Apparatus for applying information to a business form by punching and/or by printing thereupon. The information is applied from one or a plurality of sources of information, one of the sources of information ordinarily being a business form which has information applied thereto. The information form to which information is applied and the means for applying information thereto are relatively movable. The business form from which information is "read" and the "reader" means are relatively movable. Means are provided for simultaneously causing all of such relative movement.

Related applications

The subject matter of this application relates to the subject matter of application Ser. No. 521,699, filed Jan. 19, 1966, and application Ser. No. 541,779, filed Apr. 11, 1966, both of which are owned by the assignee of this application.

Background of the invention

This invention relates to apparatus for applying information to an information receiver form such as a business form or the like.

It is an object of this invention to provide apparatus which is capable of automatically applying information to a business form or the like which information is obtained from one source or from a plurality of sources. It is another object of this invention to provide such apparatus which applies information to a business form or the like by printing and/or punching thereupon.

It is another object of this invention to provide such apparatus by which information to be applied can be stored or immediately applied.

Another object of this invention is to provide such apparatus by which information can be "read" from an information carrier form and automatically applied to an information receiver form.

It is another object of this invention to provide such apparatus which is capable of rapid operation.

Other objects and advantages reside in the construction of the invention, combinations thereof, the method of manufacture, and the mode of operation, as will become more apparent from the following description.

In the drawings:

FIGURE 1 is a block diagram illustrating the operation of apparatus of this invention which applies information to an information receiver form and illustrates transmission of information to the receiver form from a plurality of sources.

FIGURE 2 is a diagrammatic perspective view of apparatus of this invention.

FIGURE 3 is a schematic diagram of electrical circuitry and mechanism of the apparatus of this invention.

FIGURE 4 is a plan view of an information receiver form upon which information is applied by apparatus of this invention.

Referring to the drawings in detail, apparatus of this invention comprises means for applying information to a business form or the like by punching and/or printing upon the business form. The diagram of FIGURE 1 illustrates generally the operation of the apparatus of this invention.

A plurality of sources of information may be employed. For example, information may be obtained from an information carrier form. Information is read from the information carrier form by suitable "reader" mechanism shown in FIGURE 1 as an Information Form Reader, which may be a part of the apparatus of this invention.

Also, information may be obtained from a keyboard which may be a part of this apparatus. Also, information may be obtained from a semixed source which may be a part of the apparatus. The semixed source may provide information such as to location of the apparatus or the date, or the like. Also, information may be obtained from a source external of the apparatus of this invention and transmitted into the apparatus of this invention. Each source of information has a plurality of data portions.

A selector mechanism 10, shown in FIGURES 2 and 3, determines the data portion from which information is to be applied to a business form by punching and/or printing thereupon.

FIGURES 2 and 3 show a rotary selector arm 11 of the selector mechanism 10. The arm 11 is carried by a rotary shaft 12 for rotative movement therewith. The arm 11 is adapted to steppingly engage contacts 102 which are annularly arranged and which are carried upon an insulator plate 108 of the selector mechanism 10.

The drive wheel 16 is rotatably mounted upon the shaft 12. The drive wheel 16 is shown as being driven by a belt or chain 18 which encompasses the drive wheel 16. The belt or chain 18 also encompasses a drive sprocket 20 which is carried by a shaft 22 of an electric motor 24.

The drive wheel 16 is thus rotatable with rotation of the drive sprocket 20. However, the shaft 12 rotatively moves only during a moment in which a solenoid K15 is energized. The solenoid K15 has an armature 28 which is normally in engagement with a toothed wheel 30. Thus, the armature 28 serves as a brake upon the toothed wheel 30 and prevents rotation thereof as the drive wheel 16 rotates. The toothed wheel 30 is secured to the shaft 12 for rotation therewith. A clutch mechanism 29 is disposed intermediate the drive wheel 16 and the toothed wheel 30 so that the drive wheel 16 is rotatable without rotation of the toothed wheel 30 and the shaft 12. However, energization of the solenoid K15 moves the armature 28 thereof out of engagement with the toothed wheel 30 so that the toothed wheel 30 can rotatively move with rotative movement of the drive wheel 16. Of course, the shaft 12, to which the wheel 30 is secured, rotatively
moves with rotative movement of the toothed wheel 30. Attached to the shaft 12 for rotation therewith is a gear wheel 34 which is in meshed relationship with an elongate rack 36. The rack 36 is attached to a carriage 38 for linear movement thereof. The rack 36 and the carriage 38 may be of the type disclosed in application Ser. No. 541,778, mentioned above. A portion of the carriage 38 carries an information carrier form 40, and a portion of the carriage 38 carries an information receiver form 42. The information receiver form 42 may be a single form or a plurality of sheets or cards or the like arranged in a stack or pack so that information may be applied simultaneously to all of the sheets or cards which constitute the information receiver form 42.

The information carrier form 40 and the information receiver form 42 are disposed upon the carriage 38 and are retained thereby in any suitable manner, not shown. An electric switch SW4 is closed when the information carrier form 40 is properly disposed upon the carriage 38, and a switch SW5 is closed when the information receiver form 42 is properly disposed upon the carriage 38. An electric switch SW5 is closed when the information carrier form 40 and the switch SW5 is closed when the information receiver form 42 is properly disposed upon the carriage 38. A print wheel P10 has a print wheel 80 operatively connected thereto which causes rotative positioning of the print wheel 80. The print wheel 80 is disposed immediately above the information receiver form 42.

Immediately following operation of one of the punches 72 and immediately following rotative positioning of the print wheel 80, the punch 72 and the print wheel 80 are released from contact. Thus, a print operation occurs upon the form 42 and the information printed conforms with information punched thereupon.

The electrical circuitry shown in FIGURE 3 illustrates the manner in which the apparatus of this invention is controlled. Due to the fact that the punching and printing operation must occur very rapidly and must be applied very accurately, control mechanism of the apparatus is very rapid and precise.

In FIGURE 3, the electric motor 24 is shown as being connected to a source of electrical energy having terminals PS1 and PS2. A conductor 120 is connected to the motor 24 and to the terminal PS1. A conductor 122 is connected to the terminal PS2 and to contacts of a normally-open relay switches K17A, K16A, and K14A, which are in parallel. The other contacts of the relay switches K17A, K16A, and K14A are connected by a conductor 124 to a contact of a normally-open relay switch K16D and to a contact of a normally-closed relay switch K16C. The other contact of the normally-closed switch K16C is connected to the motor 24 through a conductor 128. A capacitor 130 is connected to the conductors 126 and 128.

A terminal PS3 of a source of electrical energy is joined by a conductor 132 to a contact of a normally-open relay switch K17B. The other contact of the normally-open switch K17B is joined to a terminal 134 of the cam switch CS1. The cam switch CS1 is normally engaged with a terminal 136 but is moved into engagement with a terminal 138 by operation of the cam C1 which is mounted on the shaft 60, as shown in FIGURE 2. The terminal 138 is connected by a relay coil K14 by a conductor 140. The coil K14 is also connected to ground through a conductor 142.

A terminal PS4 of a source of electrical energy is connected by a conductor 144 to a contact of a normally-open relay switch K14B, which is operated by energization of the coil K14. The other contact of the relay switch K14B is joined by a conductor 146 to a terminal 148 of the cam switch CS2. The cam switch CS2 also has a terminal 150. The cam switch CS2 is normally closed between the terminal 148 and the terminal 150 but is operated by operation of the cam C2. The terminal 150 is joined to a resistor R3 through a conductor 152. The resistor R3 is also connected to ground. A diode D20 is connected between the conductor 152 and the conductor 140.

A conductor 154 is connected to the conductor 146 and to a terminal 156 of the cam switch CS4. The cam switch CS4 is normally closed between the terminal 156 and a terminal 157 but moves into engagement with a terminal 158 upon operation of the cam C4. The terminal 158 is joined to a diode D22 by a conductor 160. The diode D22 is also connected to a release coil K16B by means of a conductor 164. The release coil K16B is part of a magnetic latching relay K13. A conductor 166 connects the release coil K16B to a stop switch 170. The stop switch 170 is also connected to ground. The conductor 166 is also joined to two of the contacts 102 of the plate 100, herein shown as a contact 102.

The conductor 164 is a conductor 174 which is connected to a diode D21. A conductor 176 connects
the diode D21 to a terminal 178 of an Eject switch. The terminal 178 is also connected to a relay coil K16. The coil K16 is also connected to ground.

The Eject switch also has a terminal 180 which is connected by a conductor 182 to a terminal PSS of a source of electrical energy. The conductor 184 connects the terminal PSS to a contact of a normally-open relay switch K13A of the magnetic latching relay K13. The other contact of the switch K13A is joined by a conductor 186 to an operating coil K17 which is also connected to ground.

A coil joined to the terminal PSS is a conductor 188 which is connected to a terminal 190 of a start switch, shown herein as a Start Bar 191. Another terminal 192 of the Start Bar 191 is connected by a conductor 194 to an actuator coil 196 of the magnetic latching relay K13. A conductor 198 joins the actuator coil 196 to the switch SW5 which is carried by the carriage 38. The switch SW5 is in series with the switch SW4 which is also carried by the carriage 38. The switch SW4 is connected to the first contact 102 of the plate 100 by means of a conductor 200.

The conductor 154 is also connected to a terminal 202 of the cam switch CS3 also has a terminal 204. The cam switch CS3 is normally closed between the terminal 204 and the terminal 202 but moves into engagement with a terminal 206 upon operation of the cam C3. The terminal 204 is joined by a capacitor 209 by means of a conductor 208. The capacitor 209 is also connected to ground. The terminal 206 is connected to a resistor R25 and to a resistor R26 through a conductor 210. The resistor R26 is connected to ground, and the resistor R25 is connected to a gate 212 of a silicon controlled rectifier SCR1. The silicon controlled rectifier SCR1 is also connected to ground through a conductor 214. The silicon controlled rectifier SCR1 is also joined to a contact of a normally-closed relay switch K15B by means of a conductor 216. The other contact of the normally-closed switch K15B is joined to one side of the solenoid K15 by means of a conductor 218. As shown in FIGURES 2 and 3, the solenoid K15 operates the armature 28. The other side of the solenoid K15 is connected by a conductor 220 to a terminal PS7 of a source of electrical energy.

The conductor 154 is also joined to a resistor R16 which is also connected to a relay coil K18. The coil K18 is joined to a conductor 222. The conductor 226 is connected to a set of diodes D1, D2, D3, D4, D5, D6, D7, D8, D9, and D9 which are in electrical parallel relationship. Each of these diodes is joined to a respective terminal 1, 2, 3, 4, 5, 6, 7, 8, 9, or 0 of a Terminal Board. Also terminals of the Terminal Board are leads 1, 2, 3, 4, 5, 6, 7, 8, 9, and 0 from each of the sources of information. For example, a lead extends from the terminal 1 of the Terminal Board to terminal 1 of the Information Form Reader, and a lead extends from the terminal 1 of the Terminal Board to terminal 2 of the Information Form Reader, etc. Likewise, a lead extends to a similar terminal in each portion of each of the sources of information from a terminal of the same number of the Terminal Board.

Each one of the readers wheels 50 of the Information Form Reader is adapted to contact a conductor plate of a terminal of the Information Form Reader for establishing a circuit therewith. A lead 231 extends from the reader members 50 and is electrically joined to a plurality of the contacts 102 of the selector switch 10.

The semifixed second source of information may be closed as desired and are adapted to remain closed over an extended period of time, such as throughout a day of operation of the apparatus or longer and to provide certain types of information which do not change frequently.

The Keyboard may have any desired number of rows or columns of keys or buttons 230 or the like, as shown in FIGURES 2 and 3. Each column of buttons 230 is shown as having numbers 1, 2, 3, 4, 5, 6, 7, 8, 9, and 0. Each button, when depressed, closes a switch which has a lead extending to a terminal of the same number on the Terminal Board. Desired buttons 230 on the Keyboard are adapted to be depressed prior to operation of the apparatus for applying information to the information receiver form 42 in accordance with the buttons 230 which have been selected and depressed. Each switch of each button 230 also has a lead 237. The leads 237 of each column of buttons are joined together and are connected to a lead 239 which extends therefrom to one or more of the contacts 102 of the selector switch 10. Ordinarily, desired buttons 230 are depressed prior to each operation of the apparatus.

The external source of information may be at any location exterior of the apparatus and may have a plurality of portions. Each portion of the external source of information may have switches 1, 2, 3, 4, 5, 6, 7, 8, 9, and 0 and corresponding leads which enter the apparatus and which are attached to corresponding numbered terminals on the Terminal Board. Each switch of each portion of the external source of information has a lead 241. All of the leads 241 of each portion of the external source of information are connected together and to a lead 243 which enters the apparatus and which is attached to one or more of the contacts 102 of the selector switch 10.

A terminal PS6 of a source of electrical energy has a conductor 250 attached thereto which is also attached to a terminal 252 of the cam switch CS5. The cam switch CS5 is normally closed between the terminal 252 and a terminal 254. However, the cam switch CS5 also has a terminal 256 which is engaged by the cam switch CS5 and establishes a circuit between the terminal 252 and the terminal 256 upon operation of the cam C5.

The terminal 256 has a conductor 258 extending therefrom to a relay coil K19. A conductor 260 joins the relay coil K19 to a contact of a normally-open relay switch K18A. The other contact of the switch K18A is connected to a contact of a normally-open relay switch K14C by a conductor 264. The other contact of the relay switch K14C is joined to ground through a conductor 266.

Also, connected to the conductor 266 is a contact of a normally-closed relay switch K14E. The other contact of the relay switch K14E is connected to a relay coil K22. The relay coil K22 is also connected to a contact of a normally-closed relay switch K17C. The other contact of the switch K17C is connected to a capacitor 267 and to a contact of a normally-open relay switch K17D. The other contact of the normally-open switch K17D is connected to a terminal PS8 of a source of electrical energy.

The capacitor 267 is also connected to ground.

The conductor 250 is also connected to a terminal 270 of the cam switch CS6. The cam switch CS6 also has a terminal 272 which is normally closed. However, upon operation of the cam C6 the switch CS6 is closed to a terminal 274.

The terminal 274 is joined by a conductor 276 to a contact of a normally-open relay switch K14D. The other contact of the switch K14D has a conductor 278 connected thereto.

The conductor 278 is joined to the actuator coils A1, A2, A3, A4, A5, A6, A7, A8, A9, and A0 which are in parallel relationship. The actuator coils are discussed above and two of these actuator coils, A1 and A2, are shown in FIGURE 2. Each of the actuator coils is also
connected to one of the terminals 1, 2, 3, 4, 5, 6, 7, 8, 9, or 0 of the Terminal Board.

**Operation**

FIGURE 3 shows that the motor 24 is supplied with electrical energy from the source of electrical energy having terminals PS1 and PS2. However, before the motor 24 can be operated, certain conditions in the apparatus must be established. The carriage 38 must be in a "home" position. The carriage 38 is linearly moved by rotative movement of the gear wheel 34 which is secured to the shaft 12. As stated above, the selector arm 11 of the selector switch 10 is also attached to the shaft 12 for rotative movement therewith.

As stated above, the selector arm 11 is in juxtaposition with the insulated plate 100 which carries the contacts 102 which are in annular arrangement. The selector arm 11 is adapted to rotatively move in a stepping action from engagement with one contact 102 to engagement with an adjacent contact 102. Due to the fact that the selector arm 11 and the gear wheel 34 are both attached to the shaft 12, and due to the fact that rotative movement of the gear wheel 34 linearly moves the carriage 38, a given linear position of the carriage 38 corresponds with a given rotative position of the selector arm 11. The selector arm 11, as shown in FIGURE 2, is in engagement with the first contact 102 when the carriage 38 is in its "home" position. The circuit of FIGURE 3 shows that the first contact 102 is connected to the electrical conductor 200, and the selector arm 11 is in engagement with the first contact 102 in order to establish a circuit from ground through the selector arm 11 to the electrical conductor 200. Also, connected to the electrical conductor 200 in series relationship are the switches SW4 and SW5. Therefore, the carriage 38 is in "home" position and the information carrier form 40 is in proper position upon the carriage 38 and the information receiver form 42 is in proper position upon the carriage 38 before the motor 24 can be energized.

When these conditions are met and when the start switch or Start Bar 191 is momentarily depressed a circuit is established from the source of electrical energy PS5 through the Start switch or Start Bar 191, through the actuator coil 196 of the magnetic latching relay K13, through the switches SW5 and SW4 and through the first contact 102, and through the selector arm 11 to ground. Thus, the actuator coil 196 is energized and thus the normally-open switch K13A is closed. Energization of the actuator coil 196 of the magnetic latching relay K13 causes the contacts of the switch K13A to magnetically close and remain closed, and the contacts K13A remain closed even after the Start Bar 191 is released and the coil 196 is de-energized.

Closing of the switch K13A establishes a circuit through the relay coil K17 for energization thereof. Thus, the contacts of the normally-open switch K17A in the circuit to the motor 24 are closed. Due to the fact that the normally-closed switch K16C in the motor 24 is also closed, the motor 24 is energized and rotates the shaft 60. The energization of coil K17 also creates a change of the relay coil K17B, which is connected to the terminal PS3.

Rotative movement of the shaft 60 causes rotative movement of the cam C1 which is carried thereby. Thus, upon sufficient rotative movement of the cam C1, the cam switch CS1 is operated so that a circuit is established between the terminal 134 and the terminal 138. Thus, the relay coil K14 is energized. Energization of the coil K14 causes closing of the switches K14A, K14B, K14C, and K14D. Energization of the coil K14 also causes opening of the normally-closed switch K14E.

The shaft 60 continues its rotative movement. However, as stated above, the shaft 12 is held from rotative movement by the armature 28 of the solenoid K15 as the armature 28 engages a tooth of the toothed wheel 30. As stated above, and as discussed with respect to FIGURE 2, the clutch mechanism 29 permits rotative movement of the drive wheel 16 which encompasses the shaft 12. The clutch mechanism 29 also urges rotation of the toothed wheel 30. However, the toothed wheel 30 does not rotatively move until the armature 28 is moved from engagement therewith.

Following operation of the cam switch CS1, rotative movement of the shaft 60 continues, and the cam C3 operates the cam switch CS3 so that a circuit is established between the terminal 204 and the terminal 206. When this circuit is established, the capacitor 209 is discharged through the conductor 210 into the gate 212 of the silicon controlled rectifier SCR1 so that the silicon controlled rectifier SCR1 conducts current therethrough and the operator coil K15 is energized. Energization of the coil K15 causes the armature 28 to move away from the toothed wheel 30 and permits rotative movement thereafter as the toothed wheel 30 is driven by the clutch mechanism 29. However, such energization of the coil K15 causes opening of the normally-closed switch K15B which is in the circuit to the coil K15. Thus, the coil K15 is immediately deenergized. Thus, the coil K15 is energized only momentarily and withdraws the armature 28 from the toothed wheel 30 for only a moment sufficient to permit the toothed wheel 30 to rotatively move from one tooth thereof to the next tooth thereof.

As shown in FIGURE 2, the gear wheel 34 is attached to the shaft 12 for rotative therewith. Thus, the gear wheel 34 is rotatively moved with rotative movement of the shaft 12 and the carriage 38 is linearly moved a small distance. The teeth of the toothed wheel 30 are so arranged that rotative movement of the toothed wheel 30 from one tooth thereof to the next tooth thereof results in such rotative movement of the gear wheel 34 that the carriage 38 is precisely moved a distance such that the forms 42 and 40 are precisely moved from one column thereof to the next column thereof.

As illustrated in FIGURE 4, the columns are arranged along the length of the information receiver form 42. Thus, during rotative movement of the toothed wheel 30 from the first tooth thereof to the next tooth thereof, the carriage 38 is moved from its "home" position and becomes positioned at the distance of one column from its "home" position. Thus, the forms 42 and 40 are moved to positions for operation thereupon at the first column positions thereof.

As shown in the drawing and discussed above, the selector arm 11 is also attached to the shaft 12 for rotative movement therewith. The teeth of the toothed wheel 30 are so arranged that each rotative movement of the toothed wheel 30 from one tooth to the next tooth thereof results in rotative movement of the selector arm 11 from one contact 102 to the next contact 102. Thus, during rotative movement of the toothed wheel 30 from the first tooth thereof to the second tooth thereof, the selector arm 11 is moved from the first contact 102 to the second contact 102.

The position of the arm 11 of the selector switch 10 in engagement with the second contact 102 of the selector mechanism 16 establishes the circuit through which information is to be applied to the information receiver form 42 in the first column thereof. Each contact 102 of the selector switch 10 establishes a circuit from ground to one of the sources of information or to a given portion of one of the sources of information when the selector arm 11 is in engagement with that contact 102.

After the selector arm 11 moves to the second contact 102, the shaft 60 continues to rotate and the cam C3 operates the cam operated switch CS6. Thus, a circuit is established between the terminal 270 and the terminal 274. Due to the fact that the switch K14D was closed earlier in the operation of the apparatus, a circuit is established through one of the actuator coils A1, A2, A3,
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A4, A5, A6, A7, A8, A9, or A0. As previously stated, the contact 102 with which the arm 11 is in engagement has a lead extending therefrom to a source of information or to a portion thereof. If that portion of the source of information or a part thereof has a closed circuit, one of the actuator cells A1, A2, A3, A4, A5, A6, A7, A8, A9, or A0 is energized. For example, the second contact 102 with which the arm 11 is in engagement may have a lead which extends to the Information Form Reader. When the selector arm 11 is moved by the shaft 12 to the second contact 102, the carriage 38 is moved so that both the information carrier form 40 and the information receiver form 42 are positioned in the first column thereof. If the second contact 102 of the selector mechanism 10 has a lead which extends to the Information Form Reader, and if for example, the information receiver form 42 has information in the number 7 position thereof in the first column thereof, a circuit is established by the number 7 reader wheel 50 of the Information Form Reader. Thus, a circuit is established through the Terminal Board to the A7 actuator cell, and the A7 actuator cell is energized. Therefore, an engagement number 77 in the number 7 position within the carrier 70 is moved to its operative position. Thus, when the carrier 70 moves downwardly, a punch member 72 in a number 7 position engaged by the engagement member 77 is caused to operate and punches a hole in the form 42. A conductive connection is established in the first column thereof, as shown in FIGURE 4.

It is to be understood that the apparatus of this invention is not limited to the application of ten digits or to ten data portions of information or the like.

Following punching of the form 42 in the number 7 position, the carriage 38 which is associated with the number 7 punch member 72 operates and by intermediate mechanism rotates the print wheel 50 to a number 7 position.

The shaft 60 continues to rotate and move and the cam CS5 operates the cam switch CS5 so that a circuit is established between the terminal 252 and the terminal 256. Due to the fact that the normally-open switches K18A and K14C were closed earlier in the operation, closing of the switch CS5 between the terminals 252 and 256 results in energization of the print solenoid K19. The solenoid arm 19 moves the print platen into engagement with the lower surface of the form 42 directly below the print wheel 50 and a number 7 is printed upon the form 42 in the same column thereof in which the number 7 was punched. The result of such punch and print operation is illustrated in the figures of the information receiver form 42 shown in FIGURE 4.

As the motor 24 continues to rotate and to rotateably move the shaft 60, the carriage 38 is moved in stepping motion from one column position to the next column position in the manner discussed above. The forms 40 and 42 are moved with movement of the carriage 38. Information carried by the form 40 is positioned for reading by the reader members 50. At each column position of the forms 40 and 42 information may be applied to the information receiver form 42 from a source of information or from a portion of one of the sources of information. The circuits to the selector mechanism 10 are arranged so that information from a predetermined source thereof or from a predetermined portion of the source is applied to the form 42 in a predetermined column thereof at each step position of the selector mechanism 10.

Herein, all of the portions of the Information Form Reader are shown as being connected together, and the single conductor 231 extends from the Information Form Reader to a plurality of the contacts 102 of the selector mechanism 10. For example, the first eight contacts 102 of the selector mechanism 10 may be connected to the Information Form Reader. Thus, the first eight columns on the form 42 have information provided from the form 40 by means of the reader members 50 as the form 40 moves column by column with respect to the reader members 50. The next twenty contacts 102 of the selector mechanism 10 may establish circuits to the Keyboard. Thus, the next twenty columns of the form 42 may have information applied thereto from the information applied thereto from the Keyboard. The next ten contacts 102 of the selector mechanism 10 may establish circuits to the Semi-fixed source of information. Thus, the next ten columns of the form 42 may have information applied thereto from the Semi-fixed source of information. The next thirty contacts 102 of the selector mechanism 10 may establish circuits to the External source of information. Thus, these thirty columns of the form 42 may have information applied thereto from the External source of information.

Of course, it is to be understood that in any given operation of the apparatus, any source of information or a portion thereof may have no information to provide to the form 42. In such event, a circuit is not established through the source of information when the selector arm 11 moves to engagement with a contact 103 which has a conductor extending therefrom to the source of information. Thus, none of the engagement numbers 77 in the number 7 position within the carrier 70 is moved to its operative position. Thus, when the carrier 70 moves downwardly, a punch member 72 in a number 7 position engaged by the engagement member 77 is caused to operate and punches a hole in the form 42. The selector arm 11, the switch K18A does not close and the print solenoid K19 is not energized when the cam switch CS8 closes. Thus, no print operation occurs in a column of the form 42 in which there is no punch operation.

The circuitry of this invention is arranged to automatically stop the motor 24 at any predetermined point in the operation of the apparatus.

Upon each revolution of the shaft 60 the cam switch CS1 is opened. Thus, the circuit through the conductor 140 to the coil K14 is opened. However, after a circuit is established through the coil K14 by a previous closing of the cam switch CS1, the switch K14S is closed. Thus, a circuit is established through the terminals 148 and 150 of the cam switch CS2 and through the diode D20 to the coil K14. The cam switch CS2 remains closed after the cam switch CS1 opens. Thus, the coil K14 is energized during each complete revolution of the shaft 60 so long as the punching and printing operation is to continue.

However, in regard to stopping of the operation of the apparatus, it is to be noted in FIGURE 3 that the contact 102a on the plate 108 is connected to the conductor 166, as well as to one of the leads which extends to one of the sources of information. When the selector arm 11 moves into engagement with the contact 102a, the contact 102a becomes grounded, because the selector arm 11 is grounded. When the conductor 166 becomes grounded, and when the switch CS4 closes, a circuit is established from the source of electrical energy terminal PS4 through the cam switch CS4, through the diode D22, through the release coil 162, and through the conductor 166 to ground. Thus, the release coil 162 of the latching switch K13 is energized and the switch K13A opens. Thus, the coil K17 is de-energized and the switches K17A and K17B open. However, the motor 24 continues to operate until the cam switch CS2 opens and causes de-energization of the coil K14 so that the switch K14A opens.

It is to be noted that when the coil K14 is de-energized, the switch K14C closes. The switch K17C closes earlier in the operation when the coil K17 became de-energized. Thus, a pulse of electrical energy flows from the capacitor C27 through the coil K22. The coil K22 operates an actuator lever 233, shown in FIGURE 2, which resets all of the keys 230 which have been depressed on the Keyboard.
stopped, it may be desired to insert additional information upon the form 42 in additional columns thereof without returning the carriage 38 to its "home" position. Thus, keys on the Keyboard of source of information or any of the other sources of information may be re-operated and the Start Bar 191 can be again actuated to provide additional information to the form 42 in predetermined columns thereof from any or all of the sources of information. Due to the fact that the apparatus automatically stopped when the selector arm 11 came into engagement with the contact 182a, such additional information is applied through circuits established through selector contacts 102 which the arm 11 engages after engaging the contact 182a.

Also, a stop operation can be activated at any moment by closing the stop switch 170 which connects the conductor 166 to ground and energizes the release coil 162 of the latching relay K13. The apparatus then comes to a stop in the manner discussed above.

After the motor 24 is stopped and the shaft 60 ceases to rotate, the carriage 36 may be returned to its "home" position by closing the Eject switch to establish a circuit between the terminals 178 and 180. Thus, the coil K16 is energized and the switches K16A and K16D are closed. Thus, the motor 24 is energized through the switches K16A and K16D and through the conductor 128. Therefore, rotation of the motor 24 occurs in the opposite direction and the shafts 60 and 12 are rotated in the opposite direction until the carriage 36 reaches its "home" position.

Also, when the Eject switch is closed, a circuit is established through the diode D21 and through the release coil 162 of the latching relay K13 to insure that the latching relay K13 is de-energized and that the latching relay contacts K13A are open. Thus, the coil K17 cannot be energized during eject operation.

Thus, it is understood that the apparatus of this invention automatically applies information to an information receiver form such as a business form or the like from any one or all of a number of sources of information. One source of information can be a form provided with information. Other sources of information can be a part of the apparatus or can be a source of information external of the apparatus. Each column of the information receiver form has information applied thereto from a predetermined source thereof.

The illustrations and discussion herein relate to the application of ten digits or letters or characters to an information receiver form. However, it is to be understood that a smaller or larger number of digits or letters or characters or other types of information may be applied to an information receiver form by means of the apparatus of this invention.

As previously stated, the information receiver form 42 may be a single form or a plurality of forms or sheets or cards or the like arranged in a set or pack so that information may be applied simultaneously to all of the sheets or cards which constitute the information receiver form 42.

Although the preferred embodiment of the device has been described, it will be understood that within the purview of this invention various changes may be made in the form, details, proportion and arrangement of parts, the combination thereof and mode of operation, which generally stated consist in a device capable of carrying out the objects set forth, as disclosed and defined in the appended claims.

The invention having thus been described, the following is claimed:

1. Apparatus for transmission of information to an information receiver form from a plurality of sources of information, one of the sources of information being an information carrier form, comprising:

   information application means, support means for supporting an information receiver form and an information carrier form, the application means and the support means being relatively movable, operator means for causing relative movement between the application means and the support means, selector means for connection to a plurality of sources of information, means connecting the selector means to the application means, the selector means connecting the application means to the source of information from which information is to be transmitted to the application means, connector means connecting the operator means to the selector means for simultaneous operation of the operator means and the selector means, information thus being transmitted from a predetermined source of information and applied to a predetermined portion of the information receiver form.

2. Apparatus for applying information to an information receiver form from a plurality of sources of information, one of the sources of information being an information carrier form comprising:

   carriage means for supporting an information receiver form and for supporting an information carrier form and for simultaneous movement of the information receiver form and the information carrier form, application means for applying information to the information receiver form, selector means for selecting the source of information from which information is transmitted to the application means, means connecting the application means to the selector means, means for simultaneously operating the selector means and the carriage means.

3. Apparatus for applying information to an information receiver form from a plurality of sources of information, one of the sources of information being an information carrier form comprising:

   carriage means for movably supporting an information receiver form and for movably supporting an information carrier form, application means for applying information to the information receiver form, the application means including means for applying information to an information receiver form by printing and punching thereon of digits or letters or characters or other information and means for selecting the source of information from which information is transmitted to the application means, means connecting the application means to the selector means, means connecting each one of a plurality of sources of information to the selector means, operator means for operation of the selector means and the carriage means, electrical control means operably joined to the application means for operation therewith, the electrical control means being electrically connected to the application means and to the operator means for controlling the operation thereof.

4. Apparatus of the type described comprising:

   a plurality of sources of information, a first rotary shaft, a second rotary shaft, motor means joined to the first rotary shaft for rotary movement thereof, clutch means connecting the second rotary shaft to the first rotary shaft for rotary movement therewith, brake means connected to the secondary shaft for preventing rotary movement thereof, electrically operable brake release means connected to
the brake means for release operation of the brake means,
carriage means for support of an information receiver form,
rotary connector means joined to the second rotary shaft and to the carriage means for linear movement of the carriage means with rotative movement of the second rotary shaft,
electrical control means operably joined to the first rotary shaft for operation thereby during rotative movement thereof,
a rotary selector switch operably connected to the second rotary shaft for rotative movement therefrom,
punch means adjacent the carriage means and operable upon an information receiver form which is supported thereby,
punch operator means mechanically connected to the first rotary shaft for movement therewith,
electrical actuator means operably joined to the punch operator means for actuation thereof, the punch operator means being operable upon the punch means for applying information to an information receiver form by actuation of the punch operator means by the electrical actuator means and by movement of the punch operator means with rotation of the first rotary shaft,
electrical conductor means joining the selector switch to each source of information, the electrical conductor means also joining the sources of information to the electrical actuator means,
electrical conductor means electrically joining the electrical control means to the electrically operable brake release means and to the electrical actuator means,
operation of the brake release means and operation of the rotary selector switch and operation of the carriage means and operation of the actuator means thus being controlled by the control means which is operable with rotative movement of the first rotary shaft.

5. The apparatus of claim 4 which includes print means mechanically joined to the punch means and electrically joined to the electrical control means for operation thereby.
6. Apparatus for applying information to an information receiver form comprising:
movable carriage means for support of an information receiver form,
a rotary shaft adjacent the carriage means, reciprocally linearly movable punch means operably connected to the rotary shaft for operation with rotative movement of the shaft,
cam means carried by the rotary shaft for rotation therewith,
cam switch means adjacent the cam means for operation thereby,
everelectrically operable connector means operably connecting the carriage means to the rotary shaft for movement of the carriage means with rotative movement of the rotary shaft,
conductor means connected to the cam switch means and to the electrically operable connector means for control of the operation of the electrically operable connector means with rotative movement of the rotary shaft,
a source of information having a plurality of data portions,
selector means operably joined to the carriage means for operation therewith,
conductor means connecting the selector means and the punch means to each of the data portions of the source of information.
7. Apparatus for operation upon an information receiver form comprising:
information application means for applying information to an information receiver form,
a plurality of sources of information including reader means for obtaining information from an information carrier form,
operator means for causing simultaneous relative movement between an information receiver form and the reader means and between an information carrier form and the application means,
connector means joining the sources of information to the information application means, the connector means including selector means operable with the operator means for selecting the source of information from which information is to be transmitted to the information receiver form, the connector means also including control means for controlling operation of the application means and means for controlling operation of the operator means.
8. The apparatus of claim 7 in which the information application means includes punch means.
9. The apparatus of claim 7 in which the information application means includes punch and print means.
10. In apparatus for applying information to a business form from a source of information, the source of information having a plurality of data portions, a plurality of electrically operable actuator members, connector means connecting each of the electrically operable actuator members to one of the data portions of the source of information, the connector means including selector switch means, the selector switch means having a plurality of contacts, there being a contact for each one of the data portions of the source of information, the selector switch means having a movable contact arm which is movably engageable with each contact,
electric conductor members connecting each contact of the selector switch to one of the data portions of the source of information,
electric conductor means for joining the movable contact arm and the actuator members to a source of electrical energy, the electric conductor means including switch means,
motor means operably joined to the contact arm and to the switch means for operation thereof.
11. Apparatus for applying information to a business form comprising:
a source of information provided with a plurality of portions, selector switch means,
electric conductor means joined to each portion of the source of information and to the selector switch means so that there is a circuit from the selector switch means to each portion of the source of information,
information application mechanism provided with a plurality of applicator members, there being at least one applicator member for each portion of the source of information,
a plurality of electrically operable actuator members operably joined to the applicator members, there being one actuator member for each of the applicator members for actuation thereof,
means joining the source of information to the electrically operable actuator members,
carriage means for support of a business form adjacent the information application mechanism,
drive means operably connected to the carriage means for movement of the carriage means with respect to the application mechanism, the drive means also being operably connected to the selector switch means for simultaneous operation of the carriage means and the selector switch means, information thus being applied to the business form in a predetermined portion thereof from a predetermined portion of the source of information.
12. The apparatus of claim 11 which includes control means, and means joining the control means to the elec-
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15 trically operable actuator members, and to the drive means for control of the operation thereof.

13. The apparatus of claim 11 in which the application mechanism comprises punch mechanism.

14. The apparatus of claim 11 in which the information application mechanism includes print and punch mechanism.

15. In apparatus for applying information to an information receiver form from a source of information, the source of information having a plurality of data portions, a plurality of electrically operable actuator members, circuit means connecting each of the electrically operable actuator members to one of the data portions of the source of information, a plurality of punch engagement members, there being one punch engagement member operably connected to each of the actuator members for operation thereon, each punch engagement member having an inoperative position and an operative position, each punch engagement member being normally in its inoperative position, each of the punch engagement members operably connecting the print means to the operative portion of the source of information, a selector switch having a plurality of contacts, the selector switch having a movable arm which is movable into engagement with any one of the contacts for establishing a circuit therebetween, means joining the data portions of the source of information to contacts of the selector switch, electric circuit means joining the movable arm to the print means and to the actuator members so that the movable arm when in engagement with a contact of the selector switch establishes a circuit to one of the data portions of the source of information and to the print means and to the actuator member which is connected to the data portion of the source of information, reciprocally operable carrier means in supporting relationship to the punch engagement members for movement thereof, each punch engagement member being moveable into engagement with its respective punch member when the punch engagement member is in its inoperative position, first control means, the first control means being operable to the electrically operable actuator members for control of energization thereof, second control means, the second control means being operable to the electrically operable print means for control of energization thereof, and means operably connected to the carrier means for operation therewith for operation of the first control means and for operation of the second control means.

16. Apparatus for applying information to a business form from a source of information, the source of information having a plurality of data portions, comprising: a plurality of electrically operable actuator members, connector means connecting each of the electrically operable actuator members to one of the data portions of the source of information, a plurality of operator members, there being one operator member connected to each actuator member for operation thereof, a plurality of information applicator members, there being one information applicator member for each operator member, each applicator member being operable to apply information to a business form, reciprocally operable carrier means in supporting relationship to the operator members, the reciprocally operable carrier means being in continuous operation so that the operator members are continuously moved thereby, each operator member having an inoperative position and an operative position, each of the operator members normally being in its inoperative position, each operator member being moveable by its respective actuator member to its operative position, each operator member operating its respective information applicator member when the operator member is in its operative position and when the operator member is moved in a given direction by the carrier means, the connector means including control means for energization of any one of the actuator members to move its respective operator member into operative position so that upon movement of the carrier means in said given direction the operator member operates its respective information applicator member to provide information to a business form.

17. The apparatus of claim 16 in which each applicator member includes means for applying information to a business form by punching thereon.

18. The apparatus of claim 16 in which each applicator member includes means for applying information to a business form by printing and by punching thereon.

19. The apparatus of claim 16 in which each applicator member includes means for applying information to a business form by printing thereon.

20. The apparatus of claim 16 in which the control means is operably joined to the carrier means for operation therewith.

21. The apparatus of claim 16 which includes rotary drive means connected to the reciprocally operable carrier means for operation thereof and in which the control means includes selector switch means and means operably connecting the selector switch means to the motor means for operation thereby, the selector switch means being connected to each of the data portions of the source of information.

22. The apparatus of claim 21 in which the control means includes switch means operable by the motor means, the switch means controlling the operation of an actuator member with respect to the operation of the carrier means.

23. The apparatus of claim 19 in which the control means controls the operation of the print function of the applicator member with respect to the punch function of the applicator member.

24. Apparatus for applying information to a business form comprising: a rotary shaft, a plurality of cam members carried by the rotary shaft for rotation therewith, a plurality of switch members adjacent the cam members and operable thereby, there being at least one switch member for each of the cam members, there being a first switch member and a second switch member, punch operator means attached to the rotary shaft for movement with rotation thereof, punch means disposed adjacent the punch operator means, electrically operable punch selector means supported by the punch operator means and movable therewith into engagement with the punch means for operation thereof, operation of the punch selector means causing the punch operator means to engage the punch means as rotative movement of the rotary shaft occurs, engagement of the punch selector means with the punch means occurring during a predetermined portion of the rotative movement of the rotary shaft, a rotary print member operably connected to the punch means for operation thereby, electrical conductor means connected to the first switch member and to the electrically operable punch selector means so that operation of the punch selector means is controlled by the first switch member and occurs during a predetermined period in the rotative movement of the rotary shaft, electrically operable print means cooperating with the rotary print member to cause a print operation, the
electrically operable print means being joined to the second switch member so that the electrically operable print means is operated at a predetermined point in the rotative movement of the rotary shaft to cause a print operation, the operation of the print means also occurring at a predetermined time with respect to the time of operation of the punch selector means.

References Cited

UNITED STATES PATENTS

1,506,381 8/1924 Pierce 197—1.5
1,741,201 12/1929 Pierce 101—19

1,909,548 5/1933 Pierce 101—19
2,002,637 5/1935 Maul 101—47
2,013,540 9/1935 Kolm et al. 197—1.5
2,157,980 5/1939 Daumeyer 101—93
2,531,873 11/1950 Duly 101—19
2,603,151 7/1952 Bryce et al. 101—93
2,878,872 3/1959 Burns et al. 101—19 X
3,088,398 5/1963 Daly et al. 101—19
3,215,244 11/1965 Hickerson 197—1.5

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