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TAPE PERFORATOR

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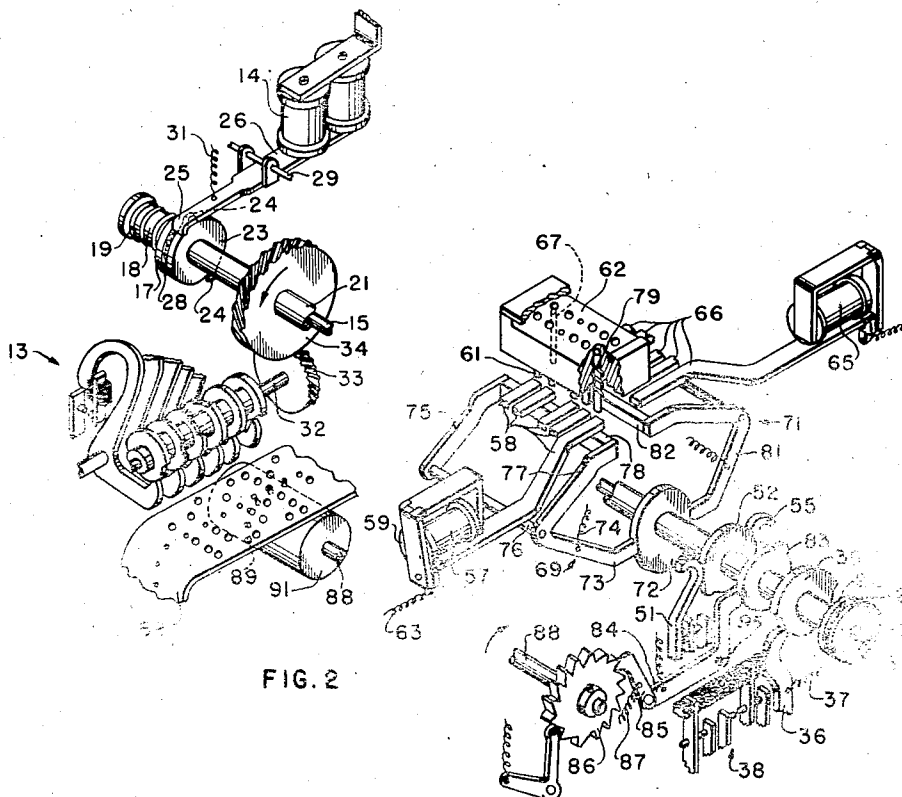


FIG. 2

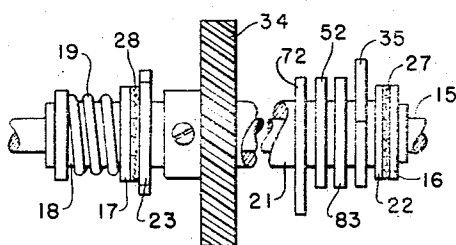


FIG. 3

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TAPE PERFORATOR

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This invention relates to printing telegraph apparatus and particularly to a tape reperforator designed for high speed operation.

The primary object of this invention is the provision of a tape reperforator which is intended to meet high speed telegraph communication requirements without loss of accuracy or reliability.

Another object of this invention is the provision of a high speed reperforator in which longer time intervals are allotted for performing the various functions associated with tape perforating operations and thus enables efficient operation at higher speeds.

In achieving the objects of the present invention it is proposed to provide a signal overlap arrangement wherein successive signal code combination impulses received by a receiver distributor are alternately allocated to each of two sets of storage relays which transfer the signal code combinations to associated sets of punch selector magnets. Each set of punch selector magnets controls an associated set of punch interponents in a manner which permits a previously conditioned set of interponents to be used for a perforating operation while the other set of punch interponents is being conditioned for the immediately succeeding perforating operation. Tape perforation is accomplished by a pair of punch balls which are timed to operate alternately upon their associated sets of punch interponents.

The receiver distributor is driven at half of the speed of a cam sleeve to which it is geared and upon which is mounted the various operating cams essential to the present invention. One cam controls a set of swinger contacts which it causes in one half of its revolution to be associated with one set of storage relays and in the other half of its revolution to be associated with the other set of storage relays. A second cam alternately controls the locking circuits for the storage relays. Another cam is provided for the alternate operation of the punch balls referred to above while an additional cam is provided which steps the tape forward two positions for each complete revolution of the cam sleeve after each of the punch balls has punched its row of perforations in the tape.

The invention may be more readily understood by reference to the detailed description which follows when read in connection with the drawings in which:

Fig. 1 is a schematic circuit illustration for controlling the tape reperforator;

Fig. 2 is an exploded perspective view of the tape reperforator; and

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Fig. 3 is an enlarged detail view of the cam assembly shown in Fig. 2.

In commencing a detailed description of the present invention it should be mentioned that the use of the well known Baudot code in a start-stop system of telegraphy is herein contemplated. In Fig. 1 is shown a transmitter 11 which may be located either at a distance or at the same station as the tape reperforator and is connected by means of line 12 with a receiver distributor 13, which is of the type disclosed in the patent of H. L. Krum, No. 1,595,472, dated August 10, 1926, to maintain in the rest condition of the apparatus a marking or energized condition of a selector magnet 14.

The tape reperforator disclosed in Fig. 2 is provided with a half revolution clutch of the friction type. The driving portion of the clutch assembly includes a constantly rotating shaft 15, a disc 16 which is locked thereto and a disc 17 formed as an integral part of a collar 18 which is keyed to shaft 15 and urged to the right by means of a compression spring 19. The driven part of the clutch assembly comprises a cam sleeve 21 provided at one end with a fixed disc 22 and at its other end with a fixed disc 23 having diametrically opposite stop lugs 24 designed to cooperate with the hooked extension 25 of armature 26 which is controlled by selector magnet 14. Friction washers 27 and 28 of felt material are interposed respectively between discs 22 and 21 and discs 17 and 23.

Upon the receipt of a start or spacing impulse by selector magnet 14, armature 26 will pivot about rod 29 in a clockwise direction under the influence of spring 31. This results in the removal of hooked extension 25 of armature 26 from blocking engagement with one of the stop lugs 24 of disc 23 and the consequent release of cam sleeve 21. Since driving shaft 32 which operates the receiver distributor 13 is rotatable at only half the speed of cam sleeve 21 due to the gearing effected between shaft 32 and cam sleeve 21 by gears 33 and 34, upon the receipt of a stop or marking impulse by selector magnet 14 at the termination of an individual signal code combination, the other stop lug 24 will be encountered by hooked extension 25 of armature 26 and rotary motion of cam sleeve 21 will be arrested.

As cam sleeve 21 is released during its first half revolution, the high part of cam 35 moves against follower 36 overcoming the influence of its spring 37 and spring 38, thereby shifting switch 38 to its leftward position. Switch 38 (Fig. 1) carries a set of five swinger contacts 39 which move to

the left with switch 38 under the above described condition, thereby closing contacts 41 and providing an energizing circuit for storage relays 42 extending from the receiver distributor 13 over conductors 43, through contacts 41, over conductors 44 and through the windings of storage relays 42. Of course, only those relays 42 which are receiving marking impulses at this time will be energized.

During the next half revolution of cam sleeve 21 follower 36 will move to the low part of cam 35, allowing swinger contacts 39 to close contacts 45 as switch 38 moves to the right under the influence of spring 30. This results in the provision of energizing circuits for storage relays 46 extending from the receiver distributor 13, over conductors 43, through contacts 45 and over conductors 47.

When selected storage relays 42 are energized, locking circuits therefor are provided as follows: From ground, through the windings of relays 42, through attracted armature 48, over conductor 49 and through closed contact 51 controlled by cam 52 to battery. Similarly, locking circuits for storage relays 46 are provided extending from ground, through the windings of storage relays 46, through attracted armatures 53, over conductor 54 and through closed contact 55 controlled by cam 52 to battery.

As armatures 56 of storage relays 42 are attracted the selection established in storage relays 42 is transferred to punch selector magnets 57, thereby positioning punch interponents 58 pivotally articulated to armatures 59 of magnets 57 (Fig. 2) either to a marking or spacing position. A marking position represents an energized condition of punch selector magnets 57 with the free ends of the interponents positioned below punch pins 61 supported by the punch block 62. On the other hand a spacing position represents a de-energized condition of punch selector magnets 57 with the free ends of punch interponents retained out of the path of punch pins due to the action of spring 63. Attraction of armatures 64 by storage relays 46 transfers a received selection to punch selector magnets 65 thereby selectively positioning interponents 66 with respect to punch pins 67 as was described in connection with the punch selector magnets 57.

For perforating tape 68 a pair of punch bails 69, 71 operable by punch cam 72 carried by cam sleeve 21 are provided. Follower arm 73 of punch bail 69 is biased into engagement with cam 72 by means of a spring 74 and together with a spaced lever 75 is pivoted about rod 76. Follower 73 integrally joins with an upstanding arm 77 which at its upper end supports together with lever 75 a striking bar 78 designed to actuate, through interponents 58, selected punch pins 61, which are normally urged downward by springs 79, to effect a signal code perforation in the tape 68 as the low part of cam 72 is encountered by follower arm 73. Likewise, when follower arm 81 of punch bail 71 encounters the low part of cam 72, striking bar 82 of punch bail 71 is effective, through interponents 66, to actuate selected punch pins 67 to effect the perforation of a signal code combination in tape 68.

Since two rows of perforations are punched in tape 68 upon one complete revolution of cam sleeve 21, a tape feed cam 83 is provided to operate lever 84 about pivot 95 to thereby obtain a double stepping action of pawl 85 to which it is pivotally articulated. Pawl 85 is urged, by means of a spring 87, into contact with the teeth of a ratchet 86 which is fixed to one end of shaft 88 which at

its other end has secured thereto a tape feed wheel 91. This double spacing action is due to the fact that the number of pins 89 on feed wheel 91 is double the number of teeth provided on ratchet 86. It is obvious then that on each operation of stepping pawl 85 the tape will be fed forward two positions.

In order to facilitate a ready understanding of the invention a typical double perforating operation will now be described. It will be assumed for the sake of the description that cam sleeve 21 has been released by the receipt of a start impulse by selector magnet 14 and that the high part of cam 52 has previously opened the contact pair 51 toward the latter part of the last half revolution of cam 52 and thereby erased a previous selection existing in storage relays 42 and punch magnets 57 and closed again to receive the next selection from the receiver distributor 13 as cam 35 now operates to move switch 38 to its leftward position. While this next selection is being set up in the magnets 57, the selection previously stored in punch magnets 65 is utilized by the operation of punch bail 71 when the low part of cam 72 is encountered by follower 81. Towards the end of this first half revolution of cam 52 after operation of punch bail 71, contact pair 55 will be opened erasing the previously existing selection from punch magnets 65 and closing again to enable the magnets 65 to acquire its next selection.

Towards the end of the first half revolution of cam 52 after punch bail 71 has operated, stepping pawl 85 starts to operate to step the tape 68 forward two positions which operation may be completed during the interval existing between the No. 5 element of the preceding code combination and the No. 1 element of the succeeding code combination, or more specifically during the stop-start intervals.

Upon receipt of the stop impulse by the receiver distributor 13, hooked extension 25 of armature 26 will now engage the other stop lug 24 of disc 23 after a half revolution of cam sleeve 21. It will be remembered that a signal combination is now stored by the punch magnets 57. When the next spacing impulse is received by selector magnet 14, cam sleeve 21 will be released for another operation during which time the selection stored by punch magnets 57 is utilized by the operation of punch bail 69 by cam 72. Towards the end of this half revolution, contacts 51 will again open as previously described. Meanwhile, the low part of cam 35 has been encountered by follower 36 and switch 38 has moved to the right to enable punch magnets 65 to store its next selection.

It is understood that various changes and modifications may be made in the present invention without a departure from its spirit and scope which should not be limited by the specific disclosure contained herein.

What is claimed is:

1. In combination, means to receive signal code combinations and a perforator including a tape to be perforated, a plurality of sets of punch instrumentalities successively conditionable by said means, a punch operator for each of said sets of punch instrumentalities, means for successively actuating said punch operators to successively punch rows of perforations in said tape, and means to periodically feed said tape a number of positions equivalent to the number of rows of perforations punched by said punch operators.

2. In combination, a receiver distributor and a perforator including a tape to be perforated, a plurality of sets of punch magnets, a set of punch interponents controlled by each of said sets of punch magnets, means to successively store signals received by said receiver distributor in each set of said punch magnets, a plurality of punch bails, one for each set of said sets of punch interponents, means for successively operating said punch bails to successively punch rows of perforations in said tape, and means to periodically feed said tape a number of positions equivalent to the number of rows of perforations punched by said punch bails.

3. In combination, means to receive signal code combinations including a signal distributing means and a perforator including a tape to be perforated, a pair of sets of punch instrumentalities alternately conditionable by said signal distributing means, a punch operator for one of said sets of punch instrumentalities, a punch operator for the other of said sets of punch instrumentalities, means to feed said tape two positions in each operation, and means for alternately operating said punch operators to successively punch rows of perforations in said tape, whereby one of said punch operators is actuated while the said punch instrumentalities associated with the other of said punch operators are being conditioned.

4. In combination, a receiver distributor and a perforator including a tape to be perforated, a pair of sets of punch selector magnets, means to store successive signal code combinations received by said receiver distributor in alternate sets of said punch selector magnets, a pair of sets of punch interponents, one of said sets of punch interponents conditioned by one of said sets of punch selector magnets, the other of said sets of punch interponents conditioned by the other of said sets of punch selector magnets, a pair of punch bails, one for operating one set of said sets of punch interponents, the other for operating the other set of said sets of punch interponents, means to feed said tape two positions at a time, and means for alternately operating said punch bails to successively punch rows of perforations in said tape, whereby one of said punch bails is operable while the set of interponents associated with the other punch bail is being conditioned.

5. In combination, a receiver distributor and a perforator including a tape to be perforated, a

pair of sets of punch selector magnets, a set of storage relays associated with one set of said punch selector magnets, another set of storage relays associated with the other set of punch selector magnets, said sets of storage relays each being adapted to receive alternate signal code combinations and transfer them to the associated set of punch selector magnets, a pair of sets of punch interponents, one of said sets of punch interponents conditioned by one of said sets of punch selector magnets, the other of said sets of punch interponents conditioned by the other of said sets of punch selector magnets, a pair of punch bails, one for operating one set of said sets of punch interponents, the other for operating the other set of said sets of punch interponents, means to feed said tape two positions at a time, and means for alternately operating said punch bails to cause the punching of successive rows of perforations in said tape, whereby one of said punch bails is operable while the set of interponents associated with the other punch bail is being conditioned.

6. In a tape perforating apparatus, a punch block, a plurality of sets of punches mounted in said punch block, each of said sets of punches adapted to punch a row of perforations in a tape, an individual set of punch interponents associated with each of said sets of punches, a plurality of sets of punch selector magnets, each of said sets of punch selector magnets being associated with and adapted to condition one of said sets of punch interponents, a plurality of punch bails wherein each punch bail is associated with one of said sets of punch interponents, and means for successively operating each of said punch bails, whereby one of said punch bails is operated to engage its associated set of punch interponents to cause the set of punches associated therewith to punch a row of perforations in the tape simultaneously with the conditioning of another set of said punch interponents by its associated set of punch selector magnets.

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REFERENCES CITED

The following references are of record in the file of this patent:

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