March 27, 1945. L. M. POTTS 2,372,515

AUTOMATIC TRANSMITTER

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FIG. 6

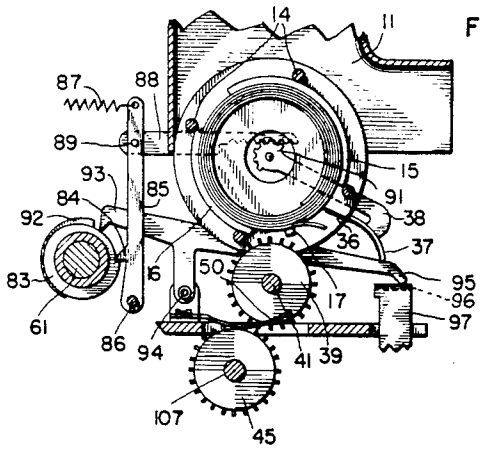
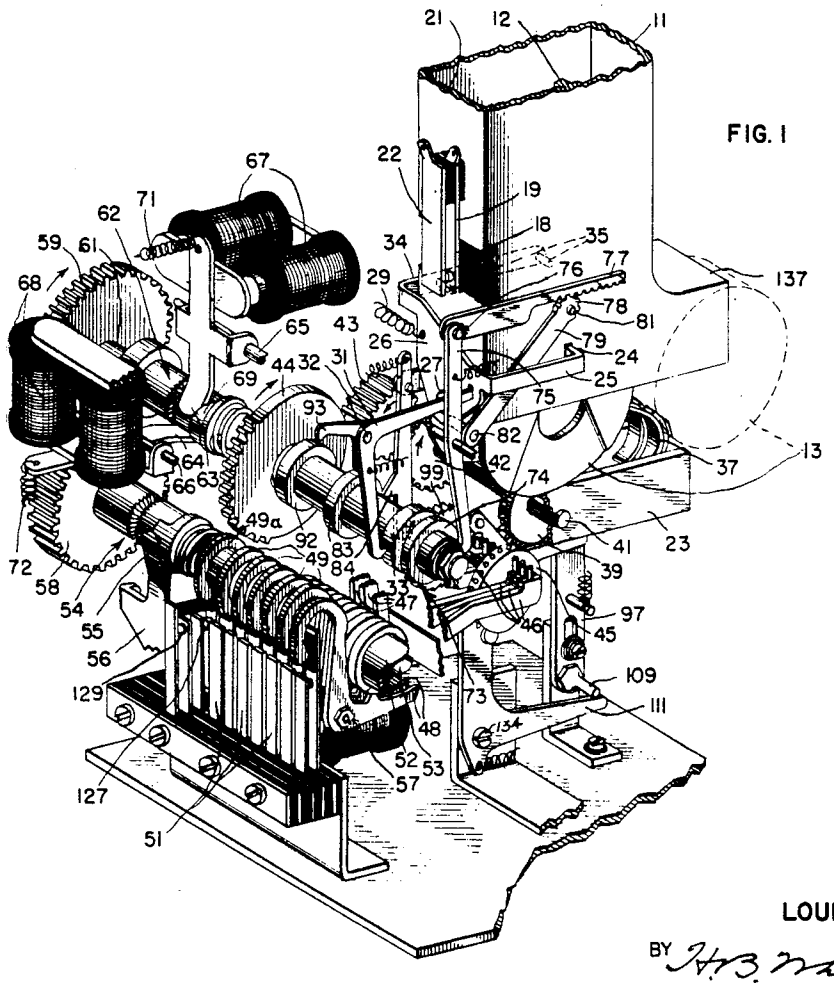


FIG. 1



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FIG. 3

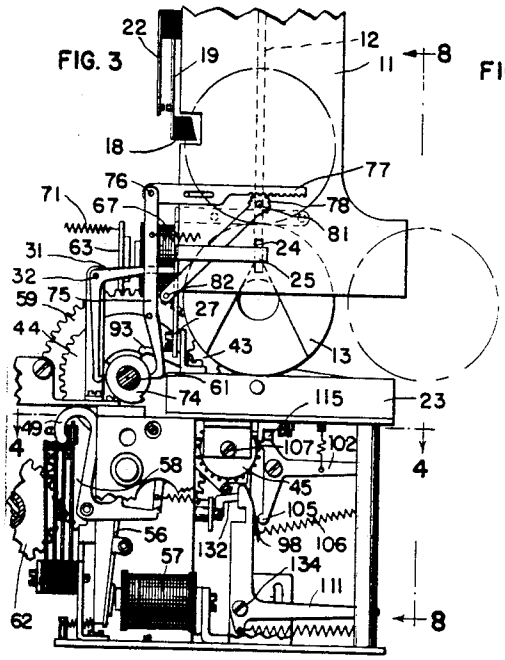


FIG. 10

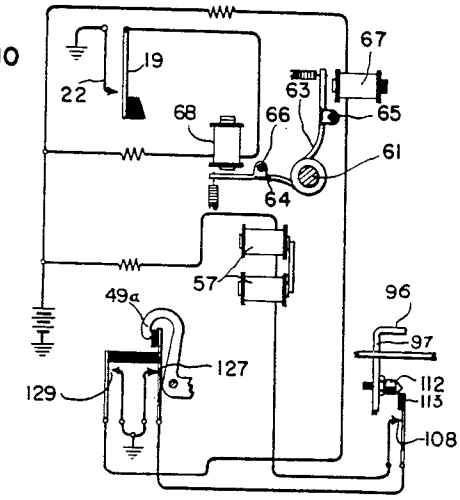
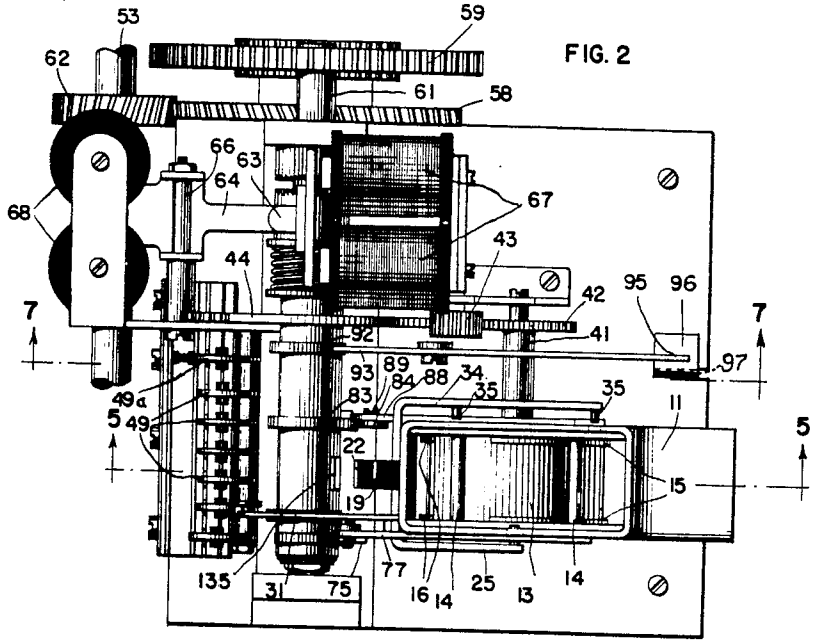


FIG. 2



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FIG. 7

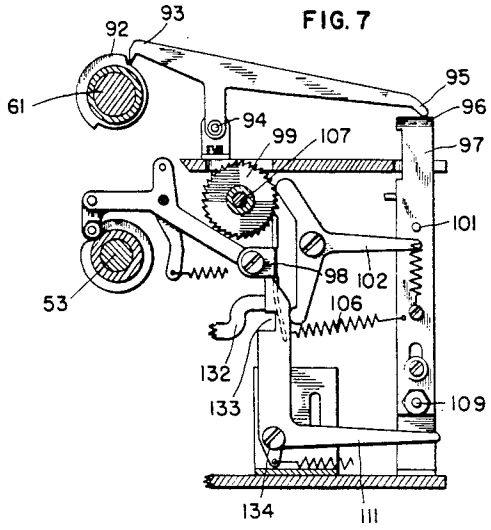


FIG. 8

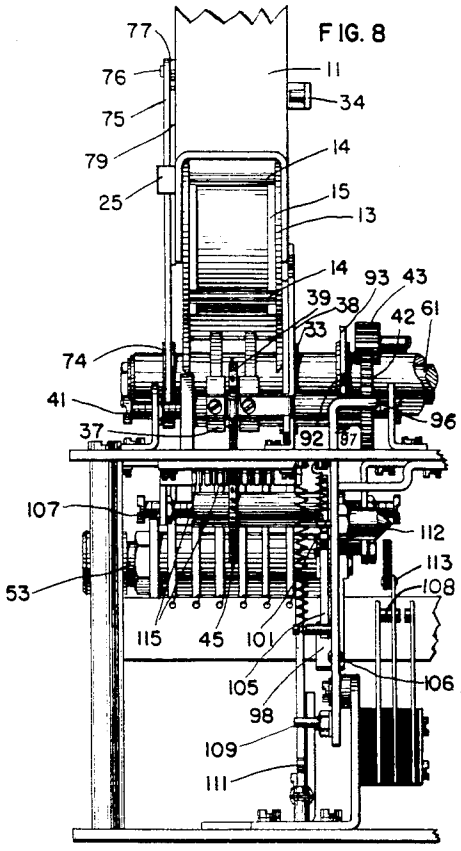
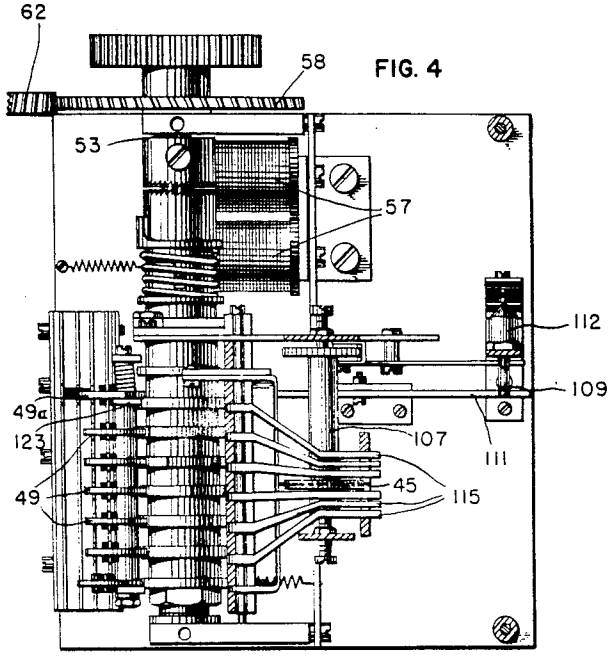


FIG. 4



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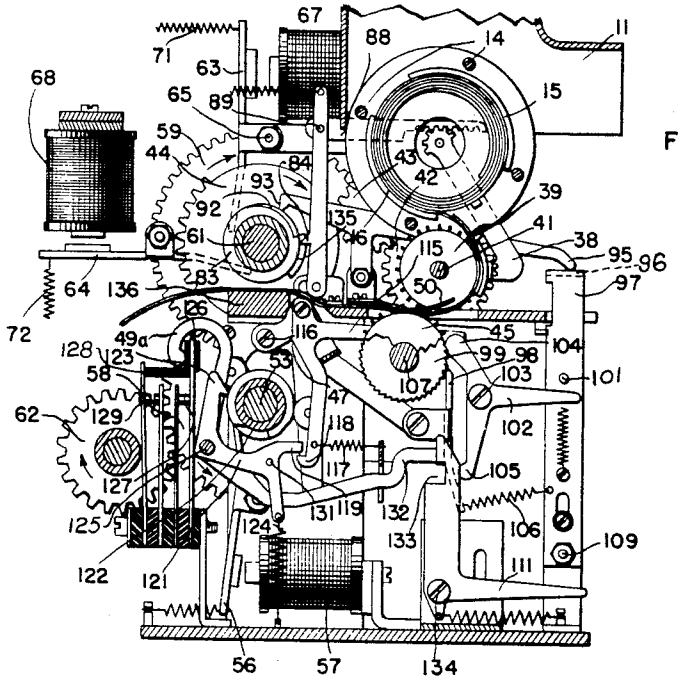
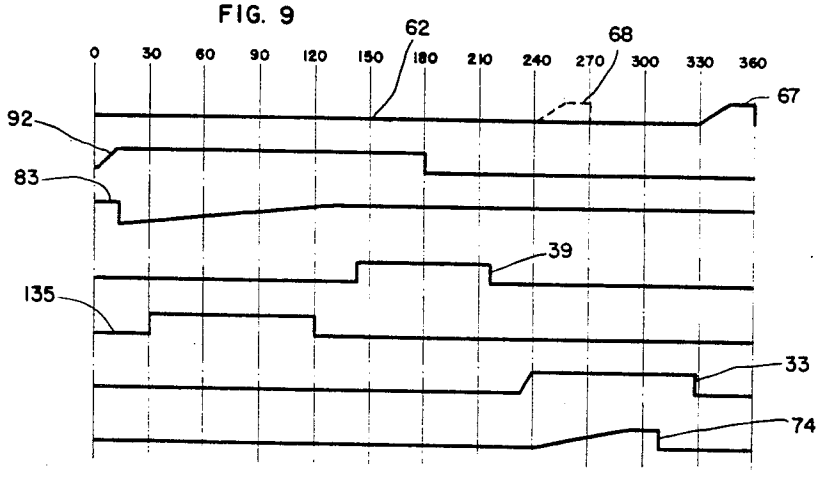


FIG. 5

FIG. 9



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2,372,515

UNITED STATES PATENT OFFICE

2,372,515

AUTOMATIC TRANSMITTER

Louis M. Potts, Evanston, Ill., assignor to Teletype Corporation, Chicago, Ill., a corporation of Delaware

Application October 7, 1943, Serial No. 505,273

17 Claims. (Cl. 178—17)

The present invention relates to automatic tape loading and transmitting apparatus and particularly to devices of this class which are controlled by perforated forms distributed in spools or containers.

The principal object of the present invention is to provide an automatic message retransmitting apparatus which will successively receive a plurality of containers including message tapes, and direct said containers so that their contents may be advanced through a sensing and telegraphic retransmission apparatus.

The featured apparatus which embodies the present invention is an adjunct of a message distribution system such as particularly disclosed in U. S. copending application Serial No. 451,577, filed July 20, 1942. This subject matter is also related to and is incorporated by reference with the disclosure of copending application Serial No. 451,576, filed July 20, 1942. It is proposed for use in a telegraph exchange office where a number of subscribers' lines are incoming and are to be brought into communication with various trunk lines consistent with volume and direction of traffic demands, to provide a system of message relaying and routing. Control forms are prepared in said office in accordance with the messages received over the various subscribers' lines and thereafter such forms are collected at various points in a distribution system in which automatic retransmitting apparatus will thereupon operate to retransmit the messages over destination lines to remote stations by unwinding or unspooling the control forms, sensing the perforations contained on the forms, and incidentally returning the containers to the distribution system where they may serve continuously in the routing and distribution of other messages.

The present improvement is particularly concerned with the automatic retransmission of the system's apparatus which involves the assembling in an alignment of message containing spools which are destined for retransmission over a particular circuit and the means whereby the message bearing control forms contained within the spools are unwound therefrom and caused to be fed through a retransmitting apparatus, all under automatic supervision and with no manual intervention until the complete discharge and retransmission have been consummated. It is of particular interest to note in this connection that the general system in addition to contemplating automatic collection and routing of message matter in individual message containers, also provides for apparatus which will operate in conjunction with a conveyor or distributor system responsive to the address portion which is carried by each message, to automatically route the travel of the message from its point of reception and form preparation to any one of a plurality of reperforating devices which happens to be associated with the particular subscriber's line, and thereafter causes the message containers to travel over the conveyor system to a discharge chute whereat they may be diverted to a collection column to take their place in an alignment of spools which are to be retransmitted by the particular automatic retransmitting mechanism located at the end of said column.

In the achievement of the foregoing and other objects, the present invention utilizes certain structural principles of a retransmitting apparatus associated with a discharge chute through which there may proceed a number of cylindrical containers or spools bearing messages perforated upon limited length pieces of control form and so arranged with respect to their containers that the outermost portion of each form corresponds to the starting portion of the message. Accordingly, as a message form is unwound and discharged through a tape sensing apparatus the perforations contained thereon are immediately converted into telegraphic signals. The container when emptied may be returned to the distribution conveyor system for service in conjunction with further message distribution while the discharged control form is disposed of in any suitable manner.

For a better understanding of the present invention, reference will now be had to the illustrations on the accompanying drawings and to the more detailed specification describing more particularly the structure and operation. In the drawings and detailed specification like reference characters indicate corresponding parts throughout and in the drawings:

Fig. 1 is a perspective view of a retransmission apparatus with detail portions broken away indicating a preferred embodiment of the present invention;

Fig. 2 is a plan view of the apparatus illustrated in Fig. 1;

Fig. 3 is a side elevation of the apparatus featured in Figs. 1 and 2;

Fig. 4 is a plan sectional view taken approximately on line 4—4 of Fig. 3;

Fig. 5 is a side sectional view taken approximately on line 5—5 of Fig. 2;

Fig. 6 is a detailed sectional view with certain

portions omitted of a part of the apparatus featured in Fig. 4 in a changed position;

Fig. 7 is a detailed sectional view taken approximately on line 7—7 of Fig. 2;

Fig. 8 is a detailed end elevational view as observed from line 8—8 of Fig. 3;

Fig. 9 is an operational timing chart illustrating curves which denote periods of operation of various elements of the apparatus disclosed in the afore-described illustrations; and

Fig. 10 is a schematic wiring diagram of the control circuit which may be utilized in the supervision of the apparatus featured in the mechanical illustrations.

Referring now more particularly to the details in the accompanying drawings, the reference character 11 designates a discharge chute which leads from the trackway and conveyor 21, Fig. 2, of applicant's copending application, Serial No. 451,577, the flared intake opening of which is designated as at 38, Fig. 3 of said copending application. This element is a vertical tubular member of rectangular cross-section and is provided internally with a rib 12 that extends throughout its length and constitutes the medium whereby the containers or spools 13 are maintained in proper position during descent until they reach the bottom of the chute.

By referring to applicant's copending application, Serial No. 451,576, it may be observed that the spools or message tape containers are of cylindrical shape and comprised of two spaced side discs held together by means of transverse posts 14, Fig. 6. The outer surface of one of the discs is specially flared and grooved to receive the rib 12 to properly align each of the message spools 13 with respect to the chutes in order to assure the position designated in Fig. 6 whereat the message container guide segments 15, 16, and 17 may be made to assume the significant relationship thereat illustrated.

As the spools are discharged from the conveyor into the transmitter chute 11 they are permitted to accumulate in a vertical alignment, each spool ultimately assuming the position of the lowermost spool as designated in Figs. 1 and 6. When the message form has been extracted and transmitted, the spool is discharged rightwardly, as viewed in Fig. 1, passing through the position indicated by the dotted outline 13. In practice, the spools are thus discharged soon after their contents are threaded into the tape sensing apparatus of the retransmitter, and in falling the contained message strip is further extracted from the spool, paying out as the transmission of signals advances the strip in the forward (right to left Fig. 1) direction.

As the column of spools gravitate in accordance with the progress of retransmission, the spool in the penultimate position engages the extremity 18 of a contactor 19 that extends through the wall 21 of the chute, holding said contactor in engagement with its associated contact blade 22. The closure of this contact pair is required in order to effect the control over the apparatus which constitutes the retransmission device after a manner which will be explained later. The lowermost spool in the column descends until its sides engage the tracks of platform 23, and though the vertical guide rib 12 does not extend downward throughout the full length of the tube there is provided a special alignment lug 24 which protrudes through an opening in the forward wall, Fig. 1, of the tube 11 and which is an integral part of one arm 25 of a reciprocable cradle 26 pivoted at 27 in the wall 21 of the chute or tube. A spring 29 tends to maintain cradle 26 in the position illustrated in Figs. 1 and 2; however, during a certain part of the operative cycle, see Fig. 9, a bell crank member 31 which is pivoted at 32 and urged in a counterclockwise direction by an individual spring associated therewith is caused to be rotated in a clockwise direction about its pivot 32 when an apex of its associated cam 33 engages its follower node and thereby rocks the cradle 26 in a clockwise direction, as viewed in Fig. 1, withdrawing the projection 24 from the guide slot of the lowermost spool 13 in contemplation of the discharge of said spool in a horizontal direction as will be explained.

As the cradle is reciprocated against the tension of its spring 29 not only is the projecting lug 24 withdrawn from the spool 13 but at the same time an opposite and slightly higher arm 34 integral with the cradle 26 is moved inwardly causing its two projections 35 to enter through appropriate openings in the back wall of the tube 11 and be then disposed in the path of the penultimate spool 13 arresting the latter momentarily in its descent until the ultimate spool has been discharged from the trackway or platform 23 and the other mechanism is in readiness for the reception of a new spool. The apparatus is restored shortly thereafter due to the passing of cam apex 33 whereupon a succeeding spool 13 is permitted to drop, upon the recession of the supporting pin 35, and then the projection 24 takes its normal position extending into the narrow slot formed on the adjacent surface of the disc of the particular spool 13.

The manner in which message bearing tape is coiled and placed within the spool 13 is explained in the afore-mentioned copending application, Serial No. 451,576, and from that disclosure it will be noted that when winding the message for storage, the outermost end corresponds with the beginning of the message and that a short tail is permitted to extend through the opening between guide rails 16 and 17. When a tape container 13 descends to the tape transmitting position indicated in Fig. 1, this tail or start portion of a message tape is exposed so as to protrude a short distance beyond the opening between the tracks 16 and 17, Fig. 6, to a sufficient extent to be caught by the flexible vanes 36 that are integrally associated with the curved placement shoe 37 when the latter member, which is carried by an arm 38, is moved from its normally prevailing position as designated in Fig. 5 back to its retracted position as designated in Fig. 6 and thereafter again to its normal position, Fig. 5, a performance which coincides with the curve 83 shown in Fig. 9.

As a result of this movement of the tape placement shoe 37, the extending tail of the message is brought into engagement with the teeth of a limited action drive sprocket 39 integrally associated with a shaft 41 and driven in a clockwise direction through the toothed engagement of its integral driven wheel 42 with an idler 43 which, in turn, receives motion from a mutilated driving gear 44.

The effect of operating sprocket wheel 39 is to pull the extending portion of the tape from its limited protrusion from the container 13 until its feed perforations are brought into engagement with the transmitter tape feed sprocket 45.

A limited engagement is obtained due to the mutilation of some of the teeth of driving wheel 44 so that as the transmitter sprocket wheel 45

takes over the propulsion of the tape, the intermediate feed wheel 39 ceases to be driven and thereafter merely idles under engagement with the feed perforations of the tape. The transmitter tape feed sprocket 45 is part of an apparatus such as that generally indicated in U. S. Patent No. 2,296,845. On both sides of the tape feed wheel 45 are a set of perforation feelers 46, and between intermittent movements of the sprocket wheel 45 the feelers 46 are permitted to engage a transverse alignment in the tape, those encountering perforations moving farther when their feeler pins protrude through said perforations while those which engage nonperforated areas remain in the position of abutment.

The operation of the tape transmitting apparatus subsequent in functional order to the tape feeding and sensing operations is similar to that of ordinary transmitters of the kind referred to in said patent. The placement of the several feeler levers 46 in accordance with the perforations in the tape causes a corresponding disposition of vertical portions 47 thereof, the shouldered extremities of which shift accordingly so as to overlie or clear the extremities 48 of a set of gooseneck bell cranks 49 which are sequentially operable to close their respective contacts 51 during a time interval in the cyclical rotation of cam assembly 52 which corresponds to the disposition of a peripheral notch in a related cam.

Cam assembly 52 is carried upon a power driven shaft 53 and is coupled thereto under the supervision of a toothed clutch 54. The latter member is permitted to become effective upon the withdrawal of a declutching arm 55 which is an integral part of an armature 56 under the supervision of a magnet 57. Counterclockwise rotation is communicated to shaft 53 by means of a suitable driving gear which meshes with the driven gear 58, and through said driven gear 58 rotary power is imparted in an opposite direction to a secondary driven gear 59, carried by the shaft 61 and rotating in a clockwise direction, as viewed in Fig. 1.

As viewed in Figs. 1 and 5, shaft 53 is rotated in a counterclockwise direction thereby imparting clockwise rotation to shaft 61 and its several carried members. A power communicating clutch 62 also of the toothed coupling class is provided for shaft 61 but differs from the clutch 54 in that it is provided with two instead of one declutching levers designated 63 and 64. Pivoted on shafts 65 and 66, these declutching levers are each under the supervision of an associated magnet 67 and 68, respectively.

The disposition of the declutching levers 63 and 64 with respect to the sleeve cam 69 is such as to permit the declutching of the driven portion of shaft 61 in two different angular positions, which, as is clear from Fig. 5, comprise the normal or zero arrestment position under the supervision of declutching lever 63 and an intermediate angular position under the supervision of declutching lever 64. As shown by the curve 62, the intermediate arrestment position which is supervised by lever 64 and its magnet 68, is effective at about 270° from the zero position in the direction of rotation. Opposing the release influence of the magnets 67 and 68 are return springs 71 and 72, respectively, and when either or both of the magnets is de-energized, it disposes the curved extremity of its declutching lever to the cam 69, thrusting the latter driven portion of clutch 62 away from engagement with the teeth of the driving portion of said clutch, and thereby effecting the arrestment of rotation of the dependent or driven assembly generally designated 73.

Cam assembly 73, Fig. 1, includes several cam members which function in the supervision of periodic operation, as variously designated on the curve chart, Fig. 9. Among these, cam 33 has already been described as one which tilts the cradle member 26 at a precise interval during the cycle, when a container 13 is discharged. Another of the cams carried upon this assembly is designated 74 and its periphery is followed by the extremity of a lever 75 whose opposite end is pivoted as at 76 to a rack bar 77. The teeth of rack bar 77 mesh with a gear segment 78 which is integrally formed with a discharge arm 79 pivoted at 81 and carrying at its free end a pin 82 which pushes the spool or container 13 at the time when the latter is to be discharged and imparts to said container a rightward rolling motion, as viewed in Fig. 1.

It is to be noted that at the time when a spool is thus discharged, tape placement shoe 37 is situated as illustrated in Fig. 5 and not as illustrated in Fig. 1, the latter condition prevailing but momentarily as the shoe is swung back and fro for the purpose of engaging and directing the extending tail portion of a message tape. The performance of shoe 37 is under the supervision of a cam designated 83 which is also on said assembly 73. The periphery of cam 83 is followed by a sidewardly extending projection 84, Fig. 6, of a third class lever 85 pivoted at 86 and urged by a spring 87 in a counterclockwise direction. A rack bar 88 is pivoted at 89 to said lever 85, its teeth meshing with a gear segment 91 integrally associated with the afore-described arm 38 which carries the shoe 37.

By observing in Fig. 9 the curves 83 and 74 which correspond in periodicity to the cams 83 and 74, respectively, it may be observed that the discharge of a spool under the supervision of cam 74 is consummated during the time designated by the dwell in curve 83. This period coincides with the time during which the shoe 37 is held close to the periphery of the intermediate tape feed wheel 39, Figs. 1 and 5.

Another cam designated 92, is carried upon the cam assembly 73 and is provided with an apex as represented by curve 92, Fig. 9, which is pursued by the follower node 93, Figs. 1 and 7, of a first class lever pivoted at 94 and having a working extremity 95 disposed to depress the flange 96 of a push bar 97 to initiate transmission by electrical control after the manner in which said push bar 97 is designed for manual supervision.

The effects of depressing push bar 97 by the operation of cam 92 are twofold. The tape feed assembly including tape feed pawl 98, whose uppermost tooth normally resides in one of the several successive notches of feed wheel 99 is released. A pin '01 carried by the push bar 97 engages and rotates clockwise a three-armed lever 102 which is pivoted at 103, and in so doing it withdraws a detent roller 104 from engagement with the periphery of the sprocket wheel 99, while at the same time depressing with its disc extremity 105 the pawl lever 98 rocking the latter clockwise against the influence of spring 106. As a result of the clockwise rotation of three-armed lever 102, tape feed pawl 98 is withheld from engagement with the ratchet wheel 99, and at the same time detent roller 104 is withheld from frictional engagement therewith. This frees the tape

transmitter sprocket wheel 45 so that subsequently upon the operation of tape advancing sprocket wheel 39 the engagement of wheel 45 with the feed perforations in the tape will not retard the feeding thereof.

After the shoe 37 has been restored to engagement with the auxiliary feed roll 39 the latter member is rotated through a limited degree of movement, as best indicated by the curve 39, Fig. 9. Thereafter the auxiliary tape feed sprocket 39 runs free as the principal tape feed sprocket wheel 45 takes over the feeding of the perforated control form, which, incidentally, remains in mesh with both feed members. Auxiliary tape feed sprocket 39 being fast to shaft 41, Figs. 1 and 3, its rotation is effected when the limited number of teeth of mutilated driving gear 44 encounter idler 43 and through the latter drives pinion gear 42. This movement is clockwise in the part of shaft 41 to which pinion gear 42 is fast and hence the teeth of auxiliary sprocket wheel 39 in so turning engage the end of the tape thrust against it by shoe 37 advancing the tape until it is brought under the guide 50, a forked member which straddles auxiliary sprocket 39 as may be understood from Fig. 6.

Guide 50 is disposed to strip the perforated control form leading end away from auxiliary sprocket 39 and to direct it tangentially of the principal tape feed sprocket 45 whose movement is intermittent during the effective period of the tape transmitter. At the time of engagement with the principal sprocket 45 on the part of the control form, however, auxiliary sprocket 39 will cease to be positively driven because the limited number of teeth on driver 44 will have passed the area of engagement with idler 43 allowing the train of elements thereafter, which includes pinion 42 and shaft 41, to drive under the influence of pull from the control form whose feed perforations continue to have interengagement with the teeth of said sprocket 39.

There will now be set forth a description illustrating a typical operation of the unit assuming the hopper 11 to be amply supplied with rolls or spools 13 to maintain the contact pair 19—22 closed.

Under conditions of signal transmission, the magnet 57 is energized and accordingly contact pair 108, Figs. 8 and 10, is closed due to the fact that the push bar 97 remains in its uppermost position with the pins 101 and 109 out of engagement with their respective levers 102 and 111. Under such conditions the contact operating plug 112 does not engage the contactor 113 and due to the closed condition of contact 108 and the consequent continued energization of magnet 57, clutch control lever 55 is withdrawn permitting the continued clutching engagement of coupling 54. Under the described conditions cam assembly 52 continues to rotate and the several gooseneck levers 49 describe a sequence of reciprocating movements as permitted by their related blocking interponents 47.

Under the described normally prevailing condition of operation, clutch control magnet 67 is de-energized due to the recession of the first gooseneck 49a, Fig. 5, which holds open the contact pair 129 and closes the contact pair 127. The condition now assumed is one under which a previous message has just been transmitted and a succeeding spool is to be advanced, and transmission is thereafter resumed. Under the described conditions, a particular message tape will then be unwound from a spool 13 in accordance with the movements of the sprocket wheel 45 in a step-by-step manner, actuated by one of the cams on the assembly sleeve 52.

For particulars concerning this apparatus, reference is again had to the afore-mentioned Patent No. 2,296,845, a general description only of the tape transmitter mechanism being here deemed necessary. The tape sensing apparatus consists of five feeler levers 46 that probe for individual perforations relating to the permutation code on a control form and a sixth feeler located at the side of the said five which probes for a notch in the side of the tape, signifying the end of a particular message when employed in connection with certain types of practice, or too, the special feeler lever is similarly responsive to a total failure of the tape as upon termination. This performance is utilized under the present practice when a particular message tape contained in one of the spools 13 runs out and a new message bearing tape is to be installed. The normal condition as described is with clutch 54 engaged and clutch 62 disengaged. Accordingly, the tape sensing apparatus will operate continuously, whereas the spool change supervising apparatus, whose function is controlled by the cams on assembly 73, is accordingly dormant.

Normal transmission continues until the afore-described special tape feeler 115, Fig. 5, encounters the end of the tape, whereupon the feeler moves counterclockwise about its pivot 116 under impetus of its individual spring 117 withdrawing the underhanging hook 118 from the latch projection 119 of a follower lever 121. Special feeler lever 115 is thus permitted to rise along with the conventional set of feeler levers 46 and according to the usual operation of this class of devices the feeler levers remain in their tape sensing (uppermost) position during the major portion of each cycle of transmission. At a particular interval during the cycle of cam assembly 52, a special cam 122, Fig. 5, carried thereby presents a notch in its periphery to the follower node 123 of said lever 121. When this occurs, and lever 121 seeks to respond to the urge of its spring 124, the extent of its rotation about pivot 125 will depend on whether or not the afore-described special tape sensing lever 115 has encountered the end of the tape or a special notch, described above.

When under the conditions assumed the end of the tape is thereby sensed, lever 121 rocks clockwise about its pivot 125 carrying with it through pin 131 the gooseneck lever 49a which thereupon shifts the contactors 126 and 128 rightwardly opening the contact pair 127 which is located in the circuit for maintaining magnet 57 energized and closing the contact pair 129 which establishes a circuit for energizing magnet 67 which then releases clutch 62 to the influence of its spring and starts the rotation of cam assembly 73.

Lever 121 may be blocked against accomplishing the described control due to the encountering of a nonperforated position by the special feeler lever 115 whereupon the underhanging portion 118 prevents clockwise rotation of said lever 121 and the consequent engagement of its pin 131 with the adjacent gooseneck 49a and extending portion 132 which lies in the same vertical plane as does the bell crank lever 111. Upon movement clockwise about pivot 125, gooseneck lever 49a may shift its extremity 132 clockwise so as to lodge within the notch 133 of bell crank lever 111. As a consequence, bell crank lever 111

rocks counterclockwise slightly about its pivot 134 and within its notch 133 retains the extremity 132 of gooseneck 49a pending a subsequent release operation upon the depression of push bar 97.

Supervisory control over the tape transmitter is initiated by cam 92 and its period is revealed by the curve 92 in Fig. 9. As a consequence of latching the gooseneck lever 49a in its extreme clockwise position, contact pair 127 is opened while contact pair 129 is closed. As a result of the opening of contact pair 127, the circuit for energizing magnet 57 is broken at that point rendering ineffective the closure of contactor 108, Fig. 8, which is in electrical series therewith and which pair of contacts is closed during the subsequent portion of the cycle of cam 92 transmission, when control lever 95 is restored to its counterclockwise position about pivot 94.

As a result of the closure of contact pair 129, the circuit is complete for energizing magnet 67, whereupon, as afore-described, the cam assembly 73 is released to rotation in a clockwise direction, as viewed in Figs. 1, 3, and 5.

By referring to the cam chart, Fig. 9, it will be readily observed that the first in the several supervisory operations performed in a cycle is the one actuated by cam 92 in its clockwise rotation of transmission control lever 95 causing the depression of push bar 97 and the consequent rotation of three-armed lever 102 and bell crank lever 111 clockwise about their respective pivots 103 and 134, Figs. 5 and 7. As a result of the rotation of lever 102, detention and actuation are removed from the sprocket feed shaft 107 by reason of the withdrawal of detent 104 and feed pawl 98. As a result of the rotation of lever 111, gooseneck 49a is unlatched and since it is under the influence of contactor spring 126 it will rotate to its counterclockwise extreme position, as illustrated in Fig. 5.

Thereafter, cam 83 acting as it does upon the follower lever 85 instantly retracts the tape hold down shoe 37 in order that its vanes 36 may engage the protruding free end of the tape carried by the spool. This direction of movement is immediately reversed and the tape shoe 37 begins to return, at a slower pace, to its position as illustrated in Fig. 5. Meanwhile, as the cam assembly 73 continues to rotate in a clockwise direction, a traction segment 135, Fig. 5, engages the trailing end of the previous tape which after passing beyond the dominion of the tape feed sprocket 45 may still be lying on the anvil 136, and frictionally engaging it discharges it clear of the apparatus so as to make room for the oncoming message tape next to be advanced by the auxiliary tape feed sprocket 39. By referring to curve 39 it will be noted that the effectiveness of sprocket 39 coincides with an interval that follows immediately after the effective performance of the ejection segment 135.

Before the auxiliary tape feed sprocket 39 has completed its brief interval of operation after engaging the starting end of the new tape directed to it by the shoe 37, the apex of cam 92 leaves the follower node of lever 95 and the latter member is permitted to return to its extreme counterclockwise position, freeing the push bar 97 and permitting levers 102 and 111 to seek normal or spring biased positions, respectively. As a result of the relaxation of push bar 97 contact operating plug 112 recedes from the contactor 113 and permits the contact pair 108 to close again. This completes the circuit for energizing start magnet 57 which thereupon attracts its armature 56, causing the clutch 54 to become engaged and thus imparting rotation to cam assembly 52.

The tape from the newly positioned spool 13 will by this time have advanced so that its feed perforations may be engaged by the teeth of sprocket wheel 45, as the latter member begins its step-by-step counterclockwise rotational movements under impetus of the feed pawl 98 which in turn is powered in a manner fully disclosed in the above-referred to U. S. patent. As the tape feed operations progress so also do the tape sensing feelers 46 and 115 begin their successive and intermittent engagements with the several transverse areas of the tape causing permutation code signals to be issued over a transmission circuit as a result of the placements of the several contact pairs 51.

Referring to curve 74, Fig. 9, it will be noted that shortly after the auxiliary tape feed sprocket 39 has ceased to be operated and begins to idle, the spool ejector 79, actuated by cam 74 which carries the ejector pin 82, is swung rightwardly out beneath the sidewardly extending canopy 137 (Fig. 1). When the particular container 13 ceases to be supported by the end of the platform 23, it gravitates into a suitable collection receptacle while the tape contained thereon unwinds clear of the spool 13, or depending upon its length, to an extent commensurate with the distance from the discharge canopy 137 to the spool receptacle.

Meanwhile, the threaded tape is being fed by the regular transmitter sprocket wheel 45 and its perforations sensed by the feeler levers 46 and 115 until the end of the tape is advanced through the sensing area whereupon the sixth feeler 115 is permitted to rise, as already explained, effecting the afore-described operation of the special gooseneck 49a in a clockwise rotation and shifting the contact position from that shown in Fig. 5 with the contact pair 129 open and the contact pair 127 closed, to an opposite condition; namely, with the contact pair 127 open and the contact pair 129 closed. As a result of the opening of contact pair 127 magnet 57 becomes de-energized and the transmitter shaft is arrested by the declutching of coupling 54.

Referring again to Fig. 9, attention will be momentarily directed to the curve 24 which represents the period of performance of the cradle member 26, including the tape guide arm 24 that confines the lowermost spool 13 in the position indicated in Fig. 1. The withdrawal of guide 24 and its reinsertion upon the descent of a subsequent tape spool is represented by the curve 33, which performance may be noted to overlap the operation of the tape ejecting arm 79, afore-described.

Upon the completion of the several supervisory controls the primary control clutch 62 becomes de-energized as designated by the curve 62 in Fig. 9. At the location 68, in dotted outline, there is represented a position of clutch arrestment designating the position in the cycle whereat magnet 68, acting upon its armature 67, may be effective in arresting the rotation of the cam assembly 73 by declutching the coupling 62 before there has been consummated the full guide arm withdrawal and ejection. The supervision of clutch 67 is by the contact pair 129 as afore-described, but the supervision of magnet 68 is under control of the special magazine-empty index contact pair 19—22.

When the spool magazine or chute 11 becomes empty, groping projection 18 is permitted to recede inwardly far enough to carry contact 19 away from engagement with contact blade 22, thereby

opening the circuit which energizes magnet 68, and permitting the afore-described arrestment of shaft 61 to occur at three-quarters of the cycle of revolution (approximately), preventing the complete revolution of the supervisory control shaft until the supply of message containers has been replenished.

While the invention has been described with reference to a particular embodiment as illustrated in the accompanying drawings and set forth in detail in the foregoing specification, numerous changes and modifications may be invoked without departing from the essential spirit or scope thereof. Accordingly, it is not intended to be limited by the particulars of the specification, nor by the details in the illustrations, except as indicated in the hereunto appended claims.

The invention claimed is:

1. In an automatic control form retransmitting apparatus, a chute element for supporting in alignment a plurality of control form carrying members, means for maintaining in said chute element said members in predetermined relative position to expose tail portions of the control form carried by each member at a predetermined angle of exposure, a principal feed sprocket, an auxiliary sprocket having a limited periodic movement for advancing said tail portions of said forms, a shoe for directing said form tail portions against said auxiliary sprocket, a step-by-step mechanism for actuating said principal feed sprocket, a tape transmitter in juxtaposition to said principal feed sprocket, and means for ejecting a form carrying member after transmission has been initiated.

2. In an automatic retransmission device, a magazine for supporting an alignment of control form carrying members, each of said members comprising a pair of discs spaced to afford an intermediate chamber within which there is disposed an involute rolled control form with the message beginning at the outermost terminal, an automatic tape transmitter including a periodically power driven sprocket and a continuously power driven sprocket, and means for engaging said outermost terminal of said form comprising a reciprocable shoe for overtaking and flexing said end against said periodically power driven sprocket, thereafter said periodically power driven sprocket feeding said outermost terminal to said continuously power driven sprocket.

3. In an automatic control form feeding device for telegraph transmitters, channel means for supporting a column of control form bearing containers, a device for peeling the control form from each container when it achieves the ultimate position in said column, means for transmitting signals in accordance with the perforations contained in said form, and automatic mechanism for discharging a container as its associated control form enters upon signal control operation.

4. In an automatic tape transmitting apparatus; a step-by-step tape feed mechanism, a ratchet wheel actuated by said mechanism including a reciprocating pawl, a detent for holding said ratchet wheel in advance tooth positions as said pawl is retracted for engaging a succeeding tooth, means for automatically inserting lead ends of message bearing control tapes in said tape feed mechanism including a reciprocable shoe and a periodically power driven sprocket, and a device responsive to the afore-said message end inserting means for automatically withdrawing said reciprocating pawl and said detent from said ratchet wheel to permit its idle movement during the insertion of said lead ends by said reciprocable shoe and said periodically power driven sprocket.

5. In an automatic multiple tape transmitter, a transmitter control shaft, a magazine for supplying a plurality of tapes to a transmitting position, a tape supply control shaft, means responsive to the termination of transmission under one tape in said transmitter for arresting said transmitter control shaft and initiating said tape supply control shaft, means responsive to the placement of a new tape in transmitting position for then arresting said tape supply control shaft and reinitiating to operation said transmitter control shaft, and a sprocket under the control of said tape supply control shaft for causing said new tape to be fed to a position whereat it is placed under the control of said transmitter control shaft during the period of operation of said tape supply control shaft.

6. In a tape transmitter, a plurality of storage containers loaded with tape having feed holes and so disposed therein as to extend a tape end beyond the periphery of the container, means for advancing said containers in alignment and with their tape ends in predetermined angular disposition, a continuously operative principal tape feed sprocket, an auxiliary tape feed sprocket, apparatus for thrusting the tape ends against said auxiliary tape feed sprocket, and means for then imparting limited rotary motion to said auxiliary tape feed sprocket to thereby advance the tape to a position for engagement with said principal tape feed sprocket, said motion imparting means thereafter terminating its effect upon said auxiliary feed sprocket to permit the latter sprocket to engage idly the feed holes of the tape.

7. Automatic apparatus for stripping control tape contents from tape containers comprising, a magazine for presenting a plurality of containers successively to a tape transmitting position, a periodically power driven tape feed sprocket engageable with an extending end of said tape, a continuously power driven tape feed sprocket engageable with said tape end after advancement by said periodic tape feed sprocket, and means for disengaging said periodic tape feed sprocket from its driving source after said tape is engaged by said continuously power driven sprocket.

8. In a telegraph transmitting apparatus, a tape uncoiling mechanism, means for advancing successively a plurality of message bearing tape coils to transmitting position, a tape sensing mechanism, means for feeding tape through said tape sensing mechanism, means under the control of said tape sensing mechanism for causing a succeeding tape coil to be placed into transmitting position, and apparatus including said uncoiling mechanism responsive to the placement of a succeeding tape coil into transmitting position for engaging its lead end and directing it to said sensing mechanism.

9. In an automatic transmitter, means for supporting in vertical alignment a succession of tape bearing containers, a device for extracting message bearing tape from each container as it achieves ultimate position in said alignment, means for transmitting signals in accordance with the perforations contained in the tape, and automatic discharge mechanism for releasing each container from said supporting means as its mes-

sage bearing tape undergoes signal control operation.

10. In an automatic control form sensing apparatus, a step-by-step form feeding mechanism including a ratchet wheel actuated by a reciprocating pawl, a detent for holding said ratchet wheel in an advance tooth position as said pawl is retracted for engaging a succeeding tooth, means for automatically inserting message bearing control forms into said feeding mechanism, including a reciprocable shoe and a periodically power driven sprocket, and a device responsive to the afore-said message form inserting means for momentarily withdrawing said reciprocating pawl and said detent from said ratchet wheel to permit its idle movement, during the operation of said reciprocable shoe and said periodically power driven sprocket, whereby the insertion of a new message bearing control form is facilitated.

11. In a tape controlled telegraph transmitted, means for advancing control tape containers in alignment, and with tape ends protruding therefrom, a tape feed sprocket for engaging feed holes on said tape, apparatus for thrusting said protruding ends against said tape feed sprocket, and means for thereafter imparting limited rotary motion to said tape feed sprocket to thereby advance the tape to a predetermined position and to permit said sprocket thereafter to continue engaging idly the feed holes of the tape.

12. Apparatus for handling transmitting tape containers comprising, a magazine for presenting a plurality of containers successively to a telegraph transmitting position with each container in predetermined alignment and having its tape's end extending from the container, a periodically power driven tape propelling sprocket engageable with said extending tape end at said transmitting position, a continuously power driven tape feed sprocket engageable with said tape end after advancement by said periodically power driven tape propelling sprocket, and means for disengaging power from said periodic tape feed sprocket after said tape end is presented to said continuously power driven tape feed sprocket.

13. A method of unwinding control forms automatically which have been previously packaged in roll form within housings which comprises the steps of advancing a plurality of housings with the outermost ends of said control form rolls extending from said housings, moving said outermost ends into the path of a limited motion propeller, extracting a limited quantity of said form from its housing, advancing said extracted quantity into peripheral engagement with a continuously moving feed apparatus, and discharging said housings prior to complete unwinding by said continuously moving feed apparatus, whereby the discharge of said housings supplements the unwinding operation.

14. An automatic tape transmitting mechanism comprising in combination, a set of tape sensing levers, a principal tape feeding sprocket wheel, an auxiliary tape feeding sprocket wheel disposed in a common vertical plane with said principal sprocket wheel, means for seizing an end of a control form roll and presenting it into engagement with said auxiliary tape feed sprocket wheel, and means for thereafter imparting a limited degree of rotation to said auxiliary tape feed sprocket wheel for advancing said form to a point of engagement with said principal tape feed sprocket wheel.

15. An automatic tape transmitter comprising in combination a set of tape sensing levers, a primary tape feeding sprocket wheel, a secondary tape feeding sprockets wheel disposed in juxtaposition to said primary sprocket wheel, means for presenting a control form into engagement with said auxiliary tape feed sprocket wheel, means for applying a source of power to said auxiliary tape feed sprocket wheel for thereby advancing said form to a point of engagement with said principal tape feed sprocket wheel, and means for disassociating said source of power from said auxiliary sprocket tape feed mechanism when said form has been advanced to engagement with the principal tape feed sprocket.

16. In an automatic transmitter for pluralities of message bearing forms, a rotary control shaft having two arrestment positions, mechanism driven by said shaft during its movement from one of said arrestment positions to the other for inserting a form into transmitting position, and means for permitting the further movement of said shaft from its said other position to its said one position only when additional message bearing forms are awaiting transmission.

17. In a telegraph transmitter, tape sensing means, a plurality of tape containers, means to position one of said tape containers in a tape sensing position, automatic means to position the tape in engagement with said tape sensing means, means to block advancement of the others of said tape containers during the sensing operation, and means under the control of said tape sensing means to remove said blocking means and to advance another of said tape containers to the tape sensing position after the sensing of said first tape.

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