

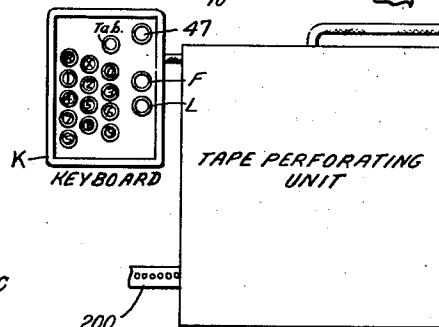
C. R. DOTY

RECORD CONTROLLED TAPE PERFORATOR WITH MANUALLY
CONTROLLED TAPE PERFORATING OPERATIONS

CONTROLLED TAPE PERFORATING OPERATIONS

Filed May 3, 1944

4 Sheets-Sheet 1

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C. R. DOTY
 RECORD CONTROLLED TAPE PERFORATOR WITH MANUALLY
 CONTROLLED TAPE PERFORATING OPERATIONS
 Filed May 3, 1944

2,372,887

4 Sheets-Sheet 2

FIG. 6.

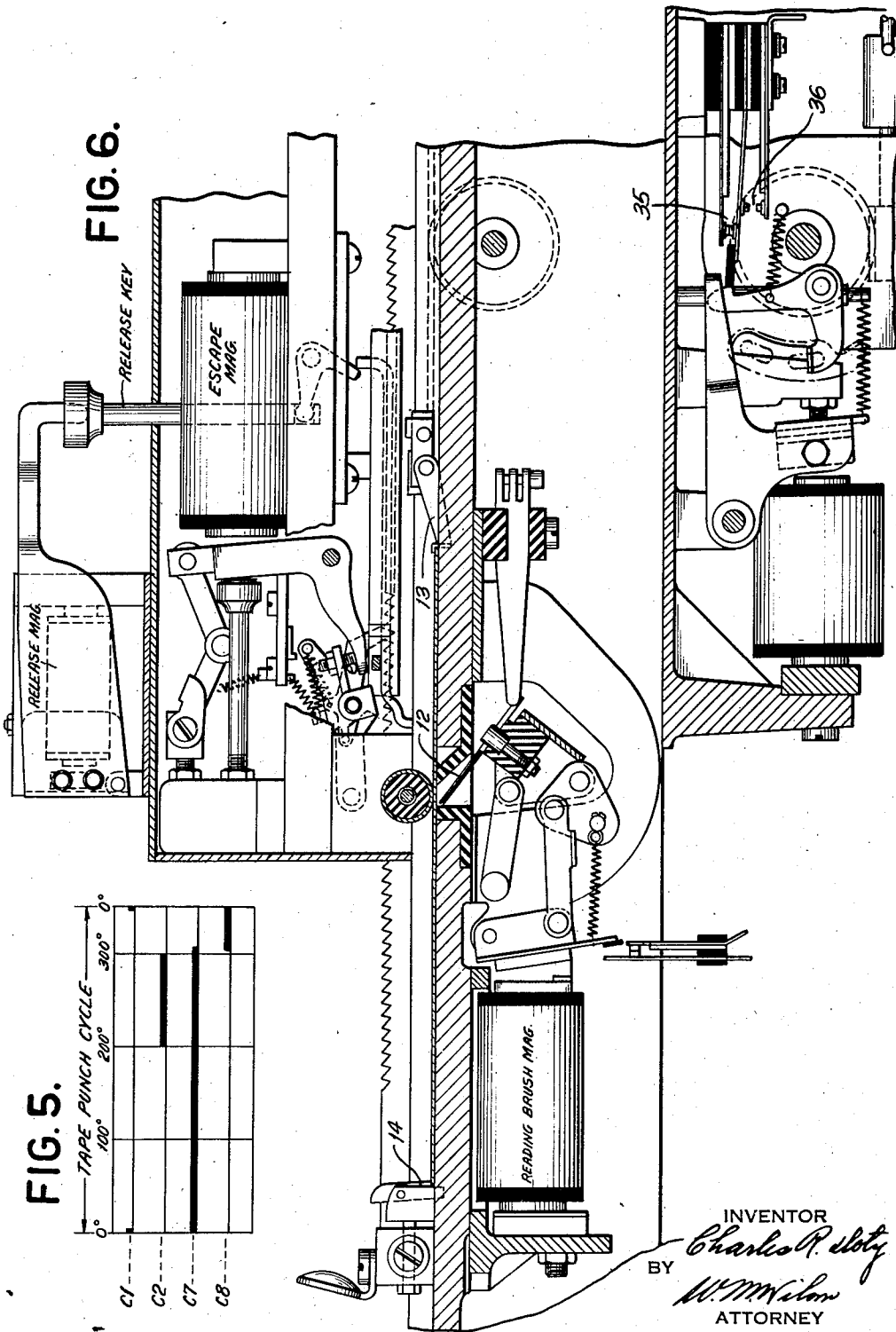
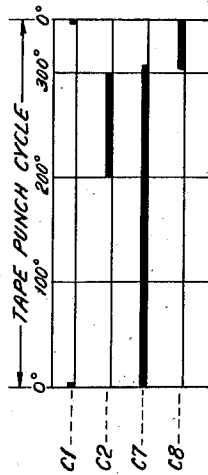


FIG. 5.



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4 Sheets-Sheet 3

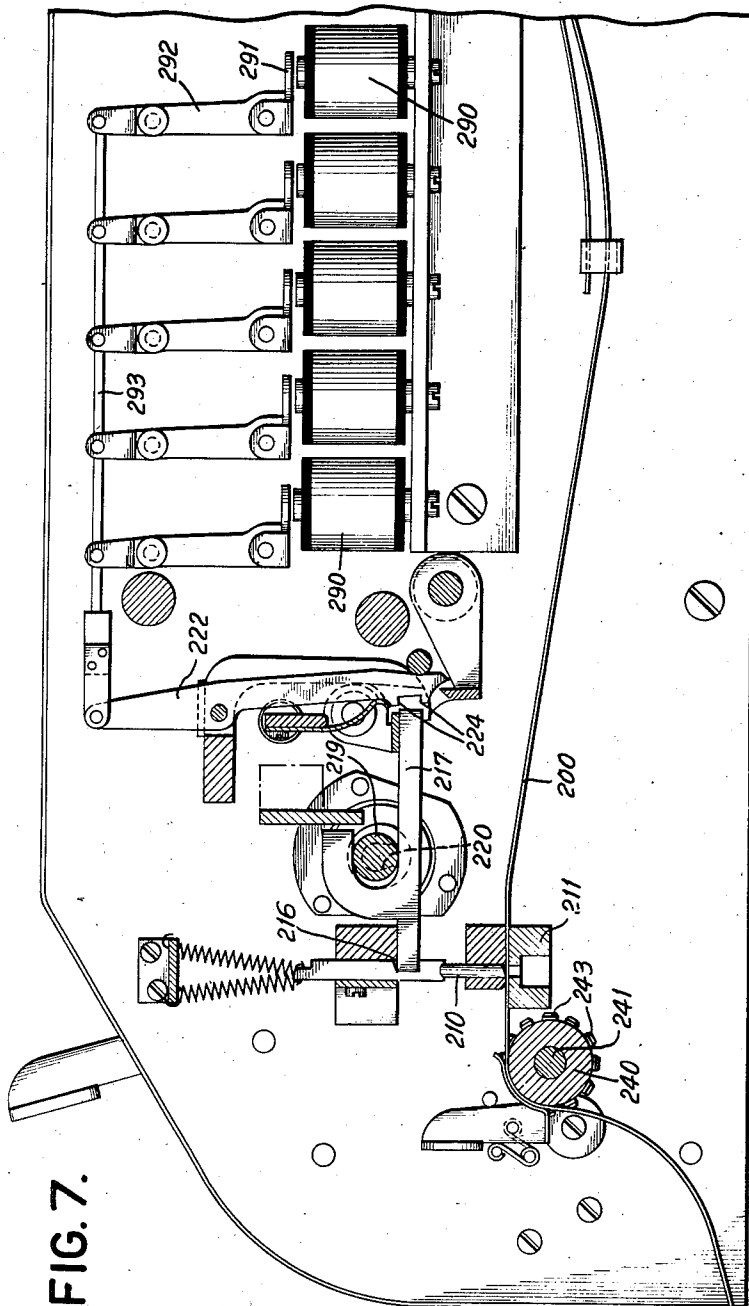


FIG. 7.

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4 Sheets-Sheet 4

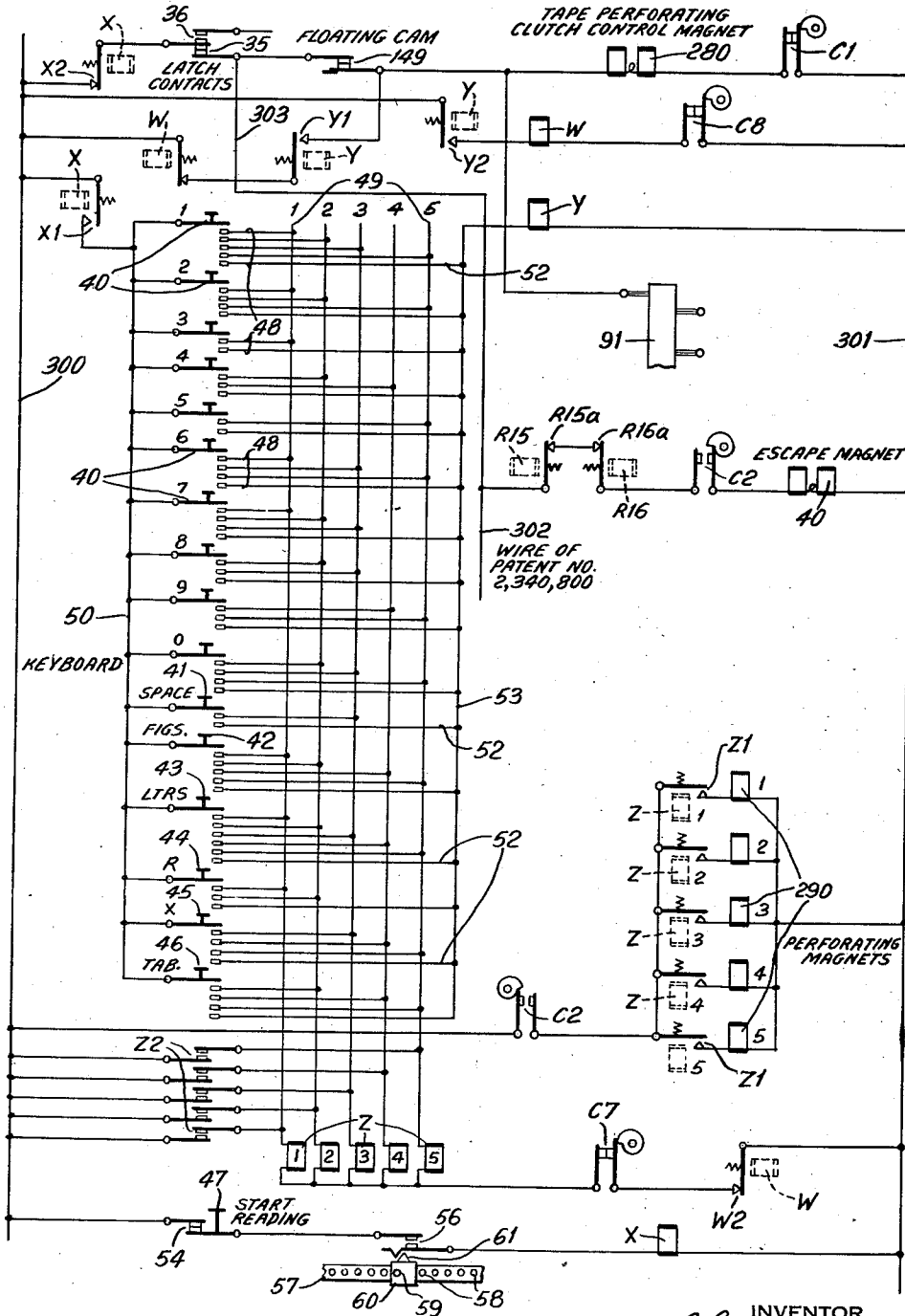


FIG. 8.

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RECORD CONTROLLED TAPE PERFORATOR
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Application May 3, 1944, Serial No. 533,918

10 Claims. (Cl. 164—115)

This invention relates to improvements in record perforating systems and more particularly where the data representations are made in one code on a tape under control of a record perforated in a different code.

More specifically the invention resides in the improvements in an apparatus whereby information recorded on a statistical or tabulating card may be perforated on a tape suitable for controlling the operation of a tape controlled printing machine or transmitter.

Machines of this character have been devised as exemplified in the patent to C. R. Doty, No. 2,340,800, granted February 1, 1944, and the present invention is directed to improvements whereby provision may be made for supplementally perforating the tape with variable information at predetermined sections thereof under control of a manually operated keyboard. Hence, each perforated section of the tape corresponding to the data derived under control of a tabulating or statistical card may be perforated to receive variable information by the operation of a manually operated keyboard.

Another object of the invention is to effect the suppression of the automatic tape perforating operations when predetermined positions of the record cards are reached and to enable the positions of the record cards where such suppression is effected to be varied at will.

Another object of the invention is to enable the restarting of the automatic card sensing and tape punching operations by an additional manual operation when the manually controlled punching is completed.

Another feature of the invention is to devise electrical circuits whereby key operations initiate the cyclic operation of the tape perforator and select the tape punching control magnets according to the telegraphic code. There is also included as a feature of the invention an electrical arrangement whereby repeat tape punching operations cannot be inadvertently effected whenever a key is held depressed beyond the normal period within which it should be released.

Other objects of the invention will be pointed out in the following description and claims and illustrated in the accompanying drawings, which disclose, by way of example, the principle of the invention and the best mode, which has been contemplated, of applying that principle.

In the drawings:

Fig. 1 is a plan view of the perforating system, showing diagrammatically the electrically connected record sensing and tape perforating units

and the associated manually operated keyboard for manually controlling supplemental tape perforating operations.

Fig. 2 represents a fragmentary portion of a statistical card shown perforated to represent the statistical code for letters and digits.

Fig. 3 represents a tape section showing the code designations of the code of the tape perforated by the tape perforating unit.

Fig. 4 represents a fragmentary portion of a tape perforated under control of the statistical card and also includes a supplemental section of the tape containing perforations which are made under control of the manually operated keyboard.

Fig. 5 is a timing diagram of the cam operated contacts utilized in connection with the electrical circuits.

Fig. 6 is a sectional view of a statistical card sensing unit showing the principal instrumentalities utilized in connection with the present improvement.

Fig. 7 is a sectional view of the tape perforating unit of the type shown in Patent No. 2,340,800.

Fig. 8 is a diagram of circuit connections of the electrical parts of the apparatus comprising the present improvement.

Before describing in detail the construction and operation of the present improvements, it should be observed that, for the purpose of illustration, the present improvement is shown in connection with the form of record controlled tape perforating apparatus shown and described in full detail in the patent to C. R. Doty, No. 2,340,800, granted February 1, 1944.

The individual record sensing and tape perforating units shown in this patent are diagrammatically shown in Fig. 1. To understand the operation of the record sensing unit of such apparatus, a general outline of the functional operations thereof will be briefly set forth.

Description of record sensing unit

Referring to Fig. 1, record cards C to be sensed or analyzed are placed in a magazine 10 from which they are advanced singly by a picker 11, toward the left to present the first column of perforations to a card sensing position above the sensing brushes 12 (Fig. 6). From this position the reciprocable card carriage comprising the pusher 13 and guide 14 engages the card and advances it column by column under control of the escapement mechanism to be described later.

The sensing station includes a group of individual sensing brushes 12, one sensing brush being provided for each index point position. The

details of the sensing unit are disclosed in the patent to Doty, No. 2,340,800 as well as the function thereof which, in general, is to set up control relays and translating relays and the latter are selectively energized in accordance with the sensed data designations on the record card.

The aforementioned Doty patent discloses in complete detail the translating mechanism controlled by the translating relays which, through their associated contacts, are effective to translate designations sensed in the statistical code to the 5-unit telegraphic or Baudot code and accordingly control selectively the energization of the tape punch control magnets 290 (Fig. 7) in different code combinations, thereby causing the code designation perforations representing the data sensed on the record cards to be punched in the tape 200.

Incidental operations, namely, card feeding and card ejecting operations of the record sensing unit, are substantially the same as that embodied in the machine well known as the "International duplicating key punch" and "Alphabetical verifier," such as is shown, for example, in Patent No. 1,772,186 to F. L. Lee et al., U. S. Patent No. 1,914,263, dated June 13, 1933, and U. S. Patent No. 2,107,161, dated February 1, 1938.

The card carriage escapement mechanism of the record sensing unit is of the same general nature as that disclosed in the Schaaff Patent No. 1,426,223, modified for electrical control as shown in detail in the patent to C. R. Doty, No. 2,340,800.

Associated with the escapement mechanism are the well known floating cam contacts 149 (Fig. 8). Such contacts are open during the escapement of the card carriage from one column to the next and when the card carriage comes to rest after having escaped through the distance of a card column, contacts 149 will come to normal position in which they are closed.

Also included in the punching machine are the well known latch contacts 35, 36, shown in Figs. 6 and 8. The purpose of such contacts and the manner in which they are transferred is fully explained in the Doty patent, No. 2,340,800 and for an understanding of the present invention it is only necessary to recognize that normally the contacts 35 are closed.

The tape perforating unit

Fig. 7 represents the construction of the tape perforating unit and discloses the principal elements which are necessary to understand the tape perforating operation. To secure full details of the construction and operation of this unit, recourse may be had to the aforementioned patent to C. R. Doty, No. 2,340,800. In general, the perforating portion of the apparatus includes individual punch plungers 210, one for each unit of the Baudot code, which punch plungers are reciprocable in a die block 211 to perforate the tape 200 according to the punch elements selected for operation. 217 represents interposers individual to punch plungers 210, each of which is operated by an eccentric cam 219 carried by the drive shaft 220 of the tape perforating unit. Normally, during the rotation of the eccentric, each interposer is moved downwardly and upwardly by the supporting eccentric about the pivotal connection formed by the end of the interposers engaging the recess 216 of the related punch plunger.

For each interposer 217 there is provided an individual latch arm 222. Whenever it is desired to select a punch plunger 210 for operation, the

related latch arm 222 is rocked in a clockwise direction so that its latch fingers 224 engage and latch the free end of the related interposer 217. Thus, upon latching of an interposer 217 and rotation of the eccentric 219 the said interposer is positioned by the eccentric about the pivotal connection formed by the latch arm and the latched end of the interposer to force the related punch plunger 210 downwardly, thereby causing the tape interposed between the lower ends of the punch plunger and the die block 211 to be perforated.

The control means for selectively positioning the latch arms 222 and thereby select the punch plungers for operation consists of the punch selecting magnets 290. The armature 291 of each magnet 290 has connected thereto an arm 292 and the latter has a call wire connection 293 between the related arm 292 and the latch arm 222. Hence, the energization of each magnet 290 positions the related latch arm 222 so as to effect the operation of the related punch plunger 210.

Other elements shown in Fig. 7 are involved in the punching operation but they are not described herein since full details of their construction and operation may be had by reference to the aforementioned patent to Doty, No. 2,340,800.

By means more fully described in the aforementioned patent, centrally located feed perforations 202 (Figs. 3 and 4) are formed as the tape is perforated. The paper tape is drawn from a supply roll (not shown) to the punching station by a feed roller 240 secured to a drive shaft 241. Said feed roller 240 is formed at its periphery with teeth 243 which cooperate with the centrally located feed perforations of the tape 200. The step-by-step rotation of the feed roller 240 feeds the tape 200 so as to present successive columns of the blank portions of the unperforated tape 200 to the punch plungers 210.

The operation of the punching mechanism of the tape perforating unit, as well as the operation of the tape feeding mechanism performed in the necessary sequence are initiated by the energization of the clutch control magnet 280, shown only in the wiring diagram of Fig. 8. In the Doty et al. patent complete details are shown of the manner in which such clutch control magnet effects the operation of the tape perforating unit. For understanding the present improvement it is sufficient to know that this initiates the operation of the punch drive shaft 220, the shaft 241 for feeding the tape and other operating elements of the punching machine to effect the punching and tape feeding operations.

Operation

The general operation of the machine will be given in connection with the circuit diagram and a more detailed description will be given of the present improvements when that point of the specification is reached. It will be assumed for the purposes of illustrating the utilization of the present improvement that one of the record cards is perforated to control the punching of a section of the tape as indicated by the message 123 JOHN JONES 567 on the tape 200 shown in Fig. 4. The manner in which the apparatus effects such tape punching under control of the record card for the particular message shown in Fig. 4 is described in complete detail in the aforementioned patent to Doty, No. 2,340,800, and it will be assumed that prior to punching the complete message on Fig. 4 the apparatus comes to a stop to

enable interpolation of manual punching on a section of the tape, under control of the manual keyboard K to represent some variable data not designated on the record card C. It will also be understood that for each sensing operation of the record sensing unit, an impulse is directed to the tape clutch magnet 280 to bring about the cyclic operation of the tape perforating mechanism. With the present improvements coordinated with the apparatus shown in the Doty patent, the circuit for effecting the cyclic operation of the tape punch is from the line 300, through relay contacts X2 now closed, through the latch contacts 35 now closed, thence through the floating cam contacts 149, the tape clutch magnet 280, through cam contacts C1 to line 301. With the exception of the provision of the normally closed X2 contacts, the circuit is the same as in the Doty patent and impulses will be directed by this circuit to the tape clutch magnet 280 as long as the X2 contacts remain closed.

Manual punching operations are effected by the keys of any suitable keyboard K shown diagrammatically in Fig. 1 which may consist of the form of keyboard shown in Figs. 1 and 8 of the patent to O. B. Shafer, No. 2,315,741, granted April 6, 1943. Details of construction of this keyboard are not given herein since they may consist of the detailed arrangement in the patent. Operable exteriorly of the keyboard K by the operator are digit keys 40, depressible to control punching operations to represent the digits 1-9 and 0 on the tape 200. Additional keys are mounted on the keyboard to effect supplementary punchings which are required in a control tape for proper interpretation by the tape controlled printing machine. Such keys are the space key 41, the figures shift key 42, the letters shift key 43, and keys 44, 45 and 46 for effecting punching of certain coded designations on the tape which are utilized in the tape controlled printing machine for effecting certain functions therein to provide correct printing of the data. The keyboard also includes a key 47 which is manually depressed to resume automatic record sensing and concurrent tape perforating operations upon completion of manual punching operations for the desired number of columns of the tape. Each of the aforementioned keys 40 to 46 is adapted to close related contacts 48 which are wired to digit wires 49 designated 1, 2, 3, 4 and 5 in Fig. 8 and which correspond to the number of units of the Baudot code. The wires 49 are connected to respective relays Z which are energized upon the depression of the keys of the keyboard by a circuit which leads from the line 300 through relay contacts X1 which are closed when the manual punching operations are to be effected, and wire 50 which is electrically connected to the uppermost blade of the contacts closed by the keys, thence through the contacts 48 to the digit wires 49 that such closed contacts have wire connections thereto, to the corresponding Z relays, thence through the C7 contacts which are now closed, through W2 contacts back to line 301. From Fig. 5 it will be noted that at the rest position of the tape punching machine, cam contacts C7 are closed to enable the completion of the described circuit. Each of the aforementioned Z relays is adapted to close related contacts Z1 to thereby select the appropriate tape punch selecting magnet 290. Whenever a contact 48 is closed by a key, it will select for energization, through the digit wire 49, the particular Z relay that the

contact has wire connection to the digit wire 49. This Z relay in turn will, through Z1 contacts, select the corresponding tape punch magnet 290 to effect punching at the desired position. By the particular wiring between the contacts of the keys and the digit wires 49, the depression of such keys will, in effect, cause the selection of tape punch magnets 290 to perforate the tape with the code designation corresponding to the key depressed whether it is one of the digit keys 40 or one of the functional keys 41-46.

It will be observed that the lowest contact blade of each of the keys has a wire connection 52 to a conductor 53 so that when the lowest contact of each of the keys is closed a supplementary circuit will be closed through its lowermost contacts 48, the wire 52, the conductor 53, through the Y relay to line 301, energizing the latter. The Y relay will close its contacts Y1, closing a circuit from line 300, through W1 contacts now closed, the Y1 relay contacts now closed, through the tape clutch magnet 280, through cam contacts C1 closed at the rest position of the punch, to the line 301. The W1 contacts are controlled by the slow-to-operate W relay which is timed to open the W1 contacts only after the impulse is sent to tape clutch magnet 280. By this circuit the tape clutch control magnet 280 is energized whenever the keys 40-46 of the keyboard are depressed to thereby effect a cyclic operation of the tape punch and cause by the selected tape punch magnets 290 the desired tape perforation. When the cyclic operation of the tape punch has been initiated, cam contacts C2 will close at substantially the midportion of the cycle and a circuit will be closed from line 300, through the C2 contacts, which correspond to the same designated contacts in the Doty patent, thence to the particular Z1 relay contacts which are closed, through the tape punch magnet 290 in circuit connection with the closed Z1 contacts, to line 301.

The keyboard is rendered effective for tape punching operations only when relay contacts X1 are closed, and closing of the latter is effected at predetermined positions of the carriage of the record sensing unit by the selective arrangement now to be described.

The circuit for the X relay is from the line 300 through normally closed contacts 54 which, however, are opened by the depression of the start reading key 47 also mounted on the keyboard K, thence through contacts 56, through X relay coil to line 301. Closing of the contacts 56 to energize the X relay and render the keyboard effective for manual punching operations by closure of related X1 contacts can be effected by any selective arrangement. For the purpose of illustration, it is preferred to utilize the card carriage control of such contacts by the arrangement fully shown and described in the patent to F. L. Lee et al., No. 1,772,186. The card carriage of the record sensing unit of the present apparatus has likewise a bar 57 which is secured to the card carriage and having at column intervals openings 58 into which may be inserted the shank of a set screw 59 threaded in a block 60 adjustable on bar 57. The block 60 may be adjusted and fixed on the bar 57 at any predetermined card column position. For purposes of illustration, it will be assumed that after the tape has been perforated to designate the space on the tape 200 after perforating the tape to represent the letter S of the word JONES, the

carriage will space to such position that block 60, through its cam projection 61, will cam the contacts 56 closed. Through the circuit previously described this will energize relay X to close the X1 contacts. The card carriage of the record sensing unit remains in such position to keep the X relay magnet continuously energized until manually punching operations are terminated by depression of the key 47. The energization of the X relay coil is timed by the closure of contacts 56 to occur so as to open the X2 contacts before the floating cam contacts 149 come to closed position after spacing the card carriage of the record sensing unit to thereby prevent the normal impulse from being transmitted to the tape clutch magnet 280 when cam contacts C1 close. Energization of the latter is thereby effected only upon each subsequent key depression of the keys 41-46 of the keyboard through the energization of the Y relay coil.

The X2 relay contacts in addition to rendering the normal impulse circuit for energizing the tape clutch magnet 280 inoperative also open other circuits incorporated in the electrical wiring of the record sensing unit to render this unit completely inoperative during manually controlled punching operations.

One of such circuits is the energizing circuit for the escape magnet 40 (Fig. 6). This circuit with the exception of the X2 contacts is the same as in the aforementioned Patent No. 2,340,800 and is from the line 300 through the X2 contacts, latch contacts 35, wire 303, through the R15a and R16a relay contacts, cam contacts C2, escapement magnet 40 to line 301. Hence, with the present circuit arrangement, the opening of the X2 relay contacts after the carriage of the record sensing unit has escaped from the last sensed position the impulse circuit for the escape magnet 40 will be ineffective and therefore the carriage of the record sensing unit will remain at rest position until the completion of manually controlled punching operations.

The opening of the X2 relay contacts also opens the circuit connection which extends from the floating cam contacts 149 to the contact roll 91 of the record sensing unit. This circuit is not completely shown herein and reference may be had to the aforementioned patent. The opening of the X2 relay contacts therefore renders the sensing mechanism of the record sensing unit inoperative.

The X2 relay contacts when open, open all of impulse circuits connected to line 302 which circuits are completely shown in the aforementioned patent. The opening of the circuits connected to the line 302 will prevent improper energization of any of the relays to which impulses would be normally transmitted by the wire 302.

Summarizing, the X2 contacts when open render the operating devices of the record sensing unit completely inoperative and retain it inoperative until the termination of manually controlled punching operations.

Therefore, it will be observed that the record sensing unit and tape perforating unit operate synchronously in cyclic relation until a predetermined column position of the carriage of the record sensing unit is reached. Automatic tape punching operations now terminate and this having been observed by the operator of the keyboard, the keys are successively depressed to interpolate the desired data. In the present machine it will be assumed that this consists of

a supplemental number which is variable but may consist of any other data, depending upon the use to which the present improvement is made. When the apparatus has come to a stop, the operator in the assumed example depresses the figure shift key 42, resulting in a cyclic operation of the machine and the perforation of the tape to represent the code designation (see Fig. 4). Thereafter, the digit keys are successively depressed to perforate the tape to represent the digits 1, 9, 8, 7, 4, 3, and 2, forming part of the number of the assumed example. When the operator has manually entered the desired digit punching on the tape, the key 47 is depressed to open contacts 54 to deenergize the X relay. The latter now releases X1 contacts and they open to disconnect the contacts of the keyboard from the line 300, rendering the keyboard ineffective. As the X2 relay contacts come to closed position an impulse is directed to the tape punch clutch magnet 280 and automatic tape punch operations are resumed thereafter until the complete message has been punched on the tape for the record card sensed. The key 47 is preferably held down during the subsequent tape perforating and record sensing cycle to insure proper operations.

To retain the Z relays energized so that their related Z1 contacts are sure to be closed during the time that the C2 cam contact closes the circuit for the selected tape punch magnets, each of the Z relays has a related Z2 holding contact. The stick circuit for each Z relay is from the line 300, through the related Z2 stick contact, the associated Z relay coil, cam contacts C7, W2 contacts now closed to line 301. This stick circuit retains the relay contact Z1 closed so that when C2 cam contacts close the tape punch magnets will be completely energized.

To prevent improper operations which might be effected by retaining the depressed keys held down longer than they should, the following interlocking circuit is provided. This circuit is from the line 300, through the Y2 relay contacts, the slow-to-operate relay W, and cam contacts C8 to line 301.

If the key is retained depressed after cam contacts C7 open and when cam contact C8 closes, the Y relay coil is held energized to close the Y2 contacts and the W relay will be energized as long as the key is held depressed. The W relay is of the slow-to-operate type but shortly after cam contacts C8 close the W relay opens the W1 contacts which are in the impulse circuit to the tape clutch magnet 280. If the key is still held depressed at 0°, it is clear that the opening of the W2 contacts prevents the selective energization of the Z relays at 0° at which time cam contacts C7 are closed. If the key is still held depressed at the end of the cycle and at 0°, it is also clear that the opening of the W1 relay contacts prevents the closing of the impulse circuit to the tape punch clutch magnet 280 when cam contacts C1 close, noting that Y1 contacts in this impulse circuit are closed if the key is held depressed.

This prevents a repetition of the setup of the Z relay coils and a repeat operation of the tape perforator.

When the depressed key is released, Y deenergizes to open Y1 contacts and to open the Y2 contacts. The opening of the Y2 contacts causes the W relay to deenergize and shortly after the Y1 contacts open the W1 contacts close. Hence, the circuit to the tape clutch magnet 280 is still

open and an impulse can be sent to the latter only by a repeat key depression.

While there have been shown and described and pointed out the fundamental novel features of the invention as applied to a single modification, it will be understood that various omissions, and substitutions and changes in the form and details of the device illustrated and in its operation may be made by those skilled in the art without departing from the spirit of the invention. It is the intention, therefore, to be limited only as indicated by the scope of the following claims.

What is claimed is:

1. In an apparatus for perforating a tape in a combinational code under control of a record card perforated according to a statistical code, said apparatus including a tape perforator and a record sensing machine, each having independently operated means for spacing the tape and record and said record sensing machine having means for successively sensing said record for successively controlling punch selecting elements of said tape perforator according to the combinational code, the combination of a keyboard including digit operating keys and coded means controlled thereby to select said punch selecting elements according to said combinational code, said keyboard being normally inoperable during the tape perforating operation under control of said record sensing machine, means operable at a predetermined column position of said record for rendering the record spacing means inoperable and for preventing further control of said record sensing machine over said tape perforator and for rendering said keyboard effective as a control for manual selection of said punch selecting elements, and means to effect for each operation of the keys a cyclic operation of the tape perforator which includes a tape perforating operation and a tape spacing operation.

2. In an apparatus for perforating a tape in a combinational code under control of a record card perforated according to a statistical code, said apparatus including a record sensing machine for successively sensing said record and means controlled thereby for successively controlling punch selecting elements of a tape perforator according to said combinational code, the combination of a keyboard including digit operating keys and coded means controlled thereby to select said punch selecting elements according to said combinational code, said keyboard being normally inoperable to select said punch selecting elements during the tape perforating operation under control of said record sensing machine, means operable at a predetermined column position of said record for rendering said keyboard operable for manual selection of said punch selecting elements, and means to effect for each operation of the keys a cyclic operation of the tape perforator which includes a tape perforating operation and a tape feeding operation while said record remains at the same column position to which it was positioned before said keyboard was rendered operable.

3. In an apparatus for perforating a tape in a combinational code under control of a record card perforated according to a statistical code, said apparatus including a record sensing machine comprising means under control of a sensed record for selecting punch selecting elements of a tape perforator according to said combinational code and for thereafter spacing said record to the next column position, the combination of a keyboard including digit operating keys and

coded means controlled thereby to select said punch selecting elements according to said combinational code, said keyboard being normally inoperable during the tape perforating operation under control of said record sensing machine, means operable at a predetermined column position of said record for rendering the punch selecting and record spacing means of said record sensing machine inoperable and for concomitantly rendering said keyboard operable for manual selection of said punch selecting elements, and means to effect for each operation of the keys a cyclic operation of the tape perforator which includes a tape perforating operation and a coordinated tape feeding operation without a record spacing operation.

4. In an apparatus for perforating a tape in a combinational code under control of a record card perforated according to a statistical code, said apparatus including a tape perforator and a record sensing machine having means for successively sensing said record for successively controlling punch selecting elements of said tape perforator according to said combinational code, the combination of a keyboard including digit operating keys and coded means controlled thereby to select said punch selecting elements according to the combinational code, said keyboard being normally inoperable for punch selection during the tape perforating operation under control of said record sensing machine, means operable at a predetermined column position of said record for rendering said record sensing machine inoperable and said keyboard operable for manual selection of said punch selecting elements, and means to effect for each operation of the keys a cyclic operation of the tape perforator which includes a tape perforating operation and a coordinated tape feeding operation without a column spacing of the record.

5. In a perforating apparatus of the class described, the combination of a tape perforator, a record sensing machine including a record card carriage, record spacing means therefor, and means to automatically control said tape perforator from said record to punch a tape in a combinational code in succession as successive record columns are sensed, control means operable at a predetermined column position of said carriage, a manually operated keyboard including means to control and effect the cyclic operation of the tape perforator to space the tape without spacing said record carriage and to punch the tape in said combinational code corresponding to the digit keys depressed, means controlled by said control means to render said manually controlled keyboard effective for its function and concomitantly rendering the record sensing machine inoperable to thereby terminate successive tape perforating operations under control of the sensed record, and manual means operable upon termination of the manually controlled punching operations for rendering said record sensing machine again operable to thereby resume automatic tape punching operations under control of the remaining columns of the sensed record.

6. In a perforating apparatus of the class described, the combination of a tape perforator, an independently operable record sensing machine including independently operable record spacing means and means to automatically control said tape perforator to space and punch a tape in a combinational code in succession as successive record columns are sensed, control means operable at a predetermined column position of said

card, a manually controlled keyboard including means to control and effect the cyclic operation of the tape perforator to punch the tape in said combinational code corresponding to the digit keys depressed and space the tape without spacing said record, means controlled by said control means to render said manually controlled keyboard effective for its function and concomitantly rendering the record sensing machine inoperable to thereby terminate successive tape perforating operations under control of the sensed record, and manual means operable upon termination of the manually controlled punching operations for rendering said record sensing machine again operable to resume automatic tape punching operations under control of the remaining columns of the sensed record.

7. In a perforating apparatus of the class described, the combination of a tape perforator including tape spacing means, a record sensing machine including record spacing means and means to automatically control said tape perforator to punch a tape in a combinational code in succession as successive record columns are sensed, control means operable at a predetermined column position of said record, a manually operated keyboard including means to control and effect the cyclic operation of the tape perforator to space and punch the tape in said combinational code corresponding to the digit keys depressed, means controlled by said control means to render said manually operated keyboard effective for its function and concomitantly rendering the record spacing means inoperable to retain the record at rest and thereby terminate successive tape perforating operations under control of the sensed record, and means operable upon termination of the manually controlled punching operations for resuming automatic tape punching operations under control of the record sensing machine for remaining columns of the sensed record.

8. In a perforating apparatus of the class described, the combination of a tape perforator including tape spacing means, record sensing machine including record spacing means and means to automatically control said tape perforator to punch a tape in a combinational code in succession as successive record columns are sensed, control means operable at a predetermined column position of said record, a digit key keyboard including means to control and effect the cyclic operation of the tape perforator and the tape spacing means thereof to space and punch the tape in said combinational code corresponding to the digit keys depressed, and means controlled by said control means to render said keyboard effective

for its function and concomitantly rendering the record spacing means inoperable to thereby retain the record at rest to terminate successive tape perforating operations under control of the sensed record.

9. In an apparatus for perforating record material under control of a master sheet, said apparatus including a master sheet sensing means and a perforator for the record material, each having independently operated means for spacing the record material and said master sheet, said master sheet sensing means having means for successively sensing said master sheet for controlling punch selecting elements of said perforator, the combination of a keyboard including digit operating keys and means controlled thereby to select said punch selecting elements to supplementally perforate said record material, said keyboard being normally inoperable during the perforating of the record material under control of said master sheet sensing means, means operable at a predetermined column position of said record material for rendering the master sheet spacing means inoperable and for preventing further control of said master sheet sensing means over said perforator and for rendering said keyboard effective as a control for manual selection of said punch selecting elements, and means to effect for each operation of the keys a cyclic operation of the perforator which includes a perforating operation for said record material and a column spacing operation thereof.

10. In an apparatus for perforating record material under control of a master sheet, said apparatus including a master sheet sensing means and a perforator for the record material, each having independently operated means for spacing the record material and said master sheet, said master sheet sensing means having means for successively sensing said master sheet for controlling punch selecting elements of said perforator, the combination of a keyboard including digit operating keys and means controlled thereby to select said punch selecting elements to supplementally perforate said record material, means operable at a predetermined column position of said record material for rendering the master sheet spacing means inoperable when said keyboard is to be used to control manual selection of said punch selecting elements, and means to effect for each operation of the keys a cyclic operation of the perforator which includes a perforating operation for said record material and a column spacing operation of the record material without spacing the master sheet.

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