

March 29, 1932.

R. HOOVER ET AL

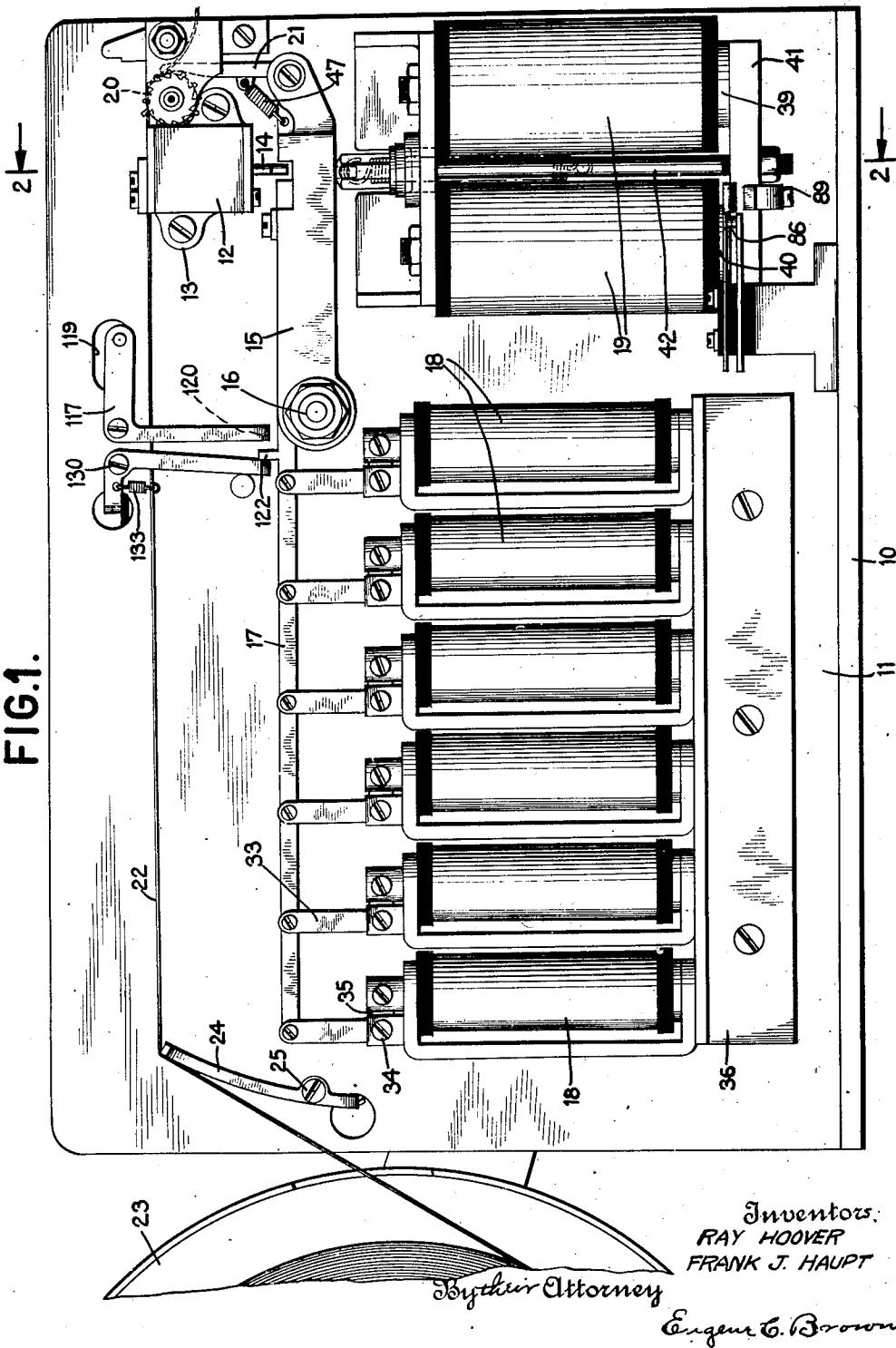
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TAPE REPERFORATOR

Filed July 18, 1930

6 Sheets-Sheet 1

FIG. 1.



March 29, 1932.

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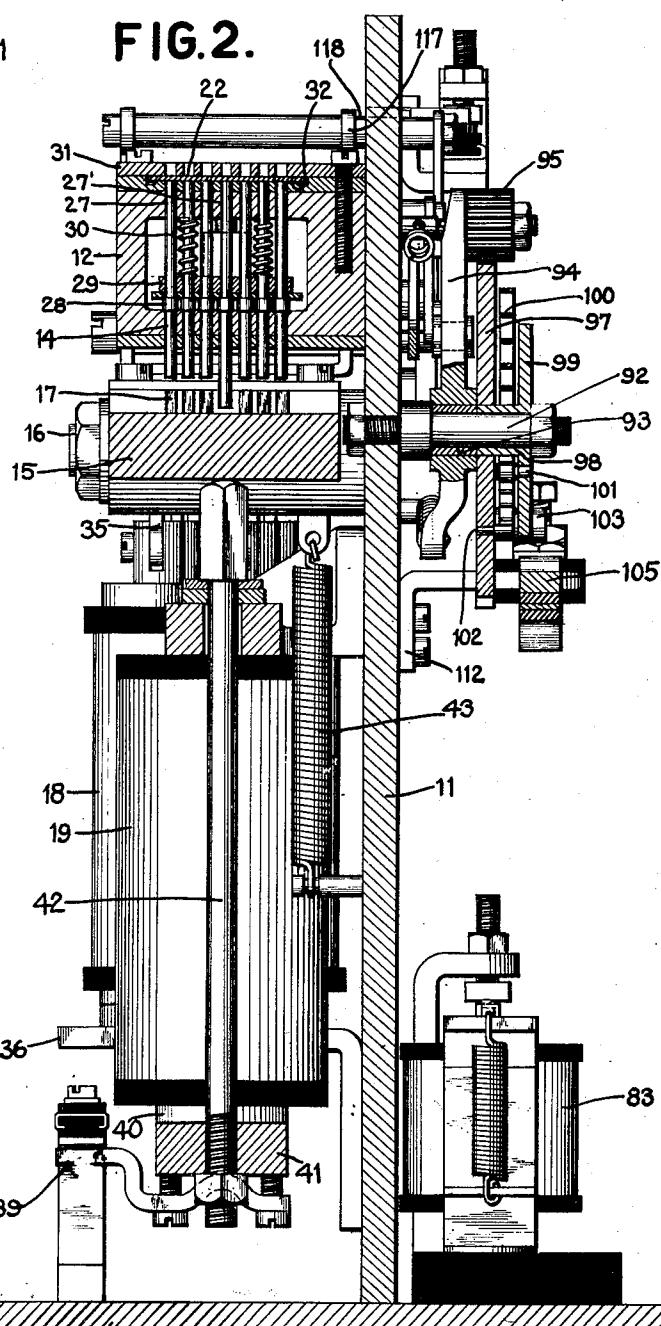
TAPE REPERFORATOR

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6 Sheets-Sheet 2

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FIG. 2.



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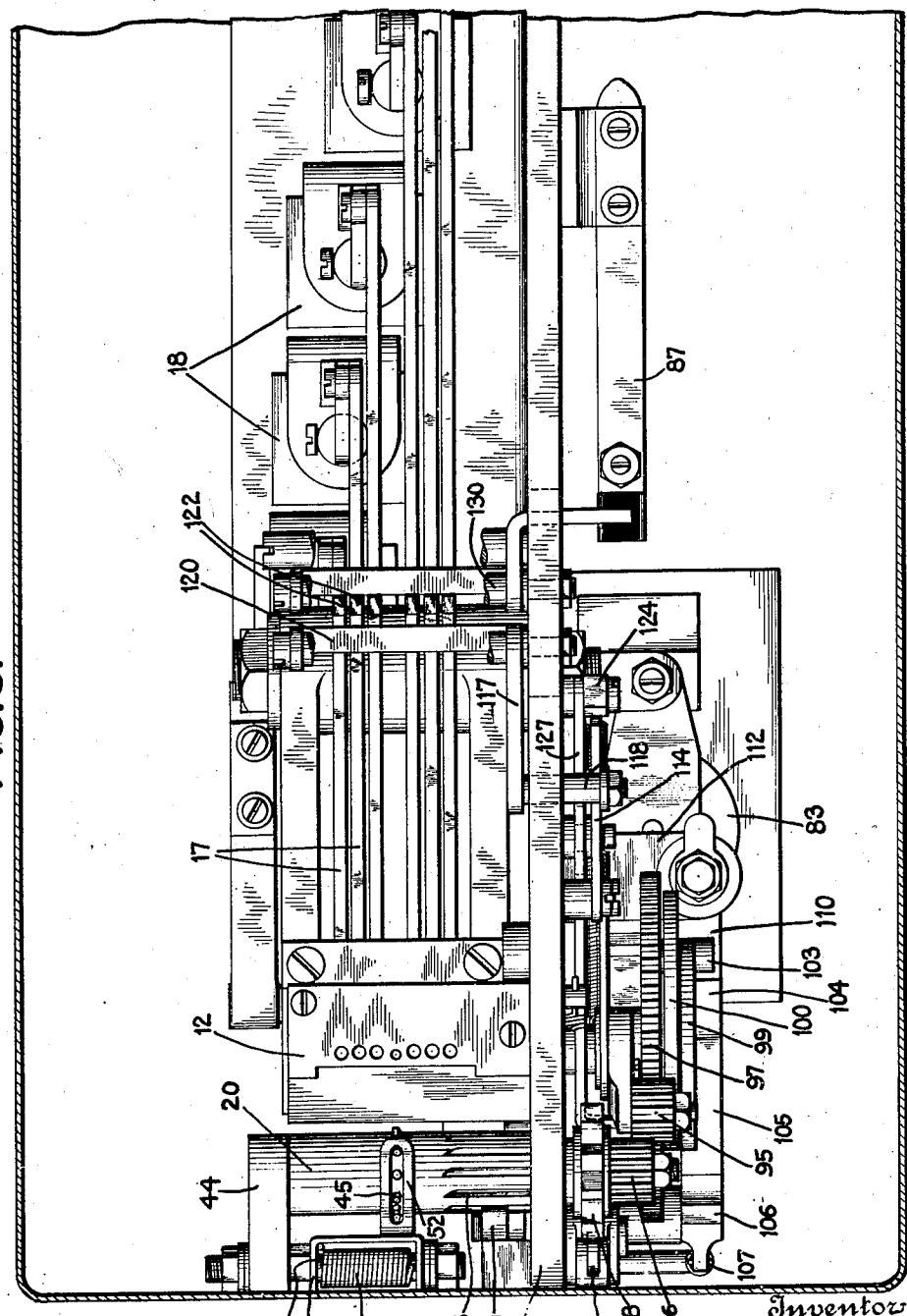
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## TAPE REPERFORATOR

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6 Sheets-Sheet 3



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TAPE REPERFORATOR

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6 Sheets-Sheet 4

FIG. 4.

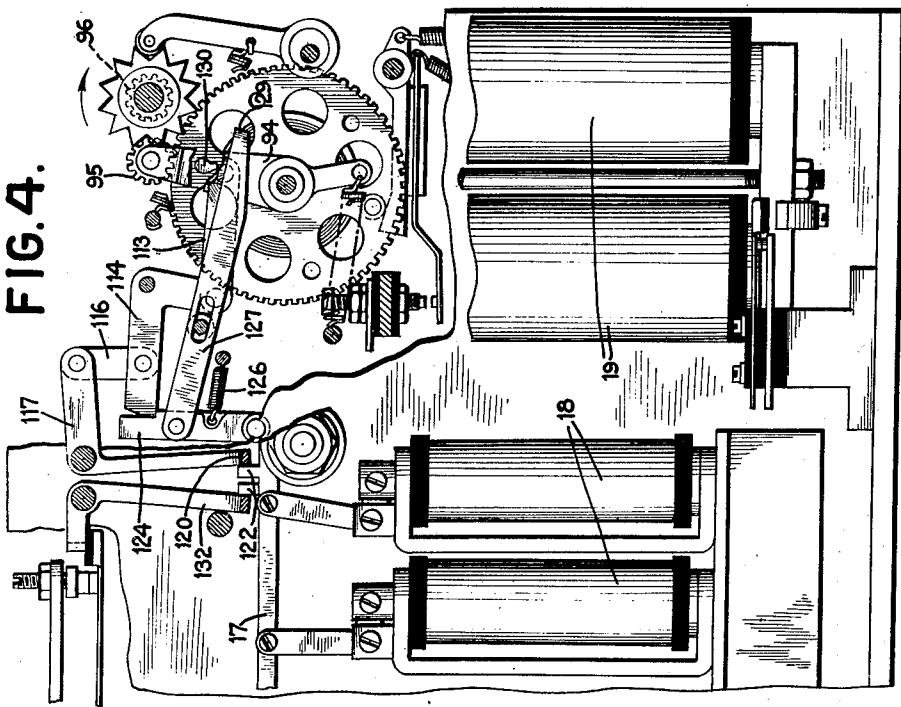
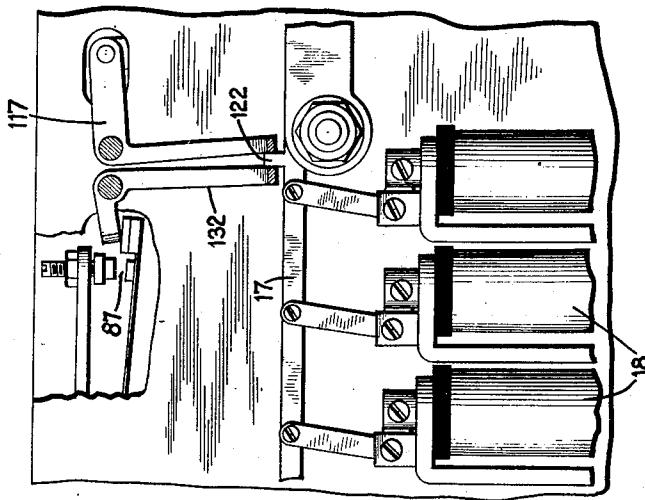


FIG. 7.



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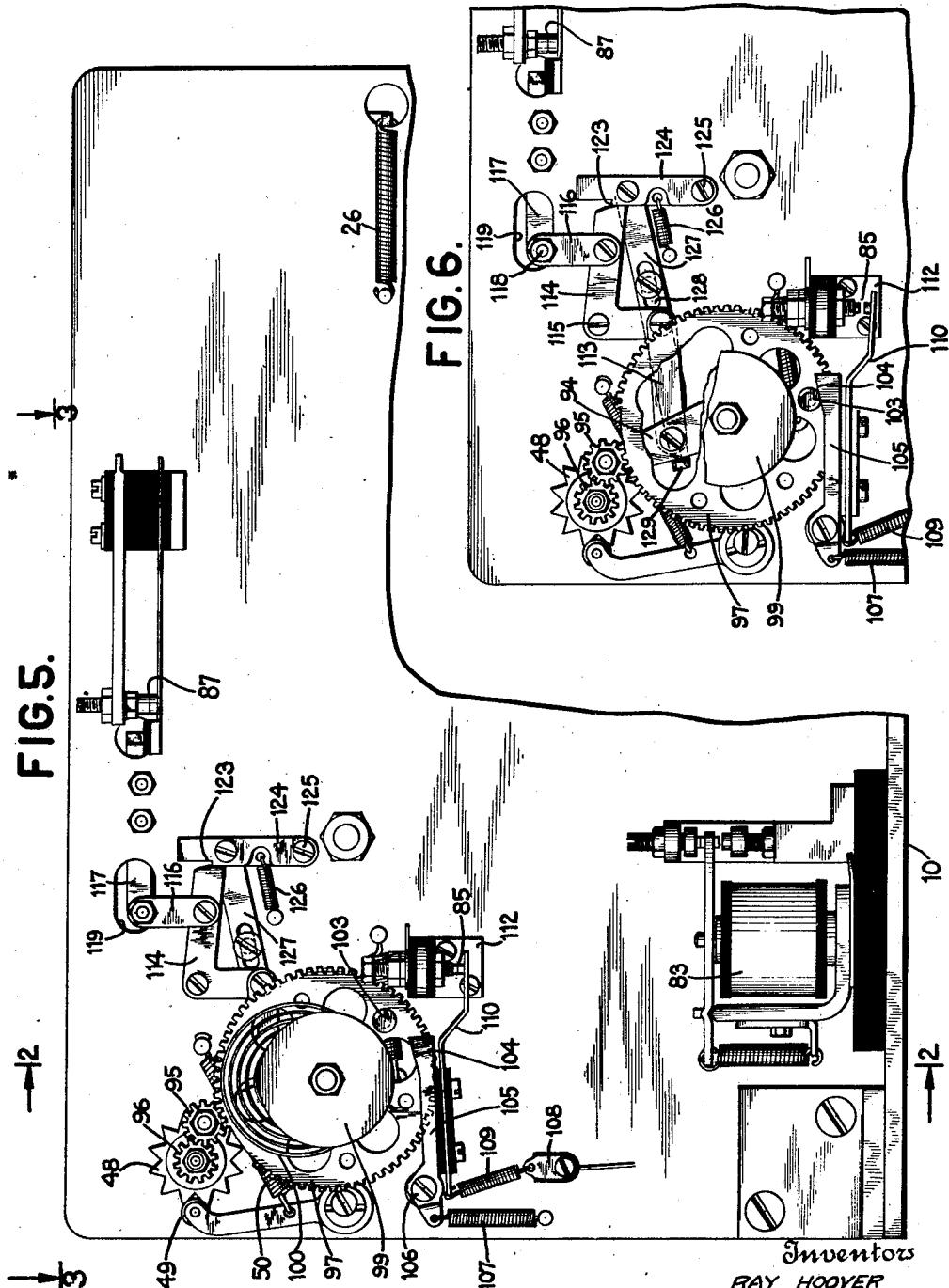
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## TAPE REPERFORATOR

Filed July 18, 1930.

6 Sheets-Sheet 5



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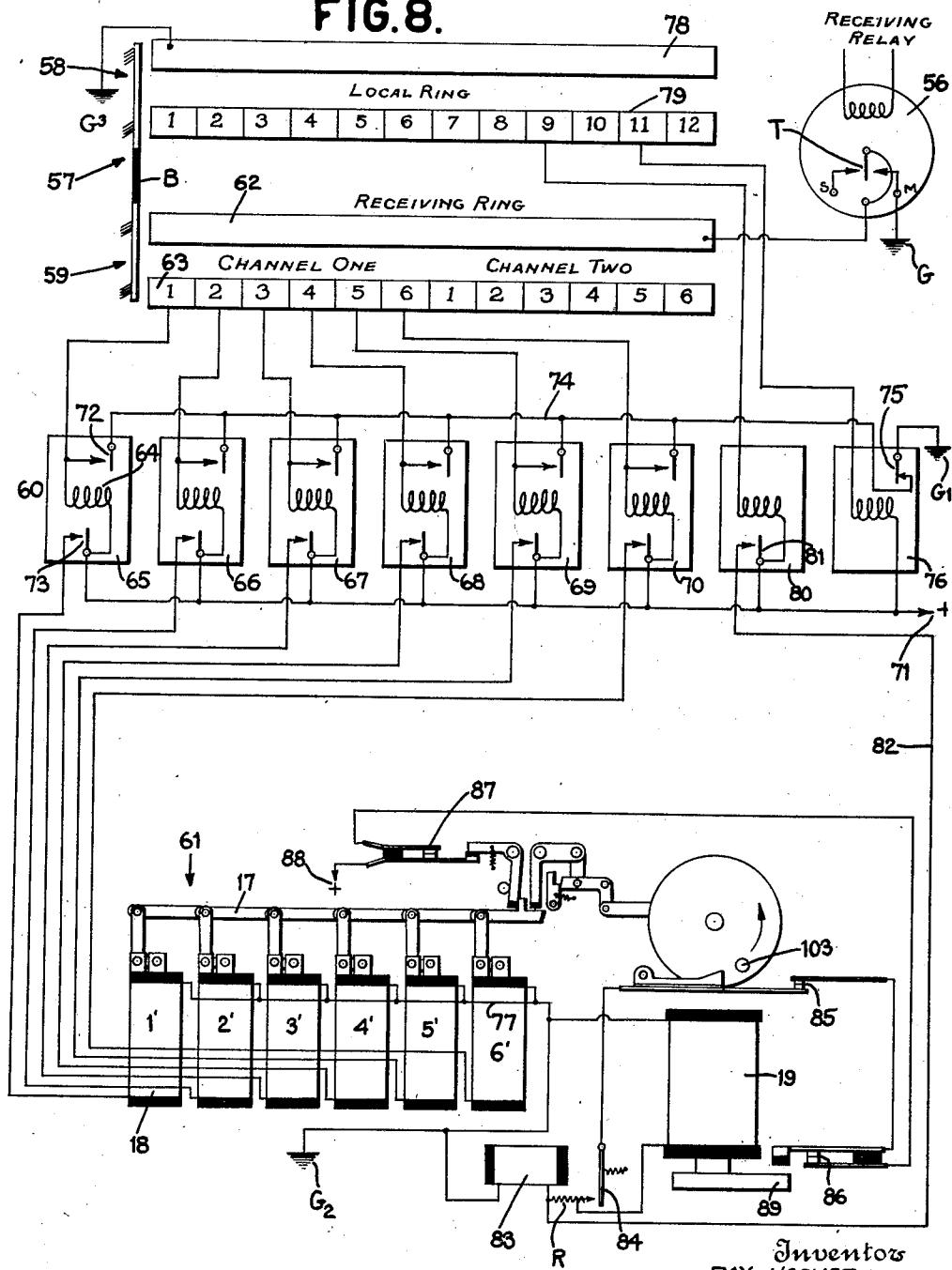
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TAPE REPERFORATOR

Filed July 18, 1930

6 Sheets-Sheet 6

**FIG. 8.**



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## UNITED STATES PATENT OFFICE

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## TAPE REPERFORATOR

Application filed July 18, 1930. Serial No. 468,921.

This invention relates to a tape perforator for use in connection with a telegraph transmitter and more particularly to the control of the feeding of the tape through the perforator.

5 In printing telegraph systems it is often desirable at a receiving station to extend the transmission from one or more of the channels of a multiplex circuit over another multiplex circuit which may have a greater or lesser number of channels and which may be operated at a different speed. Due to lack 10 of synchronism of the two circuits, the received signals cannot be repeated directly to 15 one of the channels of the second circuit. It is necessary, therefore, to provide a storage device, which in case small storage capacity only is required may be a metallic storage transmitter, or where large storage capacity 20 is required, may be a tape transmitter.

The present invention relates to a reperforator responding to line signals of the Baudot type, that is, to signals consisting of permutations of a uniform number of marking and 25 spacing conditions, received over a multiplex channel for producing a perforated tape for use in retransmission over another circuit through a tape transmitter. It is desirable, of course, to have as short a time lag 30 as possible between the perforating of the tape and the retransmission of the signals. Due to the necessary length of tape intervening 35 between the punch block of the reperforator and the pin block of the transmitter, the minimum lag between the reception of the signals and the retransmission thereof may be considerable, and in order to prevent further delay, by the signals being locked up in the tape between the perforator and the tape 40 transmitter, upon temporary cessation of the transmission of signals, it has been proposed heretofore to feed the tape continuously through the perforator during such idle periods of the channel of the receiving circuit associated with the perforator.

The present invention has for one of its objects to render such continuous tape feeding mechanism inoperative after a predetermined maximum length of tape has been advanced through the perforator.

Another object is to provide a control mechanism for causing the tape to be advanced through the perforator, upon cessation of the received signals, a sufficient distance to bring the last signal perforation into 55 operating position in the tape transmitter.

Another object is to start said control mechanism into operation immediately upon discontinuance of the received signals and to restore the same to its initial position upon 60 recommencement of said signals.

Other objects and advantages of the invention will appear from the following description taken in connection with the accompanying drawings and appended claims.

In the accompanying drawings we have illustrated our invention applied to a reperforator employing a group of selecting magnets, corresponding to the units of the permutation telegraph code, the magnets being locked up in accordance with each received code signal, through a bank of relays having their windings associated with the contacts of the receiving rotary distributor. The selecting magnets effect the selection of the punch pins to be operated. A punch solenoid is controlled through the segments of the local distributing ring to operate the punch pins, and through a paper feed mechanism to advance the tape into the succeeding perforating position. The punch solenoid is actuated once each revolution of the receiving distributor brushes, irrespective of whether signals are being received, and therefore advances the tape continuously through the perforator during idle periods of the channel.

In accordance with one embodiment of the present invention, we provide a counting or feed control mechanism, driven by the tape feed mechanism and having a predetermined maximum extent of travel, in the extreme limit of which it renders the tape feed mechanism inoperative. The feed control mechanism is brought into operative engagement with the tape feed mechanism after completing each perforating cycle of the machine, to permit the feed control mechanism to be driven by the tape feed mechanism, and it is removed from operative engagement therewith upon the reception of each group of code 95 100

signals to permit the control mechanism to be returned to its initial or starting position. Therefore, the feed control mechanism is in position, after each perforation has been completed, to permit a uniform maximum quantity of tape to be advanced through the perforator, in case no further signals are received.

In order that the invention may be more fully understood, reference will be had to the accompanying drawings in which

Figure 1 is a side elevation of the reperforator showing the perforating and selecting mechanism;

Figure 2 is a vertical sectional view on an enlarged scale of the perforator substantially on the line 2—2 of Figure 1;

Figure 3 is a plan view of the reperforator;

Figure 4 is a rear elevational view of the tape feed control mechanism;

Figure 5 is a front elevation thereof in one position of operation;

Figure 6 is a front elevational view of the tape feed control mechanism in another position of operation;

Figure 7 is a detail of the "rub out" responsive mechanism for preventing operation of the punch solenoid on the reception of a rub out signal; and

Figure 8 is a diagrammatic view of the reperforator and the operating and control circuits therefor.

Referring first to Figures 1, 2 and 3, the supporting structure for the reperforator comprises a base plate 10 and a vertical partition plate 11 carried thereby. The reperforating mechanism is supported on one side of the plate 11 (on the left hand side in Figure 2), and the tape feed control mechanism is mounted upon the opposite side thereof.

The reperforating mechanism consists in general of a punch block 12 mounted upon the plate 11 by a lug 13, and having a group of punch pins 14, a punch hammer 15 pivoted at 16, for operating the punch pins, a number of interponent bars 17 adapted to be shifted beneath the punch pins to determine the operation thereof, selecting solenoids 18 for actuating the interponent bars, punch solenoids 19 for operating the punch hammer 15 and a paper feed roller 20 actuated by the punch hammer 15 through a pawl 21. The tape 22 extends from a suitable reel 23 over a tensioning lever 24 pivoted at 25 and provided with a tensioning spring 26 (Figure 5), and thence across the top of the punch block 12.

The particular punch block illustrated is provided with punches of such number and arrangement as to adapt the perforator for use in perforating tape for automatic printing telegraph systems employing a code wherein each character comprises six impulses, although obviously the number of punches and number of units of the code may

be varied. In the form shown it comprises seven punches 27, of which six are employed to punch the code holes in the tape, and the seventh or central punch 27' is designed to form feed holes in the tape, this punch being of smaller diameter than the remaining punches. Each of the punches has an annular enlargement or collar 28 normally resting on the lower wall of the punch block, the punches extending downwardly through the lower wall and upwardly through openings in a retracting plate 29 and through openings in the top wall of the punch block. The punches are retained in the lowered position by compression springs 30 surrounding certain of the punch pins. A die plate 31 is secured to the top of the punch block and is provided with openings in alignment with the punch pins. The top of the punch block is grooved at 32 for the passage of the tape between the die plate and the top of the punch pins.

Since the feed holes have to be punched for every character and also for the blank portion of the tape, this punch 27' is made longer than the other punches so that it will always be operated by the hammer 15. The other six punches are shorter than the punch 27' so that the hammer cannot force them through the tape unless the ends of the corresponding interponent members 17 are interposed beneath the punch pins.

The six interponent members are pivoted at their opposite ends to bell crank levers 33, pivoted in turn at 34 at the tops of the selecting solenoids 18, and having plunger portions 35 adapted to be attracted by the selecting solenoids. The selecting solenoids are mounted upon a shelf 36 carried by the partition plate 11.

The cores 39 and 40 of the punch solenoids 19 are secured to a cross bar 41 having a vertical push rod 42 bearing against the lower side of the hammer 15, to elevate the same against the tension of the retractile spring 43, to raise the interponent members, which have been shifted, against the punch pins, to force the same upwardly through the tape. The hammer 15 directly engages the paper feed pin 27' to punch the feed hole.

The feed roller 20 is journaled in a block 44 and in the plate 11, and is provided with a circumferential row of radial pins 45 which engage the control feed openings of the tape to draw the tape through the punch block. Ratchet teeth 46 are formed on the feed roller, against which the pawl 21 is held by a spring 47, the pawl being positioned in one of the ratchet teeth upon the upper movement of the hammer 15, and rotating the feed wheel one space on the return movement of the hammer. One end of the feed wheel is reduced and extends through the plate 11. A star wheel 48 is attached to this extended end and a jockey roller 49 is held against the

star wheel by a spring 50 to accurately position the feed wheel after each movement thereof.

The tape is held against the feed wheel and 5 in engagement with the feed pins 45 by an eyelet 52 carried by a frame 53 pivoted on a shaft 54 and urged against the tape by a spring 55.

The operation of the mechanism so far 10 described will best be understood by reference to the circuit diagram shown in Figure 8. This view illustrates diagrammatically the receiving relay 56, rotary distributor 57 having local rings 58 and receiving rings 59, a 15 bank of relays 60 and the reperforator indicated generally at 61.

The spacing contact *s* of the receiving relay is unconnected and the marking contact *m* is connected to ground G. The receiving 20 rings of the distributor comprise a solid ring 62, connected to the tongue T of the receiving relay and a segmented ring 63, containing two sets of six segments each, for two channel 25 multiplex operation. The circuit connections for the first channel only are shown in this figure. Segments 1 to 6 of channel one are connected to one terminal of the windings 64 of the six selecting relays 65, 66, 67, 68, 69 and 70, the opposite terminals of which 30 are connected, by a common conductor, to a source of potential 71. Each of the relays 65 to 70 have two contact tongues 72 and 73 and cooperating front contacts. Tongues 72 are joined through a common conductor 74 35 and the back contact and tongue 75 of a break relay 76, to the ground at G1. The front contacts of tongues 72 are connected to one terminal of the windings 64, to provide a locking circuit therefor. Tongues 73 of each 40 of the relays 65 to 70 are connected by the common conductor to the source of potential 71, the front contact of each of these relays being connected, respectively, to one terminal of the selecting solenoids 1' to 6' of the 45 perforator. The opposite terminals of the selecting solenoids are connected by a common conductor 77 to the ground at G2. The local ring 58 comprises a solid ring 78 50 grounded at G3 and a segmented ring 79 having twelve segments. Segment 9 is connected to one terminal of the winding of the relay 80, the opposite terminal of which is connected to the source of potential 71 and segment 11 is connected to one terminal of the winding 55 of the break relay 76, the opposite terminal being connected to the source of potential at 71. Relay 80 has a single contact tongue 81 connected to the source of potential 71 and a corresponding front contact, connected by 60 conductor 82, to one end of the winding of a locking relay 83, the opposite end of which is grounded at G2. The front contact of relay 83 is connected through a resistance R to the 65 winding of the punch solenoids 19 to the

ground G2. Tongue 84 of relay 83 is connected through normally closed contacts 85, contacts 86 and contacts 87, to a source of potential 88.

The contacts 86 are adapted to be opened 70 on the upward movement of the plunger of the printing solenoid by an extension 89 carried by the cross bar 41 (Figure 2).

Assuming that signals are received over channel one for a particular code combination, as for instance the letter W, in which the signals 1, 2 and 5 are marking, the receiving relay 56 will operate to apply the ground G to the windings of the relays 65, 66 and 69, as the distributor brush B passes over receiving segments 1, 2 and 5, thus causing these relays to pick up and complete their locking circuits through the tongues 72. At the same time the battery 71 is applied through the tongues 73 of relays 65, 66 and 85 to 69, to the selecting solenoids 1', 2', and 5' to shift the interponent bars of these magnets beneath the corresponding punch pins.

Upon the continued rotation of the brush B on to segment 9, the ground G3 is applied 90 to the relay 80, which picks up and applies the battery 71, through conductor 82, to the locking relay 83 which is thus operated to complete the circuit for the punch solenoids 19, this circuit extending from the battery 88 through the contacts 87, 86 and 85 and front contact of the relay 83, thence through the punch solenoids and to ground G2. At the same time a locking circuit is established for the relay 83 from the tongue 84, through the 95 resistance R to the relay winding and thence to the ground G2. The solenoids 19, effect the perforation of the tape in accordance with the setting of the interponent bars 17, at the same time operating the tape feed mechanism through the pawl 21, to advance the tape into the succeeding perforating position. Upon the upward stroke of the printing solenoid the contact 86 is opened to break the locking 100 circuit for the relay 83.

Upon passage of the brush B across segment 11, the break relay 76 is operated to remove the ground G1 from the selecting relays 65 to 70, allowing them to return to normal and thus interrupting the circuits to the selecting solenoids 18, whereby the interponent bars are returned to normal position in readiness for the succeeding code signal.

When no code signals are being received over channel one the relays 65 to 70 remain unoperated. However, during each revolution of the brush B, the relay 80 operates to actuate the punch solenoids 19 and the tape feed mechanism, to advance the tape continuously through the perforator. Since the interponent bars 17 are not shifted during this operation, only the tape feed hole is punched.

The mechanism for limiting this continuous feeding of the tape through the reper-

forator during idle periods of the channel, to a predetermined length of tape will now be described.

A stub shaft 92 secured to the pin plate 11, has a bushing 93 upon which a lever 94 is journaled. The lever carries a pinion 95 normally held in mesh with a small gear 96 mounted rigidly upon the extended end of the feed roller 20. A gear wheel 97 in mesh with the pinion 95, is journaled upon a bushing 98 fixed to the shaft 92. Bushing 98 terminates in a disc 99 spaced from the gear 97 and a spiral spring 100 is mounted between the disc and the gear wheel 97. The inner end of a spring is anchored by a pin 101, carried by the disc and the outer end of the spring is secured to a pin 102 carried by the gear wheel. The gear wheel also carries a pin 103 near its outer edge which, when the gear is rotated sufficiently, engages the inclined face 104 of a contact block 105, pivoted at 106, to depress the same against the tension of the spring 107, to open the contacts 85. Current is conducted to the lower contact from a terminal 108 through the spring 109 and contact strip 110. The upper contact 85 is mounted upon a bracket 112 secured to the plate 11 and is adjustable in the horizontal arm of the bracket.

The gear wheel 97 is normally held by the spring 100, with the pin 103 out of contact with the inclined surface 104, as shown in Figure 5 and rotates in a counterclockwise direction to bring the pin into contact with the switch block, as shown in Figure 6.

The lever 94 has a link 113 pivoted thereto and to the vertical arm of a bell crank lever 114, pivoted at 115. The horizontal arm of the bell crank lever is connected by a link 116 to the horizontal arm of a second bell crank lever 117, by means of a pin 118, extending through an opening 119 in the plate 11. The vertical arm of the lever 117 comprises a bail having a horizontal portion 120 extending across the interponent bars 17 slightly thereto above and slightly in advance of projections 122 integral with the interponent bars, so that when any one of the interponent bars is shifted, in response to a selecting condition, the bail is engaged by the projection 122 to rock the lever 117 and thence to withdraw the pinion 95 from engagement with the gear 96, as shown in Figure 4. The horizontal arm of the bell crank lever 114, when elevated at this time, is locked in its upper position by engagement of the end thereof with a shoulder 123, of a latch 124, pivoted at 125 and urged towards the bell crank lever by a spring 126. The latch 124 is arranged to be moved from engagement with the bell crank lever 114, by a push rod 127, pivoted to the latch and to the plate 11 through the pin and slot 128. The push rod terminates at one side of the gear wheel 97 in an inturned end 129 and is engaged by a dog 130, carried by the gear wheel,

when the gear is in its normal or initial position.

The operation of the tape feed control mechanism is as follows: Assume the distributor 57 to be rotating idly, that is without signals being transmitted over channel one, so that upon each revolution thereof the solenoid 19 operates to form a feed hole in the tape and to advance the tape through the perforator. Since none of the selecting magnets are energized, all of the interponent bars 17 are held in their normal position with the projections 122 out of contact with the bell crank lever 117, thus permitting the pinion 95 to be held in mesh with the gear 96, on the feed roller shaft. Therefore, the gear wheel 97 is rotated from the position shown in Figure 5, to that shown in Figure 6, in a counterclockwise direction, to bring the pin 103 in engagement with the contact block 105, to open the contacts 85. By reference to Figure 8 it will be noted that the opening of this contact interrupts the operating circuit of the perforator solenoid from the source of current 88 so that it is no longer operative to form the feed holes in the tape and to advance the tape through the perforator. Obviously, the pin 103 may be provided at any point along the gear wheel so as to permit the tape to be fed forward at any desired number of spaces prior to the opening of the contacts 85 and should be positioned so as to permit a sufficient length of tape to be advanced after cessation of the code signals to bring the last code signal perforation in operative position in the tape transmitter, which may be located adjacent to the perforator.

The gear wheel 97 is maintained in the position shown in Figure 6 to hold the contacts 85 open until the next selecting signal is received, at which time one of the interponent bars will be shifted forward to rock the lever 94 and withdraw the pinion 95 from engagement with the gear 96, the lever 94 being locked in this position by the latch 124. The gear wheel 97 being thus released rides backwards in a clockwise direction under the action of the spring 100 until the dog 130 strikes the inturned end of the lever 127 to trip the latch 124 and again permit the pinion 95 to move into engagement with the gear 96. If no further code signals are received the previous cycle is repeated. However, if a succession of code signals are received the pinion 95 is moved out of engagement with the gear 96 for each new selecting condition, to permit the gear wheel to be reset in its initial position.

It will be understood, of course, that the tape may be advanced through the perforator any number of spaces up to the predetermined maximum as determined by the counting or control mechanism and the control mechanism will be set back to its initial position

upon the receipt of the next code signal, from whatever position it may be in.

Contact 87 serves to prevent the operation of the reperforating solenoid and tape feed mechanism upon the receipt of a rub-out signal. A rub-out signal consists of all marking impulses and is transmitted when the operator of the keyboard perforator at the transmitting station makes an error in perforating the tape. In such cases the tape is backed up through the keyboard perforator and reperforated with a complete row of openings. When a rub-out signal is received all of the interponent bars move forward and out of contact with a second bell crank lever 132, having a bail normally engaged by the projections 122. The bell crank lever is thus free to rock under the action of the spring 133 to open contacts 87 and thus interrupt the circuit to the punch solenoid 19. This is desirable in order that the rub-out signals will not be reproduced in the reperforated tape.

The locking relay 83 shown in Figure 8 is mounted upon the base plate 10 as shown in Figure 5.

It is obvious that various modifications and changes may be made in the construction of the tape feed control or counting mechanism and that the same may be applied to devices other than reperforators and hence we do not desire to be limited to the exact details shown and described, except in accordance with the appended claims.

What we claim is:

1. In a tape perforator, a perforating mechanism, a selecting mechanism responsive to signals for the Baudot code for controlling said perforating mechanism, means for advancing the tape through the perforator one space for each selecting code combination applied to said selective mechanism, and means for automatically advancing the tape through the perforator a predetermined maximum number of spaces upon inaction of said selecting mechanism.

2. In a tape perforator, a perforating mechanism, a selecting mechanism responsive to character code groups consisting of mixed marking and spacing conditions for controlling said perforating mechanism, a tape feed mechanism for advancing the tape through the perforator one space for each selecting group applied to the selecting mechanism, said tape feed mechanism automatically advancing the tape through the perforator upon inaction of said selecting mechanism and a counting mechanism set into operation when a signal group consisting of spacing conditions only is applied to said selecting mechanism, to discontinue the operation of the tape feed mechanism after the tape has advanced through the perforator a predetermined number of spaces.

3. In a tape perforator, a perforating mechanism, a selecting mechanism control-

ling said perforating mechanism, and a tape feed mechanism for advancing the tape through the perforator one space for each selecting condition, said tape feed mechanism automatically advancing the tape through the perforator upon inaction of said selecting mechanism and means driven by said tape feed mechanism for discontinuing the operation thereof after the tape has been advanced through the perforator a predetermined number of spaces.

4. In a tape perforator, a perforating mechanism, a selecting mechanism responsive to selecting signal groups of mixed marking and spacing conditions controlling said perforating mechanism, a tape feed mechanism for advancing the tape through the perforator one space for each selecting group, said tape feed mechanism also advancing blank tape through the perforator for each non-selecting signal group, a counting mechanism for determining the length of blank tape advanced through the perforator, and means responsive to a marking condition in any signal group for resetting said counting mechanism upon each operation of the selecting mechanism.

5. In combination, a synchronously operating distributor, a tape perforator, a perforating mechanism, a selecting mechanism controlled by said distributor for said perforating mechanism, a tape feed mechanism controlled by said distributor for advancing the tape through the perforator one space for each selecting condition, said tape feed mechanism also advancing blank tape through the perforator upon inaction of said selecting mechanism, a counting mechanism for determining the length of blank tape advanced through the perforator, means for starting said counting mechanism into operation after each operation of the perforating mechanism, and means for restoring the same to its initial position upon each operation of the selecting mechanism.

6. In a tape reperforator, a perforating mechanism, a selecting mechanism responsive to received signals, a tape feed mechanism for continuously advancing tape through the perforating mechanism, counting means normally in engagement with said tape feed mechanism for discontinuing the operation thereof after a predetermined length of tape has been advanced through the perforating mechanism, and means operating upon the receipt of each selecting condition for disengaging said counting means from the tape feed mechanism to reset the same to its initial position.

7. In a tape reperforator, a perforating mechanism, a selecting mechanism responsive to received signal groups of mixed marking and spacing conditions, a tape feed mechanism for continuously advancing tape through the perforating mechanism, means having a definite extent of movement acting

in one limit of movement thereof to discontinue the operation of the tape feed mechanism, and means acting upon the reception of a marking condition in each selecting group for setting said first means in its other limit of movement.

8. In a tape reperforator, a perforating mechanism, a selecting mechanism responsive to received signals, a tape feed mechanism for continuously advancing tape through the perforating mechanism, means acting when no selecting conditions are set up for rendering said perforating and tape feed mechanism inoperative after a predetermined length of tape has been advanced, and means responsive to a "rub-out" signal for rendering said perforating and tape feed mechanism immediately inoperative.

9. In a tape reperforator, a perforating mechanism, a selecting mechanism responsive to received signals, a tape feed mechanism for continuously advancing tape through the perforating mechanism, means acting when no selecting conditions are set up for rendering said perforating and tape feed mechanism inoperative after a predetermined length of tape has been advanced, means for again rendering said perforating and tape feed mechanism operative upon setting up of a selecting condition and separate means for rendering the perforating and tape feed mechanism inoperative while a "rub-out" selecting condition is set up.

10. In a tape reperforator, a perforating mechanism, a selecting mechanism responsive to received signals, a tape feed mechanism, a continuously rotating element operating in synchronism with the received signals, said element controlling said perforating and tape feed mechanism to continuously perforate feed holes and feed the tape through the perforating mechanism, a gear wheel, an intermediate pinion in mesh with said gear wheel, a gear driven by said tape feed mechanism, means for causing engagement of said pinion with said gear when the selecting mechanism is unoperated and for causing disengagement thereof when said selecting mechanism is operated to set up a selecting condition, said gear wheel on predetermined rotation thereof rendering said perforating and tape feed mechanism inoperative, and means for returning said gear wheel to its initial position upon disengagement of said pinion from said gear.

11. In a tape reperforator, a perforating mechanism, a selecting mechanism responsive to received signals, a tape feed mechanism, means for continuously operating said perforator and tape feed mechanism to feed the tape through the perforator continuously, a gear wheel, an intermediate pinion in mesh with said gear wheel, a gear driven by said tape feed mechanism, means for causing engagement of said pinion with said gear when the selecting mechanism is unoperated

and for causing disengagement thereof when said selecting mechanism is operated to set up a selecting condition, said gear wheel on predetermined rotation thereof rendering said perforating and tape feed mechanism inoperative, and means for returning said gear wheel to its initial position upon disengagement of said pinion from said gear.

12. In a tape reperforator, a perforating mechanism, a selecting mechanism responsive to received signals, a tape feed mechanism, means for continuously operating said perforator and tape feed mechanism to feed the tape through the perforator continuously, a gear wheel, an intermediate pinion in mesh with said gear wheel, a gear driven by said tape feed mechanism, means for causing engagement of said pinion with said gear when the selecting mechanism is unoperated, means acting upon operation of said selecting mechanism for disengaging said pinion and gear, means for returning said gear wheel to its initial position during disengagement of said pinion and gear, and means independent of the selecting mechanism of holding said pinion and gear disengaged during the return movement of said gear wheel.

13. In a tape perforator, a perforating mechanism responsive to signals of the Baudot code, comprising an individual element for each unit of the code movable into marking or spacing position in accordance with the code combination, a tape feeding mechanism, a punch for perforating feed holes in the tape, means for continuously operating said punch and tape feed mechanism when said elements are all in spacing position, means rendering said punch and tape feed mechanism inoperative after a predetermined amount of blank tape has been perforated, and means controlled by any of said movable elements when in marking position for again rendering the punch and tape feed mechanism operative.

14. In a tape recorder, a recording mechanism, a selective mechanism responsive to signals of the permutation code type for controlling said recording mechanism, means for advancing the tape through the recorder one space for each selecting code combination applied to said selecting mechanism and for automatically advancing the tape through the recorder a predetermined maximum number of spaces upon inaction of the selector mechanism.

15. In a tape recorder, a recording mechanism, a selecting mechanism responsive to received signals, a tape feed mechanism for continuously advancing the tape through the recorder mechanism, means acting when no selecting conditions are received for rendering said tape feed mechanism inoperative after a predetermined length of tape has been advanced and means responsive to a "rub out"

signal for rendering said tape feed mechanism immediately inoperative.

16. In a telegraph receiving instrument, a selecting mechanism responsive to receiving signals of the permutation code type, a tape supply, means controlled by said selecting mechanism for producing a record on said tape, a normal tape feed mechanism and auxiliary means acting automatically upon cessation of said permutation code signals for ejecting an additional limited amount of tape from the receiving instrument.

In testimony whereof we affix our signatures.

RAY HOOVER.  
FRANK J. HAUPT.

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