Sept. 16, 1941. R. A. LAKE 2,255,794

PRINTING PERFORATING TELEGRAPH APPARATUS

Filed May 20, 1939 2 Sheets-Sheet 1

FIG. 1

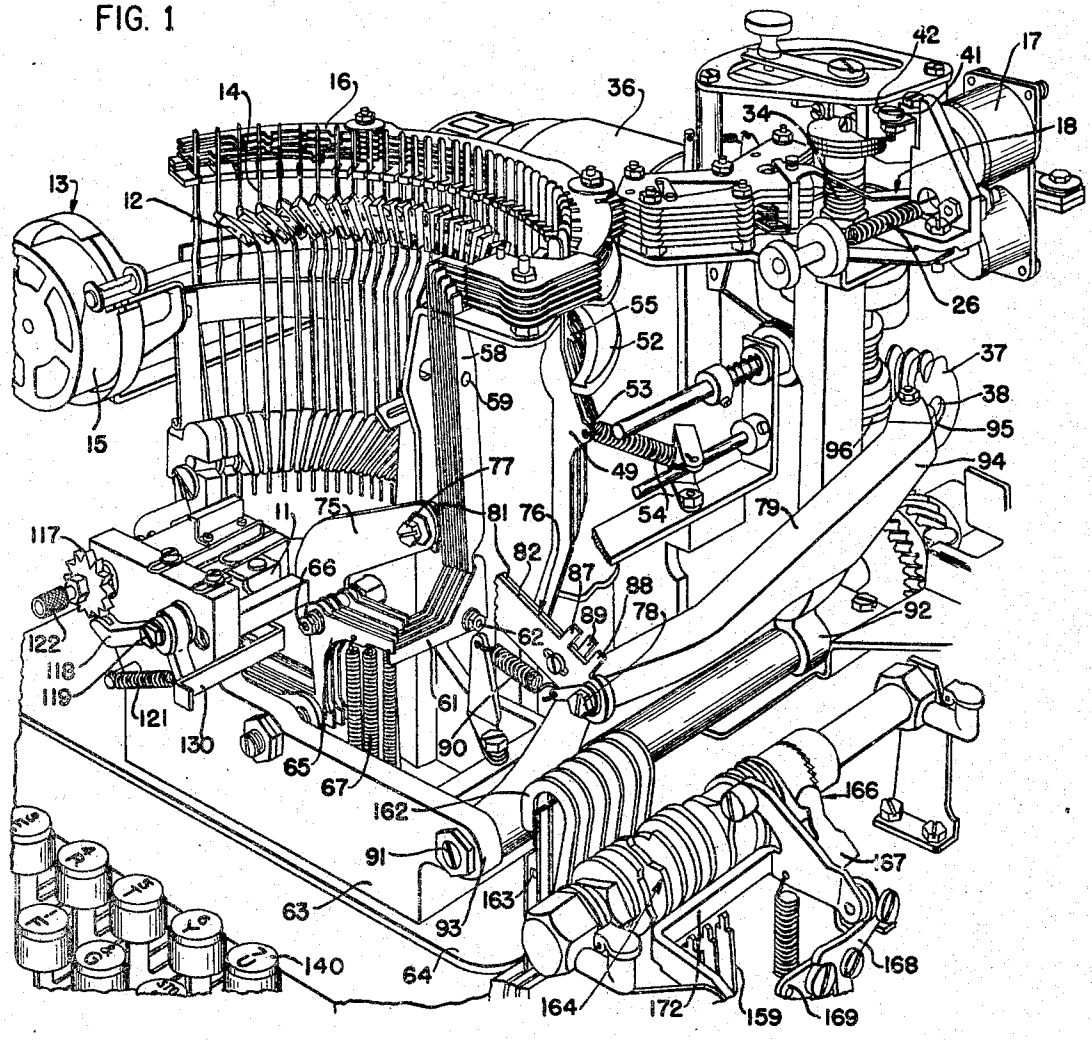

FIG. 11

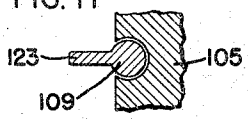

FIG. 13

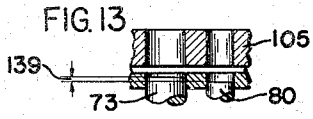

FIG. 12

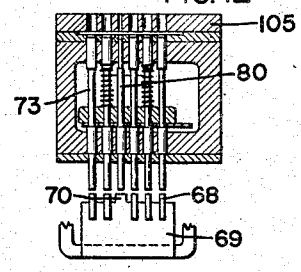

FIG. 14

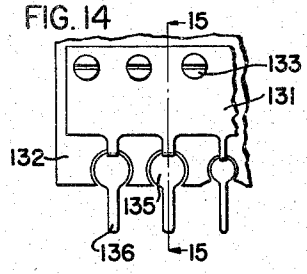

FIG. 15

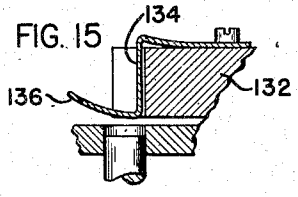

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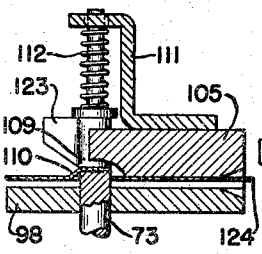
FIG. 10



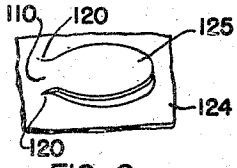


FIG. 9

FIG. 2

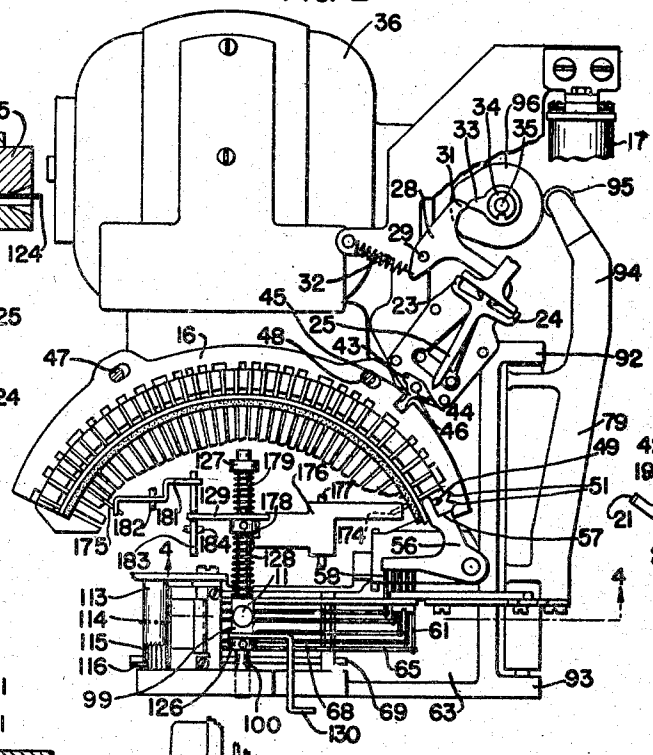


FIG. 3

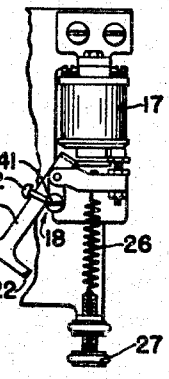
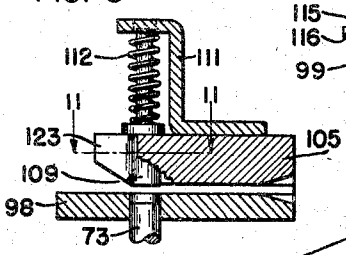


FIG. 5



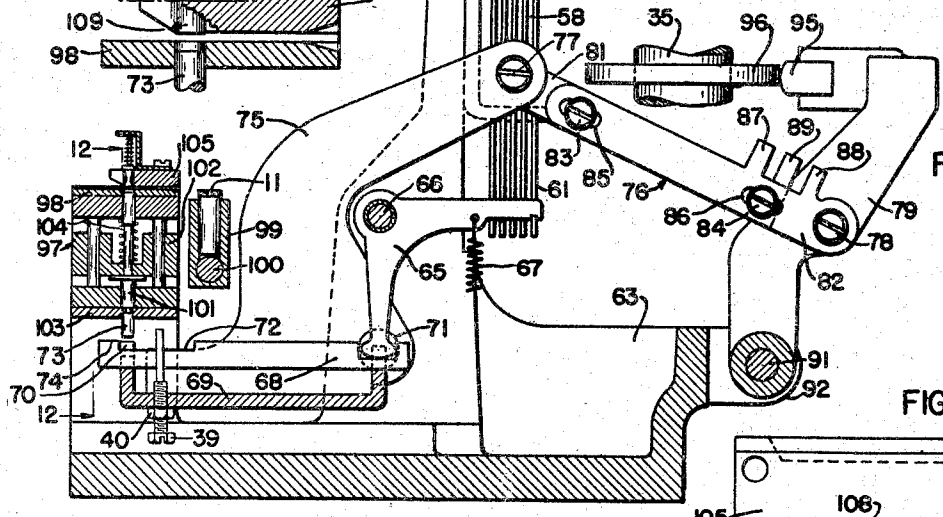


FIG. 4

FIG. 6

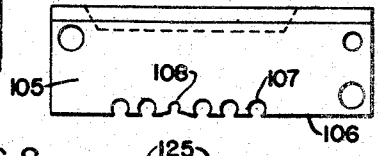


FIG. 7

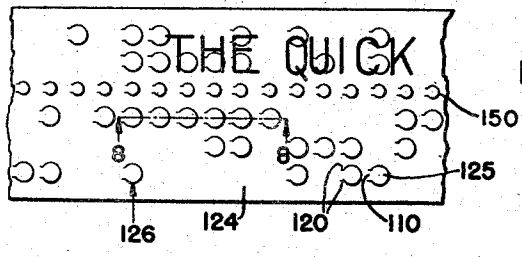
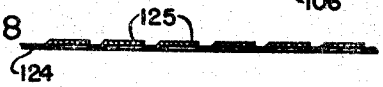


FIG. 8



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Patented Sept. 16, 1941 2,255,794

UNITED STATES PATENT OFFICE

2,255,794

PRINTING PERFORATING TELEGRAPH APPARATUS

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Application May 20, 1939, Serial No. 274,796

17 Claims. (Cl. 164—113)

The present invention pertains to printing telegraph apparatus and more particularly to combination printing and perforating apparatus for the simultaneous preparation of corresponding printed and perforated records.

The primary object of the present invention is to provide a combination printing and perforating apparatus capable of producing under the control of telegraph signals or otherwise, a printed record and code combinations of perforations representing the printed record on a single recording medium substantially simultaneously.

Another object of the invention resides in the provision of means for producing lidded apertures in a signal control strip and ejecting means for same dually functional to permit advance stepwise as well as reverse stepwise movement of the strip.

Prior devices of the type according to the present invention have been arranged to cut out the perforations completely at a single movement, thereby producing chads or pieces of waste material which often present difficult problems of disposal. To avoid the necessity of disposing of this waste material by preventing its formation, the present invention provides a perforating arrangement whereby the perforations are not completely cut out, but the chads are permitted to remain attached to the perforated material (for example, tape), the preferred arrangement being such that the punches are utilized to so pierce the material as to leave an uncut portion which serves as a hinge, thus resulting in a hinged lid which will yield to the sensing pins in a telegraph transmitter when the tape is employed for automatic control of signal transmission.

A salient advantage of producing a signal control strip having lidded apertures resides in the facility with which its proper insertability in the tape transmitter may be determined. With ordinary perforated tape one must be skilled in reading the code according to which the tape is perforated in order to place the said tape properly and correctly in the transmitting apparatus. This skill is not required in connection with the use of tape prepared according to the present invention. With the tape of this invention the lids are slightly in relief on the upper surface as an incident to the punching operation, and for this reason the upper surface of the tape can be readily recognized. In addition to this identifying characteristic is the further feature of providing the hinged portion of the lid on the advancing or leading side of the lidded aperture so that not only the upper side of the tape can be determined, but also its placement in the tape transmitter can readily be made to agree with the directional movement of the tape through the transmitter in accordance with the sequence of the message.

By this method of perforating the tape to produce lidded apertures instead of completely perforating it, tape of this variety is particularly useful in connection with a combination printer-perforator because the characters comprising the printed record may be printed over the lidded apertures and remain fully legible. Moreover, a further advantage resulting from this method of producing lidded apertures in the tape resides in the elimination of the problem of disposition of the waste material. Also, the design of punch blocks and punching structures is greatly simplified.

Essentially, to enable the preparation of signal control tape in accordance with the present invention, the punch block is modified by having a portion of the metal of the die plate surrounding each hole removed, which permits the corresponding edge of the resultant lid to remain uncut after operation of the punch. In order that the lid may be freed from the die plate to permit subsequent advancement of the tape by the tape advancing mechanism, a stripper or ejector, guided by the die plate and a bracket mounted thereon and operated by a compression spring, is provided for each punch in the punch block. Each ejector is also provided with a guide for facilitating the back-spacing of the tape.

An important feature in the design of the punch block for producing signal control strips having lidded apertures is the provision of means for maintaining uniform size and spacing of the tape feed holes.

Another feature resides in providing a positionally changeable platen wherein, due to each printing blow, the rotational position of the platen is automatically changed indeterminately.

Another feature of the invention resides in providing a combination printing and perforating apparatus, wherein printing and perforating is performed on the same tape or strip. In addition to the provision of perforated tape having lidded apertures, whereby the tape material is preserved so that the surface of the tape remains substantially intact, the printed record appears directly over the lidded apertures and is clearly readable. According to the present invention, a combination printing and perforat-

ing apparatus is provided wherein the punch interponents are controlled through the instrumentality of punch controller bell cranks operatively associated with the code bars, in such manner that the selection of the punch interponents is controlled by permitting or preventing under the control of the code bars the movement of the controller bell cranks.

A further feature resides in the provision of a dually controlled printing platen whereby the platen is shiftable manually, independently of the case shift mechanism, to render the platen accessible and readily interchangeable.

A more complete understanding of the foregoing objects and features of the invention may be had from the following description when taken in conjunction with the accompanying drawings, wherein like reference characters indicate the same parts throughout, and wherein,

Fig. 1 is a perspective view of the apparatus embodying the present invention;

Fig. 2 is a plan view of the apparatus shown in Fig. 1, with certain parts broken away for clarity;

Fig. 3 is a view of the selector magnet partially deleted from Fig. 2;

Fig. 4 is a sectional view taken substantially on line 4—4 of Fig. 2;

Fig. 5 is an enlarged sectional view of a portion of the punch block;

Fig. 6 is an enlarged plan view of the die plate according to the present invention;

Fig. 7 is an enlarged plan view of a strip of printed tape perforated in accordance with the method of the present invention;

Fig. 8 is an enlarged sectional view taken on line 8—8 of Fig. 7;

Fig. 9 is an enlarged perspective view of a portion of the signal control strip, produced according to the present invention, to show a lidded aperture;

Fig. 10 is a view similar to Fig. 5 showing punch elements in operated position;

Fig. 11 is a sectional view taken on line 11—11 of Fig. 5;

Fig. 12 is a view taken on line 12—12 of Fig. 4 with ejectors removed;

Fig. 13 is an enlarged view showing the relation between the feed hole punch and the code hole punches;

Fig. 14 is an enlarged fragmental plan view of the punch block showing a modified form of ejector; and

Fig. 15 is an enlarged sectional view taken on line 15—15 of Fig. 14.

Since the disclosure herein set forth is in the nature of an improvement of the printing telegraph receiver disclosed in U. S. Patent 1,745,633, or similar printer mechanisms operative to properly select the various type elements, move the tape forward, move and reverse the inking ribbon (as on a standard typewriter), and shift the platen for figure case characters, only so much of the mechanism of said patent will be hereinafter set forth as is necessary to an understanding of the present invention. Reference may be had to said patent for a full understanding of the printer mechanism not described hereinafter in detail.

The present invention provides perforating mechanism adapted for association with a printer, the purpose of which is to co-operate with the printing mechanism in such a manner as to perforate a tape so as to provide lidded apertures. The printed message corresponding to the perforated record appears on said tape directly over the hinged lids and remains fully readable. The present invention, of course, is not limited to the type of printer exemplified by the afore-mentioned patent, but any printer to which the invention is applicable is contemplated.

As disclosed in the above-mentioned patent, the platen 11 (Figs. 1, 2 and 4) over which the paper tape passes from right to left is located in the front and central part of the apparatus. However, the platen used in this invention is of different construction, comprising as will hereinafter appear, a cylindrical plunger carried in a rectangular block and shiftable in the manner set forth in said patent.

Arranged above the platen 11 is the ribbon feed mechanism indicated generally as 13, the left spool only of which is shown in Fig. 1. The inking ribbon 15 is directed in well-known manner over platen 11 from one spool to the other; automatic ribbon reversing mechanism also being provided. Type bars 12 are positioned to the rear of the platen and are arranged for striking forwardly and downwardly. Just to the rear of the type bars 12 is a series of notched code bars 16 which in the present instance are substantially semicircular in shape. Actuating bars 14 for operating the type bars 12 are located immediately in front of the code bars 16, and are adapted to be pulled one at a time into the alignment of notches in the code bars 16 when the notches are selectively aligned for a particular character or function. As indicated in said patent, the actuating bars 14 are articulated to the type bars 12 through a gear and rack means. The selecting mechanism for selectively operating the code bars 16 is of the sword-and-T type, fully disclosed in said patent. Briefly, this selector mechanism comprises a selecting or receiving electromagnet 17 (Figs. 1, 2 and 3), the armature lever 18 of which comprises a selecting arm 19 having abutments 21 and 22 which co-operate with abutments 23 and 24 of a series of swords 25. The armature lever 18 is responsive under certain conditions to the energization of the magnet 17 (for example, upon receipt of marking or current impulses) and under other conditions to the pull of a spring 26 (for example, upon the receipt of no current or spacing impulses), the tension of spring 26 being adjustable by means of screw 27. The swords 25, of which there is a plurality corresponding in number to the series of code bars 16, are brought into operative engagement with the selector arm 19 by their individual operating levers 28 pivoted on a common pivot rod 29. Swords 25 are pivotally articulated by a socket connection to their individual levers 28. Each of the levers 28 is provided with an arm 31 and is normally biased in a clockwise direction about the pivot 29 by a spring 32. Arms 31 co-operate with a series of helically arranged projections 33 on a selector cam drum 34, which is frictionally driven by a main operating shaft 35 located in a perpendicular position at the rear and to the right of the code bars 16. The main operating shaft 35 is driven continuously by a motor 36 through a pinion 37, secured to the motor shaft 38, which pinion meshes with a gear (not shown) operatively associated with shaft 35.

As fully described in the afore-mentioned patent, the cam drum 34 is initiated into rotation upon receipt of a starting impulse which causes the de-energization of the magnet 17, thereby releasing the armature lever 18 which then responds to the pull of the spring 26 to rotate the

lever 18 in a clockwise direction. Upon this movement, an eccentric screw 41 (Fig. 3) co-operates with a plunger 42 which acts in the manner shown in Fig. 5 of U. S. Patent No. 1,884,743 to release, through a lever arrangement, a stop arm (not shown) to initiate rotation of cam 34.

The speed of rotation of selector cam drum 34 is synchronized with the speed of code impulsing so that as the armature lever 18 is operated in response to received impulses, a cam 33 acts upon its associated lever 28 to rock it counterclockwise (as viewed in Fig. 2) to bring its sword 25 against selector arm 19. Sword 25 will be swung clockwise or counterclockwise, depending on whether abutments 21 and 23 or 22 and 24 co-operate; for example, if abutments 21 and 23 co-operate, then the sword 25 will be swung in a counterclockwise direction and will assume the position shown in Fig. 2. On the other hand, if abutments 22 and 24 co-operate, then sword 25 will be swung in a clockwise direction to assume the opposite position. After the sword 25 has been set in accordance with the nature of the signal impulse and the cam 33 passes out of operative engagement with arm 31, the lever 28 will be actuated in a clockwise direction by its spring 32, carrying its associated sword 25 along with it to impinge the sword 25 against arm 43 or 44 of a T-lever 45 pivoted at 46, thus rocking the T-lever 45 in a clockwise or counterclockwise direction. Each of the T-levers 45 is pivotally articulated to a code bar 16 so that when a T-lever 45 is actuated in a clockwise or counterclockwise direction, its associated code bar is actuated leftwardly or rightwardly, respectively, on studs 47 and 48. Accordingly, with the selecting mechanism just described, the code bars 16 are set selectively in their rightward or leftward positions in response to the impulses of a code signal.

As described in Patent 1,745,633, the setting of the code bars 16 is maintained during the printing operation by a detent or locking means. Accordingly, a locking bar 49 is provided which co-operates with beveled notches 51 on code bars 16. Bar 49 is pivotally mounted and is moved into and out of engagement with the code bars 16 as the striker bar or operating bail 52 is raised and lowered. The bail 52 is operated by a cam (not shown) on the main shaft 35, in a manner described in Patent 1,745,633. When the bail 52 is in its lowermost position, it co-operates with the beveled edges 53 of the bars 14 and 49 to hold such bars out of engagement with the code bars 16 so that the code bars 16 may be readily shifted in accordance with the operation of the selector mechanism. When the bail 52 is operated upwardly to perform a printing operation, the bars 14 and 49, due to the beveled edge 53, are permitted gradually to be actuated toward the code bars 16 by their individual springs 54. The actuating bars 14 are provided with a hook portion 55 which co-operates with the bail 52, which in its upward movement engages said hook 55 to lift the actuating bar 14, which through the rack and pinion engagement with the type bar causes the type bar to rotate about its pivot to bring the type face downwardly to impinge upon the platen 11. The locking bar 49 is not provided with a hook portion 55. Its function is merely to rock on its pivot toward and away from the code bars 16 under the control of the bail 52 to lock the code bars 16 in their set position during the printing operation.

According to the present invention the locking bar 49, while held in its position away from the code bars 16 when the bail 52 is in its lowermost position, co-operates with a series of bell cranks 56 (Fig. 2) to hold said bell cranks in counterclockwise position. Bell cranks 56 are provided with shouldered portions 57 through the instrumentality of which the bell cranks 56 are permitted or prevented by code bars 16 from rotating to their clockwise position. That is, if any one of the code bars 16 is set in the position indicated in Fig. 2, and the locking bar 49 is permitted to enter the V notch, the bell crank 56 associated therewith is blocked through the impingement of shoulder 57 upon the end of the associated code bar 16. On the other hand, if a code bar 16 assumes its leftward position, the bell crank 56 associated therewith would not be blocked, but would rotate clockwise in response to spring tension hereinafter indicated and follow the movement of the locking bar 49. As viewed in Fig. 1 it is observed that there is provided a bell crank 56 for each of the code bars 16.

Co-operating with each of the bell cranks 56 is a vertical lever 58 pivoted on a common stud 59. The upper end of each of the levers 58 co-operates with an arm of its associated bell crank 56. The lower ends of levers 58 co-operate with a corresponding series of bell cranks 61 pivotally carried on a common shaft 62. Levers 58 and 61 are pivotally mounted on a bracket 63 secured to base plate 64. The series of bell crank levers 61 co-operates with a corresponding series of bell crank levers 65, pivotally supported on a pivot stud 66 secured to the bracket 63. The bell crank levers 65 are normally urged in a clockwise direction by individual springs 67. The springs 67 associated with the bell crank levers 65 also serve to impart, through their co-operative relationship, rotational movement to levers 61, 58, and 56. The depending arms of bell crank levers 65 are provided with enlarged portions which fit into corresponding notches in a series of interponents 68 (Fig. 4), whereby the bell crank levers 65 are pivotally articulated to the interponents 68. Interponents 68 are slidably arranged in a cradle 69 pivoted at 71 to the bracket 63 and are provided near the left-hand upper edge with a cut-away portion 72 adapted to clear associated punches 73 when said interponents are in a certain operative position. Interponents 68 terminate at the left ends thereof with an enlarged portion 74 whereby they are adapted to co-operate with the punches 73 when the interponents 68 are operated to their rightward position, as viewed in Fig. 4. Cradle 69 is provided with a projection 70 (Fig. 12) adapted to co-operate with a feed hole punch 80 to invariably perforate a tape-feed hole in the tape 124 for each operation of the perforating mechanism. When the bell crank levers 56 are held in their counterclockwise position shown in Fig. 2, the interponents 68 assume their rightward or marking position. Conversely, when the bell crank levers 56 assume their clockwise position, interponents 68 assume their leftward or spacing position shown in Fig. 4.

Cradle 69 is provided with an arm 75 projecting upwardly, to the extremity of which is pivotally connected an extensible link indicated generally as 76; one end of link 76 being pivoted at 77 to arm 75 and the other end of link 76 being pivotally connected at 78 to a perforator operating lever 79. In the present form of the invention, the link 76 comprises one part 81 piv-

oted at 77 to arm 75 and a part 82 pivoted at 78 to the operating lever 79. Parts 81 and 82 are slidably connected and adjustably mounted on clamp screws 83 and 84 disposed in slots 85 and 86 in part 82. Portion 82 of link 76 is provided with a pair of spaced lugs 87 and 88, the portion 81 being provided with a single lug 89 adapted to be positioned between lugs 87 and 88. In this manner, the length of link 76 may be readily adjusted by loosening the clamp screws 83 and 84 and inserting a screwdriver or similar instrument between lugs 87 and 89 or 88 and 89, depending upon whether link 76 is to be lengthened or shortened, and twisting said instrument until the proper length is attained, whereafter the clamp screws are tightened.

The operating lever 79 is pivotally mounted on a pivot rod 91 supported in arms 92 and 93 of bracket 63. As viewed in Fig. 2, the operating lever 79 is provided with an extension 94, at the extremity of which is mounted a cam follower roller 95 which co-operates with the operating cam 96 carried on the main operating shaft 35. A spring 90 acts upon lever 79 to hold cam roller 95 against the periphery of cam 96.

Supported in the bracket 63 is a punch block indicated generally as 97 in which is carried a series of punch elements 73. Each of the punches 73 is provided with an enlarged section 101, the upper edge of which co-operates with a stripper member 102 and the lower edge of which co-operates with a backstop plate 103. Stripper member 102 is urged downwardly by springs 104, to thereby hold the punches 73 in their lower positions free of the die plate 105. As shown in the enlarged sectional view, Fig. 5, the punch 73 is shown fitted into a guide plate 98 with its upper face disposed slightly below the upper surface of said guide plate. Disposed above the guide plate 98 is the die plate 105, shown in plan view in Fig. 6. The die plate 105 is sheared along edge 106 as to remove a portion of the metal surrounding each of the holes 107 and 108; holes 107 being representative of the code punch holes and hole 108 representing the feed punch hole. When the die plate 105 is arranged above the die plate 98, as shown in Fig. 5, the punches 73, when operated upwardly into co-operation with the die plate 105 (as indicated in Fig. 10) will cut away only a portion of the tape material, leaving a small hinge portion 110 at the left side of the punch uncut (as viewed in Fig. 7), thus forcing the partially perforated lid, formed by each punch, upwardly into the die plateholes. During the punching operation, a slight tearing or shearing occurs at the point 120 (Figs. 7 and 9) of the hinge 110 (Fig. 10), as well as a very slight stretching of the tape material. To limit the clockwise movement of the cradle 69, a stop 39 is provided adjacent the punch block 97. Stop 39 is adjustably carried in cradle 69, a lock nut 40 being provided to lock said stop in adjusted position.

To minimize tearing of the tape material at the feed holes 108, the feed hole punch 80 (Fig. 13) is made slightly shorter at 139; for example .010 inch, so that when the perforator is adjusted to just perforate a feed hole, which is the preferred adjustment, the code holes (produced by the code punches 73) will all definitely be punched through the tape. It is known that due to manufacturing tolerances the code punches 73 vary slightly in length, and since this variance in length causes these code hole punches to penetrate various distances through the tape, there will result (within small limits, of course) various degrees of tearing at point 120. This, however, is not detrimental in the case of the code holes because the tape sensing pins of the tape transmitter are smaller in diameter than the code holes in the tape. The function of the tape feed holes, on the other hand, is different in that the size and spacing of the feed holes must be practically constant, and it is desirable to minimize as far as possible any variation therein due to tearing at the hinge. It has been found that this manner of punching the feed holes assures uniform and invariable spacing thereof and hence insures proper co-operation with the tape feeding mechanism of both the tape perforator and tape transmitter.

To eject the hinged lid thus formed from the die plate 105, a stripper member 109 is provided to co-operate with each punch 73. Strippers or ejectors 109 are arranged to be guided at their lower ends by the die plate 105 and at their upper ends by a Z-shaped bracket 111 attached to the plate 105, and a compression spring 112 is provided for each ejector 109 to urge the ejectors 109 downwardly. The ejectors 109 when in their downward position are adapted to extend slightly below the dieplates 105 so as to insure the ejection of the hinged lid produced in the material or tape worked upon. After ejection in this manner the hinged lids are slightly in relief, as a result of which the upper surface of the tape may be readily determined.

It is understood, that the resultant position of the lid 125 with respect to the strip 124 is dependent upon the properties of the material of which the strip is composed, as well as the thickness thereof. For example, in a paper strip, the lids 125 take the form or position substantially as shown in Fig. 9, due to the inherent characteristics of the paper, such as thinness and resilience. As the quality of the material worked upon tends toward softness, the lids 125 assume a position in relief, substantially as shown in Fig. 8, wherein the plane of the lid 125 would tend toward parallelism with the plane of the body of the material or strip 124.

The tape, after being partially perforated in this manner, passes over a tape feed roller 113 which is provided with a series of spaced feed pins or projections 114 adapted to co-operate with the lidded feed holes formed by the feed punch and die plate. The feed roll 113 is provided with a series of toothed grooves 115 which co-operate with a tape feed pawl 116 pivotally carried on the cradle 69 in well-known manner. Fixed to the shaft to which the feed roller 113 is secured is a star wheel 117 (Fig. 1) which co-operates with a detent member 118, pivoted at 119 to the bracket 63, having a spring 121 which urges the detent roller into engagement with the star wheel 117. Fixed to the star wheel 117 is a thumb portion 122, whereby the feed roller 115 may be rotated manually either clockwise or counterclockwise. Therefore, to perform a backspacing operation, the thumb portion 122 is rotated clockwise so as to move the tape rightwardly, as viewed in Fig. 5. In order that the perforated tape may be readily moved rightwardly for a backspacing operation, each of the ejector members 109 is provided with a wing portion 123 (Figs. 5 and 11) having an inclined lower edge, so that as the tape is moved rightwardly, any of the hinged lids which may be

projecting upwardly at an angle will be cammed downwardly by the wing portion 123 so as to clear the die plate 105.

In Figs. 7, 8, and 9 is illustrated a portion of the tape printed and/or perforated in accordance with the present invention. The tape 124 is perforated in such a manner that the lids 125 are not completely severed but are hinged or attached at their left sides to the tape material so that when the tape is introduced into a tape transmitter, the sensing pins will force the lids 125 upwardly and the pins will protrude through the opening provided therefor. As shown in Fig. 7, the printing appears directly over the hinged lids as if the tape had not been perforated and is readily legible. In the specific embodiment of the invention herein shown, the perforated code combination is six steps in advance of the corresponding printed character. That is, the code combination represented by the transverse row 126, Fig. 7, corresponds to the letter "Q" in the word "Quick." Of course, it is understood that if a wider tape is provided, the characters printed can be printed adjacent to the transverse row of code combinations of perforations corresponding thereto. It is conceivable that tape having prepunched feed holes would be desirable under certain conditions. In this event, the feed hole 150 (Fig. 7) would be indicated as fully perforated instead of being provided with a hinged lid. Moreover, although in the present embodiment the perforated record precedes the corresponding printed record, it is possible to position the punch block 97 to the right of the platen 11, as viewed in Fig. 4, whereby the printed record would precede the corresponding perforated record.

As indicated in Fig. 1 each type bar 12 is provided with two type faces, thus necessitating a case shift mechanism, which comprises means for shifting the platen 11. As shown in Fig. 4 the platen 11 is illustrated as consisting of a cylinder capped with a hard rubber (or other suitable) printing surface. Platen 11 is removably held in a block 99 slidably mounted on a shaft 100 which, in turn, is slidably supported in brackets 63 and 127. Fixed to shaft 100 is a collar 126 against which the block 99 is held by a spring 128 surrounding said shaft and compressed between block 99 and a shift arm 129 also fixed to said shaft. Block 99 is slidable rearwardly on shaft 100, through the instrumentality of an arm 130 fixed thereto, against the action of spring 128, to bring the platen 11 from beneath the tape and inking ribbon, so that said platen thereby becomes accessible for ready removability and interchangeability. The platen 11 is also shiftable under the control of received code signals through the medium of shift actuating bar 174 and unshift actuating bar 175. Platen 11 is shown in Fig. 2 in its unshift or "letters" position. To shift the platen 11 to "figures" position, the actuating bar 174 is selected, which when picked up by the bail 52 is raised to rock lever 176 about its pivot 177 to lower its end 178 to effect the disengagement thereof from shift arm 129, whereupon spring 179 compressed between bracket 127 and arm 129 causes shaft 100 to be moved forwardly until collar 126 thereon strikes against bracket 63. Since the relation between shift arm 129 and block 99 is unchanged, due to the compressive action of spring 128, block 99 is shifted with the shaft 100 to bring platen 11 into the shift or "figures" position. To return platen 11 to the "letters" or unshift position (shown in Fig. 2) the actuating bar 175 is selected, which when raised by bail 52 rocks lever 181 about pivot 182, and in turn rocks member 183 about its pivot 184 to actuate shift arm 129 rearwardly until arm 129 is again latched by end 178 of lever 176. It is manifest that platen 11 is shiftable under two operating conditions, one selectively in response to received code signals to shift or unshift position, and the other manually through the instrumentality of arm 130 to render the platen 11 accessible and interchangeable.

The platen 11 is in the form of a cylindrical plunger and is adapted to fit loosely in block 99. Platen 11 is capped with a substantially resilient printing surface so that upon each printing stroke of a type bar, its type face impinges against the printing surface of the platen, causing said platen to bounce and vibrate slightly, thereby disturbing its position and causing it, when it shall have come to rest, to have changed or altered its angular position somewhat. This action causes the platen 11 to present a new and/or different angular position to the printing element, thus tending to preserve the printing surface and prolong the life of the platen cap.

General Operation

In the operation of the apparatus according to the present invention, the motor 36 is considered to be running continuously, thus rotating the main operating shaft 35. Carried on the main operating shaft 35 are sleeve members rotatably associated therewith through clutch members, as disclosed in Patent 1,745,633, which sleeves are normally held against rotation. The selector magnet 17 is normally energized so that upon the receipt of a start impulse of spacing nature, the magnet 17 is de-energized and its armature lever 18 is released under the tension of spring 26 whereby the stud 41 thereon urges the plunger 42 leftwardly to release through a series of levers (not shown) the sleeve members on the shaft 45 for rotation in timed relation to each other. As indicated in the Patent 1,745,633, the cam drum selector 34 is released for rotation so that the cam projections 33 thereon operate levers 28 in such a manner that through the co-operation of selector arm 19 therewith the swords 25 are caused to abut said arm 19 and are actuated to one or the other of their selective positions. The operative relationship of the abutments on the swords 45 and selector lever 19 are determinative of the positions of said swords to operate the T-levers 45 to one or the other of their operative positions, the T-levers in turn actuating the code bars 16 to their rightward or leftward position in accordance with the received code combination.

In timed relation with the rotation of cam drum 34, the sleeve carrying the cam (not shown) for performing the several functions of the printer and the operating cam 96 is initiated into rotation. The cam (not shown) operates through mechanism, not here shown but described and shown in said Patent 1,745,633 to reciprocate the bail 52 which, on its upward movement, permits the actuating bars 14 to respond to the pull of their individual springs to be urged into engagement with the code bars 16, one of these actuating bars finding an alignment of slots or notches in the code bars 16 and thus traveling or rotating farther so as to bring its hook portion 55 into the path of the bail 52, so that the bail 52 is in its upward movement,

picks up the hook portion 55 and raises the selected actuating bar to effect rotation of the type bar 12 associated therewith through its rack and pinion connection. The type pallet on the type bar 12 is therefore caused to impinge upon the platen 11 to print a character on the tape interposed therebetween, at the same time causing the platen 11 to alter its printing position somewhat.

Simultaneously with the actuation of the type bar for printing a character through the operation of the actuating bar 14 by bail 52, the locking bar 49 is permitted to respond to the pull of its spring 54 so that the upper edge of the locking bar 49 moves into the V notches 51 in the code bars 16. In so doing, the levers 56 are permitted to follow this movement of the locking bar 49 in response to the action of spring 67 (Fig. 1). However, when any one of the code bars 16 is in its rightward position, the shoulder 57 of lever 56 will strike against said code bar and the corresponding bell crank lever 56 will be blocked against movement. Therefore, the levers 58, bell crank levers 61 and 65, and interponents 68 associated therewith will have no motion or movement imparted thereto and will assume the position opposite to that shown in Fig. 4, that is, with the portion 74 of interponent 68 in register with the punch 73. However, when any one of the code bars 16 is in its leftward position, the shoulder 57 of the lever 56 will not be blocked by its associated code bar 16 and will be permitted to rotate in a clockwise direction under the action of spring 67 through the interconnected levers 65, 61, and 58. This movement will cause the interponent 68 (Fig. 4) associated therewith to be actuated leftwardly to bring the portion 74 of the interponent 68 out of register or alignment with the punch 73. In proper timed relation with these operations, the cam 96 for operating the perforator will actuate the perforating lever 79 clockwise, as viewed in Fig. 4, so that through the link 76, the cradle 69 will be rocked clockwise to bring all of the interponents 68, which have not been moved, into engagement with their respective punches 73, thus urging said punches upwardly through the tape. As the cradle 69 is permitted to rock backward to its counterclockwise position, the stripper plate 104 acts to withdraw the punches 73, and the ejectors 109 act to expel the hinged lids from the die plate 105. Thus, there is produced with the present invention a printed and perforated tape, as shown in Fig. 7.

Modification

A modified form of ejector or stripper is shown in Figs. 14 and 15 and comprises flat spring material so conformed as to have a portion 131 attached to the die plate 132 by screws 133. Integral with base portion 131 are a plurality of projections (equal to the number of holes in the die plate 132) comprising a stem portion 134, a flat annular portion 135 and a projection 136. The projection 136 is analogous in purpose to the wing 123 of the form of ejector shown in Fig. 5.

Although the present invention has been shown and described in connection with certain specific embodiments thereof, it is of course understood that such disclosure is merely illustrative and not restrictive, reference being had to the appended claims to determine the scope of the invention, and all variations coming within the range of equivalency of the appended claims are deemed to be embraced within the purview of the appended claims.

What is claimed is:

1. In combination, a plurality of punches, a die plate cooperating therewith having a corresponding plurality of holes, said die plate having a portion thereof so sheared off as to remove from each hole a similar segmental portion thereof whereby upon the co-operation of said punches and die plate hinged lids are formed in strip material, and a corresponding plurality of resilient-arm ejectors carried by said die plate to automatically level said lids substantially into the plane of the strip material.

2. In combination, a plurality of circular punches, a die plate therefor having a corresponding plurality of holes, said die plate having a portion thereof so sheared off as to remove from each hole a segmental portion thereof, whereby upon the cooperation of said punches and die plate hinged lids are formed in the worked material, and a corresponding plurality of flat spring ejectors adapted to level said lids substantially into the plane of the worked material to facilitate shifting of said material between successive operations.

3. In combination, a mechanism comprising a plurality of code bars displaceable in accordance with a predetermined code, a plurality of levers movable into selective position independently of said code bars, a member operable solely to govern the selective positionment of said levers in accordance with the setting of said code bars, a plurality of punches, punch interponents controlled by said levers, and means for producing a perforated record through the operation of said interponents and punches corresponding to the selective positionment of said levers.

4. In combination, a mechanism comprising a plurality of code bars displaceable in accordance with a predetermined code, a plurality of levers cooperable with said code bars, a member effective to govern the positionment of said levers in accordance with the setting of said code bars, a plurality of punches, punch interponents controlled by said levers, and a die plate so conformed as to cooperate with said punches to produce under the control of said interponents lidded apertures in a record strip.

5. In combination, a mechanism comprising a plurality of code bars displaceable in accordance with a predetermined code, a plurality of levers movable into selective position independently of said code bars, a member effective solely to govern permissively the selective positionment of said levers in accordance with the setting of said code bars, a plurality of punches, punch interponents controlled by said levers, and a die plate cooperative with said punches to produce under the control of said interponents apertures in a record strip corresponding to the selective positionment of said levers.

6. In combination, a mechanism comprising a plurality of code bars displaceable in accordance with a predetermined code, printing means, a plurality of levers cooperable with said code bars, a member effective to govern permissively the positionment of said levers in accordance with the setting of said code bars, a plurality of punches, punch interponents controlled by said levers, a die plate so conformed as to cooperate with said punches to produce lidded apertures in a record strip in conformance with the operation of the printing means through the operation

of said interponents and punches, spring loaded ejectors cooperative with said punches to level said lids substantially into the plane of said strip, whereby said lidded apertures facilitate the superimposition of the printed record on said perforated record, thereby preserving the legibility of the printed record.

7. In combination, means for producing lidded apertures in a signal control strip comprising punch and die means and ejecting means for facilitating the advancement of said strip stepwise following each operation of said first recited means, and means associated with said ejecting means for guiding the lids of said apertures to facilitate the reverse stepwise movement of said strip.

8. In combination, means for producing lidded apertures in a signal control strip comprising punch and die means, strip advancing means, ejecting means cooperable with said punch and die means to facilitate the operation of said advancing means, and means associated with said ejecting means for guiding the lids of said apertures to facilitate the reverse movement of said strip advancing means.

9. In combination, means for producing lidded apertures in a tape comprising punch and die means, tape feeding means, ejecting means cooperable with said punch and die means to facilitate the normal operation of said feeding means, and means associated with said ejecting means for guiding the lids of said apertures to facilitate the reverse movement of said tape feeding means.

10. In combination, means for producing lidded apertures in a tape comprising punch and die means, tape feeding means, spring loaded ejectors cooperative with said punch and die means to level the lids of said apertures substantially into the plane of said strip to facilitate the normal progressive operation of said feeding means, and means associated with said ejectors for guiding said lids to facilitate the reverse movement of said tape feeding means.

11. In combination, a mechanism comprising a plurality of code bars displaceable in accordance with a predetermined code, a plurality of levers cooperable with said code bars, a member effective to govern the positionment of said levers in accordance with the setting of said code bars, a plurality of punches, punch interponents controlled by said levers, means for supporting said interponents, a die plate so conformed as to cooperate with said punches to produce, under the control of said interponents by said means, lidded apertures in a record strip, and means for limiting the movement of said means to preserve the uniformity of conformation of the lids of said apertures.

12. In a recorder, having a plurality of code bars, means for setting said bars in predetermined combinations, a plurality of punch controlling elements movable into selective position independently of said code bars, means effective solely to govern permissively the selective positionment of said elements in accordance with the setting of said code bars, and perforating mechanism effective under the control of said elements to produce apertures in a record strip corresponding to the selective positionment of said elements.

13. In a recorder, having a plurality of code bars, means for setting said bars in predetermined combinations, a plurality of punch controlling elements cooperable with said code bars, means effective to govern permissively the positionment of said elements in accordance with the setting of said code bars, a plurality of punches, punch interponents controlled by said levers, and a die plate so conformed as to cooperate with said punches to produce, under the control of said interponents by said elements, lidded apertures in a record strip.

14. In a recorder, having a plurality of code bars, means for setting said bars in predetermined combinations, a plurality of punch controlling elements movable into selective position independently of said code bars, means effective solely to govern the blocking or non-blocking of said elements by said code bars according to the setting of said code bars, and perforating mechanism effective under the control of said elements to produce apertures in a record strip corresponding to the selective positionment of said elements.

15. In a recorder, having a plurality of code bars, means for setting said bars in predetermined combinations, a plurality of punch controlling elements cooperable with said code bars, means effective under certain operating conditions to restrain said elements against cooperation with said code bars, said means effective under other operating conditions to enable said cooperation to permit or prevent movement of said elements according to the permutative setting of said code bars, and perforating mechanism effective under the control of said elements to produce apertures in a record strip corresponding to the movement of said elements.

16. In combination, a plurality of circular punches, a die plate therefor having a corresponding plurality of holes, said die plate having a portion thereof so sheared off as to remove from each hole a segmental portion thereof, whereby upon the co-operation of a punch and said die plate a hinged lid is formed in the worked material, and a corresponding plurality of flat spring ejectors adapted to level the lids substantially into a plane of the worked material to facilitate shifting of said material between successive operations.

17. In combination, a plurality of punches of predetermined contour, a die plate therefor having a corresponding plurality of holes, said die plate having a portion thereof so sheared off as to remove from each hole a section thereof, whereby upon the effectiveness of each punch with said die plate a hinged lid is formed in the worked material, and a corresponding plurality of flat spring ejectors adapted to level the lids substantially into a plane of the worked material to facilitate shifting of said material between successive operations.

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