May 31, 1960 J. L. DE BOO 2,938,583

PRINTING TELEGRAPH TAPE PERFORATOR

Filed Oct. 2, 1957

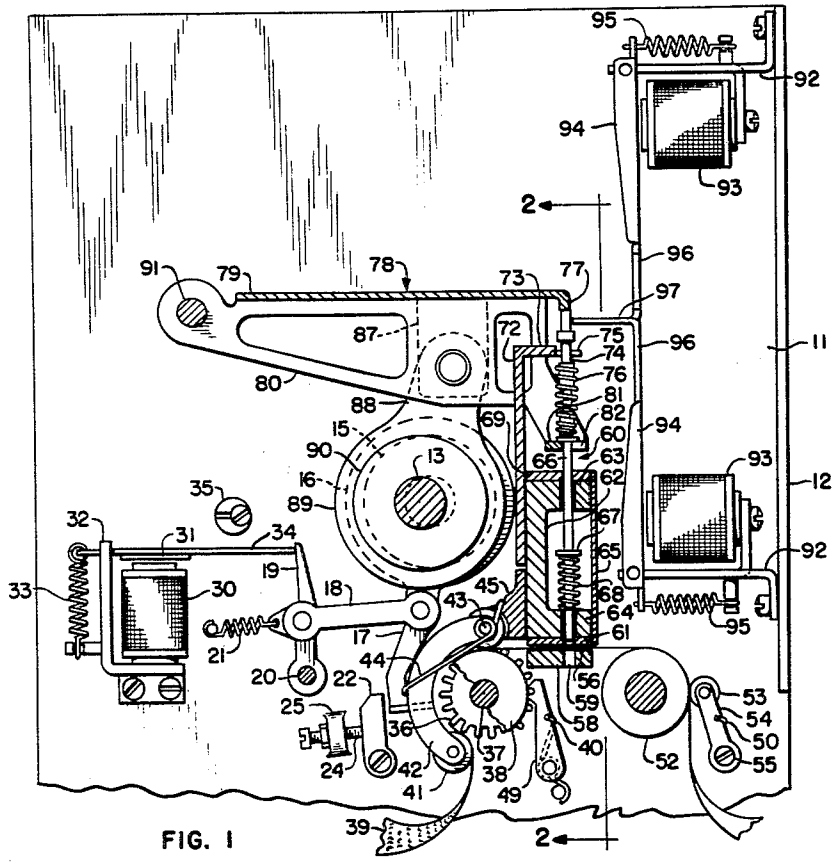

FIG. 1

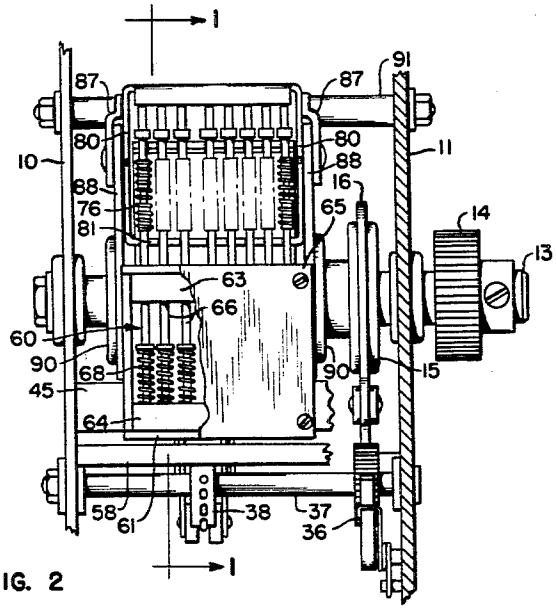

FIG. 2

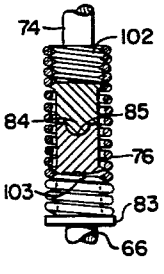

FIG. 4

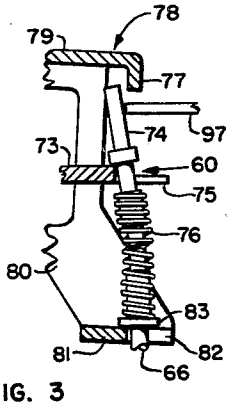

FIG. 3

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PRINTING TELEGRAPH TAPE PERFORATOR

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1 Claim. (Cl. 164—111)

This invention relates to perforating apparatus and more particularly to tape perforators having punch pins of a new and special construction which materially facilitates their selection for operation.

In the preparation of intelligence bearing tapes such as those used in data processing machines and printing telegraph apparatus, the conventional design of perforator selecting mechanisms has been rather massive in construction. As a consequence of this mass in the selecting mechanism it has been difficult to speed them up to the point where they meet requirements of high speed systems now being developed.

It is an object of the present invention to provide a perforating apparatus in which the selection of punches for actuation is effected with a minimum of moving parts.

In accordance with one embodiment of the invention for perforating a tape there is provided a constantly rotating shaft which through an eccentric drives a punch bail. A second eccentric on the shaft drives a tape feeding wheel in timed relation to reciprocation of the punch bail under control of an electromagnet which renders an eccentrically driven pawl operable to intermittently rotate the tape feeding wheel. A plurality of punches each formed in two portions or sections, resiliently urged into axial alignment one with another, have one of their portions held out of operative alignment with the punch bail by the armatures of de-energized electromagnets individual to them. When the electromagnets individual to the punches are energized they will permit the two portions of the punches to move into axial alignment, one with the other, and with the punch bail, thereby to operate those punches which have been selected and cause them to perforate the tape being intermittently fed past them.

A better understanding of the invention may be had by reference to the following detailed description when considered in conjunction with the accompanying drawing wherein:

Fig. 1 is a vertical sectional view taken through a perforating apparatus embodying the features of the invention, the section being taken substantially along line 1—1 of Fig. 2 in the direction of the arrows;

Fig. 2 is a vertical sectional view taken substantially along the line 2—2 of Fig. 1 in the direction of the arrows;

Fig. 3 is a detailed view showing details of construction of the special perforating pin, forming a part of the apparatus, and its relation to the punch bail; and

Fig. 4 is an enlarged view of the abutting ends of the two poritons of the punch showing the manner in which they are constructed.

Referring now to the drawing wherein like reference characters designate the same parts throughout the several views it will be seen that the apparatus has a pair of side plates 10 and 11 and an end plate 12 which support the various parts of the apparatus. Journaled in the side plates 10 and 11 is a shaft 13. The shaft 13 extends

an appreciable distance beyond the side plate 11 and has mounted on it a drive pulley 14 which may be driven by a belt (not shown) connected to any suitable motor drive (also not shown).

Mounted on the shaft 13, just inside the side wall 11, is an eccentric 15 which is surrounded by a crank ring 16, formed integrally with or suitably attached to a driving pawl 17. The driving pawl 17 is pivotally connected intermediate its ends to a link 18 that is in turn pivotally connected to a blocking lever 19 intermediate the ends of the blocking lever 19. Blocking lever 19 is pivoted on a pin 20 fixed to the side plate 11 and is urged to rock in a counterclockwise direction by a contractile spring 21 suitably fixed to the side plate 11.

The spring 21 tends to move not only the blocking lever 19 but also pawl 17 toward the left but the amount of movement of the pawl and the blocking lever 19 is limited by an adjustable stop member 22 pivotally mounted on a stud 23 and adjustably held in position by an adjusting screw 24 which is threaded into a boss 25 formed on or mounted on the side plate 11. Stop member 22 will block movement of the pawl 17 beyond a predetermined point and consequently will also control the amount which the blocking lever 19 can be rocked in a counterclockwise direction.

An electromagnet 30 suitably mounted on the side plate 11 has an armature 31 which is normally urged to pivot about a bracket 32 in a counterclockwise direction by a coiled spring 33. The armature 31 has a lever 34 mounted on it which, when the electromagnet 30 is de-energized, will be moved by the coiled spring 33, up into engagement with an adjustable stop 35. In Fig. 1 the electromagnet 30 is shown in its operated position where it has attracted its armature 31 and consequently has moved the lever 34 attached to the armature down into the path of the upper end of the blocking lever 19. When the blocking lever 19 is held in the position shown in Fig. 1, the pawl 17 will engage with and drive a toothed sprocket or ratchet wheel 36. The ratchet wheel 36 is mounted on a shaft 37 that is journaled in the side walls 10 and 11. The shaft 37 has fixed to it a feed wheel 38 which will engage feed perforations formed in a tape 39 to feed the tape step by step through the apparatus. The feed perforations in the tape 39 may be perforated in it by a feed hole punch which operates invariably each time the machine goes through its cycle as is usual in tape perforators of this general type and consequently has not been shown herein.

The tape feeding mechanism, just described, is described in more detail and claimed in the copending application of W. J. Zenner, Serial No. 656,045, filed April 30, 1957.

Each time the pawl 17 steps ratchet wheel 36 one place, the ratchet wheel will be held in that position by a spring pressed check pawl 49 which is mounted on the side plate 11 and urged against the ratchet wheel by a spring 40. The tape 39 is held in engagement with the feed wheel 38 by a roller 41 which is rotatably mounted on an arcuately shaped lever 42 that is pivoted on a shaft 43 and is urged to carry the roller 41 into engagement with the tape by a spring 44 which is wrapped around the pivot 43 and fixed to a support bracket 45 that extends across the apparatus between the plates 10 and 11 and serves to support the pivot shaft 43.

The tape 39, which is advanced step by step by the feed wheel 38, may be withdrawn from any suitable supply thereof and fed over a guide roller 52 against which the tape will be held by a spring pressed roller 53 mounted on a lever 54 which is urged to rock counterclockwise about a pivot stud 55 by a spring 50. The roller 52 and the feed wheel 38 serve to guide the tape

39 in its passage through a tape slot 56 formed in a punch block assemblage designated generally by numeral 57.

The punch block assemblage 57 comprises a die plate 58 having a plurality of die apertures 59 formed in it. In the present embodiment of the invention there are seven of these die apertures 59 provided to co-operate with seven punches 60 for perforating the tape. However it will be understood that any number of punches could be provided. The lower ends of the punches or perforators 60 are guided by a guide plate 61 suitably attached to the bottom surface of a guide block 62. The guide block 62, which is mounted on the bracket 45, has top and bottom guide portions 63 and 64 to which a face plate 65 may be attached to partially enclose a perforator portion 66 of each of the punches 60. The perforator portion 66 of the punch 60 has a cutting surface at its bottom edge and intermediate its ends has a slip collar 67 attached to it. A compression spring 68 encircles part of the perforator portion 66 of the punch 60 between the collar 67 and the portion 64 of the guide block 62 and normally tends to hold the punch 60 in the position shown in Fig. 1.

The top portion 63 of the guide block 62 has a plate 69 mounted on it which there are a series of guide holes for guiding the upper end of the perforator portion 66 of the punch 60. The holes in the guide plate 69 are vertically aligned with the die apertures 59 in the die plate 58.

The assemblage of the punch block 57 forms a unitary structure which is mounted on the support bracket 45 and has attached to its rear surface a plate 72 that is bent over at its upper end to provide a punch guide 73 which guides an actuator portion 74 of each of the punches 60. The actuator portions 74 of the punches 60 ride in slots 75 formed in the punch guide 73 and are normally held in alignment with the perforator portion 66 of the punch 60 by coiled springs 76 that tightly encircle the shanks of the punch portions 66 and 74 in the area thereof adjacent to bottom end of the portion 74 and the top end of the portion 66. As it will be seen most clearly by referring to Fig. 4, each of the punch portions 74 has a threaded, annular shoulder 102 formed on it and each portion 66 has a similar threaded shoulder 103 on it, onto which their associated coiled spring 76 is threaded. The spring 76 will thus urge the two portions toward each other and will tend to hold a rounded protuberance 84 formed on the lower end of the portion 74 in a rounded socket 85 formed in the end of the portion 66. Thus the portion 74 and the portion 66 of the punch 60 are normally held in axial alignment, one with the other, and with their adjacent ends in abutting relation.

The perforator portion 66 of each punch pin 60 has a flat surface at its upper end surrounding the socket 85 and the actuator portion 74 of each punch 60 has a flat perforator-portion-engaging surface at its bottom end surrounding the protuberance 84 whereby when the two portions of the punch 60 are held in axial alignment as shown in Fig. 1, by their springs 76, the upper end of the actuator portion 74 will present a flat surface in alignment with a vertically extending hammer portion 77 of a punch bail 78 so that those punches 60 which are held in the position shown in Fig. 1, by their respective springs 76 will, upon reciprocation of hammer 77, be actuated by the punch bail and will be driven through the tape 39.

The punch bail 78 comprises, in addition to the hammer portion 77, a top plate 79, a pair of side plates 80 and retractor plate 81. The retractor plate 81 is provided with a plurality of slots 82 through which the shanks of the perforator portion 66 of the punch 60 extend and the retractor plate 81 is attached to or formed integrally with the side plate 80. Each of the perforator portions 66 of the punches 60 has a collar 83 formed on it or mounted on it, which as shown most clearly in Fig. 3, will not pass through the slots 82 but will be engaged by the retractor plate 81 when the punch bail 78 oscillates in a counterclockwise direction thus to positively retract a punch 60 which has been driven downwardly by the punch bail 78.

A pair of brackets 87 is suitably attached to the punch bail 78 and serves as pivot supports for interconnecting the punch bail 78 with a pair of crank arms 88. The crank arms 88 have suitably attached to them, or formed integrally with them, crank rings 89 that, as shown most clearly in Fig. 1, encircle eccentrics 90 fixed to the shaft 13. Thus each time the shaft 13 rotates the punch bail 78 will be oscillated about a punch bail shaft 91 fixed to the plates 10 and 11.

A plurality of brackets 92 fixed to the end plate 12 serve to support a plurality of electromagnets 93 and also to pivotally support the armatures 94 of the electromagnets 93. The armatures 94 are urged to move away from the cores of their respective electromagnets 93 by coil springs 95 thereby to cause armature extensions 96 individual to them to rock to a position where horizontally disposed projections 97 on the armature extensions will rock the actuator portions 74 of punches 60 individual to them to the oblique portion shown in Fig. 3. In this position the actuator portion 74 of the punch 60 is out of axial alignment with the perforator portion 66 of the punch and also out of alignment with hammer portion 77 of the punch bail 78. In Fig. 1 the electromagnets 93 are shown in their energized condition, that is their marking condition and the electromagnets 93 have attracted their armatures 94 thus to withdraw the projections 97 from engagement with the actuator portions 74 of the punches 60. When this occurs the two portions 66 and 74 of the punch 60 will be axially aligned one with another and will be aligned with the hammer portion 77 of the punch bail 78. Consequently, when the punch bail 78 is oscillated about its pivot shaft 91 in a clockwise direction due to the operation of the crank arms 88 under the influence of eccentric 90, the punches will be driven downwardly and the perforator portions 66 of the punches 60 will be driven through the tape.

One electromagnet 93 is provided for each punch 60 and consequently the selective energization of the electromagnets 93 will cause the punches 60 to be selected in accordance with any code which is applied to the electromagnets 93 in the form of marking or spacing, that is energization or de-energization, respectively of the electromagnets 93, while the electromagnet 30 is energized. The energization of the electromagnet 30 will cause the tape to be fed step by step past the row of punches 60 in timed relation to the oscillation to the punch bail 78.

Although a specific embodiment of the invention has been shown and described herein it is to be understood that various modifications thereof may be made without departing from the scope of the present invention.

What is claimed is:

Record perforating apparatus comprising means for feeding a record medium step by step through a predetermined path, a punch bail, means for oscillating the punch bail in timed relation to the step-by-step feeding of the tape, a plurality of punches extending normal to the path of said tape and arranged in a row extending transversely of the path of movement of the tape, each of said punches having a cutting portion, an actuating portion in end-to-end abutting relation to said cutting portion and resilient means interconnecting said portions and urging them into axial alignment one with the other, an electromagnet individual to each of said punches and provided with an armature normally holding one end of said actuating portion of the associated punch out of operative relation with the punch bail by holding said actuating portion out of axial alignment with the cutting portion, said electromagnet being operable to relax its hold upon said one end of said actuating portion of the punch whereby said operating portion responds to the

urging of said resilient means and moves into operative relation with the punch bail and axial alignment with the cutting portion.

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