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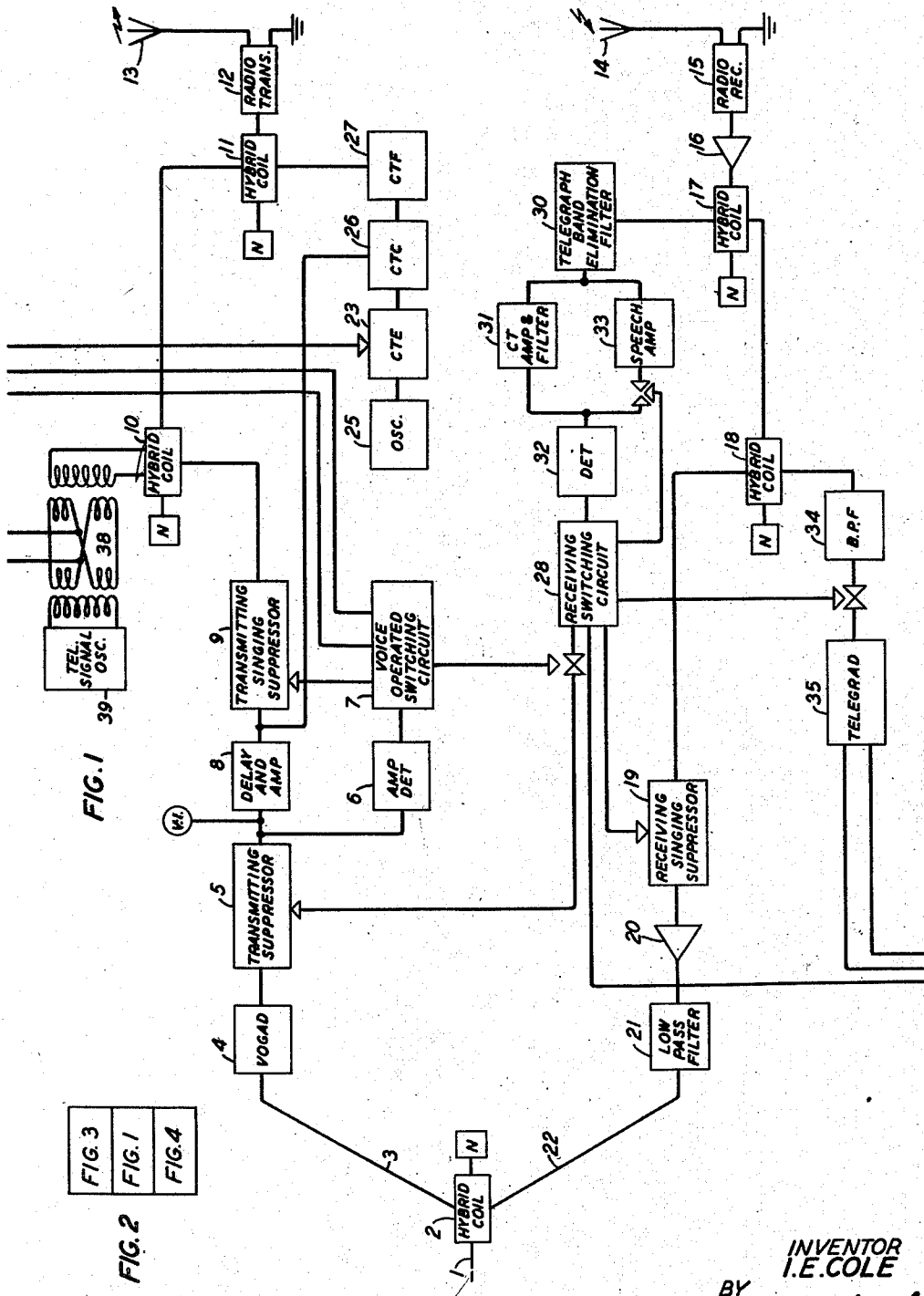
I. E. COLE

2,220,889

COMMUNICATION SYSTEM

Filed Sept. 23, 1939

7 Sheets-Sheet 1



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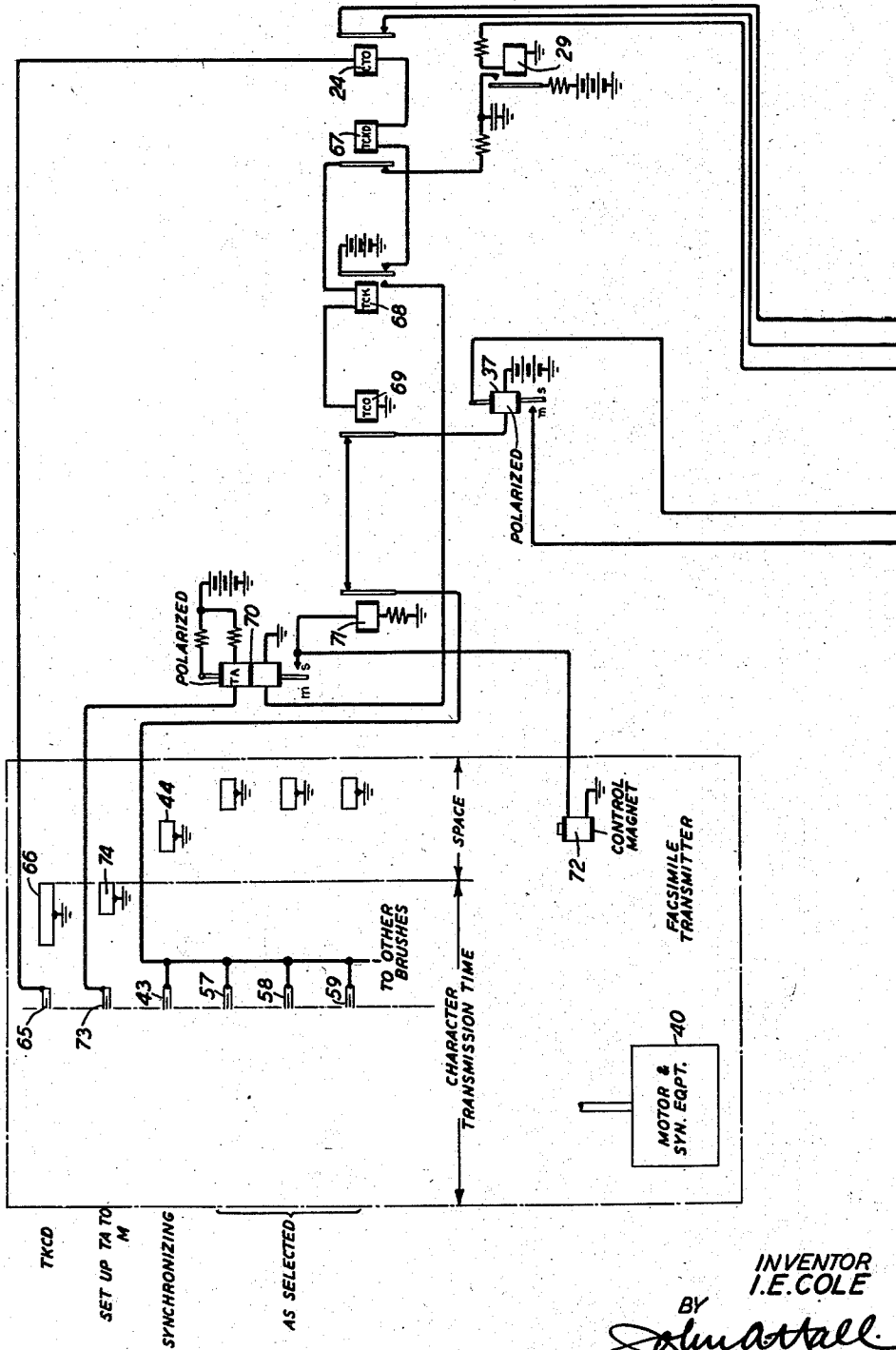
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FIG. 3



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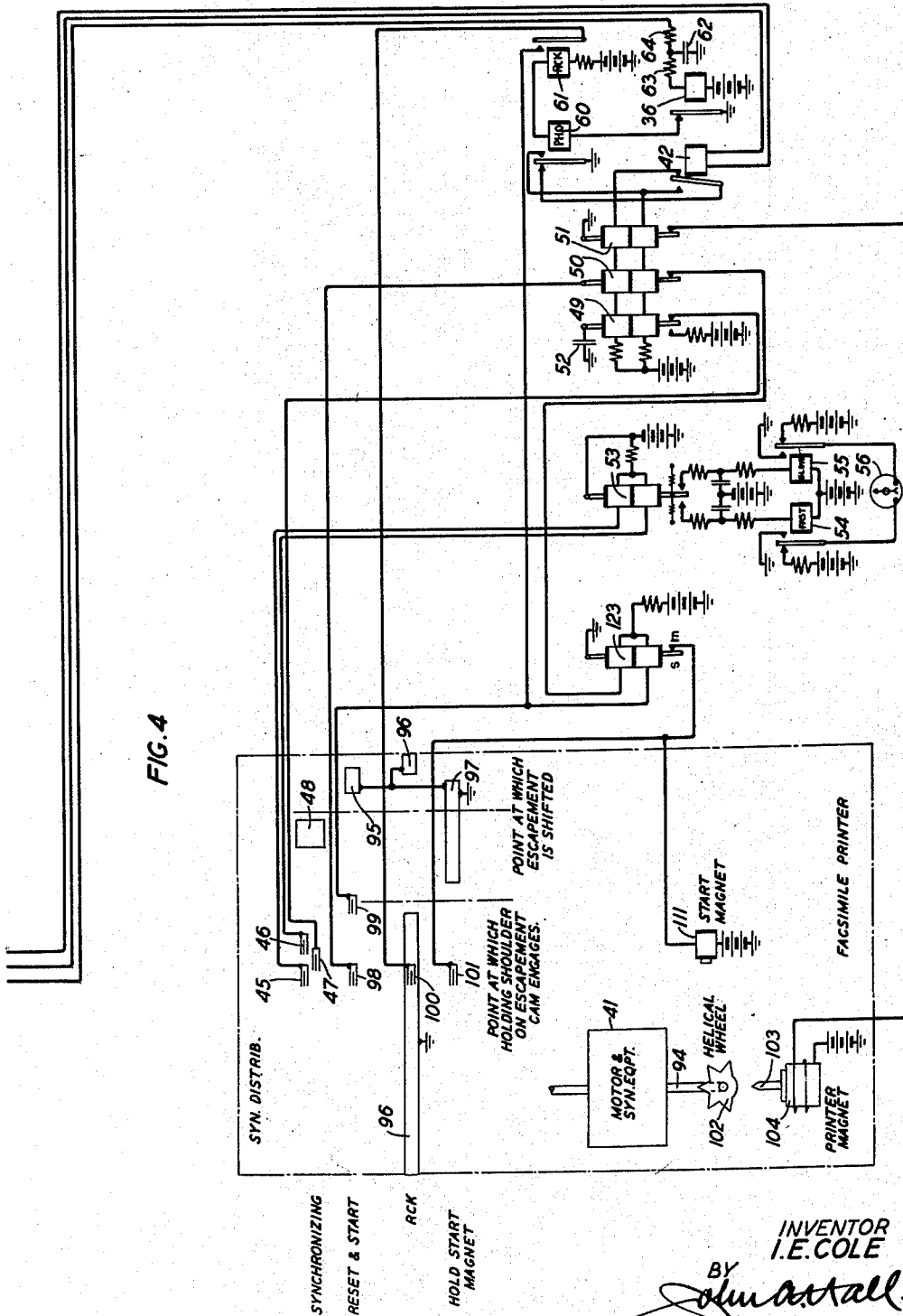
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COMMUNICATION SYSTEM

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FIG. 4



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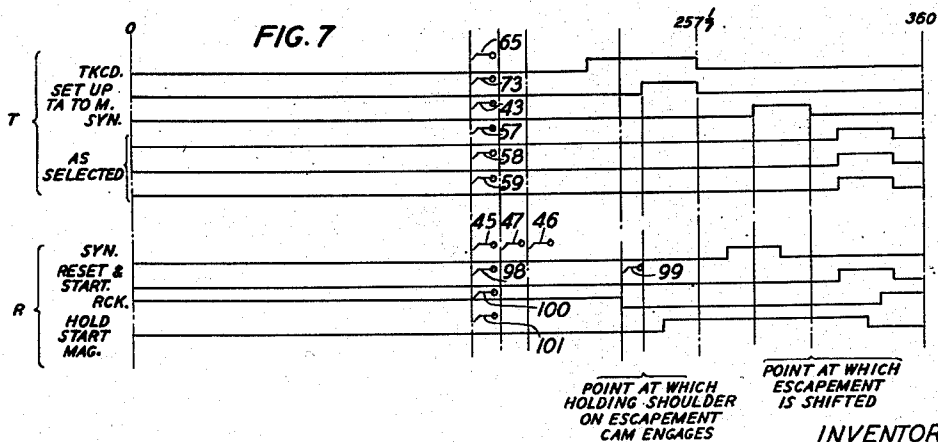
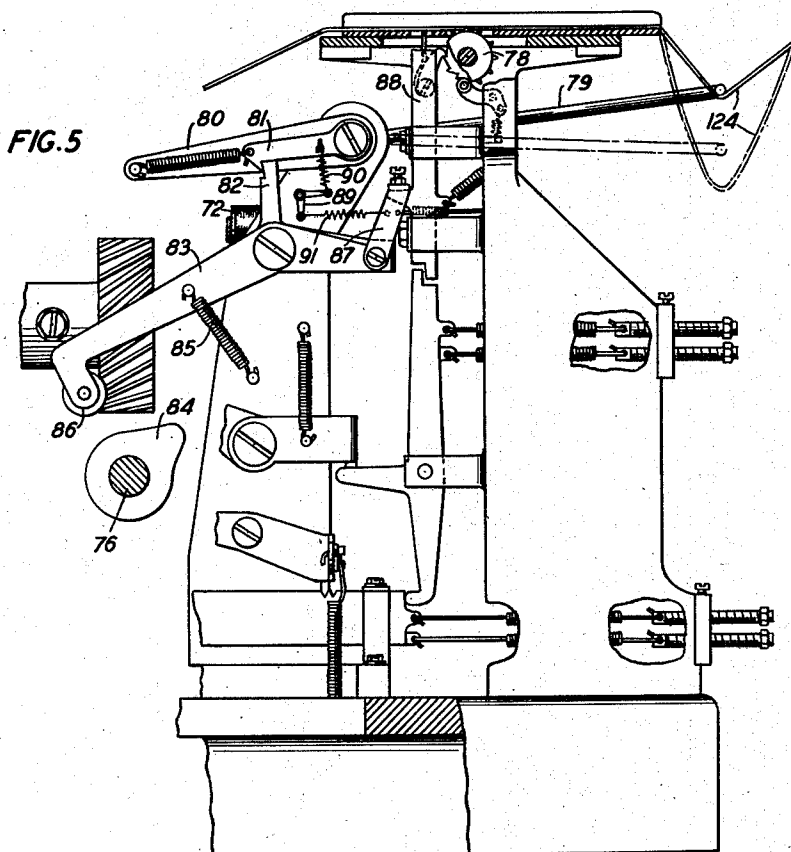
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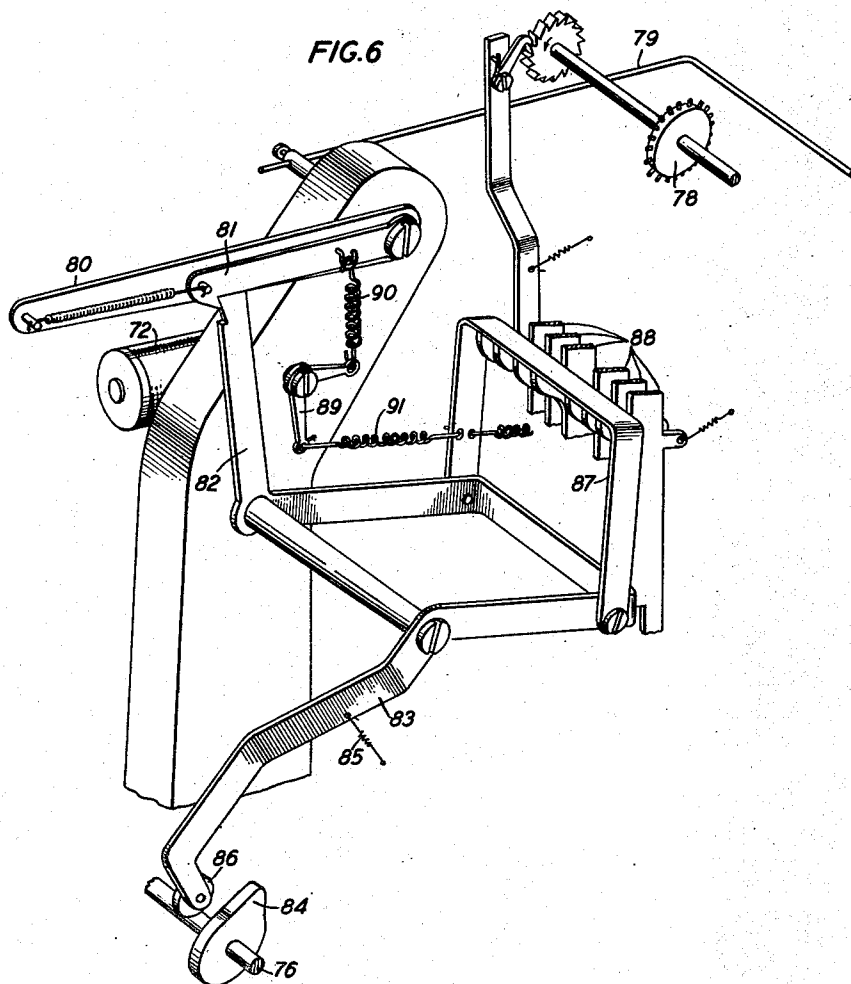
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COMMUNICATION SYSTEM

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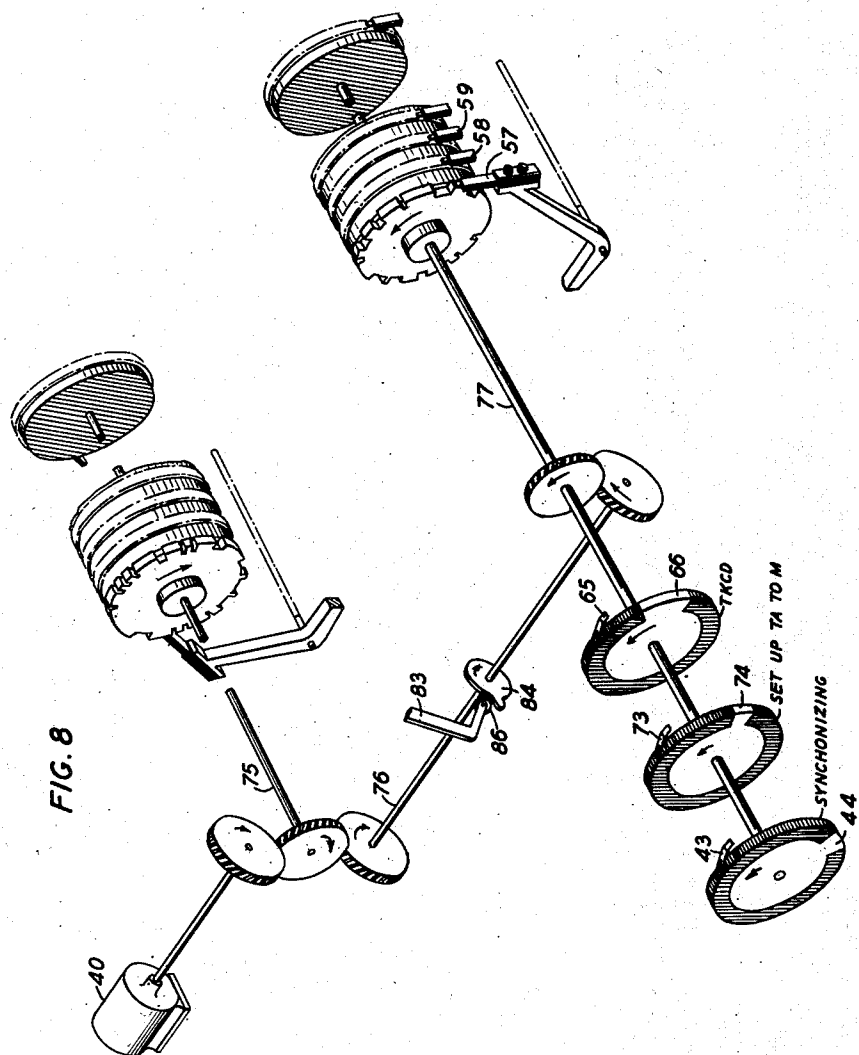
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COMMUNICATION SYSTEM

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7 Sheets-Sheet 6



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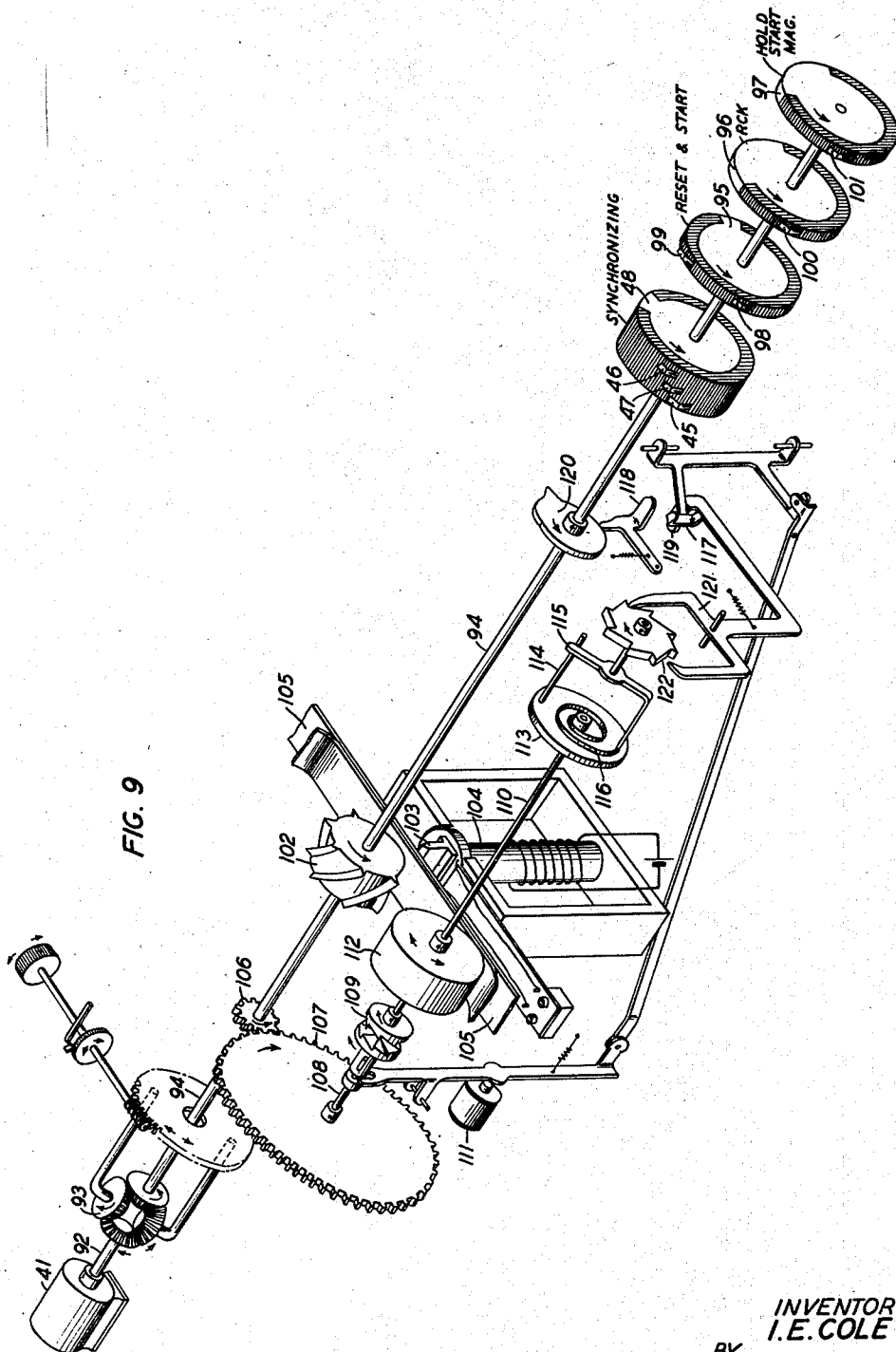
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2,220,889

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UNITED STATES PATENT OFFICE

2,220,889

COMMUNICATION SYSTEM

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Application September 23, 1939, Serial No. 296,248

12 Claims. (Cl. 179-4)

This invention relates to communication systems and particularly to combined telephone and telegraph systems in which the telegraph signals are interpolated in a telephone conversation. This invention is an improvement over the system shown in application Serial No. 219,964 filed July 19, 1938.

It is an object of the invention to operate facsimile printing telegraph devices over the telegraph channel of an interpolated telephone and telegraph system.

A feature of the invention is a means to move the tape or other surface on which the composite character is being formed backward when printing is stopped with a character only partially printed. By such means the partial inscription of this same character will be retraced and then completed with the result that mutilation will be avoided.

As in the Cole-Melrose system referred to the signals representing any one character are recorded and transmitted. If the voice currents take command of the transmission channel the telegraph transmission is interrupted and the character signals are stored for retransmission at the next opportunity. If the voice currents take command of the transmission channel within a very short distance from the end of the transmission of the signals of a character, then the voice current responsive means are delayed in their action so as to allow the completion of that particular character.

In the specific embodiment of this invention used for purposes of illustration, the character codes are recorded and then translated into what may be termed facsimile code. By use of synchronously operating motors controlled, for example, as shown in Patent No. 2,207,748, to L. A. Meacham dated July 16, 1940, a composite printer at the receiving end is actuated by impulses transmitted from the sending end. When the telegraphic transmission of such impulses is interrupted, a clutch is disengaged from the continuously running synchronous motor and the tape or recording surface is moved backwardly so that a character only partially inscribed may be retraced and completed at the next opportunity. While the clutch is thrown out the composite printer is idle and an escapement mechanism is rendered inoperative. At this time a resilient connection between the tape moving means and the escapement mechanism brings the tape back to the point where the inscription of a character is started and specifically to the point where the partially inscribed character was started. When transmission is resumed it will be started again at the beginning of the code theretofore partially transmitted and the partially inscribed character will be retraced and completed unless transmission is again inter-

rupted before the complete train of character code signals has been transmitted.

The drawings consist of seven sheets containing circuit diagrams, schematic representations, a timing chart and perspective skeleton drawings.

Figs. 1, 3 and 4, when placed together as indicated in Fig. 2, form a circuit diagram of the system with the facsimile transmitter in Fig. 3 shown schematically and the facsimile printer in Fig. 4 also shown schematically;

Fig. 5 is a broken side view of certain mechanical details of the facsimile printer;

Fig. 6 is a perspective skeletonized view of these same details;

Fig. 7 is a timing chart to explain the sequence of operations both at the transmitter and at the receiver;

Fig. 8 is a perspective skeletonized drawing of the facsimile transmitter; and

Fig. 9 is a perspective skeletonized drawing of the facsimile printer.

In general the operation of the system may be explained with the help of Figs. 1, 3 and 4. A speech path 1 leads to a hybrid coil 2 from which a path 3 for outgoing speech leads to a voad 4. The outgoing speech then passes through a transmitting suppressor 5 and by means of an amplifier detector operates a chain of relays 7 here labeled "Voice operated switching circuit." This voice operated switching circuit controls a transmitting singing suppressor 9 so that the outgoing speech can pass from the transmitting suppressor 5 through the delay and amplifier 8 and the transmitting singing suppressor 9 to the hybrid coil 10. From the hybrid coil 10 the speech reaches another hybrid coil 11 and thence goes through the radio transmitter 12 to an antenna 13. Through radio transmission the speech will be received at some distant point and for purpose of explanation it will be assumed that the distant point has a receiving circuit similar in all respects to the lower part of Fig. 1. The radio frequency modulated speech, therefore, enters antenna 14, passes through a radio receiver 15 and thence demodulated speech passes through the voice frequency repeater 16 to a hybrid coil 17. From the hybrid coil 17 the speech goes into hybrid coil 18, thence through the receiving singing suppressor 19, the receiving repeater 20, a low pass filter 21 and a path 22 to a hybrid coil, such as 2, whence it goes to the receiving subscriber over a line such as 1.

The voice operated switching circuit 7 controls a control tone enabler 23 through the contact and armature of relay 24 so that control tone from a source 25 is passed through the control tone compressor 26 and the control tone filter 27 to the hybrid coil 11 and thus accompanies speech. The voice operated switching circuit 7 also controls a switching point leading from the 60

receiving switching circuit 28 at the same terminal to the transmitting suppressor 5 so as to open this circuit during the periods that speech is going out from line 1 to antenna 13. During this time the voice operated switching circuit 7 also controls the telegraph control circuit shown in Fig. 3 by operating relay 29 in order to stop the action of the telegraph transmitting circuit during the time the voice is being transmitted from line 1 out over antenna 13 by the usual modulation means.

At the receiving end the control tone with the usual modulation of the carrier frequency coming in over antenna 14 is demodulated in radio receiver 15 and passes through the hybrid coil 17 and thence through a telegraph band elimination filter 30 and into a control tone amplifier and filter 31. Through the detector 32 the receiving switching circuit 28 is operated and this circuit performs several functions as follows: First, the receiving switching circuit 28 controls a normally open circuit between the telegraph band elimination filter 30 and the detector 32, this path including a speech amplifier 33 so that when control tone is first received the switching circuit 28 will be operated thereby and then held operated thereafter by speech currents flowing through the amplifier 33. When the control tone is first transmitted it goes out into antenna 13 at high volume but after an interval determined by the delay and amplifier 8, the speech operates a control tone compressor 26 to reduce the volume of the control tone to avoid overloading the radio transmitter 12 by the combination of control tone and speech. This, of course, operates to advantage at the receiving end by giving an impulse of great strength through the control tone amplifier and filter 31 to operate the receiving switching circuit 28 before the path to the speech amplifier 33 is closed.

The receiving switching circuit 28 also controls the receiving singing suppressor 19 to open up the speech path. The receiving switching circuit 28 also controls a normally closed path between the band-pass filter 34 and the telegrad 35 so that while speech is being received the telegrad 35 will be disabled. At the same time the receiving switching circuit 28 controls the switching relay 36 for controlling the operation of the facsimile printer of Fig. 4.

During the pauses in the speech, either when the subscriber at the distant end is talking into channel 1 or during the time when the subscriber on channel 1 pauses during his talk out over the antenna 13, a telegraph apparatus, shown in Fig. 3, is in operation. This comprises, in general, a tape controlled facsimile transmitter similar to that described in Patent 2,000,083, granted May 7, 1935, to Kleinschmidt, and which will be more fully described hereinafter. This tape transmitter operates a telegraph transmitting line relay 37 which, in turn, controls the telegraph signal converter 38. This signal converter is a circuit controlling device disclosed in Patent No. 1,749,851 to H. C. Silent, March 11, 1930. When relay 37 is at its marking contact 6, the telegraph signal converter 38 is in such a condition that alternating current coming from the telegraph signal oscillator 39 passes freely into hybrid coil 10 for transmission out over the antenna 13. When relay 37 has its armature driven to its spacing contact, then the telegraph signal converter 38 blocks off the telegraph signal current and no current will therefore get into hybrid coil 10.

At the distant end these telegraph signals in the form of spurts of alternating current of the usual form of a carrier of the oscillator frequency with side-bands about 70 cycles wide, caused by the modulation of the carrier by the telegraph transmitter, are received over antenna 14 by the radio receiver 15 and thence through repeater 16, whence they pass through the hybrid coils 17 and 18 to the band-pass filter 34. Thereafter the signals enter the telegrad 35 and are converted from varying strength alternating current signals to uniform strength direct current signals of approximately the same strength at which they were received over antenna 14. For a complete description of the telegrad reference is made to application Serial No. 283,368 filed July 8, 1939, by Barney et al. These direct current signals then pass through the switching relay circuit of Fig. 4 and the rotary distributor shown schematically in the broken line rectangle of Fig. 4 to the facsimile printer. During the reception of telegraph signals the receiving switching circuit 28 is unoperated and the speech path is blocked off by the receiving singing suppressor 19. The rotary distributor of the facsimile transmitter, here represented by the motor and synchronous equipment 40, is kept in synchronism with the distant rotary distributor of the facsimile printer here represented by the motor and synchronous equipment 41 by means disclosed in a patent granted to L. A. Meacham No. 2,207,748.

For purposes of the present description it is only necessary to mention the fact that the rotary distributor operated by motor 40 will be kept in perfect synchronism with the distributor represented by motor 41 if there is an occasional transmission from a spacing to a marking impulse, that is, if there is an occasional operation of relay 37 and, therefore, an occasional corresponding operation of relay 42. Such transitions are caused during the normal operation of the facsimile transmitter once for each cycle of operation of the rotary distributor of the facsimile transmitter. Each time that the brush 43 engages the distributor segment 44, relay 37 is driven from spacing to marking, and similarly relay 42 is driven from the spacing to the marking. If the facsimile printer is in perfect synchronism with the facsimile transmitter, then the three brushes 45, 46 and 47 will be perfectly centered on the segment 48 with the result that as relay 49 moves to its marking contact, the condenser 52 will be discharged equally into both windings of relay 53 and this relay will fail to move its armature. Relay 53, it will be noted, controls a fast and a slow relay 54 and 55, respectively, and these, in turn, control an indicator 56 which here merely represents means to cause the facsimile printer motor and synchronous equipment 41 to speed up or slow down to correct any deviation from the synchronism with the motor 40. If the brushes 45, 46 and 47 are not perfectly centered on the segment 48 when relay 49 moves to its marking contact, then the relay 53 will be driven either to its left or right-hand contact, as the case may be, and the correction will be properly made to bring the motor 41 into synchronism with motor 40 where the brushes 45, 46 and 47 will again be perfectly centered on the segment 48.

In operation, if no voice currents are being transmitted from line 1 and the voice operated circuit 7 is, therefore, unoperated, the telegraph apparatus of Fig. 3 will be fully enabled with relay 29 unoperated as shown. When in the

course of operation of the distributor operated by motor 40, any one of the brushes 57, 58 or 59 which may have been selected closes a contact to ground through the operation of the associated cam, relay 37 will be operated to its marking contact, whereupon the converter 38 will be placed in a condition so that telegraph signaling current from the oscillator 39 will pass out through hybrid coil 10 and over antenna 13.

10 This marking current is received over antenna 14 and translated by the telegraph 35 into operation of the relay 42. If relay 37 is driven to its spacing contact, then the converter 38 will prevent the telegraph signaling current from oscillator 39 from transmitting any current into the hybrid coil 10. Thus the relay 42 at the receiving end will be driven to its unoperated or spacing contact.

At the receiving end, when the telegraph apparatus is enabled, relay 36 will be operated during periods of telegraph transmission, consequently relays 60 and 61 will be unoperated as shown. With relay 42 operated on incoming marking impulses and unoperated on spacing impulses, ground will be connected to its armature and relays 49, 50 and 51 will be driven to their marking contacts when relay 42 is in the position shown. Therefore, each marking impulse will result in the operation of this chain of three relays. It has generally been explained hereinbefore how the relay 49 causes the discharge of condenser 52 into the windings or either one of them of relay 53. Condenser 52 is charged during the periods that the relay 49 is on the spacing contact.

When the voice takes charge of the receiving circuit and the receiving switching circuit 28 is energized, then relay 36, after an appropriate time interval, determined by the condenser 62 and resistances 63 and 64, will become deenergized, whereupon the relays 60 and 61 will become energized. Relays 49, 50 and 51 are then permanently held on their spacing contacts and relay 42 is rendered ineffective.

When the voice takes charge of the channel the voice operated switching circuit 7 at the transmitting end as well as the receiving switching circuit 28 at the receiving end, is operated. As a consequence relay 29 is operated. If the transmission of a character is almost completed, then brush 65 will be in contact with segment 66 and as a consequence the control tone delay relay 24 and the transmitting check delay relay 67 will be operated in a circuit to the back contact of the transmitting check relay 68. This will prevent the action of relay 29 from becoming immediately effective and hence, the transmission of the character will be completed. If, however, the operation of relay 29 occurs at any other instant than when brush 65 is in contact with segment 66, a circuit will be completed from battery through the armature and front contact of relay 29, the back contact and armature of relay 67, and thence through the windings of relays 68 and 69. Relay 68 opens the circuit of relays 67 and 29, and closes a circuit through the lower winding of relay 70 to drive this relay to its spacing contact. Thereupon relay 71 becomes operated to prevent the further operation of the telegraph transmitting line relay 37 and to operate the control magnet 72 to prevent the tape 73 from being advanced. The operation of the control magnet 72 thus effectively stores any code which has been only partially transmitted so that when next this trans-

mitting apparatus is rendered effective, the stored code will be retransmitted in full. So long as relay 70 is held to its spacing contact the control magnet 72 will remain energized. Once a revolution of the rotary distributor operated by motor 40, brush 73 contacts segment 74 and by energizing the upper winding of relay 70 tends to drive this relay to marking. However, if the circuit of the lower winding of this relay is still closed, it will stay on spacing. Only when this lower winding is opened will the contact between brush 73 and segment 74 be effective, and thus it will be noted that the control magnet 72 is never deenergized until the rotary distributor has reached such a point that the next code to be transmitted will be transmitted in full.

For a more detailed description of the operation of the facsimile transmitter reference should be made to Figs. 5, 6 and 8.

The motor 40 through a system of gears drives shafts 75, 76 and 77 continuously. Shafts 75 and 77 cause certain cams and rotary distributor segments to rotate. In Fig. 8 the brushes 43, 65 and 73 are indicated as cooperating with rotary distributors carrying segments 44, 66 and 74, respectively. The brushes 57, 58 and 59 are indicated as cooperating with cams, each of which is cut in such a way as to cause the responsive mechanism at the receiving end to trace a different character. Each brush 57, 58 or 59 is separately movable and is selectable through a system of code bars.

Referring particularly to Fig. 5, a perforated tape 124 is properly engaged with the feed wheel 78 whereby the tape will advance in step-by-step manner toward the left of the apparatus. This tape may be perforated according to any well-known method but for purposes of illustration it will be assumed to be in this case a standard six unit permutation code. Transmission of signals by this transmitter is controlled by the slackness or tautness of the tape or by the operation of the control magnet 72 hereinbefore referred to. So long as the perforated tape is fed to this transmitter faster than it can be used or the control magnet 72 is not energized, the transmitter will continue to operate. If the tape becomes taut, then bar 79 will be lifted into the position shown in full, thus moving the level 80 downwardly and carrying the latch 81 into the path of movement of the arm 82 on lever 83. This lever 83 is moved once for each revolution of the shafts 75, 76 and 77 by means of the cam 84 so now upon the next counter-clockwise movement of lever 83 under action of its spring 85 after the tape tightens, when the roller 86 leaves the high portion of cam 84, arm 82 will be latched by the latch 81. The transmission of signals will be suspended since portion 87 of lever 83 cannot rise to release feeler slides 88. With the parts in this position the motor and the driven shaft continue to rotate but the feeler slides 88 are not allowed to rise and, therefore, there is no new selection of a character.

When the voice takes command of the circuit the control magnet 72 is operated. The armature of this magnet operates a lever 89 in a clockwise direction so as to pull down latch 81 through spring 90 and to pull portion 87 out of engagement with the operating lugs on feeler slides 88 through the agency of spring 91. Thus when cam 84 next engages roller 86, those feeler slides which are in engagement with perforations in the tape are left in this position so that the code being

transmitted at the time magnet 72 is operated will be effectively stored for retransmission.

For further details of the operation of this transmitting device reference may be had to the above-noted Kleinschmidt Patent 2,000,083.

At the receiving end shown in skeletonized form in Fig. 9, the motor 41 is kept continuously running and in synchronism with the distant motor 40 by the means hereinbefore indicated. Motor 41 drives a shaft 92 coupled through a differential adjusting means 93 to the main shaft 94.

A number of distributor discs having segments 48, 95, 96 and 97 are moved by this shaft and cooperate with brushes 45, 46, 47, 98, 99, 100 and 101. These brushes and distributor segments perform certain control functions as will be more fully explained hereinafter.

The shaft 94 carries a member having a plurality of helical striking surfaces thereon. This may be termed an anvil and the part 103 moved by the magnet 104 may be termed a hammer. The hammer 103 moved in accordance with the incoming code will cause a facsimile character to be inscribed on the surface 105.

Shaft 94 moves a pinion 106 which meshes with a gear 107 to move the shaft 108. A clutch 109 causes the movement of shaft 108 to be imparted to shaft 110. While this receiving device is in full operation, the magnet 111 will be operated and shafts 108 and 110 will be clutched together so that a roller 112 will cause the surface 105 to advance between the hammer 103 and anvil 102 at the proper rate. Also connected to the shaft 110 there is a member 113 forming part of an escapement device. Member 113 carries a pin 114 which when shaft 110 is declutched from shaft 108 will engage an arm 115 through the agency of a spring 116 which tends to move the shaft 110 in a counter-clockwise direction. With the magnet 111 energized a link 117 is interposed between parts 118 and 119 so that with each revolution of the shaft 94 the cam 120 will cause the pallet 121 of the escapement to execute one complete movement to advance the toothed wheel 122 one step. Under normal conditions the pallet 121 is moved and arm 115 is brought next to pin 114 at the beginning of the inscription of a character. As the character is being inscribed the toothed wheel 122 remains stationary and hence the arm 115 remains stationary. The shaft 110, however, continues to rotate and spring 116 is wound up. Still under normal conditions when the character has been completely inscribed the cam 120 will cause the escapement to move the arm 115 to catch up to the movement of pin 114.

If the transmission is stopped after a character has been partially inscribed, then magnet 111 is deenergized, resulting in the movement of link 117 to render the action of cam 120 ineffective. At the same time shaft 110 is declutched from shaft 108 and shaft 110 now being free will be moved backwardly by spring 116 until pin 114 engages arm 115. By this backward movement roller 112 causes the surface 105 to be moved backward so that the partially inscribed character will be retraced from the beginning when transmission is again resumed.

Looking now at the circuit diagram Fig. 4, it will be noted that a relay 123 controls the energization of the magnet 111. Relay 123 is a polar relay and will stay in its marking or spacing position until energized again. As shown, relay 123 is on its marking contact. Energization through its lower winding will drive it to spacing

and energization through its upper winding will drive it to marking. Under normal conditions, that is, with the facsimile printer in full operation and with relay 36 energized whereby relay 61 is deenergized, relay 123 gets one impulse to spacing per revolution of shaft 94 and that is when brush 99 contacts segment 95. However, immediately thereafter a circuit is set up through brush 98 and the armature and marking contact of relay 50 to the upper winding of relay 123 to drive it back to marking and to start the movement of shaft 110 at a point where the character now to be inscribed will be properly begun. In order to prevent the deenergization of the magnet 111 periodically when the facsimile printer is in constant operation, a substitute circuit is provided by brush 101 and segment 97. Therefore, magnet 111 will be released only if brush 101 leaves segment 97 and relay 123 has been driven to spacing. But if relay 50 is on its marking contact, as it will be at this time if the telegraph channel is functioning, then brush 98 will contact segment 95 and drive relay 123 to marking before brush 101 leaves segment 97.

Now when the voice takes charge of the channel and relay 36 becomes deenergized, relay 61 is energized and then a circuit is completed through brush 100 and segment 96 for holding relay 123 on its spacing contact.

Reference to Fig. 7 will show the time relation between the various brushes and the distributor segments both at the transmitting and at the receiving ends, when the motors at these two ends are in synchronism with each other. There is also indicated the point at which the holding shoulder on the escapement cam 120 engages. This is a function which is provided so that if the voice takes charge near the end of the inscription of a character and the apparatus at the transmitting end has functioned to complete that character, then the receiving apparatus will also complete the character and move the tape on to receive the next character. At this point, within a short distance of the end of a character code, a shoulder on escapement cam 120 makes firm contact between parts 117, 118 and 119 so that even should magnet 111 be deenergized, the clutch 109 will not disengage shafts 108 and 110 until the pallet 121 has caused the wheel 122 to move forward another tooth. This point is also indicated on the time chart Fig. 7.

Other details of the working of the facsimile transmitter and the facsimile printer can be had from the before-mentioned Kleinschmidt Patent 2,000,083.

What is claimed is:

1. In a communication system, a transmission channel, means at one end of said channel for transmitting character code signals, means at the other end of said channel responsive to said signals for inscribing corresponding characters, means for interrupting the transmission of signals at any point in the character code whereby a character may be left only partially inscribed, means responsive to the interruption of a character code at any point other than the end thereof for starting transmission again at the beginning of said partially transmitted code, and means at the receiving end of said channel for repositioning said inscribing means for retracing said partially inscribed character.

2. In a communication system, a transmission channel, means at one end of said channel for transmitting character code signals, means at the other end of said channel for recording corre-

sponding characters on a constantly forwardly moving surface, means for interrupting the transmission of signals at any point in the character code whereby a character may be left only partially recorded, means responsive to the interruption of a character code at any point other than the end thereof for starting transmission again at the beginning of said partially transmitted code, and means at the receiving end of said channel for reversing the direction of travel of said surface for a distance equal to the length of the partially recorded character whereby the character when retransmitted will be retraced on said surface.

3. In a communication system, a transmission channel, means at one end of said channel for transmitting character code signals, means at the other end of said channel responsive to said signals for inscribing corresponding characters on a moving tape, means for interrupting the transmission of signals at any point in the character code whereby a character may be left only partially inscribed, means responsive to the interruption of a character code at any point other than the end thereof for starting transmission again at the beginning of said partially transmitted code, and means at the receiving end of said channel for moving said tape backward a distance sufficient for repositioning said tape for retracing said partially inscribed character.

4. In a composite printer, means responsive to a train of character code signals for inscribing a compositely formed character, said means including a constantly moving surface on which said character is inscribed, means responsive to the interruption of said train of signals before completion thereof for moving said surface backwardly whereby when transmission of said train of character code signals is resumed at the beginning thereof the inscription of said character will be retraced.

5. In a composite printer, a hammer and anvil, said hammer responding to a train of character code impulses and said anvil constantly moving to present a different striking surface to said hammer, and a constantly moving surface to be affected by the joint action of said hammer and anvil, and means for reversing the direction of movement of said surface responsive to an interruption of said train of impulses.

6. In a composite printer system, a hammer, an anvil, a moving tape and a motor for moving said anvil and said tape, means operating synchronously with said motor for transmitting character code impulses for operating said hammer, a clutch connection between said motor and said tape, and means for moving said tape backwardly, said last means being rendered free to operate when said clutch has disengaged said tape from said motor.

7. In a composite printer, a hammer actuated by character code impulses, a motor driven at a rate synchronous with incoming character code impulses, an anvil driven by said motor, a surface acted upon by said hammer and anvil, a surface moving mechanism, a clutch for operatively connecting said mechanism to said motor, a step-by-step device operated by said motor to advance one step for each complete train of character code impulses, and a resilient connection between said step-by-step device and said surface moving mechanism for moving said surface backwardly upon operation of said clutch in disengaging said mechanism from said motor.

8. In a composite printer, a hammer actuated

by character code impulses, a motor operating at a rate synchronous with incoming character code impulses, an anvil driven by said motor, a mechanism for constantly moving a surface between said hammer and anvil, a clutch for operatively connecting said mechanism to said motor, a step-by-step device operated by said motor to advance one step for each complete train of character code impulses, a resilient connection between said step-by-step device and said mechanism for moving said surface backwardly upon operation of said clutch in disengaging said mechanism from said motor, and means for disabling said step-by-step device.

9. In a composite printer, means for moving a tape steadily forward, a step-by-step device advancing with the movement of said tape a distance equal to the length of a character upon the reception by said printer of each complete train of character code impulses, a resilient connection between said tape moving means and said step-by-step device, and means for operatively disconnecting said tape moving means whereby said resilient connection acts to return said tape a distance equal to that part of a step which said tape had advanced since said step-by-step device last acted.

10. In a composite printer, a tape moving mechanism comprising an escapement device for advancing a tape step by step, an impeller for steadily moving a tape, and a resilient connection between said impeller and said escapement for returning a tape a fraction of a step upon relaxation of said impeller.

11. In a communication system, a transmission channel, means at one end of said channel for transmitting character code signals, a composite printer at the other end of said channel responsive to said signaling means, said printer including a motor, a tape moving means and an anvil driven by said motor, a hammer responsive to signals, an escapement driven by said motor and a resilient connection between said escapement and said tape moving means for imparting a backward movement to said tape moving means, and means for holding said motor in synchronism with said signaling means.

12. In a communication system, a transmission channel, means at one end of said channel to transmit character code signals, means at said end to interrupt the transmission of such signals and alternately connect voice current circuits to said channel, means at the other end of said channel responsive to said character code signals, means at said other end of said channel responsive to said interrupting means for disconnecting said code signal responsive means and for alternately connecting thereto voice current circuits, means operative over said channel for maintaining synchronism between said code signaling means and said code signal responsive means, said code signal responsive means comprising a composite printer having a motor, a hammer responsive to character code signals, an anvil and a tape moving device driven by said motor, a tape escapement operated by said motor, a clutch for disengaging said tape moving device from said motor, a resilient connection between said escapement and said tape moving device for backwardly adjusting said tape moving device responsive to the operation of said clutch in disengaging said tape moving device from said motor, and means responsive to said interrupting means for operating said clutch.