June 2, 1936. H. L. KRUM 2,042,788

TAPE PERFORATOR

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FIG. 2

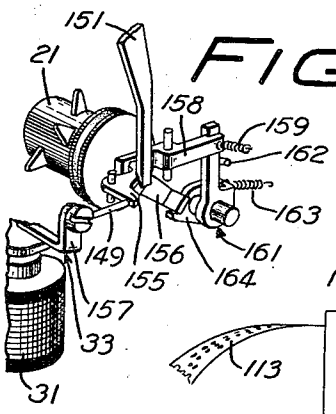
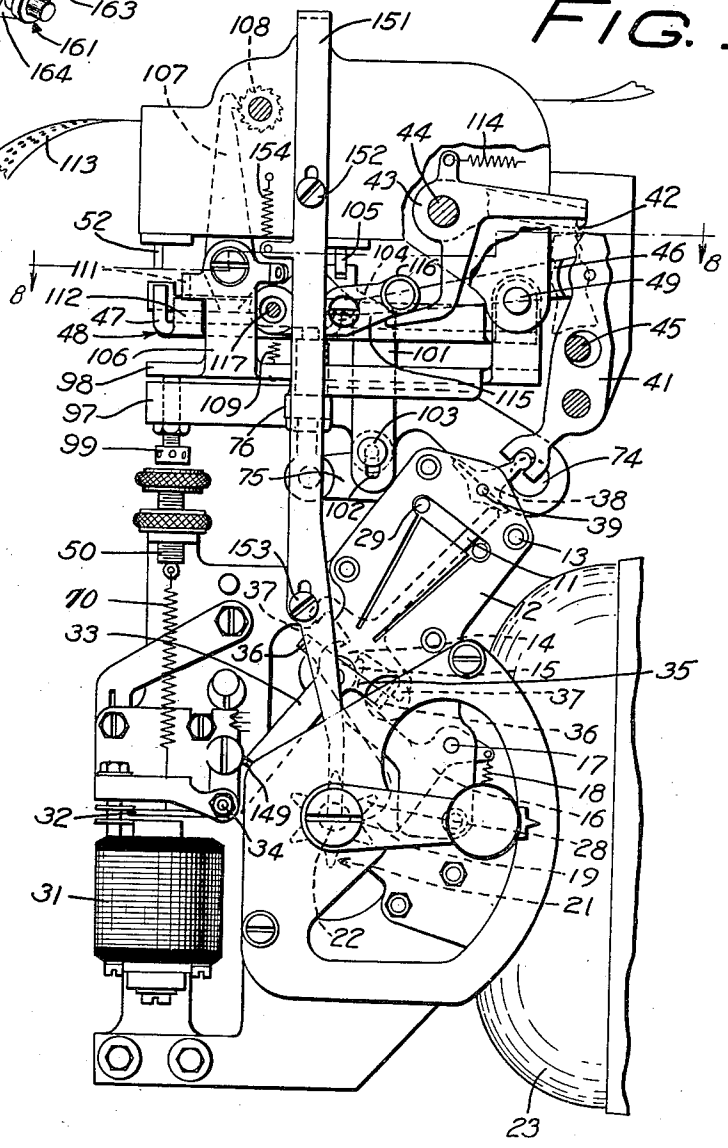


FIG. 1



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TAPE PERFORATOR

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FIG. 4

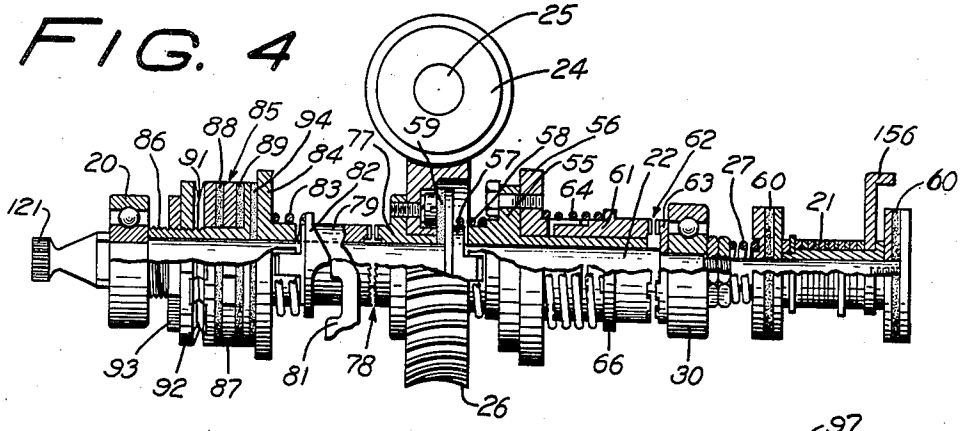
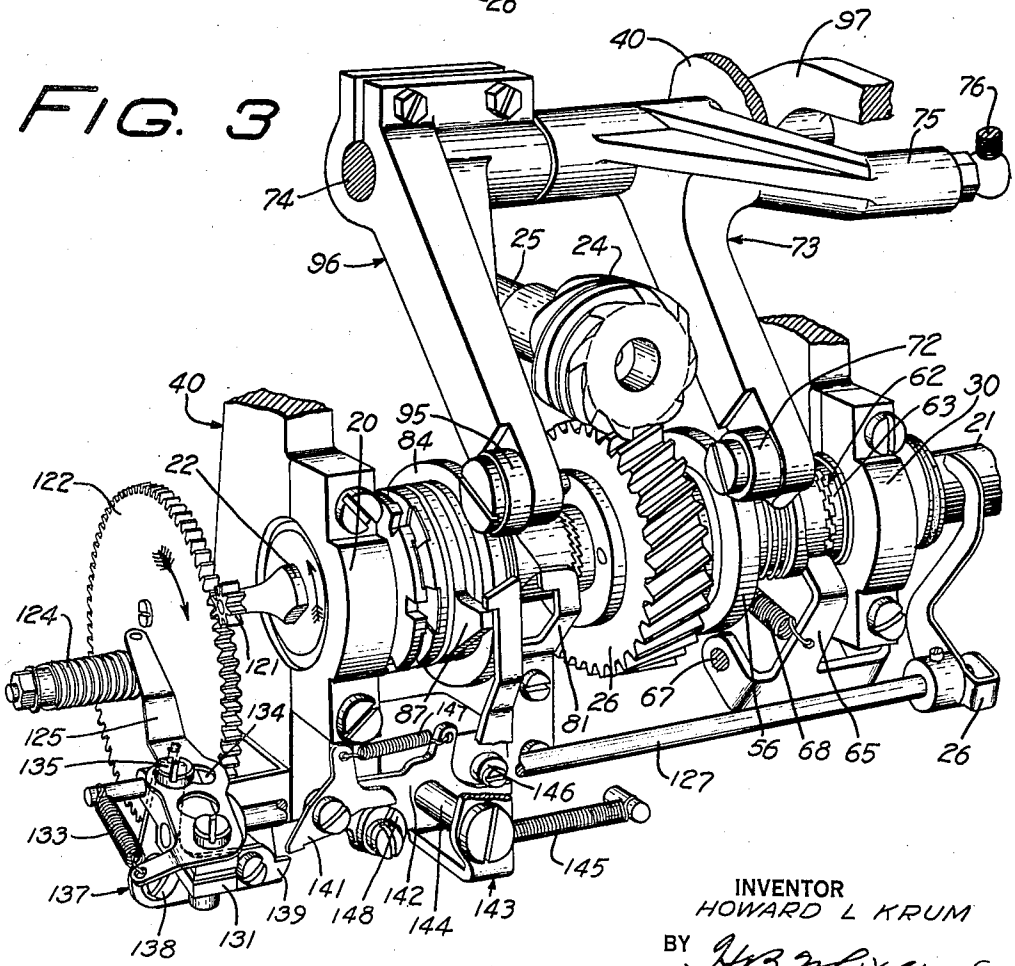


FIG. 3



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TAPE PERFORATOR

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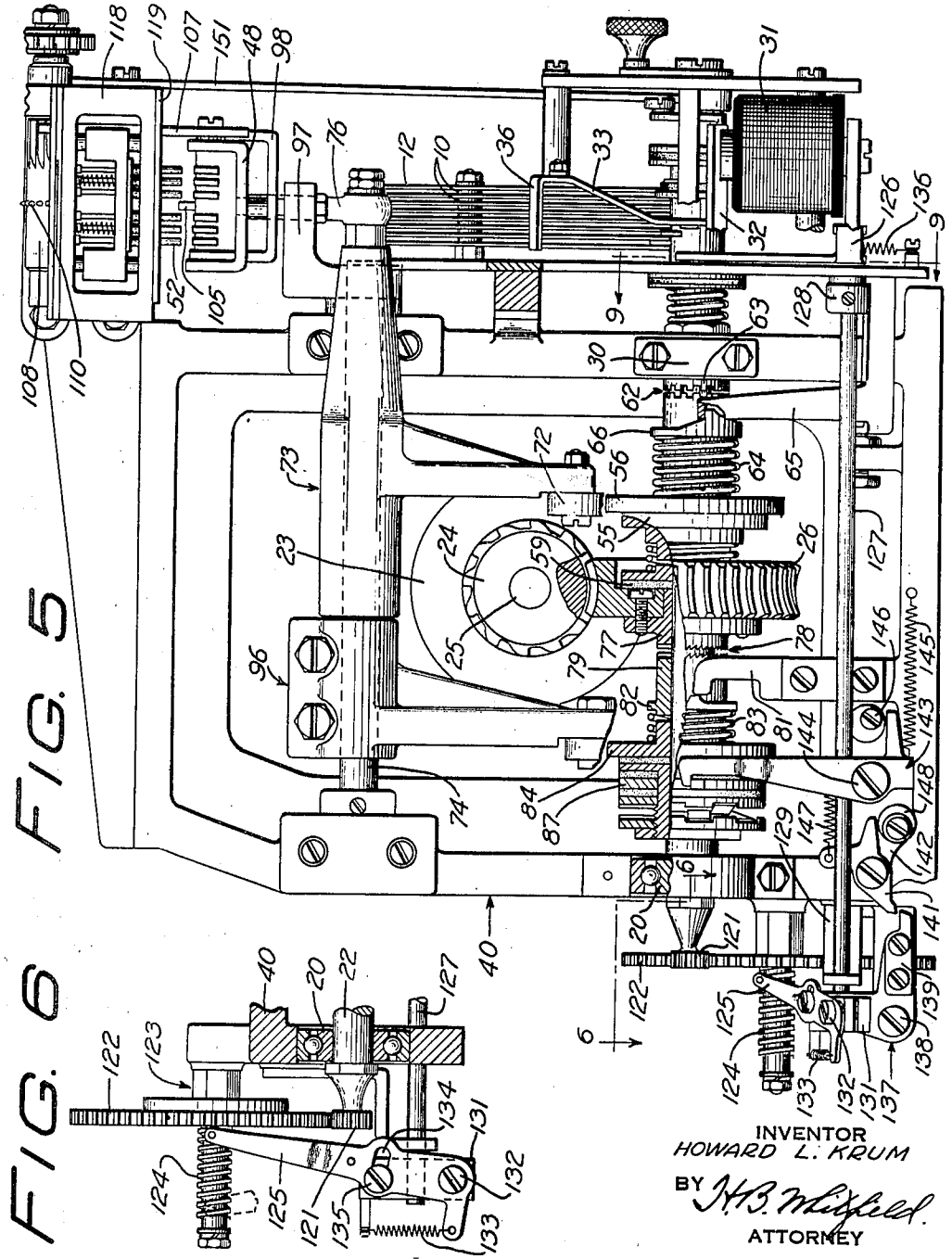


FIG. 5

FIG. 6

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TAPE PERFORATOR

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FIG. 7

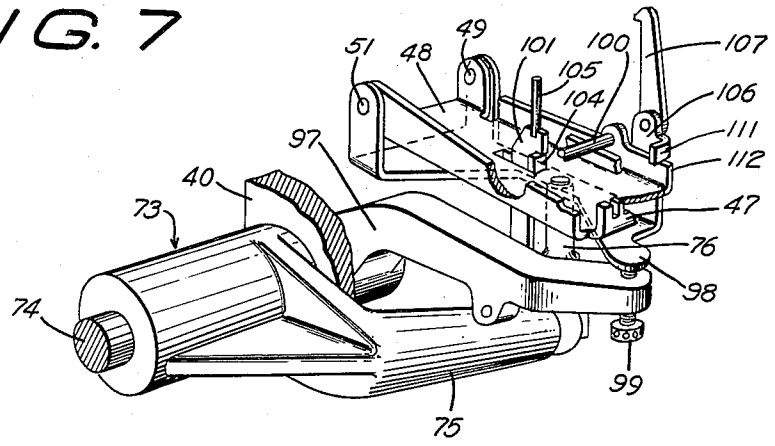
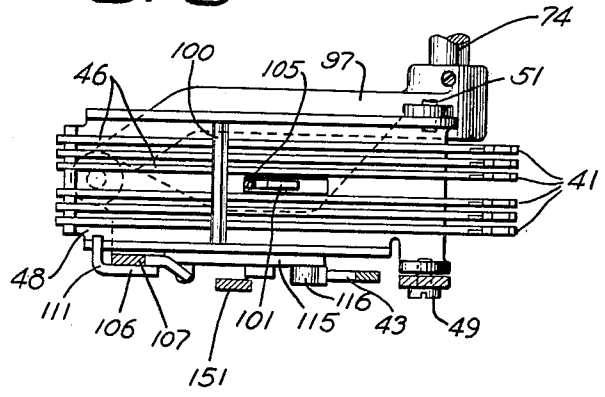


FIG. 8



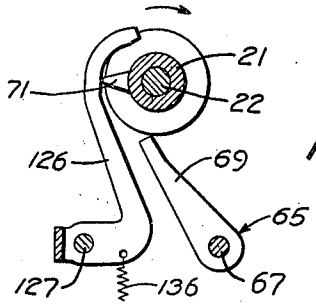


FIG. 9

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Patented June 2, 1936 2,042,788

UNITED STATES PATENT OFFICE

2,042,788

TAPE PERFORATOR

Howard L. Krum, Kenilworth, Ill., assignor to Teletype Corporation, Chicago, Ill., a corporation of Delaware

Application July 1, 1933, Serial No. 678,632

22 Claims. (Cl. 178—42)

This invention pertains to signaling apparatus and more particularly to printing telegraph signal controlled mechanisms for producing perforated tape.

The principal object of the invention is to provide a simple, efficient, and compact mechanism operative in response to signal impulses for recording characters in a recording medium, and to space out automatically a predetermined amount of the recording medium upon a cessation of signal impulses.

The apparatus for accomplishing the objects of the present invention contemplates the incorporation in a signal controlled perforating apparatus of the type disclosed in United States Patent No. 1,884,743, issued October 25, 1932 to E. E. Kleinschmidt, of power driven mechanism responsive upon a cessation of code signals for operating an auxiliary mechanism to advance automatically through the perforating apparatus a predetermined length of tape, which allows the immediate transmission of impulses represented by the code perforations therein.

Briefly, the apparatus according to this invention includes a single magnet selector mechanism responsive to received code combinations of signal impulses adapted to control permutably a plurality of punch interference members of a perforating mechanism, and a tape advancing mechanism comprising a power driven worm or screw and follower lever cooperatively related therewith responsive upon the cessation of reception of code signal impulses to control a secondary or auxiliary mechanism for spacing out a predetermined length of tape so as to preclude a situation wherein the portion of the message recorded in the tape between the punch block of the perforator and the sensing apparatus of a transmitter will be suppressed while awaiting the reception of a succeeding message, thus insuring the complete transmission of a message without delay.

A better understanding of the present invention may be had from the following description, taken in conjunction with the accompanying drawings, wherein,

Fig. 1 is a side elevational view of the mechanism illustrated in Fig. 3;

Fig. 2 is a perspective view of part of the manually operated space-out means;

Fig. 3 is a perspective view of the automatically operated tape advancing mechanism according to the present invention;

Fig. 4 is an elevational view, partly in section, of the main operating shaft with the operating elements mounted thereon;

Fig. 5 is a front elevational view of the mechanism of the present invention;

Fig. 6 is a sectional view taken on line 6—6 of Fig. 5;

Fig. 7 is a perspective view of part of the punch operating mechanism;

Fig. 8 is a sectional view taken on line 8—8 of Fig. 1, and,

Fig. 9 is a fragmentary sectional view taken on line 9—9 of Fig. 5 and illustrating the cooperative relation between the selecting cam member and the operation initiating levers of the perforating and space-out mechanisms.

Having reference to the drawings wherein like reference characters indicate the same parts thoughout the several views, the present invention is shown in the specific embodiment herein described in connection with a single magnet reperforator substantially as disclosed in the aforementioned Patent No. 1,884,743, and for a complete understanding of details not disclosed herein reference may be had to said patent. As shown in Fig. 1, the selector mechanism comprises a set of selector elements (six in the present instance) in the form of thin, flat fingers or swords 11 arranged in juxtaposed relation between guide plates 12. These plates are mounted on studs 13 and spaced by washers 10. The circular rear ends 14 of the swords 11 engage corresponding sockets 15 in six thin, flat bell cranks 16 pivoted on a common shaft 17. Individual springs 18 normally hold the bell cranks and selector fingers or swords in the position shown in Fig. 1 with the pointed rear end 19 of the bell cranks 16 in contact with a selecting cam member 21 on the main operating shaft 22 which is driven continuously by a motor 23 through a pinion 24 (Figs. 3 and 5) secured to the motor shaft 25, which pinion meshes with a gear 26 operatively associated with shaft 22. As shown in Fig. 4, the selector cam barrel 21 is frictionally driven by shaft 22 through the instrumentality of discs 60 of friction material being suitably inserted between metal discs provided therefor, the pressure for promoting the frictional relationship being supplied by a coil compression spring 27. The cam member 21 is provided with a helically arranged series of cams 28, which engage the bell cranks 16 (six in the present instance) successively and thus reciprocate longitudinally the set of swords 11 as the cam barrel is rotated.

In addition to their longitudinal movement, the swords 11 also have a lateral swinging movement

between the pair of studs 29, the setting of each sword 11 either to its right-hand or its left-hand position being determined by a selector electromagnet 31 which is mounted adjustably in the apparatus. A magnet armature 32 is secured to a selector lever 33 which is pivoted on a shaft 34 in the frame of the apparatus and is subjected to the pull of a spring 70 distended between the armature 32 and an adjusting screw 50. Lever 33 terminates in a U-shaped portion 35, having laterally extending arms 36 which constitute abutments for cooperating with arms 37 on the rear ends of the swords 11 for moving the latter in either a right-hand or a left-hand position. The swords 11 act through a corresponding number of T-shaped levers 38, arranged between the guide plates 12 and pivotally mounted on a stud 39, to position a set of levers 41. The springs 18 associated with bell cranks 16 normally hold the swords 11 in their forward position and in engagement with the T-levers 38, maintaining the latter in either one or the other of its two selectable positions according to the position of the associated swords 11.

As the signal impulses are received, the electromagnet 31 responds to but one of the two different electrical conditions comprising the signals attracting its armature 32 when a marking impulse is received and releasing it again when a spacing signal is received, while the swords 11 are reciprocated, successively and in synchronism with the signals, by the cams 28. The arms 37 of the swords 11 are thereby brought into cooperative relation with the abutments 36 of the selector lever 33 at the corresponding signal intervals, setting the selector swords 11 in variant combinations.

The levers 41 are likewise set in variant combinations corresponding to the particular setting of swords 11 for each received code combination of signals. Each of the levers 41 is beveled at its extremity for cooperation with a knife-edge 42 on a universal bail 43 which is pivoted at 44. Levers 41 are adapted to be locked in either their clockwise or counterclockwise positions between the knife-edge 42 and a stop 45 operative in an enlarged hole in each of the levers 41. Pivotally connected to each lever 41 is a punch interference member 46, the extremity of which is slidably carried in slots provided in a comb member 47 integrally formed on a cradle 48 which is pivotally carried on a pair of studs 49 and 51. Each of the interference members 46 is provided with an enlargement at its extremity, the purpose of which is to cooperate with an associated punch 52, the enlarged portion being adapted to be slid into or out of cooperative engagement with an associated punch 52 as determined by the position of its associated lever 41. A rod 100 (Fig. 8) is disposed over the interference members 46 and is provided to guide the members 46 and to prevent independent upward movement thereof.

The perforating mechanism for operating the punches 52 will now be described. Having reference to Figs. 3, 4, and 5, the main shaft 22 is indicated as journalled in anti-friction bearings 28 and 30 mounted in frame 40 and is constantly rotated through gear 26 and pinion 24 by an electric motor 23.

Also mounted on the shaft 22 is a flanged sleeve member 55 to which is secured the operating cam 56 for the signal-hole punches 52. Sleeve 55 has a slidable connection with a flanged member 57, a helical spring 58 being interposed between members 55 and 57. The tension of spring 58 tends to create through a disc of friction material 59 a frictional connection between member 57 and gear 26. Slidably carried on sleeve member 55 is a bushing 61 which forms the driven member of a grab clutch 62, the driving member 63 of which is keyed to the shaft 22. By this construction a combination friction and grab clutch is provided whereby the cam 56 is actuated during the initial and final periods of its rotation by the friction means 59 and during its effective or intermediate period of operation by the grab or tooth clutch 62. The driven portion of the grab clutch is urged during its operative period into mesh with the driving portion 63 by a compression spring 64. This tendency, however, is counteracted by a stop lever 65 (Figs. 3 and 5) which coacts with a cam formed on the side of flange 66 integral with bushing 61. Lever 65, which is pivoted at 67, is normally urged into cooperative relation with the cam formed on the flange 66 by its spring 68. Lever 65 is provided with an arm 69 (Fig. 9) which cooperates with one of the helical series of cams on the selecting cam member 21 in such manner that, at a predetermined point in the cycle of rotation or operation of the selector cam member 21, the cam portion 71 will coact with arm 69 to rotate lever 65 against the action of its spring 68 for disengaging it from bushing 61, permitting the cooperative engagement of bushings 61 and 63 of clutch 62 and the ensuing single cylic rotation of said clutch in the following manner. When lever 65 is disengaged from bushing 61, the bushing 61 is actuated toward the right into mesh with the driving member 63. However, immediately upon the disengagement of lever 65 the rotation of bushing 61 is initiated through the instrumentality of friction means 59 to move the cam portion on flange 66 out of range of the follower portion of lever 65. Simultaneously with this movement the meshing of bushings 61 and 63 will be operated due to the action of spring 64 to render the positive clutch 62 effective. During the single cycle of rotation of clutch 62, the lever 65 will be restored to its operative position with respect to bushing 61 by spring 68 preparatory to coacting again with the cam portion on flange 66, which occurs during the final period of rotation of clutch 62, at which time the power communicated through friction clutch means 59 will effect through the camming action of the cam on flange 66 and the follower on lever 65 the disengagement of bushings 61 and 63.

Cam 56 coacts with a follower roller 72 (Figs. 3 and 5), carried at the extremity of one arm of a punch operating bell crank lever 73 which is freely mounted on a shaft 74 suitably carried in the frame 40. As clearly shown in Figs. 3 and 7, the lever 73 is provided with an arm 75 at the extremity of which is pivotally articulated an adjustable strut 76 which functions to actuate the cradle 48 pivotally about pivots 49 and 51.

Referring again to Figs. 4 and 5, it is noted that the gear 26 is carried on a flanged sleeve 77, affixed to shaft 22, which forms the driving portion of a grab clutch 78, the driven portion 79 of which is normally held out of mesh with the driving portion 77 by a fixed cam follower 81 adapted to coact with a cam portion formed on the side of flange 82 integral with clutch portion 79. The clutch portion 79 is maintained out of meshing engagement with driving portion 77 by the cam follower 81 against the action of a compression spring 83 and has a slidable connection with a cam member 84 so that cam 84 rotates with the clutch 78. Frictionally associated with cam 84 is a clutch assembly 85 comprising a flanged sleeve

member 86 on which is carried a stop disc 87 interposed between a pair of washers 88 and 89 of friction material. A slit annular spring member 91 is provided to impart a compressive action to the friction clutch, the pressure of which is adjusted by means of a nut 92 and a locknut 93. A washer or disc 94 of friction material is interposed between the clutch assembly 85 and cam 84 and by virtue of the pressure exerted by spring 83, cam 84 is thus frictionally connected to drive shaft 22, whereby, together with positive clutch 78, cam 84 is, during a cyclic operation, initially and finally controlled by the friction clutch and intermediately controlled by the positive clutch 78 in a manner similar to that set forth in connection with aforementioned cam 56.

Cam 84 cooperates with a follower roller 95 (Figs. 3 and 5) carried at the extremity of a lever 96 which is clamped tightly on shaft 74. In this manner shaft 74 is constrained to rock in accordance with the movement of lever 96. At the right-hand extremity of shaft 74, as viewed in Fig. 7, is secured a lever 97 which cooperates with a member 98 (Figs. 1 and 7) which is also pivotally carried on the studs 49 and 51. The lever 97 is provided at its extremity with an adjusting screw 99 which serves to provide an adjustable relation between lever 97 and member 98. Also pivotally carried on lever 97 substantially intermediate the adjusting screw 99 and the shaft 74 is a feed punch carrier 101 which is provided with a slotted hole 102 which engages the pivot stud 103 carried on the lever 97. The purpose of the slotted hole 102 is to permit the operation of carrier 101 and hence feed punch 105 either with the cradle 48 and associated punches 52 or independently. The carrier 101 is provided at its upper extremity with a shouldered portion which cooperates with a vertical projection 104 integrally formed on the cradle 48. As viewed in Figs. 5 and 7, the carrier 101 is also notched to provide a seat for a feed punch 105. It is clearly apparent that the feed punch 105 is operable either independently of or conjointly with the signal hole punches 52 in the following manner. Upon reciprocation of strut 76 by means of the punch operating lever 73 (the lever 97, at this time, remaining unoperated due to the inaction of cam 84, Fig. 3), the cradle 48 will be oscillated about pivots 49 and 51, thus likewise causing interference members 46 to oscillate about their common pivot 45 to actuate the punches 52 in accordance with the relative positions of the enlarged ends of the interference members 46. Simultaneously, punch carrier 101 will be carried upwardly by the cooperation of projection 104 and the shoulder on carrier 101 to actuate feed punch 105, the purpose of slotted hole 102 being to permit the actuation of carrier 101 by cradle 48 independently of lever 97 during the normal reception of code signal impulses. Thus, it is seen that the actuation of cradle 48 through the instrumentality of the punch operating member 73 causes the actuation of signal punches 52 and feed punch 105 conjointly.

Provision is made for the independent operation of the feed hole punch 105, thus, when a rocking motion is imparted to shaft 74 by the cooperation of cam 84 and follower 95, as will presently appear, a corresponding rocking motion or oscillation will be imparted to lever 97 which, since it carries the feed punch carrier 101, will cause a corresponding reciprocal motion of carrier 101 independently of cradle 48, which at this time remains at rest due to a cessation of reception of code signal impulses, and the consequent inaction of cam 56. Member 98, which is interposed between cradle 48 and lever 97, is controlled by either the cradle 48 or the lever 97 to effect the stepping or advancement of the tape. Member 98 is provided with a vertical portion 106 at the upper end of which is pivotally carried a feed pawl 107 which is normally urged into cooperative engagement with the ratchet portion of cylinder 108 by a spring 109 distended between the pawl member 107 and member 98. Portion 106 of member 98 is provided with a projection 111 which is adapted to cooperate with a vertical projection 112 on cradle 48 so that, when cradle 48 is oscillated about its pivots 49 and 51, member 98 will be reciprocated correspondingly through the cooperation of projections 111 and 112 to effect the stepping of the tape 113 through the actuation of cylinder 108 by pawl 107 in a manner well known in the art, the cylinder 108 being provided also with a circumferential series of tape-feed pins 110 (Fig. 3). Also, when cradle 48 remains at rest and lever 97 alone is oscillated, member 98 will respond to the movement of lever 97 through its cooperation with adjusting screw 99 to effect the stepping of the tape 113 through pawl 107 and pins 110 of cylinder 108.

The oscillation of cradle 48, during each oscillation thereof, also effects the actuation of locking ball 42 because, as cradle 48 is swung upwardly, the member 43 is allowed to rotate about its pivot 44 by the pull of a spring 114. The proper timing of the motion imparted to member 43 is governed by an adjustable member 115 pivotally carried on the side wall of the cradle 48 (Fig. 5). As shown, one end of member 115 carries a roller 116 which coacts with the bent portion of a depending arm or member 42. The other end of lever 115 is provided with an enlarged hole through which extends a clamping screw 117 of considerably smaller diameter. In this manner lever 115 can be rotated slightly in either direction about its pivot to determine by proper adjustment the timing of the engagement of ball 42 with levers 41.

Incidentally, the punches 52 and 105, which are spring returned, are operatively carried in a punch block 118, as indicated in Fig. 3, and are adapted to be movable through a guide plate 119 and coact with die plates to perforate the tape 113.

The left end of shaft 22 (as viewed in Figs. 1, 2, 3, and 4) is formed with a pinion 121 which meshes with a gear 122 loosely carried on a stud shaft 123 mounted on the frame 40. Integrally formed with the gear 122 is a square-threaded worm or screw 124 which cooperates with a follower or traveling member 125 to effect, upon the cessation of reception of code signals, the stepping out or spacing out of a predetermined length of tape, as will presently appear.

The cam projection 71 (Fig. 9) not only coacts with lever 65, but also cooperates cyclically with a lever arm 126 fixed to a rock shaft 127 (Figs. 1 and 3) suitably carried in brackets 128 and 129 affixed to the frame 40. At the left extremity of the rock shaft 127 (Figs. 1, 3, and 6) there is clamped an adjustably positionable member 131 on which is pivotally carried at 132 the follower lever or traveling arm 125. Having particular reference to Fig. 6, it is seen that the arm 125 is normally urged in a clockwise direction about pivot 132 by a spring 133. The movement of arm 125 is limited by a slot 134 therein and a shoulder screw 135. Upon each cyclic operation of the selecting cam member 21, the

lever arm 126 is actuated against the action of its spring 136 (Figs. 5 and 9) to rock the shaft 127 slightly; thus raising the arm 125 out of operative engagement with the constantly rotating screw 124. In the event that no signals are received; that is, upon a cessation of reception of code signals, during which period the rotation of selecting cam member 21 is arrested, the arm 125 remains in cooperative engagement with the screw 124, and hence will be caused to travel longitudinally with respect to the axis of the screw 124 until it either reaches the end of the series of screw threads thereon or is raised out of operative engagement with the screw upon the initiation of rotation of the selecting cam member 21 upon resumption of code signal reception. Thus, whenever the arm 125 has traveled any distance, however slight, along the screw 124 and is again raised out of operative engagement with the screw, it is actuated in a clockwise direction by its spring 133 to the starting position.

Pivotally articulated to the traveling arm 125 (Figs. 1 and 3) is the extremity of the vertical arm of a bell crank 137 pivotally supported at 138 to a bracket mounted on frame 40. Through this interconnection with traveling arm 125, the bell crank 137 is caused to rotate in a counterclockwise direction whenever the traveling arm is actuated leftwardly along the screw 124. The extremity of the horizontal arm of the bell crank 137 is provided with a longitudinally adjustable member 139 adapted to coact with a member 141 adjustably carried on arm 142 of a release lever 143 mounted on a stud shaft 144 secured to frame 40. Release lever 143 is normally biased in a counterclockwise direction by a spring 145 against an eccentric adjusting screw 146. Member 141 is normally actuated in a clockwise direction by a spring 147 against an eccentric adjusting screw 148 carried on arm 142 of release lever 143. By means of their respective adjustments, the timed engagement or bite between members 139 and 141 can be accurately controlled.

Upon a cessation of code signals, the rock shaft 127 remaining quiescent due to the arrested motion of cam member 21, the follower 125 will thereupon travel along the screw 124, and in so doing, portion 139 of bell crank 137 will, at a predetermined moment, engage member 141 of release lever 143. Upon the continued movement of driving arm 125, bell crank 137 will be actuated counterclockwise, to rotate, in turn, release lever 143 in a clockwise direction out of engagement with stop disc 87. Release lever 143 will remain out of positive engagement with the stop disc 87 upon the further continuance of the travel of the arm 125 along the screw 124 until the bell crank 137 has been rotated a sufficient amount so that the portion 139 has become disengaged from the portion 141. As has been noted, the period of engagement between portions 139 and 141 has been predetermined by their respective adjustments, so that the stop disc 87, and hence cam 84, have been permitted to rotate a predetermined number of times, the ultimate effect of which is to permit a series of oscillations of lever 96 to rock, correspondingly, shaft 74 to oscillate lever 97 in turn to actuate the feed punch 105 and to oscillate member 98 to effect the feeding of the tape. In this manner the continued rotation of stop disc 87 and cam 84 for a predetermined length of time will cause the feeding or spacing out of the tape a definite predetermined length or distance.

When the portions 139 and 141 have become disengaged by the continued travel of arm 125 along screw 124, lever 143 will respond to the tension of its spring 145 and will be rotated into arresting engagement with stop disc 87, effecting simultaneously the arrest of cam 84 and the discontinuance of the spacing-out operation. The follower arm 125, however, will continue to travel along the screw 124 until it has reached the end of the series of threads where it will remain until code signals are again received, at which time lever 126 will again be actuated to rock the shaft 127 to raise in turn the follower arm 125 out of coaction with the screw 124, whereupon the follower arm 125 will be restored to its right-hand position by its spring 133, and the cycle of operation described will be repeated.

General operation

A further understanding of the structure constituting the present invention can, it is thought, be obtained from the following detailed description of its operation.

Assuming that the motor is running and that the various parts of the machine are stopped in their normal positions, the selector magnet 31 is normally energized due to the fact that the current on the line is of marking nature. Since the start impulse of a code combination of signal impulses is of spacing nature, the reception thereof preceding a signal code causes the deenergization of selector magnet 31, whereupon selector lever 33 is actuated by its spring 70 in a clockwise direction to effect through plunger 149 the initiation of rotation of the selecting cam member 21. The cooperative effect of the member 21 (which is rotated in synchronism with incoming signals) and selector lever 33 (which is actuated in either of two positions by the signal impulses) will be to set the swords 11 by means of levers 16 into either of their two positions according to the nature of the signal impulses received, as previously described. Levers 41 will be set through T-levers 38 to correspond with the setting of swords 11, thereby establishing the positions of the interference members 46 preparatory to perforating the signal code in the tape. After the cam member 21 has rotated a predetermined angular amount, the cam projection 71 (Fig. 9) thereon cooperates with lever 65 to effect the operation of clutch 62 to cause in turn the operation of lever 73 by cam 56, which operation functions through strut 76 and cradle 48 to actuate punches 52 and 105 simultaneously, the latter being effective by reason of the cooperative relation between cradle 48 and punch carrier 101 through projection 104, thereby producing in the tape a series of code signals in one position and a feed punch hole in another position, the feed hole in relation to its associated signal holes being thereby prepunched. When, during the perforating operation the cradle 48 is oscillated, lock bail 42 is operated in proper timed relation with the perforating operation to maintain levers 41, and hence interference bars 46 in their selected positions. Such is the operation of the perforator during the normal reception of signal code combinations of impulses.

However, in the event that the reception of code signals ceases, the present invention contemplates the provision of mechanism responsive to the cessation of code signals to space out a sufficient amount of tape to insure the complete transmission of the message recorded therein. The mechanism shown in Fig. 1 is accordingly

provided which, as previously mentioned, comprises essentially a constantly rotating screw or worm and a follower arm coacting therewith, the coaction of which is controlled through the rock shaft 127 by the lever 126. The lever 126 is actuated once during each cyclic operation of cam member 21 to lift arm 125 out of cooperative engagement with screw 124 to permit its return by spring 133 to the start position. But, when the reception of code signals ceases, the arm 125 remains in cooperative engagement with screw 124 and travels along the threads thereof to effect the rotation of bell crank 137, and through members 139 and 141, a counter-rotation in release arm 143, whereupon the clutches 78 and 85 are rendered effective for rotation for a predetermined length of time, depending upon the adjusted engagement or bite established between members 139 and 141. The ensuing continued rotation of cam 84, which is controlled by clutches 78 and 85, causes, through lever 96, shaft 74 to rock continuously, thus oscillating arm 97 secured to the end thereof, correspondingly, to operate through punch carrier 101 the feed punch 105. The oscillation of arm 97 also effects, through member 98 and pawl 107, the stepping of the tape. The amount of tape to be stepped or spaced out is determined by the distance between the pin block of the transmitter and the punch block of the perforator, and the amount of tape actually spaced out is accordingly obtained by the adjustment established between members 139 and 141. As previously described, the arm 125 continues to travel along the screw 124 even after the member 139 has become disengaged from member 141, until arm 125 has reached the end of the screw, to insure the positive operation of the spacing-out mechanism. The mechanism remains in this condition; that is, with the arm 125 at the left end of the screw 124, as viewed in Fig. 4, until the resumption of reception of code signals, whereupon lever 126 will again be actuated by cam projection 71 to raise or lift, through shaft 127, arm 125 out of engagement with screw 124, whereupon arm 125 will be returned to its rightward position by its spring 133.

Manually operated space-out means

The present invention also contemplates the provision of a manually operated space-out means for facilitating the introduction of tape to the perforating mechanism, such as the feeding initially of tape stock or material to the perforator. This means is shown in Figs. 2 and 5 and comprises a member 151 slidably supported through screw and slot connections 152 and 153 to the frame of the apparatus. Member 151 is normally held in its vertical or upward position by a spring 154. The lower extremity of member 151 is beveled and cooperates with the bell crank 155 of the latch mechanism, shown in Fig. 2, for initiating the rotation of the selecting cam member 21. As already set forth, a constant tendency to rotate is imparted to member 21 through its frictional connection to main shaft 22. The cam member 21 is held against rotation by the cooperation of a stop arm 156 secured thereto (Fig. 2) with said latch mechanism which is controlled by an arm 157 of selector lever 33 through the plunger 149. A feature of this invention resides in the initiation of operation of the selector mechanism, and hence the apparatus either by means of received signal impulses or by manually operable means. By the former mode of control the initiation of operation is effected through the instrumentality of the selector magnet 31. Thus, upon the deenergization of magnet 31 by the start impulse, selector lever 33 will be biased slightly clockwise by its spring 30 so that the eccentric screw on arm 157 will function to urge plunger 149 rightwardly to rotate bell crank 155 in a counterclockwise direction (as viewed in Fig. 2) whereby latch 158 is caused to rotate in an opposite direction against the tendency of a compression spring 159 to effect its disengagement from stop gate 161. Stop gate 161 is normally held against the stop 162 by a spring 163, but since the torque constantly applied to the cam member 21, and hence to stop arm 156, is of greater force than that exerted by spring 163, the holding effect of stop gate 161 on arm 156 is overcome and cam member 21 permitted to rotate. The action of arm 156 on gate 161 being to rotate gate 161 a certain angular amount against the action of its spring 163 until the disengagement of arm 156 from gate 161 occurs, gate 161 will thereafter be returned to its position against stop 162 by spring 163.

During the last portion of the revolution of arm 156, the selector magnet 31 becomes energized by the stop impulse of the code combination of impulses under which condition latch 158 will be engaged with gate 161 to prevent the rotation of said gate when arm 156 strikes arm 164 thereof. The arrest of arm 156, and hence of cam member 21 will prevail until either a start or no-current impulse is received to effect the deenergization of magnet 31 and the consequent operation of plunger 149, as just described, or by the manual operation of bell crank 155 by the manual tape space-out release member 151. Thus, when lever 151 is depressed, the beveled surface at its lower extremity will impart a camming action upon bell crank 155 to effect a rotation of said bell crank in a manner comparable to the action of plunger 149 thereon to initiate the rotation of cam member 21 in a manner similar thereto, as just described. However, the continued depression of member 151 will hold bell crank 155 in its counterclockwise position (Fig. 2), to hold in turn member 158 unlatched from stop gate 161, thus permitting the cam member 21 to rotate continuously, which rotation effects through cam 56 and the perforator operating lever 73 the continued perforation and advancement of the tape. When the selector cam member 21 is operated in this manner, the interference members 46 are set in their operated position; that is, with their enlarged ends positioned beneath the punches 52, and an all marking or rub-out signal will be perforated in the tape; the reason for this being that, since the normal stop condition of the signal line is marking, the selector magnet 31 will be energized during the prolonged stop period or interval, and the rotation of cam member 21 will effect the actuation of the selecting elements, and hence interference members 46, to their marking positions.

Although the present invention has been disclosed and described with reference to tape perforators, it is, of course, understood that the invention is capable of embodiment in many and widely varied forms other than that specifically disclosed, without departing from the spirit and scope of the present invention.

What is claimed is:

1. In a tape perforator, a perforating mechanism, a selecting mechanism responsive to signals for controlling the operation of said mechanism, means for advancing the tape with each operation of the perforating mechanism, a cam mechanism,

and means constantly tending to operate but rendered ineffective during normal signaling periods including a duality of clutches cooperatively related to each other and to said cam mechanism effective upon a cessation of signals for operating said advancing mechanism a predetermined amount.

2. In a tape perforator, a perforating mechanism, a selecting mechanism responsive to code signals for controlling the operation of said mechanism, means for advancing the tape with each operation of the perforating mechanism, and means comprising a cam dually operated through a friction clutch and a positive clutch and effective upon a cessation of code signals for operating said advancing mechanism a predetermined amount.

3. In combination in a tape perforator, a selector mechanism, a normal spacing operating means, an auxiliary spacing operating means, means controlled directly by said selector mechanism to render said normal spacing operating means effective to space the tape for each code selection, and means to render said auxiliary spacing operating means effective to space the tape upon a cessation of code signals.

4. In combination in a signal controlled apparatus, a selector mechanism, a first spacing operating means, a second spacing operating means, means controlled by said selector mechanism for rendering said first spacing operating means effective and said second spacing operating means ineffective, and means operable upon the ineffectiveness of said first spacing operating means to render said second spacing operating means effective.

5. In a tape perforator, a selector mechanism cyclically operated by code signals, tape advancing means, a constantly rotating shaft, means upon which a constant tendency to function is imparted by said shaft, means for disaffecting said means upon each cyclic operation of said selector mechanism, and means effective upon a cessation of code signals to render said second mentioned means effective to cause the actuation of said tape advancing means a predetermined number of times.

6. In a tape perforator, a perforating mechanism, tape advancing means, a selecting mechanism responsive to code signals for controlling said perforating mechanism, means for operating said tape advancing means once for each code signal applied to said selecting mechanism, and separate means directly controlled by said selecting mechanism for automatically operating said tape advancing means a predetermined number of times.

7. In an apparatus for preparing a control strip, signal controlled means, a constantly rotating shaft, dual means operatively associated with said shaft to operate said means, each of said dual means including a friction clutch adapted to be operatively associated with said signal controlled means during its complete cycle of operation and a positive clutch adapted to be operatively associated intermittently with said controlled means, a first means effective during the reception of code signals to connect through the instrumentality of one of said sets of clutches and its associated one of said dual means said controlled means to said shaft, a second means effective upon the cessation of code signal reception to connect through the instrumentality of the other of said sets of clutches and its associated one of said dual means said controlled means to said shaft, and means individual to each of said dual means to render their respective positive clutches effective only during the effectual period of operation of said signal controlled means.

8. In combination, a selector mechanism responsive to code combinations of signaling impulses, a device for forming indicia on a tape, a first means controlled directly by said selector mechanism for advancing the tape one step upon each operation of said device, and a second means also controlled directly by said selector mechanism and operative independently of said first means upon the cessation of code signals to advance the tape a predetermined amount.

9. In a printing telegraph apparatus, a recording mechanism for recording characters on a medium, a selecting mechanism responsive to signals for controlling the operation of the recording mechanism, means for advancing the medium, a cam mechanism, and means constantly tending to operate but rendered ineffective during normal signaling periods including a duality of clutches cooperatively related to each other and to said cam mechanism effective upon a cessation of signals for operating the advancing mechanism a predetermined amount.

10. A perforating mechanism comprising a plurality of punches, means for selecting said punches for operation, power driven means for operating the selected punches to perforate a tape and effect its advancement, and separate means controlled directly by said selecting means and effective when said selecting means is not operated for advancing said tape a predetermined amount.

11. A perforating mechanism including a single selecting electromagnet, a plurality of punches, means responsive to the energization of said electromagnet for selecting said punches for operation, means for operating the selected punches to perforate a tape and effect its advancement, and separate means controlled directly by said selecting means and effective when said selecting means remains ineffective for a predetermined period for causing the advancement of said tape a predetermined amount.

12. A perforating mechanism including a single selecting electromagnet, a plurality of punches, means responsive to the energization of said electromagnet for selecting said punches for operation, power driven means for operating the selected punches to perforate a tape and effect its advancement, means tending invariably to initiate and control the continuous advancement of the tape, and means operative for each selective operation of the punches for disabling said last mentioned means.

13. A perforating mechanism comprising a plurality of punches, means for selecting said punches for operation, power driven means for operating the selected punches to perforate a tape and effect its advancement, additional power driven mechanism for also causing the advancement of the tape, and means directly controlled by said selecting means and effective upon a predetermined cessation of the operation of said selecting means for rendering said additional tape advancing means effective to advance said tape a predetermined amount.

14. A perforating mechanism comprising a plurality of punches, means for selecting said punches for operation, power driven means for operating the selected punches to perforate a tape and effect its advancement, additional means

operative to advance said tape, means tending normally to render said additional means effective, and means responsive to the operation of said selecting means for rendering said last mentioned means ineffective and for effecting the disablement of said additional advancing means.

15. A perforating mechanism comprising a plurality of punches, means for selecting said punches for operation, power driven means for operating the selected punches to perforate a tape and effect its advancement, additional means also operative to advance the tape, and means effective for each cycle of operation of said power driven means for rendering said additional means ineffective.

16. A perforating mechanism comprising a plurality of punches, means for selecting said punches for operation, power driven means for operating the selected punches to perforate a tape and effect its advancement, additional means operative to advance the tape, and means directly controlled by said selecting means and operative during a cessation of the operation of said selecting means for operating said additional means to cause the advancement of said tape a predetermined amount.

17. In combination in a tape perforator, a code signal controlled selecting device, a normal spacing means, an auxiliary spacing means, means to render said normal spacing means effective to space the tape for each code selection, and means directly controlled by said selecting device to initiate said auxiliary spacing means into operation upon a cessation of code signals.

18. In combination, a device for forming indicia on a tape, a selector mechanism responsive to code combinations of signaling impulses, means responsive to the operation of said selector mechanism for advancing the tape one step upon each operation of said device, and separate means directly controlled by said selector mechanism and initiated into operation upon a cessation of code signals to advance the tape a predetermined amount.

19. In combination, a device for forming indicia on a tape, a code signal controlled selecting device, means responsive to the operation of said selecting device for advancing the tape one step upon each operation of said first mentioned device, and means, comprising a first part directly controlled by said selecting device and a second part controlled by said first part, initiated into operation upon a cessation of code signals to advance the tape a predetermined amount.

20. In combination, a device for forming indicia on a tape, a code signal controlled selecting device, means responsive to the operation of said selecting device for advancing the tape one step upon each operation of said first mentioned device, and means initiated into operation upon a cessation of code signals to advance the tape a predetermined amount, said last recited means comprising a first part directly controlled by said selecting device and a second part controlled by said first part, the cooperable relationship between said first and said second parts being determinative of the amount of advancement imparted to the tape during said cessation of code signals.

21. In combination in a tape perforator, a code signal controlled selecting device, a normal spacing means, an auxiliary spacing means, means to render said normal spacing means effective to space the tape for each code selection, and means to initiate said auxiliary spacing means into operation upon a cessation of code signals, said last recited means comprising a first part directly controlled by said selecting means, and a second part controlled by said first part, the cooperable relationship between said first and said second parts being determinative of the amount of advancement imparted to the tape during said cessation of code signals.

22. A perforating mechanism comprising a plurality of punches, means for selecting said punches for operation, power driven means for operating the selected punches to perforate a tape and effect its advancement, additional means operative to advance the tape, and means operative during a cessation of the operation of said selecting means for operating said additional means to cause the advancement of said tape a predetermined amount, said last recited means comprising a first part directly controlled by said selecting means and a second part controlled by said first part, the cooperable relationship between said first and said second parts being determinative of the amount of advancement imparted to the tape during said cessation of operation.

HOWARD L. KRUM.