Jan. 26, 1937. W. M. BACON 2,069,000

TELEGRAPH SYSTEM

Original Filed Sept. 12, 1934 3 Sheets-Sheet 1

FIG. 1

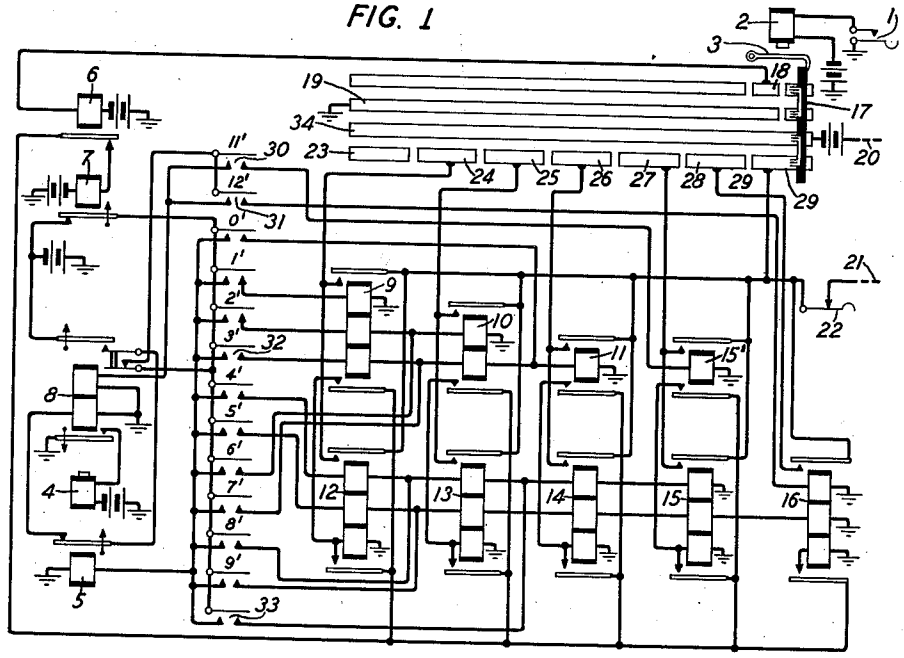

FIG. 2

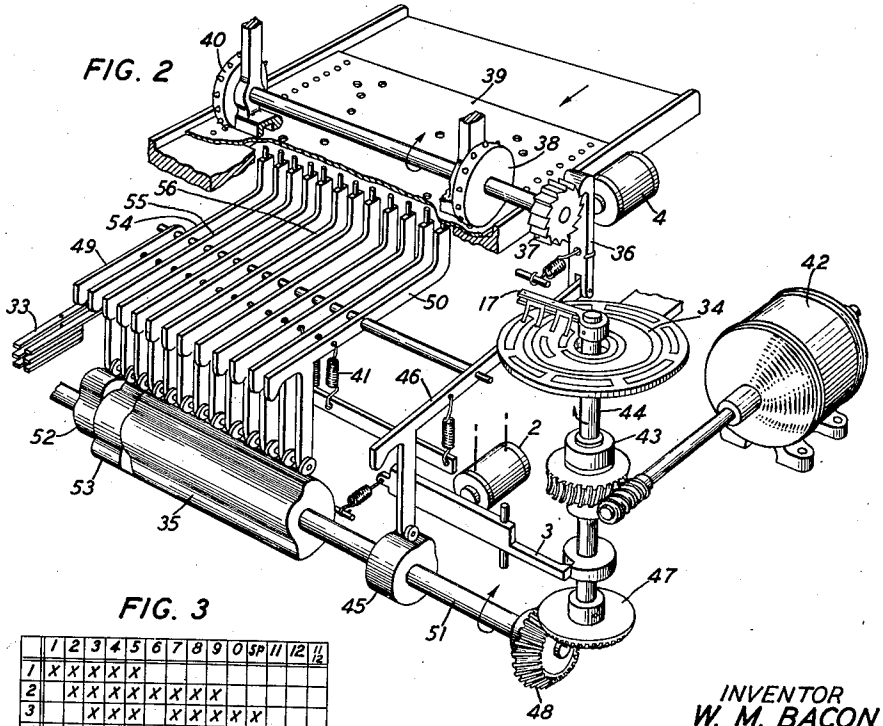

FIG. 3

	1	2	3	4	5	6	7	8	9	0	SP	11	12	11/12
1	X	X	X	X	X									
2		X	X	X	X	X	X	X	X					
3			X	X	X		X	X	X	X	X			
4				X	X			X	X		X	X		X
5					X				X				X	X

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FIG. 4

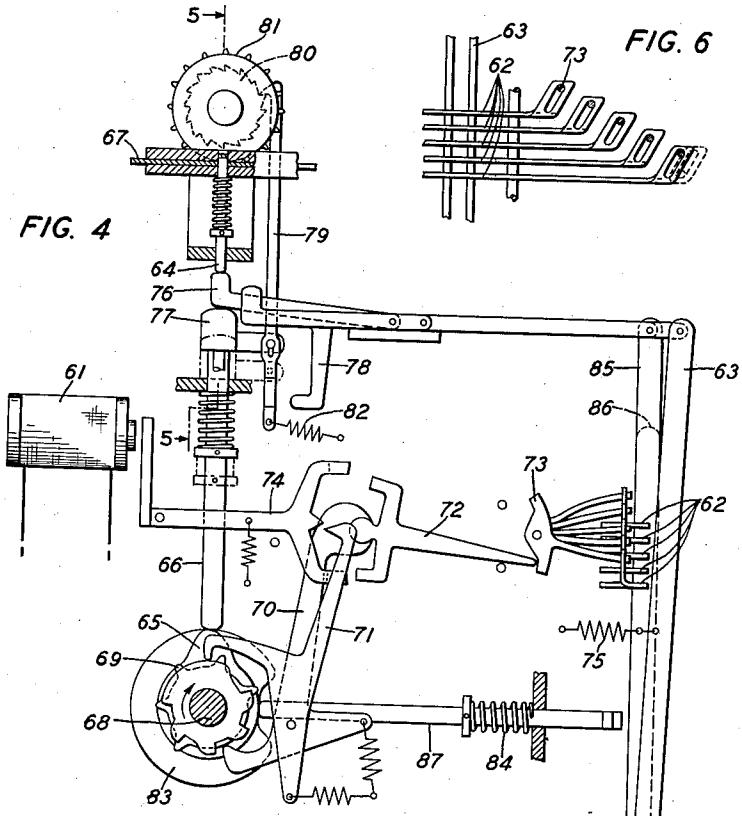

FIG. 6

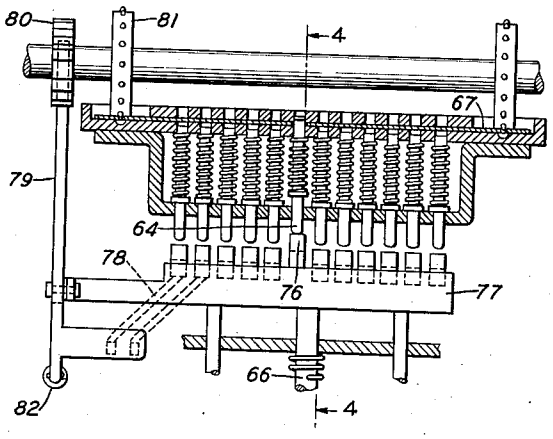

FIG. 5

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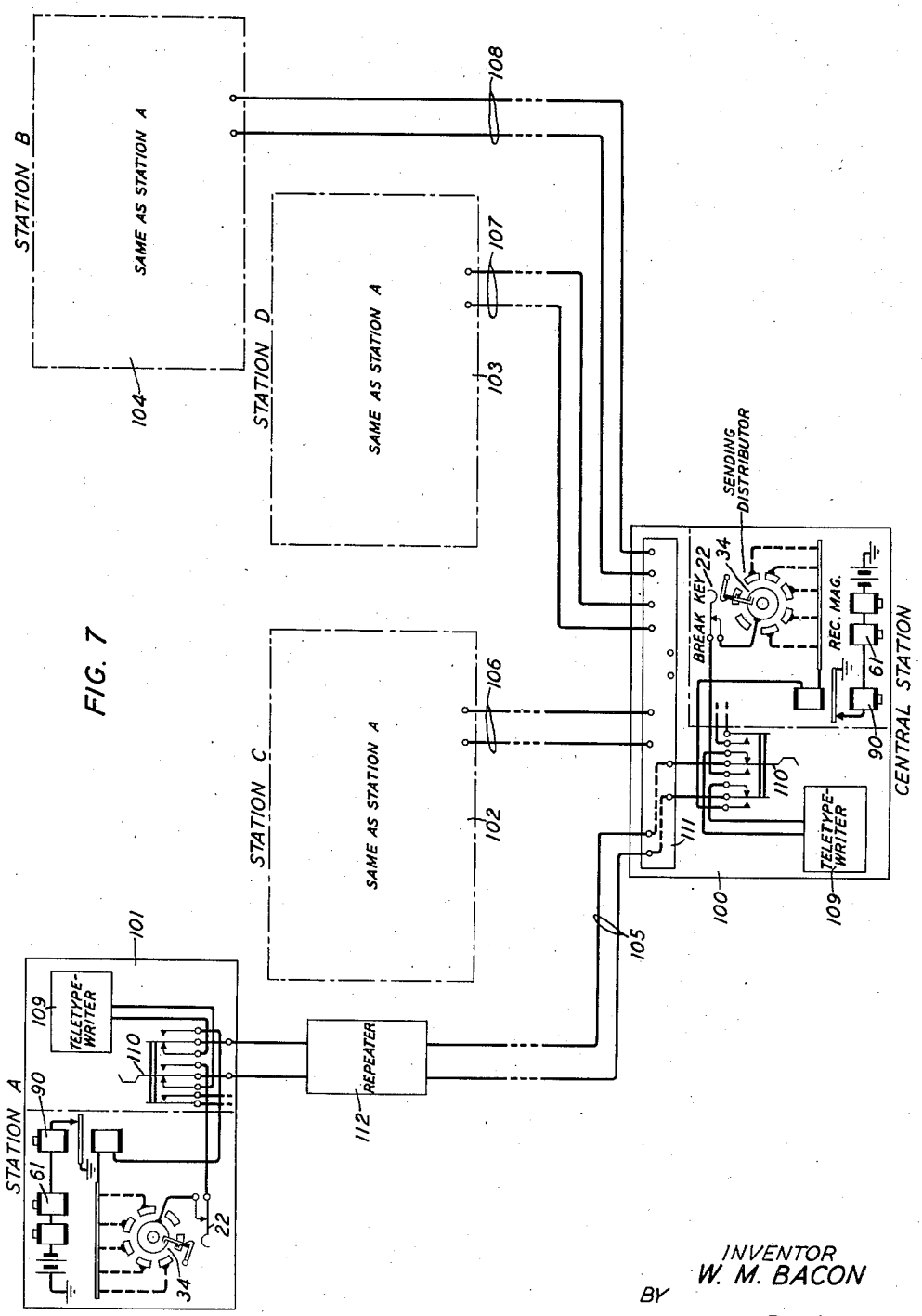

FIG. 7

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2,069,000

TELEGRAPH SYSTEM

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Continuation of application Serial No. 743,762, September 12, 1934. This application July 2, 1936, Serial No. 88,664

6 Claims. (Cl. 178—4)

This invention relates to telegraph systems and more particularly to the transmission of information recorded on statistical cards over telegraph systems and apparatus and is a continuation of an application filed September 12, 1934, Serial No. 743,762.

In the usual teletypewriter systems a five-unit Baudot selecting code is employed to represent the various symbols to be transmitted. This code provides a maximum of thirty-two different combinations so that thirty-two different symbols may be transmitted over the telegraph system by this code. This number of different combinations proves quite adequate for printing telegraph service.

Information is usually recorded on statistical cards by perforations which are arranged in columns. The perforations of these columns represent the symbols recorded on these cards. Since on many of those cards the number of combinations possible in any column exceeds thirty-two it is difficult to transmit this information over a telegraph system employing a five-unit code.

It is the object of this invention to provide translating means so that each column on the card may be represented by one or more groups of five-element start-stop signals. These groups can then be transmitted over a start-stop telegraph system to a distant receiver where they may be employed to perforate other statistical cards in accordance with the perforations in the card at the transmitting station.

A feature of the invention is that this apparatus may be provided as an attachment to teletypewriters and teletypewriter exchange systems.

The invention will be more readily understood by reference to the accompanying drawings in which:

Figure 1 shows the circuit arrangements for translating and transmitting over a telegraph system the information contained on the punched cards;

Fig. 2 shows the mechanical features of the transmitter;

Fig. 3 shows a code used in transmitting the information;

Figs. 4, 5, and 6 show the mechanical features of the perforator located at the distant point; and

Fig. 7 shows a card controlled transmitter and receiver connected to a telegraph circuit.

In the drawings an arrangement is shown for progressively scanning the card for punched holes by means of a number of pins attached to levers which are operated by cams. With the card in position the pins are placed in contact with the card and wherever a hole is punched go through the hole in the card and operate associated sets of contact springs. These contact springs operate appropriate relays which connect the line wires to segments of a commutator. As the commutator brush rotates it alternately opens and closes the line wires in accordance with the operated condition of the relays. At the distant end, a magnet follows the impulses and alters the position of five vanes of the type usually used in telegraph printers, in accordance with the impulses sent. This allows the bar, corresponding to the code sent, to assume a position underneath a punch and as the motor rotates a cam punches a hole in the card corresponding to the hole in the original card. After sending impulses corresponding to the holes in one column on the card, the card is advanced to the next column.

The code which has been selected for the purpose of illustration is shown on Fig. 3. It is arranged to transmit impulses representing a single punch in any position from 0′ to 9′, a punch in any position from 0′ to 9′ and in addition a punch in either position 11′ or 12′ or both 11′ and 12′, a single punch in either position 11′ or 12′, punches in both positions 11′ and 12′ and no holes punched in the column. With these various combinations of punched holes the number of distinct combinations that may be punched in any column of the card exceeds 32 which is the number of different combinations of a five unit code. In order to transmit impulses representing all of the combinations over a telegraph system employing a five unit code it is necessary to transmit and receive two groups of impulses to represent certain of the combinations of holes punched in the card. This is accomplished at both the transmitting and receiving stations by arranging the apparatus at these stations to advance the card in response to certain perforations or punches in the column of the card, or the impulses representing these perforations and not to advance the card in response to other perforations or corresponding groups of impulses. In addition it is necessary to send a group of impulses which will advance the card without punching any holes in it.

The operation of the system will now be described in detail. It will be assumed that a card such as card 39 containing punched holes which record information has been inserted in the transmitter, either manually or in some well known mechanical fashion, so that the pins connected to the levers, such as lever 50 register with

the holes of one of the columns of card 39. The action of card 39 in coming into position operates contact 1 (see Fig. 1) which in turn operates magnet 2 by connecting ground to its winding. The energizing of magnet 2 withdraws latch 3 allowing shaft 44 (see Fig. 2) to rotate through friction drive 43 in the usual manner. Commutator brush 17 is attached to shaft 44 and rotates with it. Shaft 51 and cams 35, 45, 52 and 53 are also driven by shaft 44 through shaft 51 and gears 47 and 48. In rotating, cam 53 permits the springs similar to spring 41, to elevate levers 54 and 55 so that the pins associated with them "feel" or "read" the card. If a hole is punched in the card in position 11' or 12' which positions are associated with levers 54 and 55 the pin goes through the hole and operates either contact spring (see Fig. 1) combination 30 or 31 which is similar to the contact spring combination 33 shown in Fig. 2.

Cams 35, 45, 52, and 53 are so designed and positioned that they properly control the closure of the contacts and the advance of the card. As shown in the drawings these cams are arranged so that spring combinations 30 and 31 close their contacts before any of the other contact springs, such as spring 32, and contact spring combination 33. Contact springs 33 operate every revolution of cam 52 regardless of whether any holes are found in the card or not and closes its contacts last. It is to be understood, however, that it is within the scope of the invention to use any suitable contour for these cams so that they will properly time and control the operation of the relays, card feeding apparatus, transmitting distributor, etc.

For purposes of illustration, the action of the transmitter will be described for a single punch in any position 0' to 9' in a column, such as for example, position 3'; a single punch in position 11' or 12'; the combination of 11' or 12', and a punch in any position 0' to 9' such as position 3'; and no holes punched in a column.

Assume that a hole is punched in a column of the card in position 3' only. As cam 35 revolves the pin associated with lever 56 goes through the hole and operates spring combination 32. Then, later, due to the action of cam 52, spring combination 33 is operated. The operation of spring combination 32 causes the operation of relays 9, 10, and 11 in a circuit traced from battery through the contacts of relay 7, armature of spring combination 32, right-hand contact of spring combination 32 to ground through the lowermost winding of relays 9, 10, and 11 in series. The operation of spring combination 32 also operates relay 5 in a circuit traced from battery through the contacts of relay 7, armature and left-hand contact of spring combination 32 to ground through the winding of relay 5. The operation of relay 5 performs no useful function at this time. Relays 9, 10, and 11, in operating operate relays 12, 13 and 14 respectively in circuits traced from ground through their lower windings and lower contacts of relays 9, 10, and 11 to battery through the contacts of relay 6 and the winding of relay 7. Relays 12, 13, and 14 lock operated in circuits from ground through their lower windings and contacts to battery through the contacts of relay 6 and winding of relay 7. Relay 7 operates in the locking circuit just traced and removes battery from the armatures of all the spring combinations. As mentioned previously spring assembly 33 is operated by cam 52 at an interval after the other spring assemblies, such as assembly 32. This interval is provided to allow sufficient time for the translating relays such as relays 9, 10, 11, etc. to operate, in case there is a punch in one of the numerical positions 0' to 9' such as position 3', and to lock in series with relay 7, operating the latter relay and removing battery from the armatures of all the spring assemblies before assembly 33 operates. In addition relay 7 is slow enough to operate to allow all of the other relays such as 9, 10, 11, etc. to operate but fast enough so as to operate before springs 33 are operated.

In addition to controlling the speed of operation of the various relays, it is within the scope of this invention to select relay windings having suitable values of resistance to permit the proper operation of the various relays and to prevent false operation due to spurious circuits.

The operation of relays 9, 10, and 11 also the operation of relays 12, 13, and 14 connect lines wire 21 to segments 24, 25, and 26, respectively and as commutator arm 17 proceeds over the various segments the line wires 20 and 21 are connected together while the brush passes segments 24, 25 and 26 but are not so connected while the brush passes segments 23, 27 and 28. Thus a signal is sent over the line wires that represents a perforation in position 3'. This signal is in accordance with the code shown in Fig. 3.

After remaining operated for a sufficiently long interval to insure the operation and locking of the translating relays such as relays 9, 10, and 11, and relays 12, 13, and 14, cams 35, 53, and 52 lower all of the pins from the card and return all of the spring combinations to their normal unoperated condition. This permits the relays, such as relays 9, 10, and 11, which are not locked operated to release. These relays in releasing at this time do not affect or change the code impulses transmitted because they have previously operated other relays (relays 12, 13, and 14) which also control the code impulses transmitted and which are locked operated until after the code impulses are transmitted.

Cam 45 also rotates with shaft 51 and is so positioned that it lifts lever 46 which rotates notched wheel 37 one tooth through pawl 36 after cams 35, 53, and 52 have returned all of the levers and the pins associated with them to their normal positions. The rotation of wheel 37 one tooth causes wheels 38 and 40 to rotate and move card 39 in the direction of the arrow thus bringing the perforations of the next column into register with the pins.

After the code impulses have been transmitted and brush arm 17 reaches the position of segment 18 it closes a circuit from ground on segment 19, brush arm 17, segment 18 to battery through the winding of relay 6. Relay 6 operates in this circuit and breaks the locking circuits of relays 12, 13, and 14 through the winding of relay 7. Relays 12, 13, and 14 release as does relay 7. When the circuit between segments 19 and 18 is broken due to brush 17 reaching its normal position relay 6 releases but relay 7 does not reoperate due to the circuit being broken at the contacts of relays 12, 13, and 14.

In the next column it will be assumed that position 11' only is punched so that as cams 35, 53, and 52 revolve, contact spring combination 30 and later combination 33 are operated. The operation of spring combination 30 causes the operation of relay 15' in a circuit traced from battery through the contacts of relay 7, upper break contact of relay 8, armature and right-

hand contact of spring combination 30, to ground through the winding of relay 15'. Relay 15' in operating operates relay 15 in a circuit traced from battery through the winding of relay 7, contacts of relay 6, lower contacts of relay 15' and lower winding of relay 15 to ground. The lower contacts of relay 15 are in parallel with the lower contacts of relay 15' and lock relay 15 operated a circuit similar to the one described above. The operation of spring combination 30 also causes the operation of relay 8 in a circuit traced from battery through the contacts of relay 7, upper break contacts of relay 8, armature and left-hand contact of spring combination 30 to ground through the upper winding of relay 8. Relay 8 in operating closes its locking circuit from ground through its lower winding, the contacts of relay 5, to battery through the upper make contacts of relay 8. The upper spring assembly of relay 8 is arranged so that the circuit to its lower winding is closed before the circuit to its upper winding is opened thus insuring the complete operation and locking of relay 8.

Relay 7 operates in the circuit previously traced after relays 15' and 8 have operated and opens the circuit from battery to the armatures of all of the spring combinations including combination 33 before cams 35 and 52 operate the spring combinations associated with levers 50 as well as with lever 49. The operation of relay 8 through its lower contacts causes the operation of magnet 4 which, in turn, removes pawl 36 from engagement with notched wheel 37 (see Fig. 2) so that as shaft 51 completes its revolution cam 45 does not cause the card to advance to the next column. Relays 15 and 15' operated, connect line wire 21 to segment 27 through break key 22 and as brush 17 advances over the commutator segments the pulses corresponding to the code for a perforation in position 11, as shown in Fig. 3, are sent to the distant point. When brush 17 passes segment 18, relay 6 is operated and relays 7, 15, and 15' released but relay 8 remains operated.

The perforator at the distant end is also arranged to omit the advance of the card whenever the code combination representing a perforation in positions 11' and 12' is received. It waits in anticipation of another group of impulses to be recorded in the same column as will be hereinafter explained. If, however, only 11' or 12' or both 11' and 12' are perforated in the column the second group of impulses will be used to advance the card at the distant end. In this case the second group of impulses or spacing signal is sent in the following manner through the operation of relay 8 which is energized whenever spring combination 30 or 31 is operated due to a hole in the card in position 11' or 12'. With relay 8 operated magnet 4 prevents the advance of card 39 at the transmitter as previously described. As cam 53 again revolves, it operates spring combinations 30 and 33 as before. Due to the operated condition of relay 8, however, battery is not connected to the armatures of spring combinations 30 and 31 and relays 15 and 15' are not operated as before. When spring combination 33 operates battery is still connected to its armature due to the unoperated condition of relay 7. In this case relays 14 and 15 are operated in a path traced from battery through the contacts of relay 7, armature and right-hand contact of spring combination 33 to ground through the upper windings of relays 14 and 15 in series. Relay 15 locks in a circuit traced from ground through lower winding and lower contacts of relay 15 to battery through the contacts of relay 6 and winding of relay 7. Relay 14 locks in series with relay 7 in a similar circuit through its lower winding and lower contacts. Relay 5 is also energized by spring combination 33, the operating path being traced from battery through the contacts of relay 7, armature and left-hand contact of spring combination 33 to ground through the winding of relay 5. Relay 5 operated, opens the circuit through the lower winding of relay 8 allowing it to release. Relay 8 is made slow in releasing to insure the operation of relay 7 and the removal of battery from the armatures of the spring combinations before relay 8 recloses its top break contacts, thus preventing the false operation of other relays through spring combinations associated over positions, as for example, 11' or 12'. Relay 5 is also made slow in releasing to make sure that relay 8 opens its top front contact before relay 5 closes its back contact which if not provided might also cause the false operation of relay 8.

The operation of relays 14 and 15 connect line wire 21 to segments 26 and 27 so that as brush 17 traverses the segments the signal for the space is transmitted. At the distant end the card is advanced on receiving the space signal and since relay 8 and consequently magnet 4 are released when cam 45 operates lever 46, card 39 is advanced to the next column through the action of pawl 36, notched wheel 37 and wheels 38 and 40 as previously described.

It is assumed that in the next column holes have been punched in positions 12' and 3'. In this case as cams 35, 52, and 53 revolve the associated pins go through holes 12' and 3' in the card and spring combinations 31, 32 and 33 are operated. Spring combination 31 operates first and energizes relay 16 in a circuit traced from battery through the contacts of relay 7, upper break contacts of relay 8, armature and right-hand contact of spring combination 31 to ground through the top winding of relay 16. Relay 16 locks in a circuit traced from ground through the lower winding and lower contacts of relay 16, contacts of relay 6 to battery through the winding of relay 7. Relay 7 operates in the circuit just traced and removes battery from the armatures of all of the spring combinations before spring combinations 32 and 33 operate. Relay 8 operates and locks due to the closing of the left-hand contact of spring combination 31 in the same manner as described for the operation of spring combination 30. Relay 8 in operating operates magnet 4 which moves member 36 from wheel 37 so that card 39 will not be advanced near the end of the first revolution of cam 45. Relay 16, operated connects line wire 21 to segment 28 so brush 17 transmits the impulses corresponding to a perforation in position 12' to the distant point. When brush 17 passes segment 18, relay 6 is operated as described above and relays 7 and 16 are released. Relay 8 remains operated, however, and causes the transmitter to make a second revolution before advancing the card since magnet 4 is operated as hereinbefore described. On the second revolution spring combination 31 again operates first but is ineffective because battery is not connected to its armature due to the operated condition of relay 8. Spring combination 32 cioses its contact next and causes the operation of relays 9, 10, and 11 in a circuit traced from battery through the contacts of relay 7, armature and right-hand contact of spring

combination 32 to ground through the lowermost windings of relays 9, 10, and 11 in series. Relays 9, 10, and 11 in operating operate relays 12, 13, and 14 in series with relay 7 which lock operated in series with relay 7 as described previously. Relay 5 is also operated through spring combination 32 in a circuit traced from battery through the contacts of relay 7, armature and left-hand contacts of spring combination 32 to ground through the winding of relay 5. The operation of relay 5 releases relay 8 which in turn releases magnet 4 as previously described, so that the card at the transmitting station will be advanced at the completion of the second revolution of shaft 51. Relay 7 operates in the locking circuit previously described and removes battery from the armatures of all the spring combinations so that the subsequent operation of spring combination 33 is ineffective. Relays 9, 10, and 11 and relays 12, 13, and 14 connect line wire 21 to segments 24, 25, and 26 and as brush 17 sweeps over them it sends the code for a punch in position 3'. When brush 17 again makes contact with segment 18 relay 6 is operated as before and relays 7, 9, 10 and 11, 12, 13, and 14 are released thus restoring the circuit to normal.

In the next column it is assumed that no holes are punched and that when cams 35, 52, and 53 revolve only spring combination 33 is operated. In this case relays 14 and 15 are operated, the circuit for this operation of these relays being traced from battery through the contacts of relay 7, armature and right hand contact of spring combination 33 to ground through the upper windings of relays 14 and 15 in series. Relay 5 also operates through the left-hand contact of spring combination 33 but does not perform any useful function at this time. Relays 14 and 15 lock in series with relay 7 as previously described. These relays 14 and 15 connect line wire 21 to segments 26 and 27 thus causing the signal representing a space to be transmitted to the distant point. When cam 45 lifts lever 46 the card is advanced to the next column.

Referring now to Figs. 4, 5, and 6, the mechanical details of the apparatus at the distant point will be described. The electrical circuit and many of the mechanical details are the same as are used in the usual type of printing telegraph systems. Magnet 61 is controlled over the line wires in the usual manner. The line circuit may be of the closed circuit type in which case the first open circuit impulse starts shaft 68 revolving and with it the various cams usually found in telegraph printers. Five operating levers such as lever 70 in addition to the locking lever 71 operate in succession as shaft 68 revolves and brings swords such as sword 72 up against armature extension 74. The first sword 72 is brought up against armature extension 74 during the first code impulse interval after the start pulse and if it finds the armature in an operated position, as shown, it will position sword 72 against its upper stop and as lever 70 returns due to the action of cam 69 it will position connecting link 73 and vane 62 corresponding to a closed circuit during the first pulse. Had the first pulse been an open circuit magnet 61 would have been unoperated and sword 72 would have been positioned against its lower stop, as shown and connecting link 73 and vane 62 would have taken a position corresponding to an open circuit during the first pulse.

After the five pulses of the code have been received and the five vanes have been positioned cam 83 allows spring 84 to move bar 87 to the left. This causes the bars 63 to rest against the selecting vanes 62. Vanes 62 have notches cut in their edge. As is usual these notches line up for only one of the bars 63 such as 85 for each code combination. This allows the selected bar, such as bar 85, to move to the left as shown in Fig. 4. This interposes the lever 76 attached to bar 85 between pin 64 and striker 77 and when the shaft 68 revolves sufficiently for cam 65 to lift bar 66, a hole is punched in card 67 in the position corresponding to the punch in the original card. Just before coming to rest cam 83 operates bar 87 to the right which moves bar 85 to the right thus allowing the vanes to take a different position for the next character and removing lever 76 from contact with pin 64 and striker 77. A locking bar 86 may be provided to lock the vanes 62 during the time one of the bars 63 is to the left when a hole is being punched in the card.

Connected to striker 77 is pawl 79 which moves up and down with striker 77 whenever the latter is operated by cam 65. Pawl 79 engages notched wheel 80 and rotates wheel 81 one notch and advances card 67 one column, each revolution of shaft 68 except as hereinafter noted. It has been previously mentioned that the apparatus at the terminating end is arranged so that the card is not advanced after receiving the signal for perforating positions either 11' or 12' or both 11' and 12'. This is accomplished in the following manner: Attached to the levers similar to lever 76, which are associated with punches for perforating positions 11' and 12' are extensions 78. Whenever either of these levers assumes a position between striker 77 and the pin which is associated with position 11' and 12' similar to pin 64, an extension 78 pushes pawl 79 against the action of spring 82 at a point below its fulcrum. This removes pawl 79 from engagement with notched wheel 80 and when pawl 79 is raised and lowered by the action of cam 65, card 67 is not advanced but awaits the reception of another group of impulses representing other than perforations in positions 11' and 12'.

Other views of the mechanical construction of the perforator are shown in Fig. 5 which shows a side view of the punching mechanism and in Fig. 6 which shows the arrangement of the vanes, bars and levers.

Fig. 7 illustrates one method that this card controlled and punching apparatus may be used in a telegraph system. Here 100 represents a central station which may have switching apparatus and circuits such as represented by switchboard 111. A plurality of outlying or subscribers' stations 101, 102, 103, and 104 are connected to the central station by lines 105, 106, 107, and 108, respectively. These stations as well as the central station may be equipped with the usual teletypewriter apparatus and signaling circuits as represented by 109. A key or switch 110 is provided to connect either the teletypewriter apparatus or the statistical card apparatus to the line. In addition to this apparatus a break key 22 and relay 90 are provided for signaling purposes in case some failure or trouble occurs.

The central station may connect two or more subscribers' stations together so they may communicate with each other, or it may communicate to any or all of the subscribers' stations. The switching may also be arranged so that any subscriber may communicate with any or all of the other subscribers. In addition any of the lines 105 to 108 may include one or more re-

peaters of the usual or regenerative type such as 112 in line 105 as well as other forms of communication channels. Since all these arrangements and circuits perform in their usual manner and are well known to those skilled in the art their details have not been fully described.

In the preferred manner of operating the system shown in Fig. 7, a subscriber may signal the operator in any conventional manner and communicate to the operator by means of the teletypewriter the calling or interconnecting information necessary for the operator at the central station to connect the subscriber with any other subscriber with which he desires to be connected. The subscriber will then transmit to the second subscriber by means of the teletypewriter information relating to the type of material he has to send to him. If it is desired to send statistical card information they will both operate switching keys 110 to connect a statistical card controlled apparatus to the lines at their respective station and the statistical card information transmitted between the two subscribers. In case some trouble occurs at the receiving subscriber's station or some place else in the system a receiving subscriber will send a break signal and connect his teletypewriter to the line. The transmitting subscriber will also connect his teletypewriter to the line to receive information relating to the trouble encountered and where to start retransmitting the statistical card information when the trouble is cured.

In case the operator at the central station is provided with broadcast facilities to enable her to communicate with all or a selected group of the subscribers' stations, she will communicate with them by means of the teletypewriter and indicate the type of information as well as any other information and request the subscribers to connect their statistical card controlled apparatus to the line. She will then do likewise and transmit from her statistical card controlled apparatus such information as she wishes to transmit to the various subscribers' stations.

It is to be understood, however, that the above description is to illustrate features of the invention but is not to limit the scope of the invenion, as set forth in the following claims.

What is claimed is:

1. A communication system comprising a perforated card controlled telegraph transmitter having contacts for reading the perforations in said cards column by column, a translating device for translating the perforations of each of said columns into a plurality of groups of telegraph signal impulses, a telegraph transmission channel connected to said transmitter, a telegraph receiving device connected to said channel having translating and perforating devices for perforating a card column by column in accordance with the received groups of telegraph signal impulses.

2. A system for transmitting information recorded on statistical cards over a start-stop telegraph system which comprises means for reading the information recorded on said cards column by column, a translating circuit connected to said reading means for translating the information recorded in each column into groups of start-stop telegraph signal impulses, a telegraph transmitter connected to said translating circuit to transmit said groups of signal impulses, a telegraph receiver, a telegraph transmission channel connecting said transmitter and said receiver, translating and recording devices controlled by said groups of impulses as received by said receiver for recording the information on other statistical cards.

3. An attachment for teletypewriters which comprises a statistical card controlled telegraph transmitter which includes a control circuit for transmitting a single group of telegraph signal impulses for a certain combination recorded in a column on said card and for transmitting more than one group of impulses for other combinations recorded in a column on said card, and a telegraph signal receiving device for receiving and recording received signals in columns on statistical cards which includes means for recording more than one group of signal impulses in a column on said statistical cards.

4. In a telegraph system, a line and a station, said station comprising printing telegraph transmitting receiving and recording apparatus; statistical card telegraph transmitting, receiving, and recording apparatus, and switching means for connecting and disconnecting said printing apparatus and said statistical card apparatus to and from said line.

5. In a telegraph system a receiving apparatus comprising a receiving magnet, a group of permutation elements controlled by said magnet, means for perforating a statistical card column by column in accordance with the position of said elements, said means including card advancing apparatus which advances the card only in response to certain positions of said permutation elements.

6. A telegraph system comprising a plurality of telegraph stations, a central station, telegraph signal channels connecting each of said plurality of stations to said central station, interconnecting means at said central station for interconnecting said plurality of stations, each of said plurality of stations comprising printing telegraph apparatus for transmitting and receiving to and from said central station respectively general information including information relating to the interconnecting of said stations said printing telegraph apparatus including telegraph transmitting, receiving and recording mechanisms, statistical card apparatus comprising a telegraph transmitting mechanism controlled by said cards and a telegraph receiving and recording mechanism for perforating statistical cards and switch means individual to each of said plurality of stations for connecting one of said apparatus to said telegraph channel and for disconnecting the other of said apparatus from said channel.

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