main 46 and through lead 296 (Fig. 1), terminal 297 will be connected to negative main 46 to energize carriage return solenoid 484 of the slave typewriter to rotate its platen one line to line 4 and move its carriage so that the type head next to be actuated will strike the first position on such line.

A name may now be typed in conventional manner on line 2 of card 11 in the master typewriter. As the keys K associated with the letters of the name are pressed, the corresponding switches 23 will be closed to connect the associated terminals 27 to positive main 25. Through the associated leads 492, terminals 491 of the slave typewriter related to the letters will be connected to positive main 25 and as previously described, the respective solenoids 483 will be energized to type the letters on the card 12.

Assuming that the wiper arms W–1 to W–4, as the keys K are actuated, have reached contacts 36 and no further letters of the name remain to be typed, the carriage of the master typewriter may readily be moved so that the type keys will strike at the first position on the third line of card 11 and the platen rotated to line 3 by merely pressing the tabulating button 444 designated "Tab Out" in section B of cycling unit 222 (Fig. 4). When this button is pressed, the coil 438 of relay 431 will be energized through closed contacts 441, 443 of switch 442 and the closed contacts 446, 448 of relay 445 and contacts 432, 435 of relay 431 will close to provide a holding circuit for such relay.

Contacts 433, 436 and 434, 437 will also be closed by energization of coil 438. As a result, a circuit will be completed from wiper arm W–1 of stepping switch S–1 connected to negative main 46 and which is presently engaging contact 36, terminal 283, lead 284 (Fig. 1), terminal 285 of section B of cycling unit 222, closed contacts 433, 436, terminal 300, lead 299 to terminal 298 of bank B–4 of stepping switch S–1 (Fig. 8) and thence by lead 298' to terminal 251 of stepping switch S–1. As contacts 243, 246 and 244, 247 are closed, the coil 231 will be energized opening only contacts 243, 246 to de-energize coil 231 causing wiper arms W–1 to W–4 to move to engage contacts 37 and the contacts 243, 246 will again close when contact 37 of bank B–1 is again engaged. The above cycle will be repeated and such operation will continue rapidly, without movement of the carriage of the typewriter 21, until the wiper arms W–1 to W–3 which are connected to negative main 46 and wiper arm W–4 engage contacts 50.

As contact 50 on bank B–1 of stepping switch S–1 is connected to terminal 281 and through lead 282 to terminal 34 of typewriter 21 (Fig. 2), the carriage return solenoid will be energized to rotate the platen of the master typewriter to line 3 and move the carriage so that the type heads may strike the first position on such line. When the carriage moves, cam 50 will be rotated to deliver a negative pulse to coil 231 of stepping switch S–1 to advance its wiper arms to engage contacts 51.

When wiper arm W–2 of stepping switch S–1 engages contact 50, terminal 286 will be connected to negative main 46 and through lead 288 (Fig. 1), terminal 289 of section B of unit 222 will be so connected. As a result, coil 449 of relay 445 will be energized to open its contacts 446, 448 to break the holding circuit for the coil 438 of relay 431. Thus, the relay 431 will be de-energized to open its contacts to ready the relay for the next "Tab Out" operation.

When wiper arm W–3 of stepping switch S–1 engages contact 50 of Bank B–3, terminal 295 will be connected to negative main 46 and through lead 296 (Fig. 1) terminal 297 of the slave typewriter will also be so connected to energize carriage return solenoid 484 to rotate the platen of the slave typewriter to line 5 and move the carriage to the beginning of such line.

The address may then be typed on line 3 of card 11. Although the address may contain numbers which actuate the relays of coding unit 81, as none of the coils 122 of relays 107 of the storage unit are energized at this time, the action of the coding unit will have no effect to actuate any of the relays of the memory banks. When the key K representing the first character of the address is pressed, the corresponding character will be typed at the first position on line 3 of card 11 in the master typewriter and at the first position on line 5 of card 12 in the slave typewriter as previously described. After the key K is released and the carriage of the master typewriter moves one space, due to the rotation of cam 50, coil 231 will be energized to advance the wiper arms to engage contacts 52. At this position, wiper arm W–2 connects negative main 46 to terminal 287 and through lead 287', terminal 268 of stepping switch S–2 is connected to negative main 46. As a result, coil 232 will be energized to open its normally closed contacts 243, 246.

After the second character of the address is typed the wiper arms of stepping switch S–1 will move to "0" or home position. In addition, through the conventional mechanical action of said switch, contacts 244, 247 and 245, 249 will open and contact 245 will engage contact 248. As terminal 287 associated with contact 52 of bank B–2 is no longer connected to negative main 46, coil 232 of stepping switch S–2 is de-energized so that its wiper arms move to engage contacts 1 of banks B–1 to B–4 and contacts 243, 246 open, contacts 244, 247 close and contact 245 moves away from contact 248 to engage contact 249, breaking the circuit from terminal 261 through lead 257 to coil 231 and connecting terminal 261 through closed contacts 245, 248 of switch S–1, closed contacts 245, 249 of stepping switch S–2 to one side of its coil 232, the other side of which is connected to positive main 25.

As additional keys of the master typewriter are pressed to type the street address, the wiper arms of stepping switch S–2 will advance from the first contact. Assuming that the street address has but eight characters, i. e., 10 Jane St. with the name "Jane" being separated from "10" and "St." by a single space, as such characters are typed on the cards, the wiper arms of stepping switch S–2 will be advanced as previously described to engage contacts 9.

At this time, the platen of the master typewriter may be rotated one line to line 4 and the carriage moved to the first position on the fourth line by merely pressing the "Tab Out" button 444 shown in section B of unit 222. This will cause the relay 431 to be energized and held by closed contacts 432, 435. The contacts 434, 437 will also close to complete a circuit from negative main 46 through the wiper arm W–1 of bank B–1 of stepping switch S–2 to terminal 301 and by lead 302 to terminal 303 of section B of unit 222 through closed contacts 434, 437 to

terminal 307 and by lead 306 to terminal 305 of bank B–4 of stepping switch S–2 and thence by lead 305' to terminal 252 of stepping switch S–2. As contacts 243, 246 and 244, 247 are closed, the coil 232 will be energized opening contacts 243, 246 to de-energize coil 232, causing wiper arms W–1 to W–4 to move to engage contacts 10 and the contacts 243, 246 will again close when contact 10 of bank B–1 is engaged. The above cycle will be repeated and such operation will continue rapidly until the wiper arms W–1 to W–4 engage contacts 23.

When the wiper arm W–1 of bank B–1 of stepping switch S–2 is engaging contact 23, through terminal 281, lead 282 and terminal 34, the carriage return solenoid 32 will be connected to negative main 46, thereby rotating the platen of the master typewriter to the fourth line and moving its carriage to the first position on such line to advance wiper arms W–1 to W–4 of stepping switch S–2 to engage contacts 24.

When wiper arm W–2 is engaging contact 23 of bank B–2 of stepping switch S–2, terminal 286 will be connected to negative main 46 and through lead 288, terminal 289 of section B of unit 222 will be so connected. As a result, coil 449 of relay 445 will be energized to open its contacts 446, 448 to break the holding circuit for the coil 438 of relay 431. Thus the relay 431 will be de-energized to open its contacts to ready the relay for the next "Tab Out" operation.

When wiper arm W–3 engages contact 23 of bank B–3 of stepping switch S–2, terminal 295 will be connected to negative main 46 and through lead 296 (Fig. 1), terminal 297 of the slave typewriter will also be so connected to energize carriage return solenoid 484 to rotate the platen of the slave typewriter to line 6 and move the carriage to the beginning of such line.

The town and state, for example, may then be typed on the fourth line of the card 11 in the master typewriter and the sixth line of the card 12 in the slave typewriter. With each release of the type key K and rotation of the cam 50, the wiper arms of the stepping switch S–2 will advance from the twenty-fourth position. After the town and state have been typed, and the wiper arms of stepping switch S–2 are engaging contacts 34, for example, the "Tab Out" button 444 may again be pressed to connect the negative main 46 through terminal 301, lead 302, terminal 303 of section B of unit 222, closed contacts 434, 437, terminal 307, lead 306 to terminal 305 of bank 4 of stepping switch S–2 and thence by lead 305' to terminal 252 of stepping switch S–2, As previously described, coil 232 will intermittently be energized to step its wiper arms until they engage contacts 48.

When the wiper arm W–1 of stepping switch S–2 is engaging contact 48, negative main 46 will be connected to terminal 281 and through lead 282 to terminal 34 of typewriter 21 to energize the carriage return solenoid thereby rotating the platen of the master typewriter to the fifth line and returning the carriage to the first position on line five. Such movement of the carriage as previously described will cause the wiper arms W–1 to W–4 of stepping switch S–2 to advance to engage contacts 49.

When wiper arm W–2 is engaging contact 48 of bank B–2, terminal 286 will be connected to negative main 46 and through lead 288, terminal 289 of section B of unit 222 will be so connected. As a result, coil 449 of relay 445 will be energized to open its contacts 446, 448 to break the holding circuit for the coil 438 of relay 431. Thus the relay 431 will be de-energized to open its contacts to ready the relay for the next "Tab Out" operation.

When wiper arm W–3 engages contact 48 of bank B–3, terminal 295 will be connected to negative main 46 and through lead 296 (Fig. 1), terminal 297 of the slave typewriter will also be so connected to energize carriage return solenoid 484 to rotate the platen of the slave typewriter to line seven and move the carriage to the beginning of such line.

The first few spaces on line 5 of card 11 may either be left blank and the space bar of the master typewriter need merely be pressed to advance its carriage thereby to energize coil 232 to advance the wiper arms W–1 to W–4, or any desired information may be typed therein and simultaneously typed on card 12 in the slave typewriter. In information is typed, each movement of the carriage will also energize coil 232 to advance the wiper arms W–1 to W–4.

When wiper arm W–2 engages contact 52 of bank B–2 of stepping switch S–2, the terminal 304 will be connected to negative main 46 and through lead 304', terminal 269 of stepping switch S–3 will also be connected to negative main 46. As a result, the coil 233 will be energized to open its normally closed contacts 243, 246.

With the wiper arms W–1 to W–4 of stepping switch S–2 engaging contacts 52, if a key K or the space bar 20 should be pressed, the rotation of cam 50 will momentarily energize coil 232 to move its wiper arms to "0" or home position. In addition, contacts 244, 247 and 245, 249 of stepping switch S–2 will open and contact 245 will engage contact 248, the movement of arm 245 away from contact 249 breaking the circuit to coil 232. Upon movement of wiper arm W–2 away from contact 52, the negative connection to terminal 269 of coil 233 will be broken and coil 233 will be de-energized to move wiper arms W–1 and W–4 of stepping switch S–3 from position "0" to position 1 and simultaneously closing contacts 244, 247 and 245, 249.

At this time, if no further information is to be typed at the beginning of the fifth line, the "Tab In" button 462 of section C of unit 222 may be pressed. This will energize coil 456 of relay 451 providing a holding circuit therefor through its closed contacts 452, 454. Closing of contacts 453, 455, will connect negative main 46 through the wiper arm W–1 engaging contact 1 of bank B–1 of stepping switch S–3 to terminal 311 and through lead 311', terminal 313 of section C of unit 222, closed contacts 455, 453, terminal 465, leads 466 and 218 to terminal 33 of typewriter 21 thereby actuating space bar solenoid 31 to move the carriage one space. Such movement of the carriage will cause the wiper arms W–1 to W–4 of stepping switch S–3 to advance to engage the second contacts. As the solenoid 31 will be de-energized with each movement of the wiper arms, this operation will continue until the wiper arms engage contacts 14 of stepping switch S–3 at which time the carriage will have been advanced so that the type head next actuated will strike at position 18 on line 5 of card 11. With the wiper arm W–1 engaging contact 14, it will be connected to terminal 314 and through the associated lead 317 to terminal 318 of renewal unit 184. As the contacts 356, 357 of unit 184 are closed, as previously described, due to the previous pressing of the "R" key, terminal 181 will be connected to negative main 46 as will terminal 170 of storage unit 102 (Fig. 7) through lead 180. This will energize relay 107 of bank M–5 to close its four pairs of contacts.

At the same time wiper arm W–2 of stepping switch S–3 will connect the negative main 46 to terminal 322 and through lead 322' (Fig. 1) to terminal 324 of section C of unit 222 to energize relay 468 to break the circuit to the "Tab In" relay 451, opening its contacts and readying the relay for the next "Tab In" operation.

When wiper arm W–3 of stepping switch S–3 engages contact 14, terminal 295 will be connected to negative main 46 to energize carriage return solenoid 484 of slave typewriter 294 thereby rotating its platen to line 7 and moving the carriage to the first position on such line.

A second date can now be typed on card 11 in the master typewriter, i. e., say September 1951 represented by the numerals 9 51.

To this end, the key K associated with the numeral "9" on the typewriter 21 is pressed to type the numeral "9" at position 18 on line 5 and to close the associated

switch 23. Although the terminal 491 of the slave typewriter associated with numeral "9" will be connected to positive main 25, as previously described, the associated solenoid 483 will not be energized to type such number, as the contacts after contact 14 on bank B–3 of stepping switch S–3 are open and do not connect terminal 293 of the slave typewriter to negative main 46.

The closing of switch 23 of typewriter 21 will, however, energize coil 82 of relay R–9 of coding unit 84, as previously described, to close its two pairs of contacts 83, 84 and connect terminals 91 and 93 to negative main 46. Through the associated leads 96, terminals 97 and 99 of storage unit 102 (Fig. 7) will be connected to negative main 46. As a result, relays 103 and 105 of bank M–5 related to number 9 will be energized and held through closed contacts 111, 124; contacts 112, 131 will close and arm 113 will engage contact 162. After the key K related to number 9 is released, the carriage will move to position 19 and the wiper arms of stepping switch S–3 will advance to engage its contacts 15.

Thus, negative main 46 will be connected through wiper arms W–1 to terminal 276 and through lead 277, to terminal 33 of typewriter 21 to energize the space bar solenoid 31, thereby moving the carriage one space to position 20 and advancing the wiper arms of stepping switch S–3 to engage contacts 16.

As a result, the negative main 46 will be connected to terminal 315 and through the associated lead 317 to terminal 319 of renewal unit 184, through closed contacts 358, 359 to terminal 182 and by lead 182' to terminal 171 of storage unit 102 to energize relay 107 of memory bank M–6 to close its four pairs of contacts.

The key K related to number "5" of the typewriter 21 is then pressed to type number "5" at position 20 on line 5 and to close the associated switch 23 to energize relay R–5 of the coding unit 81 to close its two pairs of contacts 83, 84 thereby connecting terminals 93, 94 to negative main 46. This will connect terminals 99, 100 of storage unit 102 to negative main 46 to energize relays 105, 106 of bank M–6 to close their contacts 112, 131 and to move arms 113 into engagement with contact 162, the relays being held by the closing of contacts 111, 124.

Upon release of the number 5 key and movement of the carriage to position 21 the wiper arms of stepping switch S–3 will move to engage contacts 17.

When this occurs the negative wiper arm W–1 will be connected to terminal 316 and through lead 317 to terminal 320 of unit 184 and through closed contacts 360, 361, terminal 183 and lead 183', terminal 172 of the storage unit 102 will also be connected to negative main 46 to energize relay 107 of bank M–7 to close its four pairs of contacts. The key K related to number 1 of the typewriter 21 may then be pressed to type such number at position 21 on line 5 and to close its associated switch 23 thereby energizng relay R–1 of coding unit 81 to close its pair of contacts 83, 84 to connect terminal 94 to negative main 46. As a result, terminal 100 of memory unit 102 will be connected to negative main 46 to energize relay 106 of bank M–7 related to number 1 to close its contacts 112, 131 and move arm 113 against contact 162, the closing of contacts 111, 124 providing a holding circuit for said relay. Upon release of key 1, the carriage will move to position 22 on line 5 and the wiper arms of stepping switch S–3 will move to engage contacts 18.

As contact 18 of bank B–1 of stepping switch S–3 is connected to terminal 281 and thence by lead 282 to terminal 34 of the typewriter the carriage return solenoid 32 will be energized to rotate the platen to line 6 and to return the carriage to position 1 on such line. Such movement of the carriage will cause the wiper arms to move to engage contacts 19.

With the wiper arm W–1 engaging contact 19 of bank B–1 of stepping switch S–3, the terminal 276 will be connected to negative main 46 as will be the terminal 33 of the typewriter and the space bar will be actuated to move the carriage to the second position on line 6 again causing the wiper arms of stepping switch S–3 to move to engage contact 20.

The operation above described will again be repeated to move the carriage to the third position on line 6 and thence to the fourth position, and the coil 233 of stepping switch S–3 will be energized to move its wiper arms to engage contacts 22. Thus the negative main 46 will be connected through wiper arm W–1 to terminal 187.

Terminal 187 is connected by an associated lead 186 to terminal 154 of bank M–1 of storage unit 102. Hence, through lead 149, closed contacts 113, 157 of relay 106, lead 158 and main 159, the terminal 161 is connected to negative main 46. Through lead 218 (Fig. 1) the terminal 33 of typewriter 21 is connected to negative main 46 energizng space bar solenoid 31 to move the carriage to the fifth position on line 6.

Such movement will rotate cam 50 and in the manner previously described, the wiper arms of stepping switch S–3 will move to engage contacts 23. As contacts 23 and 24 are connected to terminal 276, the carriage will move two spaces as previously described to position seven on line 6 and the wiper arm W–1 of stepping switch S–3 will move to engage contact 25 connecting terminal 188 to negative main 46. Referring to Figs. 1 and 6, terminal 153 will also be connected to negative main 46, and through lead 148, closed contacts 113, 157 of relay 105, leads 158, 159 the terminal 161 will be so connected. As previously described, the space bar of the typewriter 21 will be actuated to move the carriage one space to position 8 and through cam 50 the wiper arms of stepping switch S–3 will move to engage contacts 26.

As contacts 26 and 27 are connected to terminal 276, in the manner previously described, the carriage will move two spaces to position 10 on line 6 and the wiper arm W–1 will move to engage contact 28 to connect terminal 189 to negative main 46. Through lead 186, terminal 152 of storage unit 102, lead 147, closed contacts 113, 157 of relay 104, leads 158, 159, the terminal 161 is also connected to negative main 46 and through lead 218 the space bar solenoid 31 is actuated to move the carriage to position 11 and through cam 50 the wiper arm W–1 of stepping switch S–3 will move to engage contact 29. The carriage will then move two spaces to position 13 on line 6 and the wiper arm W–1 will move from contact 29 to 30 in the manner previously described and thence to contact 31 to connect terminal 190 to negative main 46.

Through lead 186, terminal 151 of storage unit 102 will be connected to negative main 46 and through lead 146, closed contacts 113, 162 of previously energized relay 103 of bank M–1 related to number 4, leads 163, 164, terminal 165 will be connected to negative. Thence through lead 217 and terminal 36, code bar lever solenoid 35 of the typewriter 21 will be energized to type a code bar at the thirteenth position on line 6 which is at the fourth code region on this line and represents the number "4" as shown in the code set forth in Fig. 12.

After the code bar lever has returned, the cam 50 will rotate to advance the wiper arm W–1 of stepping switch S–3 to engage contact 32. In this position terminal 281 will be connected to negative main 46 and as previously described, the carriage return solenoid 32 will be actuated to rotate the platen to line 7 and move the carriage to the first position on line 7 and due to the rotation of cam 50 to advance the wiper arms to engage contacts 33.

The operations above described will then be repeated with respect to line 7. Thus, when wiper arm W–1 of stepping switch S–3 is engaging contacts 36, 39, 42 and 45 and the carriage is at the 4th, 7th, 10th and 13th positon on line 7, terminals 191, 192, 193 and 194 will be connected to negative main 46 as will terminals 154, 153, 152, 151 of memory bank M–2 respectively. As only relays 104 and 105 of bank M–2 related to the number

"6" are energized as previously described, the code bar lever solenoid 35 will be energized only when the wiper arms are engaging contacts 39 and 42 to print code bars at positions 7 and 10 on row 7, i. e., the second and third code regions representing the number "6" as shown in Fig. 12.

As only relays 105 and 106 of bank M–3 related to the number "5" are energized, as previously described, further advance of the carriage and the stepping switch wiper arm W–1 to engage contacts 48 and 51, will cause code bars to be typed at the sixteenth and nineteenth positions on row 7, i. e., the fifth and sixth code regions representing the number "5." When the wiper arm W–1 of stepping switch S–3 reaches the 52nd contact, terminal 276 will be connected to negative main 46 energizing space bar solenoid 31 to advance the carriage one space to position 21 on card 11. Upon movement of the carriage and rotation of cam 50, the wiper arms of stepping switch S–3 will be advanced to the "0" or home position opening contacts 244, 247 and moving arm 245 against contact 249 to break the circuit for coil 233.

When contact 52 of bank B–2 of stepping switch S–3 is engaged by wiper arm W–2, terminal 323 will be connected to negative main 46 and through lead 323', and terminal 270, coil 234 of stepping switch S–4 will be energized to open its contacts 243, 246. Upon de-energization of coil 234 when contact 52 of bank B–2 of stepping switch S–3 is no longer engaged by the wiper arm W–2, the wiper arms of stepping switch S–4 will move to engage contacts 1; contacts 244, 247 of coil 234 will close and arm 245 will engage contact 249 to place coil 234 in circuit to control the wiper arms of the stepping switch S–4.

In the twenty-second and twenty-fifth position on line 7 when wiper arm W–1 of stepping switch S–4 is engaging contacts 2 and 5, terminals 197 and 198 will be connected to negative main 46 as will terminals 152, 151 of bank M–3. However, as previously described, as only relays 105, 106 are energized, the code bar lever solenoid will not be actuated.

In the twenty-eighth, thirty-first, thirty-fourth and thirty-seventh position on line 7, when wiper arm W–1 is engaging contacts 8, 11, 14 and 17, terminals 199, 200, 201 and 202 will be connected to negative main 46 as will terminals 154, 153, 152 and 151 of bank M–4. As only relay 105 of bank M–4 related to number "2" is energized, the code bar lever solenoid 35 will be energized only when the wiper arm is engaging contact 11 to type a code bar at position 31 on row 7, i. e., the tenth code region representing the number "2."

The wiper arm W–1 of stepping switch S–4 will have advanced as previously described until it engages contact 18. Thus, the terminal 281 is connected to negative main 46 to actuate the carriage return mechanism of typewriter 21 to rotate the platen one space and move the carriage to the first position on line 8. Cam 50 will rotate to move the wiper arm W–1 to engage contact 19 which is also connected to terminal 281, and the platen will rotate to line 9 and the carriage will move to the first position on this line and through the rotation of cam 50 will move the wiper arms to engage contacts 20.

Thus, terminal 224 is connected to negative main 46, and through lead 219, terminal 223 of renewal unit 184 will be so connected. As a result, through closed contacts 354, 355, terminal 275, leads 274, 277, terminal 33 of typewriter 21 will be connected to negative main 46 and the space bar solenoid 31 will be energized to move the carriage to position 2 on line 9 and rotate cam 50 to advance the wiper arms of stepping switch to engage contacts 21. This operation will be repeated until contacts 23 are engaged, at which time the carriage of the typewriter will be at position 4 on line 9. When the wiper arm W–3 of stepping switch S–4 engaged contact 20, terminal 332 was connected to negative main 46 as was terminal 334 of renewal unit 184, through lead 333. However, as contacts 362, 363 of unit 184 are open due to the energization of such relay when the key K was pressed, this has no effect.

The wiper arms of stepping switch S–4 will advance until they engage contacts 52 and in the manner previously described, the date typed on row 5 of the card 11 will be decoded and as this code is September '51 or 9 51, such date will be typed in the form of code bars at positions seven, thirteen, sixteen, nineteen and twenty-eight or code regions 2 and 4, 5 and 6 and 9 on the ninth row representing the numbers 9 51 respectively by reason of the energization of the related relays in banks M–5, M–6 and M–7 of the memory unit.

As terminal 224 will be connected to negative main 46, when contact 52 of bank B–1 of stepping switch S–4 is engaged by wiper arm W–1 as previously described, the space bar solenoid 31 will be energized to move the carriage one space and the wiper arms of switch S–4 will move to "0" or home position.

At the same time, wiper arm W–2 will connect terminal 331 to negative main 46 to energize coil 235 through lead 331'. As a result, contacts 243, 246 of coil 235 will open. When wiper arm W–2 moves away from contact 52 and terminal 331 is no longer engaged, coil 235 will be de-energized and the wiper arms of stepping switch S–5 will engage contacts 1 and contacts 244, 247 will close and arm 245 will engage contact 249.

After the code on the ninth line of card 11 has been typed and the wiper arms of stepping switch S–5 have moved to engage contacts 5, terminal 281 will be connected to negative main 46 through lead 282 and the carriage return solenoid 32 will be energized to rotate the platen to line 10 and move the carriage to the first position on such line, the rotation of cam 50 advancing the wiper arms of stepping switch S–5 to the sixth contacts.

As contact 6 on bank B–1 of stepping switch S–5 is also connected to terminal 281, the carriage return solenoid 32 will again be energized. However, as the carriage is already at the first position, it will not be moved and as only the lower edge of the card 11 is held by the platen, the rotation of the platen will facilitate removal of the card from the typewriter by the operator without need for manually turning the platen.

The rotation of cam 50 due to the last actuation of the carriage return bar will move the wiper arms of stepping switch S–5 to engage the seventh contacts.

As wiper arm W–3 of stepping switch S–5 is connected through terminal 237, lead 225 to terminal 226 of section A of unit 222 and thence through closed contacts 401, 402, lead 415, contacts 392, 394 of relay 375, which were closed when the "Set" button 386 as initially pressed at the beginning of the cycle, to negative main 46 and as all of the succeeding contacts of banks B–3 and B–4 of stepping switch S–5 after contacts 6 are connected to terminal 346, such terminal 346 will also be connected to negative main 46 and hence coil 235 will be energized through lead 346' and closed contacts 244, 247, and 243, 246 to open its contacts 243, 246. This will de-energize the coil to advance its wiper arms. Repeated energization and de-energization of coil 235 will thereby occur rapidly to advance the wiper arms of stepping switch S–5 until they reach contacts 52 and then move back to "0" or home position at which time the homing action will stop.

When wiper arms W–1 and W–2 of stepping switch S–5 are engaging contacts 52, terminals 336 and 343 will be connected to negative main 46. When terminal 336 is connected to negative main 46, through lead 337, terminal 338 of section A of unit 222 will also be connected to energize the counter 428 to indicate that a card has been completed.

When terminal 343 is connected to negative main 46, through lead 344, terminal 345 of section A will also be

connected to negative main 46 energizing coil 422 of relay 419 to open its contacts 423, 424 and 418, 421. Opening of contacts 423, 424 will break the circuit from negative main 46 through leads 426 and 279 (Fig. 1) to coil 366 of relay 351 of renewal unit 184 so that the relay contacts will move to the position shown in Fig. 9. Opening of contacts 418, 421 will break the holding circuit for coil 389 of the "Set" relay 375 in section A of unit 222 to ready the latter for the next cycle and by the opening of contacts 391, 393 of relay 399 in section A, the circuit to relay 42 (Fig. 2) will be broken to de-energize the drive motor of typewriter 21. The opening of contacts 418, 421 (Fig. 4, section A) will also break the circuit to terminal 221 to open the circuit to the coils of the relays in the storage unit 102 to ready it for the next cycle.

At this time the typed cards 11 and 12 can be removed from the master and slave typewriter, another card placed in each typewriter, the "Set" button 386 pressed and the above operation repeated.

If an error is found after the cards in the master and slave typewriters have been partly typed and the wiper arms of stepping switch S–1, for example, have been advanced toward contacts 52, such cards may be discarded and the equipment may readily be reset by merely pressing the "Reset" button 414. As a result, relay 399 will be energized to open its contacts 401, 402; 405, 406; 407, 408 and to close its contacts 403, 404. In addition, contacts 411′ and 413′ will close to energize coil 422 of relay 419. As a result, through the opening of contacts 418, 421 of relay 419, the circuit to terminal 144 of the storage unit 102 will be broken to reset any of the relays in the storage unit 102 that had been actuated.

When contacts 401, 402 are opened, the circuit from negative main 46 through closed contacts 392, 394 of relay 375, lead 415 and contacts 401, 402, terminal 226 and lead 225 to terminal 237 (Fig. 8) will be broken to remove the negative potential from the wiper arms W–1, W–2, W–3 of the stepping switches. When contacts 403, 404 are closed, a negative potential will be applied to terminal 239 (Fig. 8) and hence to the wiper arms W–4 of all of the stepping switches. As a result, the terminals 298, 305, 327, 335 and 346 of all of the stepping switches and the associated coils 231 to 235 will be connected to negative main 46 to effect actuation of all of the stepping switches whose wiper arms are not in the "0" or home position.

When contacts 405, 406 of section A of unit 222 (Fig. 4) are opened, the circuit to the coil 389 of the "Set" relay 375 will be broken to recycle the latter. When contacts 407, 408 are opened, the circuit to the counter 428 will be broken so that in the event the fifth stepping switch was in operation and it homed to terminal 336, no potential will be applied to actuate the counter, such count not being desired as a defective card is present.

As previously described, after the date of June '52 had been typed on the first line of the card 11, the letter "R" was typed when the wiper arms of stepping switch S–1 were engaging contacts 24. This caused the relay 351 of unit 184 (Fig. 9) to be energized.

If the "Reset" button 414 is pressed after relay 351 is energized by reason of the opening of contacts 423, 424 of relay 419 (Fig. 4) the circuit to coil 366 of relay 351 through closed contacts 352′, 353′ is broken and the renewal relay 351 will be set for the next operation.

In the event that it is not desired to type a code on the card for the previous expiration date, the letter "R" would not be typed, but instead the space bar 20 pressed to advance the carriage one space in the manner previously described to advance the wiper arms of stepping switch S–1 to contacts 25. The operations previously described would then be performed until the wiper arms of stepping switch S–4 reach contacts 20. The negative potential from the wiper arm W–3 of stepping switch S–4 would be applied to terminal 332 and through lead 333 (Fig. 1), terminal 334 of unit 184 (Fig. 9), normally closed contacts 362, 363 of unit 184, terminal 330, lead 329 to terminal 335 of control unit 179 and the terminal 254 of coil 234 of stepping switch S–4 would be connected to negative main 46 to pulse such coil as previously described to move the wiper arms of stepping switch S–4 to "0" position.

When such wiper arms reached the 52nd contact, terminal 331 would then be connected to negative main 46 to actuate coil 235. As previously described, stepping switch S–5 would then be actuated to connect negative main 46 through wiper arm W–2, the first contact of bank B–2 of stepping switch S–5, terminal 339, through closed contacts 364, 365 of unit 184 to terminal 346 and thence to coil 235 to advance the wiper arms of stepping switch S–5. When contacts 5 and 6 of bank B–1 were engaged by wiper arm W–1, the platen would be turned two lines and the carriage advanced to the beginning of the line and the wiper arms would be advanced to position 7 and the stepping switch S–5 would then be homed as previously described.

It is to be understood that any desired arrangement of the circuit connections of the control unit could be provided so that the data recorded on the cards in the master typewriter could be spaced as desired on one line or separated by one or more lines and the coded information can be on successive lines or spaces. Furthermore, the data on the card in the slave typewriter can be broken up and typed into any number of lines within the limits of the card.

Although the invention has been illustratively described with respect to its application in the subscription fulfilment field, it is readily apparent that it could be used in a multiplicity of other fields. Thus, for example, the data recording means could be a cash register modified to deliver impulses depending upon the amount of the sale, a code number for the salesman, and a code number for the item for example, and the code designations typed on a card which could be used in a suitable classifying equipment to classify such cards according to salesmen and stock items as well as the amount of the sales.

The system could also be used as an automatic typewriter with predetermined tabulating on a plurality of lines by appropriate connections in the control unit.

The illustrative applications of the equipment herein given are by no means all inclusive and all applications possible within the ambit of the claims are within the scope of the invention from its broader aspects.

Although the code designation is illustratively shown as a bar typed on a card, it is within the scope of the invention to employ code designations that emit or reflect waves of any desired frequency between very wide limits or produce a field illustratively an electro-static or electro-magnetic field.

While the invention preferably uses imperforate cards, it is within the scope of the invention, as defined in the claims, to utilize perforations as the code designations.

Where imperforate cards or other carrying media are used with the items of indicia and codes thereon, such indicia and codes may readily be obliterated or covered and the cards or other carrying media may be re-used with new or added indicia and/or codes.

In the illustrative embodiment herein shown, the carrying media for the indicia, codes or data are cards. However, it is within the scope of the invention to use other types of carrying media such as sheets, strips, film or the like.

As many changes could be made in the above system and equipment, and many apparently widely different embodiments of this invention could be made without departing from the scope of the claims, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, what I claim as

new and desire to secure by Letters Patent of the United States is:

1. A system of the character described comprising an electric typewriter having a keyboard, type heads controlled thereby, an additional code marking type head, switch means controlled from said keyboard, means under control of said switch means for storing sequences of data, and means operatively connected after storing of each such sequence, automatically to actuate said code marking type head in accordance with such stored data and for clearing such data storing means after such stored data has been recorded in code.

2. A system of the character described comprising an electric typewriter having a carriage, a keyboard, type heads controlled thereby, an additional code marking type head, means for storing a sequence of data, control means therefor connected for control by keyboard operation to ready said storage means at predetermined positions of said carriage, switch means controlled from certain keys of said keyboard, coding means controlled from said switch means, and means controlled by said coding means selectively to actuate said readied storage means, said control means including means operative after a sequence of data has been stored to actuate said code marking type head to record code in accordance with the stored data.

3. A system of the character described comprising an electric typewriter having a keyboard, a carriage, a platen thereon and carriage spacing mechanism, control means having a sequence of switches, means associated with and serving with each operation of said typewriter to deliver a pulse of electric energy to said control means, successive pulses being delivered to actuate successive switches of said control means, and a solenoid to actuate said carriage spacing mechanism, at least one of the switches being connected to said solenoid, whereby upon operation of said solenoid by said latter switch, carriage advance is effected automatically, and such carriage advance in turn effects actuation of the next switch in the sequence.

4. A system of the character described comprising an electric typewriter having a keyboard, a carriage, a platen thereon and carriage spacing mechanism, control means having a sequence of switches, means associated with and serving with each operation of said typewriter to deliver a pulse of electric energy to said control means, successive pulses being delivered to actuate successive switches of said control means, and a solenoid to actuate said carriage spacing mechanism, a set of consecutive switches of said sequence being connected to said carriage spacing solenoid, whereby the actuation of each switch of said set effects automatic advance of the carriage and each carriage advance in turn effects the actuation of the next switch until all switches of the set have been actuated.

5. A system of the character described comprising an electric typewriter having a keyboard, a carriage, a platen thereon, carriage spacing mechanism and carriage return mechanism, control means having a sequence of switches, means associated with and serving with each operation of said typewriter to deliver a pulse of electric energy to said control means, successive pulses being delivered to actuate successive switches of said control means, a solenoid to actuate said carriage spacing mechanism, and a solenoid to actuate said carriage return mechanism, a plurality of sets of said switches being connected to said carriage spacing solenoid, whereby the actuation of each switch of each set effects the advance of the carriage and each carriage advance in turn effects the actuation of the next switch, until all of the switches of the set in question have been actuated, and a switch of said sequence intervening between at least two of said sets and connected to said carriage return solenoid, whereby upon actuation of said latter switch, the typewriter platen will be rotated and the carriage will be returned to the first typing position on the next line.

6. A system of the character described comprising an electric typewriter having a keyboard, a carriage, a platen thereon and carriage return mechanism, control means having a sequence of switches, means successively to actuate said switches, means associated with and serving with each operation of said typewriter to operate said actuating means, a set of said sequence of switches being connected to effect operation of said actuating means independently of said typewriter, a solenoid to actuate said carriage return mechanism, a switch after said set of switches but in said sequence and connected to said solenoid, and a normally open switch in circuit with each switch of said set and with said actuating means, whereby with any of said set of switches actuated, upon closure of the normally open switch said actuating means will operate for successive actuation of said sequence of switches independently of the typewriter, and upon operation thereafter of the solenoid connected switch the platen is rotated and the carriage advanced to the first typing position on the next line.

7. The combination recited in claim 6 in which the typewriter includes carriage spacing mechanism and a solenoid to actuate said mechanism, at least one of the switches of said sequence distinct from said set of switches being connected to said solenoid, whereby upon operation of said solenoid, carriage advance is effected independently of the keyboard, and such carriage advance in turn effects operation of said actuating means.

8. A system of the character described comprising a typewriter for recording data, coding means controlled by the typewriter and code storage means connected thereto, and control means comprising means for discriminating portions of such data to be coded from the remaining portions, said discriminating means being connected for selectively readying one of said coding and code storage means to effect storage only of such data as is to be coded, said typewriter including means for recording in code, said control means comprising means arranged for actuation only after the corresponding portions have been completely recorded, and serving for operating said code recording means.

9. The system recited in claim 8 in which said code storage means comprises a plurality of memory banks at least equal in number to the number of items of data to be coded, each bank having a plurality of electrical elements, said discriminating means controlling the readying of said banks in sequence, and the coding means has a plurality of electrical elements arranged in permutations and combinations of circuits each uniquely related to and under control of an individual character of said typewriter, said circuits being inter-connected with the electrical elements of said memory banks selectively to actuate those electrical elements of the readied memory bank related to the actuated character of said typewriter.

10. The system recited in claim 9 in which the electrical elements of said memory banks and said coding means are relays.

11. The system recited in claim 9 in which the discriminating means includes a sequence of switches connected for successive operation by actuation of said typewriter.

12. The system recited in claim 11 in which means are associated with said typewriter for delivering with each actuation thereof, an actuating pulse of electric energy to said switches.

13. The system recited in claim 9 in which the discriminating means comprises a stepping switch having a movable contact and a sequence of fixed contacts successively engaged thereby, and the typewriter is connected for operation of a switch which in turn effects stepping of said movable contact along said sequence of fixed contacts.

14. The system recited in claim 8 in which the typewriter has a keyboard, a carriage and spacing mechanism therefor, the control means comprises a stepping switch

having a movable contact and a sequence of fixed contacts successively engaged thereby, a switch is provided under control of said typewriter for effecting a step advance of said stepping switch with each typewriter operation, and a solenoid is connected for operating the carriage spacing mechanism, a sequence of the contacts of said stepping switch being connected to said solenoid, whereby upon energizing the solenoid, said spacing mechanism will effect advance of the carriage in turn to advance the movable contact and again energize the solenoid until the movable contact has traversed said sequence of fixed contacts.

15. The system set forth in claim 8 in which the code recording means is a particular type head of the typewriter, in which the timing of various data typing operations and subsequent selective code typing operation is determined by said control means, in which the control means is stepped with each typewriter operation and in which predetermined stepping operations of the control means subsequent to those stepped during data recording effect operative connection under control of the code storage means for actuating the code marking type head at the places and in the sequences determined by the control means.

16. The combination set forth in claim 8 in which the typewriter has a keyboard and a carriage, a plurality of switch means are actuated respectively by certain parts of said keyboard, the coding means has a plurality of relays connected respectively to said switch means and arranged in permutations and combinations of circuits, each uniquely related to and under control of an individual character, and the code storage means comprises a plurality of banks of memory units at least equal in number to the number of items of data to be coded, each unit having a plurality of relays, said discriminating means being connected for readying of such banks in sequence, each of the circuits of said coding means being interconnected with and controlling the operation of corresponding relays of each of said memory banks, selectively to actuate those relays of the readied memory bank related to the actuated character of the typewriter.

17. The combination set forth in claim 16 in which the control means comprises a stepping switch having a movable contact arm and a sequence of fixed contacts successively engaged thereby, and a switch is provided under control of the typewriter for effecting a step advance of said stepping switch with each typewriter operation, certain of the contacts of said stepping switch being connected respectively to the plurality of banks of said code storage means for readying said respective banks at the desired times.

18. The combination set forth in claim 16 in which the typewriter has a solenoid and a code bar marking member actuated thereby, said control means comprises a stepping switch having a movable contact arm and a sequence of fixed contacts successively engaged thereby, and a switch is provided under control of the typewriter for effecting a step advance of said stepping switch with each typewriter operation, certain of said fixed contacts successively reached by said movable contact for particular positions of said carriage being respectively connected to corresponding relays of at least one of said memory banks, each of said relays being connected to the solenoid for said code bar member, whereby when each of said certain contacts is engaged by said movable contact, a circuit is completed to energize said solenoid through the corresponding actuated relay of said memory bank, thereby to type a code bar at that predetermined position of the carriage which corresponds to the datum encoded.

19. The combination set forth in claim 16 in which the typewriter has a code bar marking member and a carriage spacing mechanism for advancing the carriage of said typewriter, solenoids are connected to actuate said member and said carriage spacing mechanism, said control means comprises a stepping switch having a movable contact and a sequence of fixed contacts successively engaged thereby, and a switch is provided under control of the typwriter for effecting a step advance of said stepping switch with each typewriter operation, sets of the contacts of said stepping switch being connected to the carriage spacing solenoid, whereby as said movable contact engages each of said set of contacts, said carriage spacing solenoid will be energized to actuate said spacing mechanism until the movable contact has traversed said set of contacts, certain contacts distinct from said set corresponding to particular positions of the carriage and being connected to corresponding relays of at least one of said memory banks, each of said relays being connected to the solenoid for said code bar member, whereby when each of said certain contacts is engaged by said movable contact, a circuit is completed to energize said solenoid through the corresponding actuated relay of said memory bank, thereby to type a code bar at that predetermined position of said carriage which corresponds to the datum encoded.

20. The system recited in claim 8 in which said typewriter has a keyboard, a carriage and a platen thereon, and said control means includes a relay and means for readying said relay only at a predetermined position of the carriage, one of the keys of said typewriter being connected to actuate said readied relay, said relay readying one of said coding and code storage means to effect storage only of such data as is to be recorded at such predetermined position of said carriage.

21. A system of the character described comprising a typewriter having a keyboard for recording data, a plurality of switch means actuated respectively by a plurality of said keys, coding means controlled by the typewriter, and code storage means connected thereto, said coding means having a plurality of relays connected respectively to said switch means and arranged in permutations and combinations of circuits uniquely related to and under control of an individual character associated with the related key of said typewriter, control means comprising means for discriminating portions of such data to be coded from the remaining portions, said discriminating means being connected for selectively readying one of said coding and code storage means to effect storage only of such data as is to be coded, and means for recording in code, said control means comprising means arranged for actuation only after the corresponding portions have been completely recorded, and serving for operating said code recording means.

22. A system of the character described comprising an electric typewriter having a keyboard, a carriage, a platen thereon, and carriage return mechanism, control means, means for delivering intermittent pulses of electric energy to said control means with each actuation of said typewriter, to actuate the control means in timed relation with the movement of said carriage, a plurality of switches in said control means successively actuated by such pulses, and a solenoid controlling said carriage return mechanism and said control means including at least one switch after said plurality of switches and connected to said solenoid, whereby after a predetermined number of actuations of said typewriter the switch connected to said solenoid is actuated to effect rotation of said platen and movement of the carriage to the first typing position on the next line.

References Cited in the file of this patent

UNITED STATES PATENTS

2,131,914	Carroll et al.	Oct. 4, 1938
2,431,714	Sundstrand	Dec. 2, 1947
2,605,879	O'Halloran	Aug. 5, 1952