

June 13, 1933.

L. C. REYNOLDS

1,914,293

PERFORATING MACHINE

Filed Oct. 30, 1930

3 Sheets-Sheet 1

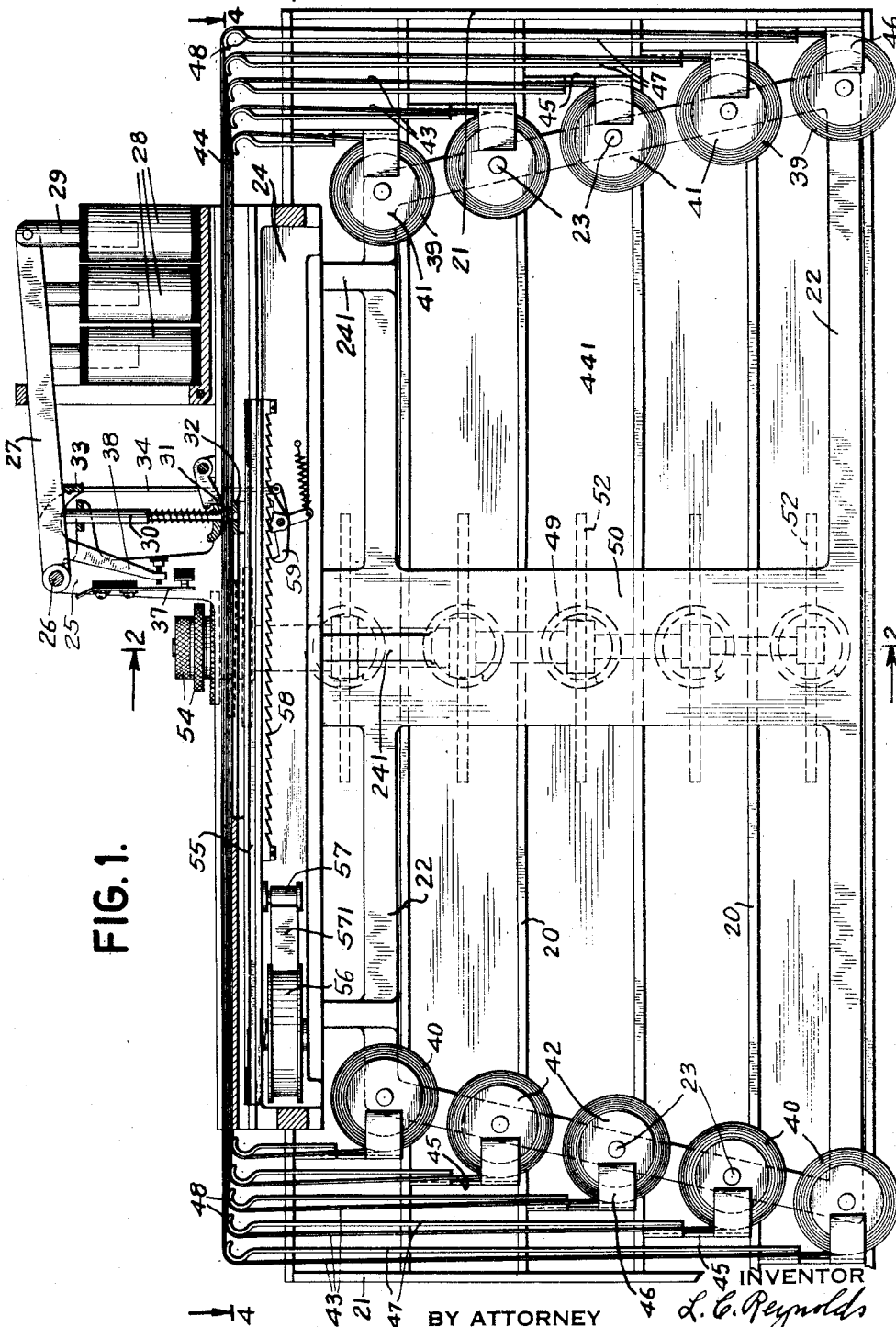


FIG. 1.

BY ATTORNEY

W. M. Wilson

INVENTOR

L. C. Reynolds

June 13, 1933.

L. C. REYNOLDS

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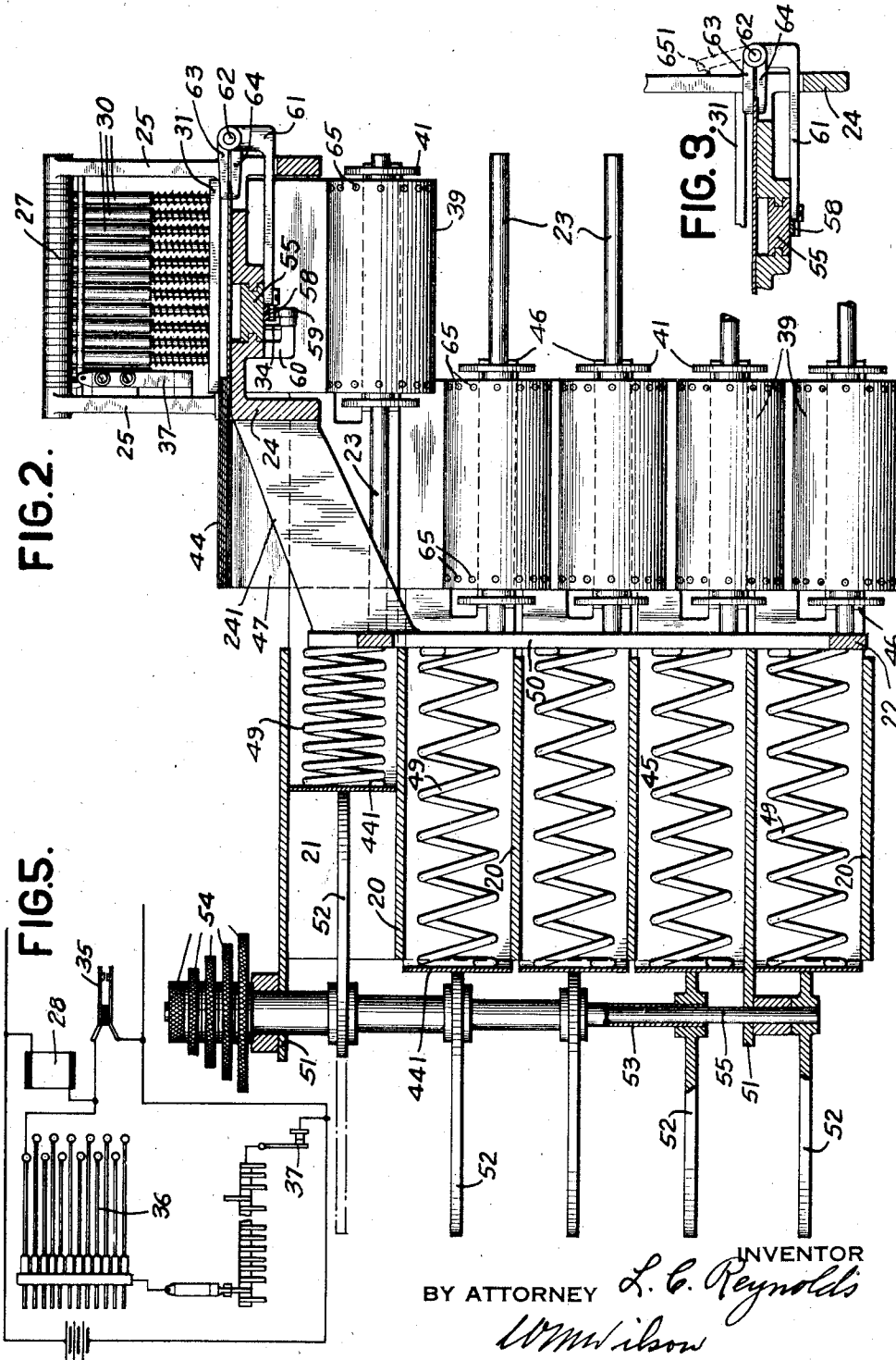
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FIG. 2.

FIG. 5.



INVENTOR
L. C. Reynolds
BY ATTORNEY W. M. Wilson

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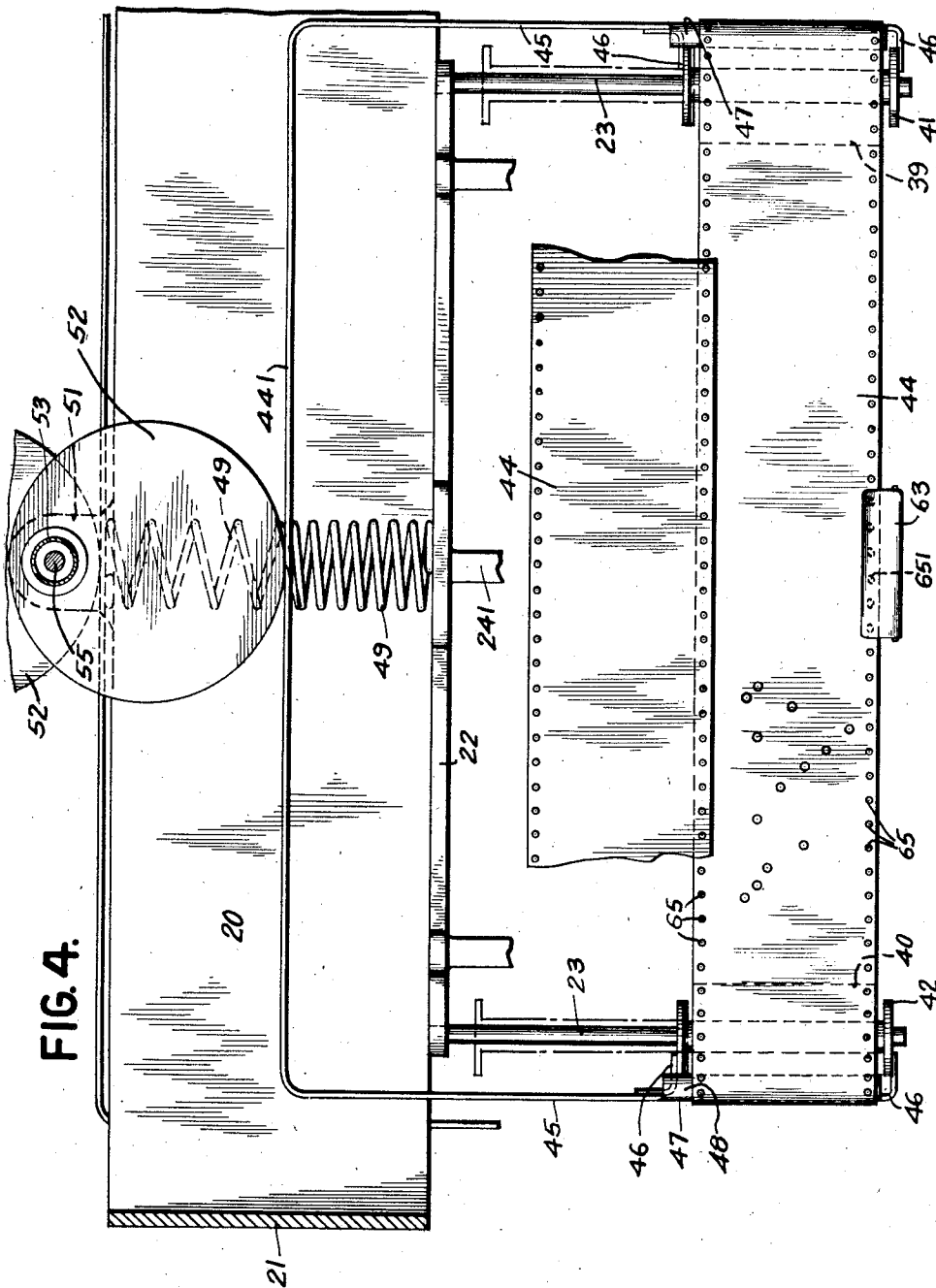
L. C. REYNOLDS

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3 Sheets-Sheet 3



BY ATTORNEY

BY ATTORNEY *L. C. Reynolds* INVENTOR
Wm Wilson

Wm Wilson

Wm Wilson

UNITED STATES PATENT OFFICE

LYNUS CLYDE REYNOLDS, OF SWEETWATER, TENNESSEE, ASSIGNOR TO THE TABULATING MACHINE COMPANY, OF ENDICOTT, NEW YORK, A CORPORATION OF NEW JERSEY

PERFORATING MACHINE

Application filed October 30, 1929. Serial No. 402,153.

The present invention relates to mechanism for making perforated records and has for its principal object to provide an improved form of multiple tape perforating device.

An object is to provide a device in which a plurality of record tapes may be selectively positioned beneath a common perforating mechanism and there receive record perforations.

Another object is to provide a structure in which a plurality of record tapes are engaged by a common feeding mechanism when they are brought to a record receiving position.

The invention also involves the punching of single or duplicate records on tapes under either manipulative control or automatic control by a master record card or strip.

A feature of the invention is the novel arrangement of the multiple tapes which is so devised that an overlap of the strips of tape always exists even when certain of the strips are moved to a position to receive a record perforation while other strips are left in normal position. The buckling and tearing of the record strips or the interference with each other as they are brought in and out of record receiving position is thereby avoided.

In all former methods of producing a perforated record strip or tape, the records resulting therefrom were not always as desirable as records in the form of punched cards of the well known Hollerith type. The cards made it possible to file or sort certain data according to a certain group or classification whereas a single record tape had the data of all groups or classifications on one piece of record material and thereby did not form as desirable a source of information as a stack of cards divided into groups. Now, by means of the present invention a plurality of tapes rather than a single tape may be made to cooperate with a record perforating device. Each tape may then be delegated to receive the record of a certain group or classification, just as each group of cards held the information of a certain class. Thus it is clear that a disadvantage in the use of tape instead of cards is obviated. The classification of the data on the different tapes is only limited by

the number of tapes provided in a record making device.

In the illustrated embodiment of the present invention there is shown a plurality of rolls of record tape, each having a supply and storage roll. The tapes are drawn from the supply roll and are brought up vertically and then across horizontally underneath a record perforating device. The end of the tape is then brought down vertically and wound around a receiving or storage roll. The rolls are mounted on spools which are slidable along horizontal studs projecting from a frame. Both spools are engaged by extensions of a frame which is common to both spools, the frame also having upwardly extending arms for supporting the horizontal portion of the tape which is free from the rolls. A compression spring normally holds the frame and rolls connected therewith in normal inoperative position. When it is desired to select one of the tapes to receive record perforations a related knurled knob on a selection shaft is rotated. This knurled knob is connected by means of tubing to a cam which moves the frame and rolls longitudinally, bringing the record tape beneath the perforating plungers. The extent of movement by these cams is such that the selected record tapes never move completely out of the plane of the tapes which remain in normal position. There is always an overlap between the adjacent tapes.

The tapes are fed along horizontally by means of an escapement device and is energized by a spring motor connected to a traveling carriage upon which an escapement rack is mounted. A clamp engages any of the record tapes which are brought into record receiving position and when operation of the perforating devices takes place the escapement is also operated thereby giving the paper strip a step-by-step movement in a manner that enables the perforations to be made in one column after the other.

A form of perforating device is shown which is described in detail in my former Patents No. 1,298,400 and No. 1,761,632. This form of perforating mechanism is adapted to be controlled either by depression of a

key or by automatic control under the guidance of a master card. Although this form of perforating mechanism is an admirable one, it is to be understood that any perforating or record making device could be substituted for the same and so cooperate with the novel multiple tape arrangement set forth in this specification.

The invention will be readily understood after reading the following detailed description which should be read in connection with the accompanying drawings in which:

Fig. 1 is a front elevational view showing the arrangement of the multiple tapes, the tape feeding mechanism, and the perforating devices.

Fig. 2 is a sectional elevation taken along the line 2—2 in Fig. 1, showing one end of the tapes and the selecting devices therefor.

Fig. 3 is a detail sectional view of the paper engaging devices on the tape feeding mechanism.

Fig. 4 is a plan view with the perforating mechanism removed, showing a frame for moving a related pair of record tape spools and a cam for moving the frame.

Fig. 5 is a circuit diagram of the wiring of one of the solenoids used in the perforating devices.

The framework of the device comprises a series of shelves 20 (Fig. 2) which are held in spaced relationship to each other by means of a pair of side frames 21. These shelves carry and guide a series of frames which move the record tapes to and from record receiving position. Fixed in front of the shelves is a vertical frame 22 which serves as a mounting for a series of studs 23. These studs serve to support the spools on the rolls of record tape. A frame 24 is provided for carrying the perforating and tape feeding mechanism. This frame is held in position with respect to the shelves 20 and frame 22 by means of brackets 241 extending from the front of frame 22. Bearing supports 25 extend upwardly from the frame 24 (Fig. 2) and form a bearing for a shaft 26 (Fig. 1) which is used as the fulcrum for punch actuating arms 27.

As shown in the present embodiment of the invention the perforating punches are actuated by the series of solenoids 28 (Fig. 1). One of these solenoids is shown in the wiring diagram (Fig. 5). However, it is to be noted that a plurality of such solenoids are to be used as described in my previous patents above noted. A single solenoid is shown in Fig. 5 merely because of the limited space in which the figure is placed. The core 29 of each solenoid is connected with a related arm 27 (Fig. 1) and the lower edge of each arm 27 abuts the upper extension of a punch 30. The punches 30 are supported in the frame 24 and extend down through a guide plate 31 above the record tapes and are adapted to be

forced through a die 32 below the tapes. Extending beneath the series of arms 27 is a common bail 33 pivoted on shaft 26 and adapted to partake of the movement of any of the arms 27. A link 34 extends down from this common bail for operating the paper feeding escapement in a manner that will be described hereinafter.

Each solenoid is adapted to be energized either by the closing of a pair of contacts 35 (Fig. 5) by means of a key on the key board or by means of contacts made through a punched master card on an arrangement such as that indicated by reference numeral 36 in Fig. 5 and described in detail in my previous patents. Another contact member 37 is shown in Fig. 5 and is also illustrated in Fig. 1 wherein it is noted that a downwardly extending arm 38 on the common bail 33 is adapted to break this contact and open the circuit after the arm 27 has moved an amount sufficient to punch a record under control of the automatic punching arrangement. Instead of the form of perforating devices shown and described, any form of perforating, printing or record making mechanism could be used to place a record on the record tapes in the machine.

Turning now to the manner in which the multiple tapes are mounted for movement into record receiving position we note that each tape is provided with a supply roll 39 (Fig. 1) and a storage roll 40 in horizontal alignment. A spool 41 holds the supply roll and spool 42 holds the storage roll. These spools are mounted on the studs 23 above mentioned and are slidable thereon to bring the tape in and out of record receiving position. A certain portion of the tape is free from the rolls and extends across the device in the form of an inverted U. The studs 23 for the spools are mounted in a slanted formation (see Fig. 1) in order that the vertical free portions 43 of adjacent tapes are free from interference with each other. The horizontal portions 44 (Figs. 1 and 2) of the tapes are arranged in a compact formation, one tape being directly above the other. The means for positioning the tapes will now be taken up.

Between each pair of shelves 20 there is placed a frame 441 (see Figs. 2 and 4). Each frame has a pair of forwardly extending sides 45 (Fig. 4) with ears 46 for engaging both the supply roll spool 41 and the related storage roll spool 42 of a record tape, there being one of such frames 441 for each of the record strips provided in the machine. Extending upwardly from the side portions 45 of the frame 441 are supporting arms 47 (Fig. 1) which guide the horizontal portions 44 of a record tape and support the free portions of the tape while the rolls of tape are being moved. It is obvious that through the connections between the various parts of the

tape and the frame, movement of the frame will be imparted directly to the tape and serve to shift the same longitudinally in the machine.

the step-by-step movement of the carriage 55. The pawls 59 are connected to the link 34 which was mentioned above as being operated by downward movement of any of the punches. Thus it is clear that upon any record making movement of the punches the pawls 59 will be oscillated thereby allowing rack 58 to escape one step to the left after the retraction of the punches, being urged in this direction by the spring motor 56. When the carriage reaches its extreme left position after a series of step-by-step movements, it may be restored to its effective position on the right by hand.

Attached to the lower portion of the carriage 55 is a bracket 61. This bracket at the upper end of its vertical leg carries a stud 62 upon which a pair of tape engaging fingers 63 and 64 are pivoted. These fingers are adapted to grasp the record tapes when they are brought into record receiving position, thus forming a connection between the carriage and the tapes so that movement of the carriage is imparted to the tapes.

It may be noted from the showing in Fig. 4 that each tape is provided with a series of holes 65 extending along both borders of the tape. These holes are provided for feeding the record tape in the perforating device now being described and also for the handling of the record tape in other accounting or tabulating machines in which the data perforated on the tape may be compiled or printed. As used in the present device only the lower set of holes 65 (Fig. 4) is used. It is contemplated that a light spring may hold the fingers 63 and 64 normally in closed position and that adjustment of one or more of the tapes to record receiving position will force the fingers open, the fingers closing when extensions 651 on the fingers are finally located in holes 65 on the tape.

Another way of having this tape feed engaging means function would be to have the upper arm 63 so mounted that it may be manipulated to a position such as that shown in Fig. 3 and then after the record tapes have been positioned this finger could be brought down by hand. The paper feeding carriage and tapes connected therewith could then be shifted to the right (Fig. 1) by hand to any desired position, thus selecting the particular field on the tapes in which the perforations will be made.

It is contemplated that a winding spring or paper take-up device (not shown) may be provided on all of the storage rolls for the purpose of taking up the slack in the tapes as they are fed past the perforating device. A friction device (not shown) may be provided on all of the supply rolls to maintain the tautness of the tapes as they are fed off the supply rolls. As devices of this kind are common in the art it is not believed necessary to show one of the many forms.

It is clear from the illustration in Fig. 1 that the arms 47 for the tapes mounted on rolls stationed lower in the device are necessarily of a greater height than the arms connected with the frames for the rolls at the top of frame 22. It may also be noted that the rounded tops 48 of the arms 47 are in a stepped formation so that the outer one is higher than the inner one. This is to properly position the horizontal portions 44 of the record tapes so that they are arranged one above the other as shown in section in Fig. 2.

A compression spring 49 is placed between the rear portion of each frame 441 and a rib 50 on frame 22. These springs serve to hold the frames 441 and the rolls connected therewith in normal position.

In order to selectively bring the record tapes into record receiving position a camming arrangement such as that shown in Fig. 2 may be used. There it is noted that bearings 51 extend from certain of the shelves 20 to support a series of nested sleeves on which the cams for shifting the frames 441 are mounted. Each cam 52 is fixed to the end of a tube 53 at the upper end of which there is mounted a knurled knob 54 which is adapted to be manipulated by hand. The lower cam 52, it is noted, is mounted directly on the inner shaft 55 (Fig. 2) and thus is connected with the upper knurled knob 54. Rotation of any of these knurled knobs 54 through an angle of 180 degrees will position the frame 441 associated therewith to a position such as that shown by the upper frame in Fig. 2. When any frame 441 is so actuated, the horizontal portion 44 of the related tape will be brought into a record receiving position beneath the punches 30; this is made very clear by the showing in Fig. 2. Frames 441 could be moved by devices other than cams, many forms of shifting mechanism could be substituted for the arrangement shown in Fig. 2; it is contemplated that shifting of the frames may be controlled from a key board.

The means for feeding the record tapes once they have been brought into record receiving position will now be described. It may be noted by reference to Fig. 2 that a traveling carriage 55 is mounted in frame 24 for horizontal movement along the line of travel of the record tapes across the machine. A spring motor 56 (Fig. 1) mounted on frame 24 is connected to a stud 57 on carriage 55 by means of a band 571 and tends at all times to move the carriage to the left (Fig. 1). A ratchet bar 58 mounted on carriage 55 is adapted to cooperate with a pair of escape-ment pawls 59 mounted on a stud in an arm 60 (Fig. 2) extending from frame 24. The pawls and bar serve to control the spacing of

The relation between a record tape in record receiving position and one out of record receiving position may be noted by reference to Fig. 4. There it is seen that the upper tape is in normal position while the lower one has been brought in record receiving position. It is to be particularly noted from this showing that the lower portion of the upper tape and the upper portion of the lower tape overlap. This overlapping relation between tapes in operative and inoperative positions may also be noted in Fig. 2. This arrangement of the tapes is a very useful one in preventing the buckling and tearing of the tapes against each other as they are brought in and out of record receiving position. Were it not for the overlapping arrangement shown the tapes could not be as compactly arranged without the probability that they would be destroyed by interference with each other. The novel arrangement disclosed enables the maintenance of the record tapes in perfect condition throughout their course in the machine.

Although only five tapes have been shown in the illustrated embodiment of the invention, it is apparent that a larger number of tapes may be provided in a device of the type disclosed by merely expanding the principles of construction disclosed by the present invention.

While it is thought that the above description outlines an admirable form of the present invention it is not intended to limit the construction to such a form. The invention is intended to be limited only as indicated by the scope of the following claims:

1. In a device of the class described, a plurality of record receiving tapes, a frame for each tape, means for perforating a record in said tapes, and means for camming said frames thereby bringing said tapes into a position to be perforated.

2. In a device of the class described, a record perforating means, a plurality of record tapes adapted to be perforated by said means, and means for selectively placing one or more of said tapes in a position to receive record perforations from said perforating means.

3. In a device of the class described, a plurality of record receiving tapes, means for perforating a record in said tapes, and means for determining how many of said tapes are to be perforated by said perforating means.

4. In a device of the class described, a paper feeding mechanism, a plurality of record tapes normally out of control of said feeding mechanism, and means for bringing one or more of said tapes under control of said feeding mechanism.

5. In a device of the class described, a record perforating means, a record feeding mechanism, a plurality of strips of record material, and means for selectively bringing

the strips of record material into cooperation with said punching means and said feeding mechanism.

6. In a device of the class described, a record perforating means, a plurality of record tapes each being provided with holes for feeding, a paper feeding means, and means for selectively bringing the tapes into a position to receive record perforations and at the same time engaging the selected tape or tapes with said feeding means by means of the feeding holes in the tape.

7. In a device of the class described, means for producing record perforations, a plurality of record tapes, a tape feeding mechanism, means for selectively bringing the tapes under control of the feeding mechanism and into position to receive perforations, and an adjustable means on said feeding mechanism for bringing a particular field on said tapes into position to receive a perforation.

8. In a device of the class described, an electrically controlled record perforating means, a paper feeding mechanism under control of said means, a plurality of strips of record paper each strip having supply and storage rolls, and means for positively selecting and moving the record strips in a position to be punched by said perforating means and fed by said mechanism.

9. In a device of the class described, a plurality of strips of record material, means for recording data on said material, and means for moving one or more of the strips of record material into and out of cooperation with the recording means, the extent of movement being such that a portion of a shifted strip is always between adjacent strips.

10. In a device of the class described, a plurality of record tapes, each tape consisting of a supply roll, a storage roll and a length of tape free from said rolls, a recording device, and means for selectively bringing the free lengths of the tapes in a position to receive a record from said recording device.

11. A device as in claim 10 in which the free lengths of the tapes always overlap.

12. In a device of the class described, a plurality of record tapes, an electrically operated record perforating means, means for operating said perforating means by manipulation of keys, means for operating said perforating means from automatic control by a master record card, a feeding mechanism, and means for bringing one or more of said tapes into perforation receiving position and under control of said feeding mechanism.

13. In a device of the class described, a plurality of tapes each having a supply and storage roll and a portion free from said rolls, means for perforating a code record in said tapes, a frame for each tape for supporting the free portion of the tape and engaging

the rolls of said tape so that movement of the frame is imparted to the tape, a series of cams one for each frame for camming said frame so that the tape on the frame is brought
5 into position to receive perforations from said means, connections from the cams to manipulative knobs for operating said cams, and springs acting on said frames in order to hold said tapes normally out of record receiving position.
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In testimony whereof I hereto affix my signature.

LYNUS CLYDE REYNOLDS.

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