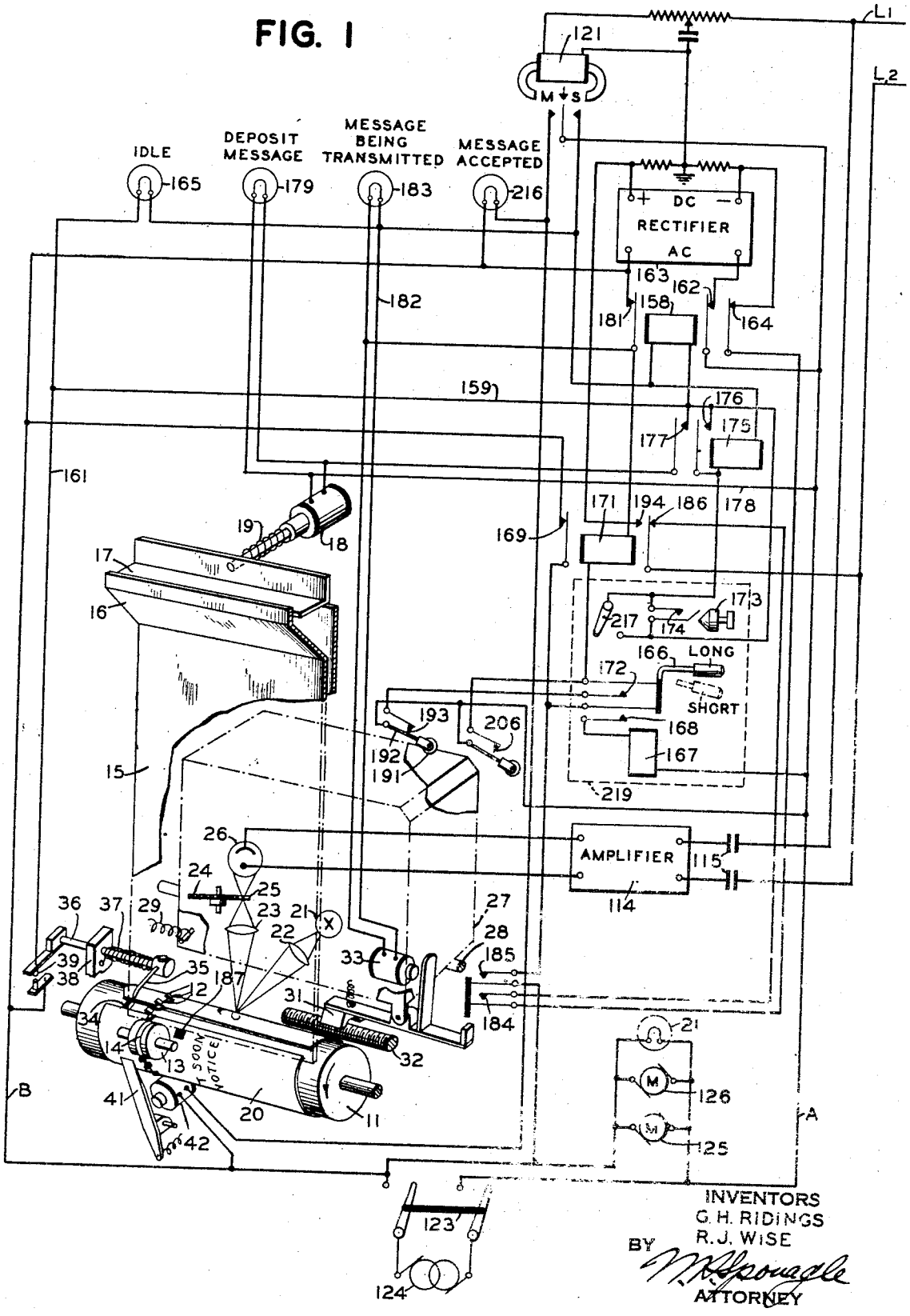
Nov. 2, 1943. G. H. RIDINGS ET AL 2,333,272

AUTOMATIC FACSIMILE SYSTEM

Filed Dec. 19, 1940 3 Sheets-Sheet 1

FIG. 1



INVENTORS
G. H. RIDINGS
R. J. WISE

BY

ATTORNEY

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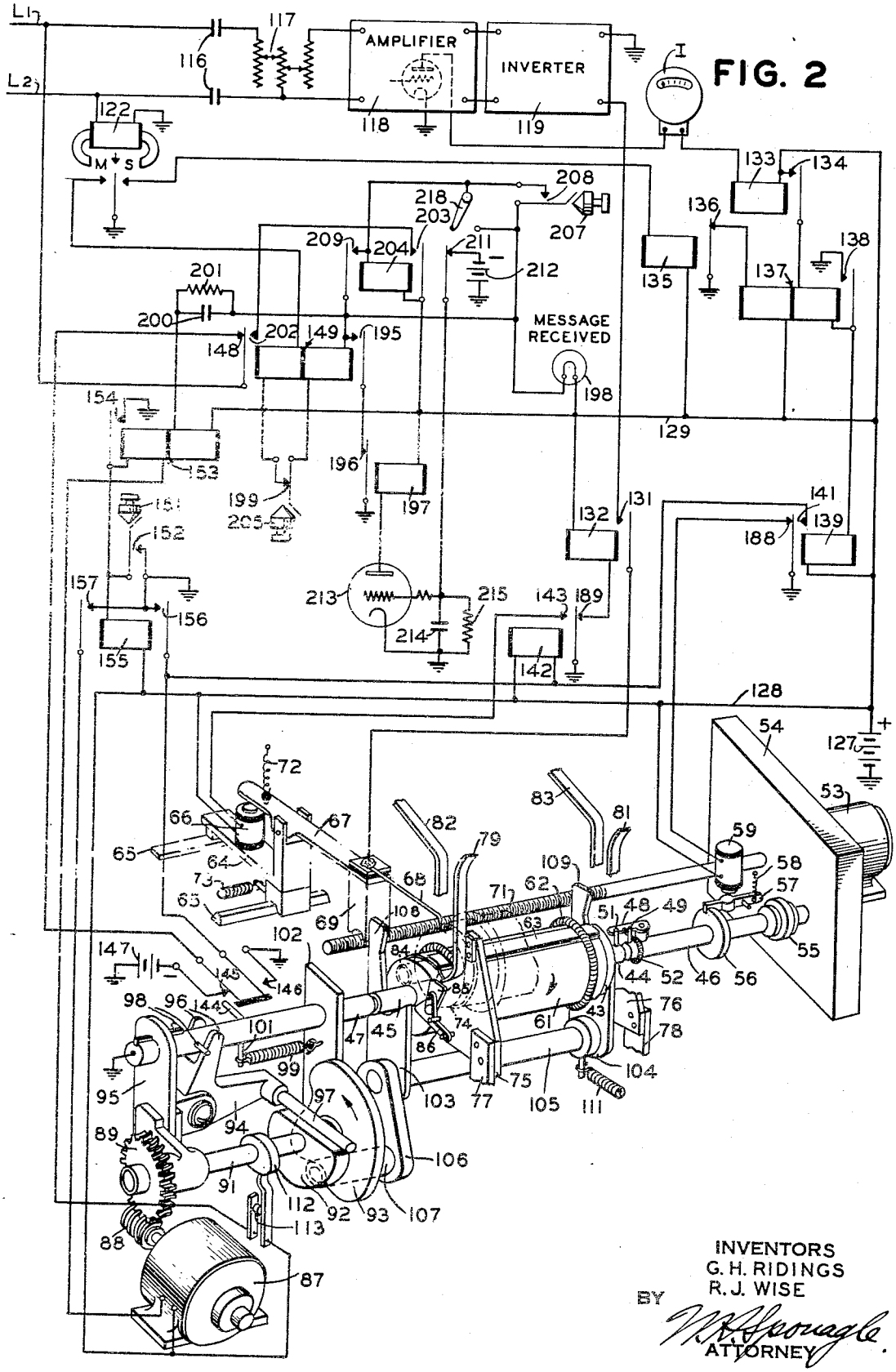
Filed Dec. 19, 1940 3 Sheets-Sheet 2

FIG. 2



INVENTORS
G. H. RIDINGS
R. J. WISE

BY W. F. Scanlon

ATTORNEY

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AUTOMATIC FACSIMILE SYSTEM

Filed Dec. 19, 1940 3 Sheets-Sheet 3

FIG. 3

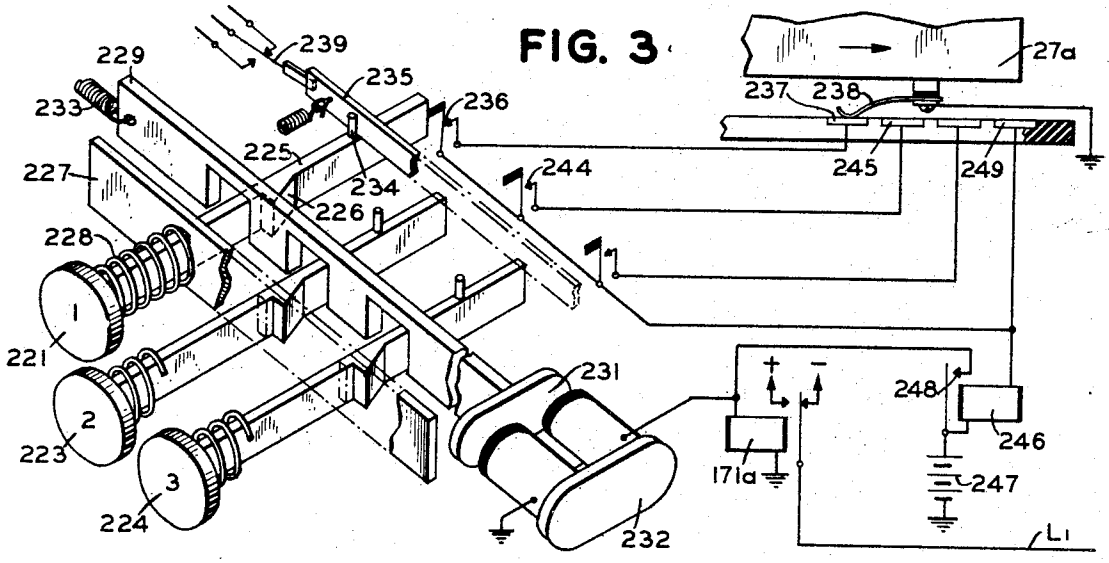


FIG. 4

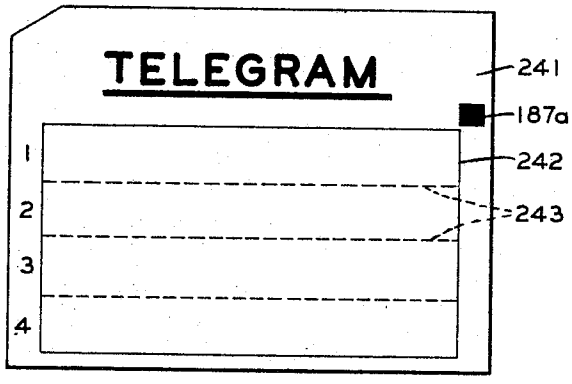
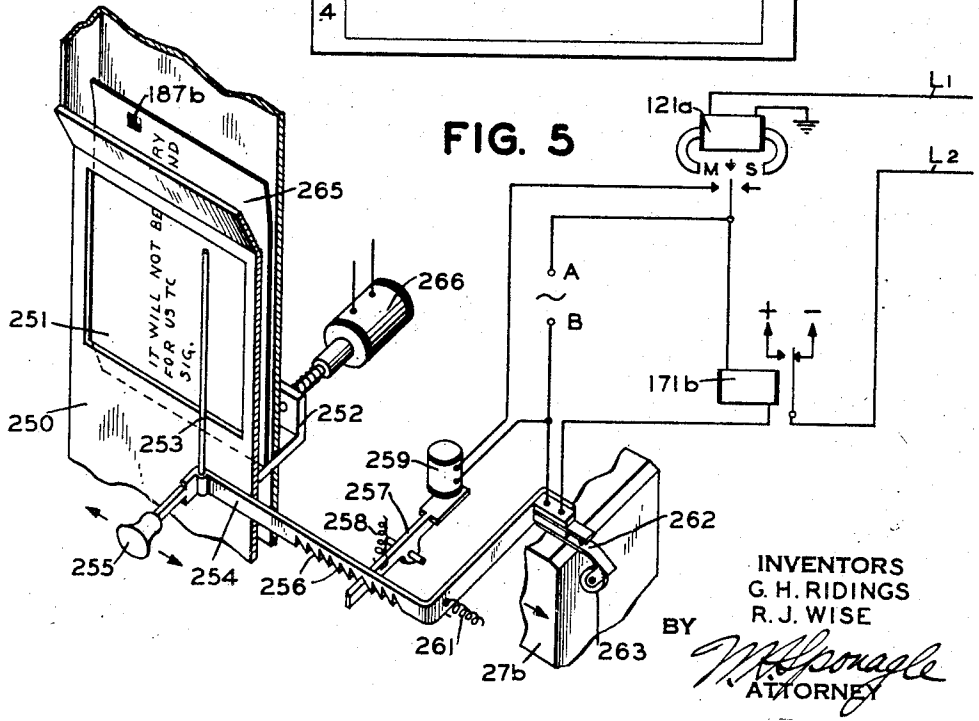


FIG. 5



INVENTORS
G. H. RIDINGS
R. J. WISE
BY
ATTORNEY

Patented Nov. 2, 1943

2,333,272

UNITED STATES PATENT OFFICE

2,333,272

AUTOMATIC FACSIMILE SYSTEM

Garvice H. Ridings, Summit, and Raleigh J. Wise, Dunellen, N. J., assignors to The Western Union Telegraph Company, New York, N. Y., a corporation of New York

Application December 19, 1940, Serial No. 370,748

18 Claims. (Cl. 178—6.6)

This invention relates to facsimile telegraph systems and has particular reference to a control system whereby automatic terminal apparatus may be operated.

In a copending application of R. J. Wise and G. H. Ridings, Serial No. 269,314, filed April 22, 1939, patented November 11, 1941, No. 2,262,715, and entitled "System and apparatus for automatic facsimile telegraphy," there is disclosed a facsimile machine suitable for use as a transmitter. A conveying chute is provided for guiding the message blank so that it may be positioned in the machine for scanning. The facsimile signals which are generated by the scanning operation are transmitted to a central station where they are employed to reproduce the subject matter in a recording machine. In this copending application the various functions of the transmitter are controlled remotely by an attendant at the central station. This transmitting apparatus is provided with means for gripping and wrapping the message blank around a rotating drum. After the scanning operation, the attendant at the central station manipulates a control switch which actuates mechanism at the transmitter for removing the message blank from the rotating drum and depositing it in a storage bin.

In another copending application of R. J. Wise et al., Serial No. 110,760, filed November 13, 1936, patented September 16, 1941, No. 2,555,868, and entitled "System and apparatus for facsimile telegraphy," there is disclosed a facsimile machine which is provided with facilities for automatic operation. The recording blanks are mounted upon cylindrical copyholders which are adapted to be inserted in the recording apparatus one at a time. The copyholder bearing the recording sheet is rotated and scanned in a direction parallel to the axis thereof by a stylus member which bears upon the recording sheet and has impressed thereon electrical potentials representative of the picture elements. The machine disclosed in this application is provided with a mechanism for removing a copyholder from an operative position in the machine and for replacing it with another copyholder bearing a blank recording sheet. Means are also provided for storing a plurality of copyholders bearing blank recording sheets in a magazine from which they may be fed in succession to the facsimile machine. The apparatus disclosed in the copending application, Serial No. 110,760, is suitable for use either as a transmitter or as a recorder, but for the purposes of the instant application only the recording elements will be considered.

The facsimile system which forms the novel subject matter of the present application is employed to interconnect a transmitter of the type disclosed in the copending application, Serial No. 269,314, and a recorder of the type disclosed in the copending application, Serial No. 110,760.

It is one of the objects of the instant invention to provide an interconnection between an automatic facsimile transmitter of the slot loading type and an automatic facsimile recorder of the drum changing type whereby certain of the functions of each facsimile machine may be automatically controlled by operations occurring at the other machine.

Another object of the invention is to provide means for conditioning an automatic facsimile transmitter to receive a sheet bearing subject matter to be transmitted only when the recording apparatus is in operative condition to receive and record facsimile signals.

A further object of the invention is to provide means for operating the sheet removing mechanism at the transmitter under the control of the recording apparatus.

Still another object of the invention is to provide a novel means for controlling the generation of an end-of-message signal whereby a more economical use of the line time may be made.

Another object of the invention is the provision of means for timing the generation of an end-of-message signal by preselecting one of a plurality of fixed electrical contacts for operation by a movable scanning member.

Another object of the invention is to time the generation of an end-of-message signal by positioning a contact to be actuated by a movable scanning member immediately following the completion of the scanning operation.

The means for attaining the aforementioned objects, together with other more specific objects, will become apparent from the following description of an illustrative embodiment of the invention, which is taken in conjunction with the accompanying drawings:

Fig. 1 is a schematic representation of an automatic facsimile transmitter of the slot loading type, together with control apparatus and the circuits therefor;

Fig. 2 is a schematic representation of an automatic facsimile recorder of the drum changing type, together with the control apparatus and circuits therefor;

Fig. 3 is a fragmentary view of alternative

apparatus for timing the generation of the end-of-message signal;

Fig. 4 is an illustration of a typical message blank to be used in conjunction with the end-of-message control apparatus shown in Fig. 3; and

Fig. 5 is another modification of apparatus for timing the generation of the end-of-message signal.

General

The present facsimile system is designed to be installed between a central telegraph office and a remote branch office or agency which has sufficient business with the central station to warrant the installation of an exclusive circuit. In this case an automatic facsimile transmitter of the slot loading type is installed in the branch office or agency and connected to one terminal of a circuit, the other terminal of which is in the central station and is connected permanently to an automatic facsimile recorder of the drum changing type. Such a system requires a minimum of attention by operators at the two stations and, when the apparatus is equipped with a timing device to control the end-of-message signal so that valuable line time is not utilized for the scanning of blank portions of the message sheets, a large number of messages may be transmitted in a minimum of time.

The automatic transmitter located at the branch office is provided with a plurality of signs which may be selectively illuminated to give an indication of the performance of the machine. The machine is housed in a casing in which a slot is provided which is in communication with a chute leading to the scanning mechanism. The chute may be opened or closed at various times during the operation of the machine so as to either permit the insertion of a message blank or prevent such an operation. Controlling devices are provided whereby an attendant may supervise the operation of the transmitter or if desired, may arrange for the full automatic operation thereof under the joint control of the transmitter scanning apparatus and the recording apparatus. Thus, at the branch office the desired message is written on a specially prepared blank which is inserted in the conveying chute at the proper time and is seized by the transmitting mechanism and placed in position for scanning, which operation follows immediately. The facsimile signals which are generated by the scanning operation are transmitted to the central station at which they are applied to a recorder which is at all times prepared to operate. The operation of the recorder is also automatic and the attendant at that station has only to keep the machine supplied with copyholders bearing blank recording sheets and to remove the sheets upon which recordings have been made from the copyholders which are automatically discharged from the recorder.

Transmitter

The invention will be better understood by referring to Figs. 1 and 2. The transmitting apparatus illustrated in Fig. 1 comprises a copyholder 11 which is mounted for rotation in suitable bearings and is in the form of a cylinder. The copyholder has adjacent one end thereof a plurality of teeth 12 arranged circumferentially and extending outward from the surface of the cylinder. A pressure roller 13 is suitably journaled and bears against the surface of the copyholder 11. The roller 13 is provided with a groove 14 which is of suitable dimensions to permit the free entry therein of the gripping teeth 12. A chute or guideway 15 is located so that the lower opening thereof is adjacent to the surface of the copyholder 11 at the point where the roller 13 is in contact therewith. The upper end of the chute 15 is flared to form a lip 16 so as to permit the easy insertion of a flexible message sheet. An angular slide 17 or shutter is disposed at the mouth of the chute 15 in such a manner that it normally blocks the chute, thereby preventing the insertion therein of a message sheet. The position of the blocking slide 17 is controlled by an electromagnet or solenoid 18, the armature of which is connected to the slide. When the solenoid 18 is deenergized, a compression spring 19 mounted upon the armature forces the slide 17 into its closed position; but, upon energization of the solenoid, the armature is drawn against the action of the spring 19 thereby moving the slide 17 from its blocking position.

A message sheet may then be inserted in the chute 15 by which it is conveyed by gravity action to a point where it is gripped between the roller 13 and the copyholder 11 which is continuously rotated. The message sheet 20 is pierced by the teeth 12 and is drawn downward from the chute and wrapped around the copyholder 11 in a position to be scanned.

An optical scanning system is provided which includes an exciter lamp 21, the light from which is condensed by a lens 22 so that a small spot of light impinges on the message sheet 20 and is reflected therefrom in an amount dependent upon the tonal density of the elemental area scanned. The reflected light is again condensed by another lens 23 to a point which lies in the plane of a light chopper 24 which may be in the form of a perforated disc or, as illustrated, a disc having notches such as 25 formed in the periphery thereof. The disc is mounted upon a shaft which is rotated at a suitable speed by means of a small motor (not shown), whereby the light reflected from the message sheet 20 is alternately transmitted and interrupted at a rate dependent upon the speed of rotation of the light chopper disc 24 and the number of openings provided therein. The light which is transmitted through the chopper disc 24 impinges upon a photocell 26 and thereby generates alternating current signals which are modulated in amplitude in accordance with the tone values of the picture elements.

All of the optical scanning mechanism is mounted in a carriage 27 which is suitably arranged for sliding movement in a direction parallel to the axis of rotation of the copyholder 11 upon a rail system such as 28 or in any other suitable manner. The carriage is normally urged toward the left hand end of the machine by means of a spring 29. When a scanning movement of the carriage 27 is desired, a half-nut 31 is moved into engagement with a continuously rotating feed screw 32 by means of an electromagnet 33. The feed screw 32 and the copyholder 11 may be rotated at their respective rates by means of a single driving motor coupled thereto by means of appropriate reduction gearing.

The copyholder 11 is also provided with a groove 34 which extends circumferentially thereof and which, when there is no message sheet in position upon the copyholder, is adapted to receive the end of a small rod 35 which is secured to a rocker shaft 36. A torsion spring 37 is connected to the rocker shaft 36 and to any convenient supporting member such as a bearing 38

and tends to rotate the shaft 36 in such a manner as to force the rod 35 into groove 34. The rocker arm also carries the movable member of a drum contact 39. When there is no message sheet upon the copyholder and the rod 35 is engaged with the groove 34, the drum contact 39 is closed. However, as soon as a message sheet 20 is secured upon the copyholder 11, the rod 35 is disengaged from the groove 34 and the drum contact 39 is opened for a purpose which will be more fully described later.

The transmitting apparatus is also provided with a mechanism for removing the message sheet 20 from the copyholder 11. The message sheet is shorter than the circumference of the copyholder 11 by an amount sufficient to leave a small gap between the edges thereof when it is wrapped around the copyholder. A pivoted member 41 is provided with a sharp end and is so located that when it is pivoted under the influence of an electromagnet 42, the sharp end is placed in position to slip under the leading edge of the message sheet as it is rotated, thereby progressively pulling the sheet away from the drum and disengaging the perforated section from the teeth 12. The message sheet thus detached from the copyholder 11 is permitted to drop into a bin or other convenient compartment.

Recorder

The recording apparatus installed at the central office is shown diagrammatically in Fig. 2, and in detail in the copending application, Serial No. 110,760. The machine comprises a copyholder 43 which is cylindrical in form and is provided with two axially extending arbors 44 and 45 and is supported for rotation between centering spindles 46 and 47, respectively, which are arranged to cooperate with the copyholder arbors. An arm 48 is pivoted on the spindle 46 and extends in the direction of the copyholder to engage a pin 49 projecting radially from the spindle and also a pin 51 which extends radially from the arbor 44. The arm 48 is urged into engagement with the pins by means of a spring 52, one end of which is attached to the arm and the other end of which is attached to the spindle 46. This linkage serves to revolve the copyholder 43 when the spindle 46 is rotated. The rotation of the spindle is effected by means of a driving motor 53 acting through suitable reduction gearing 54. Also included in the driving mechanism is a friction clutch 55 which permits the arresting of the shaft 46. A disc 56 having a notch formed in the periphery thereof is secured to the centering shaft 46. An arm or latch 57 is arranged to engage the peripheral notch of the disc 56 when acted upon solely by the retractile spring 58. An electromagnet 59 which is termed herein the framing magnet is provided so that, upon energization, the latch 57 is lifted and becomes disengaged from the disc 56 and thereby permits rotation of the shaft 46.

A sheet of recording material 61 is wrapped around the copyholder 43 and is secured thereto by means of a plurality of circular elastic members such as 62. The sheet 61 is mounted upon the copyholder so that the lap 63 formed therein invariably bears a definite relation to the notch formed in the disc 56. Such an arrangement is for the purpose of securing the proper phasing or framing between the recorder and the branch office transmitter and will be described in greater detail in a subsequent portion of the specification.

A carriage 64 is arranged to be slidably moved on a pair of rails 65 disposed parallel to the axis of rotation of the copyholder 43. An electromagnet 66 is mounted on the carriage and when energized serves to pivot a lever 67 into the retracted position shown in the drawings. A recording stylus 68 is attached to one extremity of the lever 67 and, as illustrated, is held out of engagement with the sheet of recording material 61 during idle periods. A half-nut 69 is also attached to the lever 67 and is adapted to engage a threaded feed screw 71 which is rotated at a suitable speed by the driving motor 53 acting through its associated reduction gearing 54. When the electromagnet 66 is deenergized, the lever 67 is moved by means of a spring 72 in such a manner that the half-nut 69 engages the feed screw 71 and the stylus 68 is brought into contact with the surface of the recording sheet 61. The engagement of the half-nut with the feed screw results in the movement of the carriage 64 toward the right, as viewed in this figure, against the restraining action of a retractile spring 73. Obviously, at the end of the scanning operation, when the lever 67 is pivoted to disengage the half-nut from the feed screw, the carriage is returned by means of the retractile spring to the extreme left hand position shown.

The recording machine illustrated is provided with facilities for automatically discharging a copyholder after a recording operation and for feeding a fresh copyholder into the machine. The machine is normally provided with a copious supply of fresh copyholders, one of which 74 is shown fragmentarily. A rack or magazine is used to store the copyholders and comprises two rail members 75 and 76 mounted on a pair of supporting brackets 77 and 78 respectively and spaced apart slightly more than the length of the copyholder 43. A pair of resilient upright members 79 and 81 are secured to the rail members 75 and 76 respectively and cooperate with an auxiliary pair of spaced rails 82 and 83 respectively to guide the stored copyholders toward the scanning device. The copyholder 74 awaiting positioning in the facsimile recorder is held in readiness by having its arbors such as 84 supported by the upper end of a pair of detents one of which 85 is shown. Each of the detents is pivoted adjacent its lower end on the respective rail members and is normally held in this cylinder restraining position by means of a pair of resilient members such as the spring 86 attached thereto and also to the rail member 75.

Upon completion of a scanning operation a copyholder changing motor 87 is started and drives a worm gear 88 which in turn drives a cooperating pinion gear 89. The pinion gear is keyed to a shaft 91 upon which is also secured a pair of cams 92 and 93. A bell cam 94 is pivoted on any convenient stationary member such as the bracket 95 and is provided with a forked portion 96 adjacent the extremity of one arm thereof and also with a rod or cam follower 97 adjacent the extremity of the other arm. Rotation of the shaft 91 brings the raised portion of the cam 92 into engagement with the rod 97 thereby pivoting the bell crank 94 and bringing the bifurcated portion 96 into engagement with a pair of pins 98 attached to the centering shaft 47. Further movement of the bell crank caused by the continued rotation of the cam 92 moves the shaft 47 toward the left as viewed in the drawings against the action of a spring 99, one end of which is attached to a pin 101 extending from

the shaft and the other end of which is secured to a stationary bracket 102.

The withdrawal of the centering shaft 47 as described permits the copyholder 43 to drop so that the arbors 44 and 45 thereof rest in a cradle formed by grooves in a pair of members 103 and 104. These members are secured adjacent their lower extremities to a rocker shaft 105 which is suitably journaled in bearings mounted in any convenient fixed brackets. Also secured to the rocker shaft 105 is an arm 106 carrying at its outer extremity a cam follower in the form of a roller 107. This roller is adapted to cooperate with the cam 93 so that when the shaft 91 is rotated by means of the mechanism driven by the motor 87, the engagement of the roller 107 with the raised portion of the cam 93 results in a clockwise movement of the arm 106 as viewed from the left hand end of the facsimile machine thereby imparting a rocking movement to the spaced members 103 and 104.

As the rocker shaft 105 is rotated as described, the cradle members 103 and 104 are moved forward until a position is reached whereby the drum or copyholder 43 is permitted to roll from the recesses formed in these members into any suitable receptacle or conveyor. A continuation of the rocking movement brings the upwardly extending arms 108 and 109 respectively of the cradle members 103 and 104 into engagement with the respective detents such as 85. These detents are thus moved out of the downward path of the arbors such as 84 of the copyholder 74 thereby permitting this copyholder to drop so that the arbors thereof rest upon the upper edges of the arms 108 and 109. When, by continued rotation of the cam 93, the rocker shaft 105 is permitted to return the cradle members 103 and 104 to their upright positions under the influence of the spring 111 attached to one of the members and to any convenient stationary member, the upper edges of the arms 108 and 109 are withdrawn from under the arbors of the copyholder 74, thereby allowing these arbors to roll into the recesses formed in the cradle members. The new copyholder 74 is thus carried into a position such that, when the cradle members have been fully restored to their upright positions, the indentations formed in the ends of the arbors may be engaged by the conical centering points formed on the shafts 46 and 47. Prior to this engagement the axis of the copyholder which rests in the recesses of the cradle members lies slightly below the center of rotation provided by the centering shafts. However, because of the conical configuration of the ends of these shafts the subsequent movement of the rod 47 toward the copyholder is instrumental in lifting the copyholder slighting so that it may rotate freely.

The initiation of the copyholder changing cycle just described is effected by applying power to the motor 87 subsequent to a scanning operation, or at any other desired time, by means which will be described more fully in the operation portion of the specification. A cam 112 is mounted on the cam shaft 91 for cooperation with the movable member of a contact 113. The cam 112 is oriented with respect to the cams 92 and 93 so that, at the completion of a copyholder changing cycle, the contact 113 is opened momentarily. It will be seen from the operation portion of the specification that the momentary opening of this contact causes the power to be disconnected from the motor 87. However, the mechanism is so designed that before the motor can be brought to a stop by means of a braking system, the cam 112 becomes disengaged from the contact member thereby permitting the reclosure of the contact 113.

Connecting circuit

The circuit interconnecting the transmitter of Fig. 1 and the recorder of Fig. 2 comprises a pair of conductors L1 and L2 which are used simultaneously for the transmission of the alternating current facsimile signals and the direct current control signals by means of which the operation of the transmitting and recording apparatus is controlled. The facsimile signals originate at the photoelectric cell 26 which is connected to an amplifier 114, the output circuit of which is connected through a pair of blocking condensers 115 to the conductors L1 and L2. The purpose of the condensers 115 is to isolate the alternating current facsimile signals from the direct current control signals. At the recording station of Fig. 2 the line conductors L1 and L2 are connected through another pair of blocking condensers 116 and through an adjustable pad 117 to an amplifier 118. The output of this amplifier is connected to a signal inverter 119, the output circuit of which is arranged to be connected between ground and the recording stylus 68. The polarity of the direct current potentials which are applied to the conductor L1 is controlled by the apparatus of the recording station for the purpose of operating a polar relay 121 connected to this conductor at the transmitting station. Similarly, the polarity of the direct current potentials which are applied to the conductor L2 is controlled by the apparatus of the transmitting station for the purpose of operating a polar relay 122 connected to this conductor at the recording station. Both of these polar relays are of the three-position type whereby the armatures thereof are moved to one extreme contact in response to one polarity of potential, to the other extreme contact in response to the opposite polarity of potential, and to a mid-position disengaged from both of the extreme contacts in response to a no-current condition.

Operation

The operation of the facsimile apparatus described will be described in conjunction with Figs. 1 and 2 taken together. Prior to the start of a series of operations it is assumed that power is supplied to the transmitting apparatus by the movement of a switch 123 to its left hand contacts thereby connecting a source of alternating current potential 124 to bus bars A and B. The driving motor 125 for the copyholder 11 and the feed screw 32 and the motor 126 for the light chopper disc 24 are thus energized to rotate the equipment coupled thereto. Also, the exciter lamp 21 is illuminated, thereby providing for the generation of alternating current in conjunction with the photocell 26 and the light chopper 24 by reflection from the surface of the copyholder 11. Similarly, power, suitably rectified where necessary, is applied to the amplifier 114 in any conventional manner (not shown).

At the recording station power is also supplied principally from a source of direct current potential 127 which in this case is of positive polarity. Negative direct current potential is also supplied as specified hereinafter. The positive

potential is connected to energize a pair of bus bars 128 and 129 to which most of the control apparatus is connected. The driving motor 53 is supplied with alternating current energy which is synchronous with the transmitter alternating current power supply. The facsimile alternating current which is generated at the transmitter is received at the recording station but is prevented from reaching the stylus 68 during idle periods because of the open contact 131 of a relay 132. At least a part of the plate current for the amplifier 118 is supplied from the source 127 through the winding of a relay 133 and an indicating instrument I or equivalent visual indicator. The signals which are generated under the described idle conditions are of maximum amplitude whereby the amplifier draws a current sufficient to energize the relay 133 to close its front contact 134, and the instrument I indicates to an attendant that the transmitter is running and ready for operaion. The relay 135 is at this time deenergized thereby applying a ground through its break contact 136 to energize the left hand winding of relay 137. This relay is locked through its own make contact 138, its right hand winding and the make contact 134 of relay 133. The closure of the make contact 138 of relay 137 energizes a relay 139 to connect ground through its make contact 141 to energize a relay 142. A ground connected through the make contact 143 of this relay energizes the electromagnet 66 to move the half-nut 69 and the stylus 68 into their disengaged positions.

It is assumed that the recording apparatus is not provided with a copyholder in operative position for recording. The spindle 47 is thus permitted to move farther to the right than it normally would to engage the arbor of a copyholder and in doing so effects the engagement of a pin 144 carried thereby with a set of overthrow contacts 145 and 146. The closure of contact 146 connects an additional ground to the operating winding of the relay 142 which merely supplements the ground applied by the make contact 141 of relay 139. The opening of the overthrow contact 145 disconnects a negative source of potential 147 from the break contact 148 of relay 149, thereby preventing the connection of the negative battery 147 to the line conductor L1. Since the relay 149 is deenergized at this time, the conductor L1 is not connected to any other source of potential. Consequently at the transmitting station the polar relay 121 is maintained in its neutral or mid-position.

At the transmitting station the line conductor L2 is not connected to either polarity of direct current potential, so that the polar relay 122 at the recording station is in its neutral position.

In order to place the facsimile apparatus in condition for operation, the attendant at the recording station places a number of copyholders equipped with blank record sheets in the magazine of the recorder. The first of such a series of copyholders is inserted in the recorder by momentarily operating a push button 151 which closes a contact 152 to place a ground on one terminal of the left hand winding of a relay 153. The other terminal of this winding is connected through the closed recorder cam contact 113 to the positive bus bar 128. The relay 153 is thus operated to energize through its make contact 154 a relay 155. The relay 153 is also locked through its make contact so that the push button 151 may be released. The operation of relay 155 connects an additional ground to the winding of relay 142 through its make contact 156. The other make contact 157 of this relay completes a circuit to energize the copyholder changing motor 87. This motor drives the previously described mechanism through a cycle of operations resulting in the placing of a copyholder in operative recording position in the machine. At the completion of this cycle, the cam contact 113 is momentarily opened, thereby interrupting the locking circuit of the relay 153, permitting this relay to be released and thereby releasing the relay 155. Thus, power is disconnected from the copyholder changing motor 87 and one of the grounds removed from the winding of relay 142.

With a copyholder in position in the recorder the spindle 47 is withdrawn sufficiently to permit the opening of the overthrow contact 146, thereby removing another ground from the winding of relay 142. At this stage the latter relay is maintained in an operative condition under the sole control of the make contact 141 of relay 139. The closure of the other overthrow contact 145 connects negative battery through the break contact 148 of relay 149 to the line conductor L1.

The negative potential of conductor L1 operates the polar relay 121 at the transmitting station to effect the engagement of its armature with its spacing contact S. A connection is then established from the bus bar A through the spacing contact S of the relay 121, through the winding of relay 158, over conductors 159 and 161, through the closed drum contact 39 to the bus bar B. Relay 158 is thus energized to open a break contact 162, whereby the alternating current connection of the rectifier 163 to the bus bar A is interrupted. Also, by the opening of break contact 164 of relay 158, the negative terminal of the rectifier is disconnected from the transmitting station apparatus. Connected in shunt with the winding of relay 158 is a lamp 165 which becomes illuminated, indicating to the attendant at the branch office that the system is idle and ready for use.

The message to be transmitted is inscribed on a blank sheet provided for the purpose and may be inspected by the attendant to determine the length thereof. Facilities are provided for controlling the transmitting apparatus in such a manner that the scanning operation is continued only as long as is necessary to completely scan the subject matter. Assume that the message to be inserted in the transmitting machine is a relatively short one. The patron or attendant at the branch office will then depress a lever 166 which is accessible from the outside of the machine. A holding magnet 167 becomes energized by reason of a circuit which is established from the bus bar A through a locking contact 168 controlled by the lever 166 and through a break contact 169 of a relay 171 to the bus bar B. At the same time, a selector contact 172 is also closed.

The attendant at the branch office then operates a push button 173 to close a contact 174 to energize a relay 175 through a circuit which may be traced from the bus bar A through the spacing contact S of the polar relay 121, the winding af the relay 175, the contact 174 and thence by way of conductors 159 and 161 through the closed drum contact 39 to the bus bar B. This relay immediately locks through a make

contact 178 so that the push button 173 may be released. The closure of a make contact 177 of this relay completes a circuit from the bus bar A over conductor 178, through the winding of the solenoid 18 and the contact 177 to the bus bar B through the closed drum contact 39. Connected in shunt with the solenoid 18 is a lamp 179 which is lighted to illuminate a sign reading "Deposit message." Simultaneously therewith the energization of the solenoid 18 withdraws the slide 17, thereby opening the chute 15.

The sheet containing the message is then inserted in the chute, by means of which it is carried to the scanning apparatus, where it is engaged and placed in position for scanning as previously described. The wrapping of the message bearing sheet 20 upon the copyholder 11 disengages the arm 35 from the groove 34, thereby opening of the drum contact 39. This operation results in the release of relays 158 and 175 and the extinguishing of lamp 165. The opening of contact 177 of relay 175 extinguishes the "Deposit message" lamp 179 and deenergizes the solenoid 18, thereby closing the chute 15. The closure of break contact 162 of relay 158 completes the connection of the alternating current potential to the rectifier 163. The release of relay 158 also closes a break contact 181 which completes a circuit extending from the bus bar A through the spacing contact S of the polar relay 121 over conductor 182, through the winding of the half nut magnet 33 and the contact 181 to the bus bar B. Connected in shunt with the half nut magnet is a lamp 183 which illuminates a sign bearing the legend "Message being transmitted." The energization of the half nut magnet moves the half nut 31 into engagement with the feed screw 32, thereby initiating a scanning movement of the carriage. The half nut magnet 33 also controls a pair of make contacts 184 and 185, the latter of which provides an additional connection of the locking magnet 167 to the bus bar B. The closure of the contact 164 of relay 158 and the auxiliary contact 184 controlled by the half nut magnet establishes a connection from the negative terminal of the rectifier 163 through these two contacts and the break contact 186 of relay 171 to the line conductor L2.

The connection of negative potential to the conductor L2 operates the armature of the polar relay 122 at the recording station to its spacing contact S, thereby applying a ground to energize the relay 135. The operation of this relay interrupts the circuit through the left hand winding of relay 137 at the contact 136. However, this relay is maintained operative by means of its right hand winding which is energized at this time. As soon as the scanning operation at the transmitter has progressed to a point where a black spot 187 which appears on the sheet 20 is scanned, a facsimile signal having the minimum amplitude is generated and transmitted to the recording station. This event usually occurs upon the completion of the first revolution of the copyholder 11 following the positioning thereon of the message bearing sheet. The response by the amplifier 118 to such a signal reduces the plate current sufficiently to permit the release of relay 133, thereby opening the make contact 134 and completely deenergizing relay 137 and effecting its release. The opening of contact 138 of this relay deenergizes relay 139 which, through the opening of its make contact 141, deenergizes relay 142. The release of this relay deenergizes the electromagnet 66, thereby permitting the engagement of the half nut 69 with the feed screw 71 and the engagement of the stylus 68 with the recording sheet 61. The closure of the break contact 188 of relay 139 energizes the framing magnet 59 to withdraw the latch 57 and permit rotation of the copyholder 43. Also, the closure of the break contact 189 of relay 142 energizes the relay 132 to close its make contact 131, thereby connecting the stylus 68 with the signal invertor 119 whereby the facsimile signals, properly amplified and inverted, are applied by means of the stylus to the recording sheet 61.

At the transmitting station following the scanning of the last portion of the subject matter to be transmitted, the carriage 27 will have moved toward the right, as viewed in the figure, sufficiently to engage the roller 191 of a pivoted member 192, thereby actuating this member to close a contact 193. A connection is then established from the bus bar A through the contact 193, the selector contact 172, through the winding of relay 171 and the contact 181 of relay 158 to the bus bar B, thereby operating relay 171. The opening of the break contact 169 of this relay interrupts one of the locking connections of the holding magnet 167, but since the contact 185 controlled by the half nut magnet is still closed, the holding magnet remains energized. The opening of break contact 186 and the closing of the make contact 194 of relay 171 disconnects the negative direct current potential from the line conductor L2 and substitutes therefor a positive potential derived from the rectifier 163.

At the recording station the disconnection of negative potential from the line conductor L2 disengages the armature of the polar relay 122 from its spacing contact S, thereby releasing relay 135. The release of this relay operates, through its break contact 136, the relay 137, which, through its make contact 138, energizes the relay 139. The opening of the break contact 188 and the closing of the make contact 141 of this relay deenergizes the framing magnet 59, thereby arresting rotation of the copyholder 43 and energizes the relay 142. The opening of the break contact 189 and the closure of the make contact 143 of this relay deenergizes relay 132, thereby opening the facsimile signal circuit to the stylus 68 at the contact 131 and energizes the electromagnet 66 which pivots the lever 67 to disengage the half nut 69 from the feed screw 71 and the stylus 68 from the recording sheet 61. The retractile spring 73 then becomes effective to return the carriage 64 to its extreme left hand position.

Also, at the recording station the connection of positive potential to the conductor L2 operates the armature of the polar relay 122 into engagement with its marking contact M, thereby applying a ground to one terminal of the left hand winding of relay 149. The other terminal of this winding is connected to the positive bus bar 129 so that the relay is operated. The closing of the make contact 195 of this relay completes a circuit from ground through a break contact 196 of relay 197 to energize a lamp 198 which gives an indication to the attendant that a message has been received. The relay 149 is locked through its right hand winding, the make contact 195 and a push button contact 199. The contact 195 also applies a ground to complete a circuit through the right hand winding of relay 153. Connected in series in this circuit is a condenser 200 which is shunted by a high resistance

201. The capacity of the condenser is sufficient so that the charging current therefor momentarily energizes the right hand winding of relay 153. The value of the shunting resistance 201 is sufficiently high so that, after the condenser becomes charged, the steady state current flowing through the resistor is insufficient to maintain the relay 153 operated. However, this relay is provided with a locking circuit through its left hand winding which extends from ground through its make contact 154 and includes the cam contact 113. The closure of contact 154 energizes the relay 155 which, by the closure of its contact 157, energizes the copyholder changing motor 87 to initiate a copyholder changing cycle. The closure of contact 156 of this relay also provides a ground to insure the continued operation of relay 142 until after the copyholder changing cycle has been completed.

When the relay 149 is operated in response to the engagement of the armature of the polar relay 122 with its marking contact M, the line conductor L1 is disconnected from the negative battery 147 by the opening of the break contact 148 of relay 149. It is then connected by the make contact 202 of this relay to a contact 203 of relay 204 which is open at this time because the relay is not energized.

Therefore, the direct current potential is removed from the line conductor L1 which produces at the transmitting station a response by the polar relay 121 whereby the armature of this relay is disconnected from its spacing contact S. This operation results in the deenergization of the half nut magnet 33 and the extinguishing of the lamp 183. The half nut 31 is thus disengaged from the feed screw 32, permitting the carriage 27 to be restored by the spring 29 to its extreme left hand position. The auxiliary contacts 184 and 185 controlled by the half nut magnet are also opened. The opening of contact 184 disconnects the negative terminal of the rectifier 163 from the break contact 186 of the relay 171. The opening of the contact 185 opens the locking circuit of the holding magnet 167, permitting the release of the lever 166 so that it is restored to its upper position, thereby opening the locking contact 168 and the selector contact 172.

The attendant at the recording station upon being notified by the lamp 198 that a message has been received, inspects the recording which has been produced upon the sheet mounted on the copyholder which is discharged from the recorder as described. Assume that the record which has been made is found to be unsatisfactory. The attendant may make suitable adjustments, such as by manipulation of the pad 117 whereby a better record may be obtained. Following this operation, the push button 205 is operated, thereby opening the contact 199. The locking circuit of the relay 149 is thus interrupted, permitting this relay to be released. The closure of the break contact 148 of this relay reconnects the negative battery 147 to the line conductor L1.

The response at the transmitting station to the negative potential connected to conductor L1 is the engagement of the armature of the polar relay 121 with its spacing contact S. The previously described circuit for the energization of the half nut magnet 33 and the lamp 183 is thus reestablished, thereby initiating a second scanning of the sheet 20. The attendant at the branch office noting the relighting of the "Message being transmitted" light may depress the lever 166 in order to select the short message contact 193 for the timing of the end-of-message signal; as before the holding magnet 167 would be energized and locked. However, it may be that the starting of the retransmission of the message is not noticed at the transmitting station so that the lever 166 is left in its upper position. In this case, the end-of-message signal will not be generated at the time that the contact 193 is closed, but scanning will continue until the carriage 27 operates a second contact 206. This is the so-called long message contact and connects the bus bar A to one terminal of the winding of relay 171 to complete the previously described circuit for the operation of this relay. Thus, again the polarity of the potential which is applied to the conductor L2 is reversed from negative to positive.

The reversal of potential on the conductor L2 produces the same response by the recording station apparatus as in the first case. Also, the signal is transmitted from the recording station to the transmitting station to restore the apparatus there to its normal position as described. The attendant at the recording station, finding upon inspection of the record produced upon the second copyholder discharged from the apparatus that it is satisfactory, operates a push button 207 which momentarily closes a circuit from the bus bar 129 through the winding of relay 204, the push button contact 208, the closed contact 195 of relay 149 and the break contact 196 of relay 197 to ground. Relay 204 thus becomes operated and is locked through a make contact 209 to the ground controlled by relay 197. The opening of break contact 211 of relay 204 removes the negative potential of a battery 212 from the control grid of a vacuum tube 213. Connected between the grid and the cathode of this tube is a condenser 214 which is shunted by a high resistance 215. As long as the negative potential of the battery 212 is connected to the grid of the tube 213, the condenser 214 remains fully charged to the potential of the battery 212, and the space discharge path of the tube is substantially open. As soon as the negative potential is removed, however, the charge upon the condenser 214 starts to dissipate through the leak resistance 215. The circuit constants are chosen so that, after the lapse of approximately three seconds from the opening of contact 211 of relay 204, the negative potential between the grid and the cathode of the tube 213 is decreased to a value whereby the conductivity of the tube is increased sufficiently to energize the relay 197, through the winding of which plate current for the tube is drawn from the positive bus bar 129.

Before considering the results produced by the operation of relay 197, the control of the transmitting apparatus which is effected by the operation of relay 204 will be described. The closure of the make contact 203 of this relay connects the positive potential of the bus bar 129 through the make contact 202 of relay 149 to the line conductor L1. This produces a response by the polar relay 121 at the transmitting station whereby the armature is moved into engagement with its marking contact M. A circuit is thus established from the bus bar A through the marking contact of relay 121 and through the winding of the electromagnet 42 to the bus bar B. The energization of this electromagnet operates the arm 41 to strip the message bearing sheet 20 from the drum 11 as described. Also, the closure of the make contact M of the polar

relay 121 energizes a lamp 216 which illuminates a sign bearing the legend "Message accepted."

Thus, it is apparent that there is a delay of approximately three seconds produced by the electronic timer from the time that the control signal is sent from the recording station to the transmitting station to strip the message blank from the copyholder and the time that the relay 197 at the recording station is operated. This time delay is for the purpose of insuring that the transmitting scanning apparatus is properly restored to its idle position. The operation of relay 197 opens its break contact 196, thereby opening the locking circuit through the right hand winding of relay 149 to permit the release of this relay, opening the locking circuit of relay 204 to permit the release of that relay and extinguishing the "Message received" lamp 198. The release of relay 204 recloses the break contact 211, thereby reconnecting the negative potential of the battery 212 to the grid of the vacuum tube 213 whereby the conductivity of the space discharge path is reduced to deenergize the winding of relay 197. Thus, the recording apparatus is restored to normal and, so long as there is a copyholder in operative position in the recording apparatus, the negative potential 147 is connected to the line conductor L1 which maintains the transmitting apparatus in condition to be operated to transmit another message.

In the operation of the system described up to this point, certain manual operations are performed by the attendants at the respective stations. However, it is contemplated that the transmitting station apparatus and/or the recording station apparatus may be substantially completely automatic in operation. For this purpose the transmitting apparatus is provided with a switch 217 which is operated to its right hand contact for automatic operation. This merely shunts the push button contact 174 permanently so that whenever the polar relay 121 is operated to its spacing contact S and there is no message bearing sheet secured upon the copyholder 11 so that the drum contact 39 is closed, the relays 158 and 175 will be operated. This leaves the chute 15 open for the insertion of a message bearing sheet and the "Idle" lamp 165 and the "Deposit message" lamp 179 are both illuminated. The insertion of a message bearing sheet into the chute 15 initiates the same cycle of operation as that described.

Similarly, at the recording station the push button 207 may be of the locking type or the contacts 208 controlled thereby may be shunted by an additional switch 218. The positioning of this switch on its right hand contact provides for the immediate operation of relay 204 whenever the relay 149 is operated. Thus, at the recording station, it is only necessary to maintain a copious supply of copyholders and to remove those discharged from the recorder.

At the transmitting station the apparatus enclosed within the rectangle 219 may be mounted at the front or rear of the transmitting machine or, if desired, may be located at a remote point and connected by means of a suitable cable to the transmitting apparatus. Such an arrangement provides a somewhat flexible means for controlling the operation of the transmitting device to suit any desired need.

One alternative structure for timing the length of the scanning period is illustrated fragmentarily in Fig. 3, to which reference will now be made. The contact selecting mechanism is controlled by means of a plurality of push buttons such as 221, 223 and 224. Each of the push buttons such as 221 is attached to one end of a slideable bar 225 upon which is formed a cam surface 226. The push buttons such as 221 are arranged to slide through suitable slots formed in a plate 227. A compression spring 228 which is restrained between the head of the push button and the front surface of the plate 227 serves to urge the bar 225 toward the left. Disposed at the rear of the plate 227 is a retaining bar 229 which is provided with a series of slots cooperating with the push button bars 225. One end of the retaining bar is attached to the armature 231 of an electromagnet 232, and the other end has secured thereto a spring 233. Each of the push button bars such as 225 is provided with a pin 234 which, upon operation of the push button is adapted to engage an operating bar 235. Also, each of the push button bars is adapted to engage a contact individual to each of the bars upon being actuated. The contact 236, for example, is closed when the push button 221 is actuated. The movement of the push button bars, under pressure applied to the corresponding push button, by means of the camming surface formed thereon moves the retaining bar 229 toward the electromagnet 232 against the spring 233. After the push button bar has been depressed sufficiently, the cam surface becomes disengaged from the retaining bar, permitting the restoration thereof. The push button is thus held in its operated position by the engagement of the shoulder portion of the cam with the retaining bar 229. A push button thus operated is maintained in this position until either a second push button is operated to cam the retaining bar 229 so as to release the first operated push button bar or until the electromagnet 232 is energized to move the retaining bar 229 to its unlocking position.

Each one of the individually selected contacts such as 236 is connected to a conducting segment such as 237. The series of segments is mounted in a position whereby they may be engaged by a contacting brush 238 attached to the movable carriage 27a in which the scanning apparatus is located. The contact selected by the operation of the push button 221 is connected to a segment which will be the first one engaged by the contactor 238, as the carriage is moved during a scanning operation and also the other selector contacts are connected to segments which will be engaged at latter stages of the scanning operation. The movement of the bar 235 upon the operation of any of the push buttons may be employed to operate a set of contacts such as 239 whereby any desired functions of the transmitting apparatus may be controlled.

The set of push buttons employed to control the apparatus described may be located at any convenient place on the transmitting machine where they may be manipulated by an attendant to selectively control the length of the scanning period in accordance with the length of the message to be transmitted. In Fig. 4 there is illustrated a message blank 241 which may be used in conjunction with such a mechanism. The space within the rectangle 242 which is available for the inscription of a message is marked off by means of a plurality of lines 243 into a number of zones. The lines 243 may be lightly imprinted upon the blank in red or other suitable color whereby no appreciable response is produced by the scanning mechanism when the

light spot impinges upon the lines. In this manner the copy which is reproduced at the recording station will not contain the guide lines. Each of the zones marked off by the guide lines 243 is numbered, and there may be provided for each one of the zones a push button similarly numbered. The attendant, upon inspecting the message which is inscribed upon the blank 241 for transmission, will note, for example, that the complete message is contained wholly within the zones numbered 1 and 2. Consequently, in order to completely record the message, it is only necessary to scan these two zones. The number 2 push button 223 is, therefore, operated to close its selector contact 244. When the carriage 27a is moved to the point where the contactor 238 engages the segment 245, a circuit is closed from ground through the contactor and the engaged segment through the closed contact 244 and the winding of a relay 246 to battery 247. A circuit is closed at the make contact 248 of this relay to operate a relay 171a which corresponds to the like-numbered relay of Fig. 1. Through its contacts it reverses the polarity of battery applied to the line conductor L1 to control the recording apparatus in the manner described. The closure of contact 248 of the relay 246 also completes a circuit to energize the electromagnet 232 whereby the retaining bar 229 is operated to release the depressed push button. If no push buttons are operated, the carriage 27a is moved to completely scan the message bearing sheet, after which a segment 249 is engaged by the contactor 238 to operate the relay 246 directly.

Fig. 5 is a fragmentary illustration of another mechanism for timing the generation of an end-of-message signal. In this case, the conveying chute 250 is provided with a window 251 so that when a message bearing sheet is inserted into the chute while it is shut off from the scanning mechanism by the blocking member 252, the subject matter inscribed upon the message blank is visible for inspection from the outside of the machine. An indicator 253 which extends upward on the outside of the chute adjacent the window is secured to an operating arm 254. The arm is angularly formed at one end thereof and supports a knob 255 which is accessible from the outside of the machine. A portion of the arm 254 is also provided with a series of notches or teeth 256. Cooperating with the teeth 256 is a pivoted latch 257 which is normally urged by a spring 258 into engagement with the teeth. The latch is also controlled by an electromagnet 259 which when energized pivots the latch to disengage it from the teeth. The arm 254 is urged by means of a spring 261 toward the right, as viewed in this figure, so that when the latch 257 is disengaged from the teeth 256 the arm and the pointer 253 carried thereby are moved to their extreme right hand positions. The arm 254 also carries a contact 262, the pivoted member of which is equipped with a roller 263, and is in a position to be engaged by a portion of the movable carriage 27b.

In the operation of this mechanism, the message bearing sheet 265 is deposited in the chute 250. The knob 255 is then moved to the left until the indicator 253 lies just to the right of the subject matter inscribed upon the sheet. The mechanism is left in this position where it is held by means of the latch 257 in cooperation with one of the teeth 256, and the attendant operates the control push button previously described to energize the electromagnet 266 to move the blocking member 252 aside and allow the message bearing sheet to be carried to the scanning apparatus. When the scanning operation has been completed the carriage 27b will have been moved to a point where the contact 262 is closed. A circuit is then closed from the A terminal of a source of alternating current through the winding of a relay 171b and through the closed contact 262 to the B terminal. The relay 171b is similar to the correspondingly numbered relay of Fig. 1 and operates to reverse the polarity of the potential applied to the line conductor L2. When the end-of-message signal thus transmitted to the recording station has been received, and the apparatus at that station has responded thereto in the manner described, positive potential is applied to the line conductor L1 to operate the armature of polar relay 121a to its marking contact, thereby closing a circuit from the source of alternating current to energize the electromagnet 259, thereby pivoting the latch 257 and disengaging it from the teeth 256. The arm 254 and the mechanism connected thereto is restored to its extreme right hand position.

The nature of the invention may be ascertained from the foregoing description of an illustrative embodiment thereof, the scope thereof being defined in the appended claims.

What is claimed is:

1. In a facsimile system, a transmitting device, conveying means for delivering a message bearing sheet to said transmitting device, a scanning mechanism in said transmitting device for generating signals representative of the message on said sheet, a recording device for translating said signals, and means responsive to an operative condition of said recording device for controlling said conveying means in a maner to deliver a message bearing sheet to said transmitting device.

2. In a facsimile system, a transmitting device having a scanner, means for automatically presenting a message bearing sheet to said scanner, a chute to convey said sheet to said presenting means, a closure for said chute, a recorder, a signaling circuit interconnecting said transmitter and said recorder, a relay connected to said circuit responsive to an operative condition of said recorder, and means including said relay and circuits controlled thereby to withdraw said closure from said chute.

3. In a facsimile system, a transmitting device having a scanning mechanism, conveying means including a chute for delivering a message bearing sheet to said transmitting device, a recording device having a rotating drum carrying a record sheet, means for automatically removing said drum from the recording device, and means responsive to a condition whereby the recording device is not equipped with a drum in operative position for recording to disable said conveying means whereby the transmitting device is prevented from receiving a message bearing sheet.

4. In a facsimile system, a transmitting device, conveying means operable for delivering a message bearing sheet to said transmitting device, means in said transmitting device for receiving said sheet and automatically transmitting signals representative of the message on the sheet, a recording device for translating said signals to reproduce the message on a record sheet, means responsive to a condition of said recording device to control the operation of said conveying means and means actuated by the reception of the message bearing sheet by the transmitting

device to prepare the recording device for scanning operation.

5. The combination defined in claim 4 further characterized by means at the transmitting device for subsequently generating a signal to initiate operation of the recording device.

6. In a facsimile system, a transmitter having a scanner, conveying means operable for delivering a message bearing sheet to said scanner, a recorder having a cylindrical drum carrying a record sheet, means for detecting the end of a scanning operation at the transmitter, means responsive to said detecting means for removing a drum carrying a recording from said recorder and placing another drum bearing a blank record sheet in said recorder, and means responsive to the completion of said drum changing operation at the recorder for operatively conditioning said conveying means for communication with said scanner.

7. In a facsimile system, a transmitting device having scanning mechanism and control apparatus, means for detecting the completion of a scanning operation by said scanning mechanism, a recorder having associated therewith control apparatus, means including said recorder control apparatus responding to said detecting means for transmitting a signal to said transmitting apparatus, and means including said control apparatus for the transmitting device operated by said signal to restore said transmitting device to its normal idle condition.

8. In a facsimile transmitting device, scannnig apparatus including a movable member, means for presenting a message bearing sheet to said scanning apparatus, a plurality of contacts disposed to be individually operated by said movable member at different stages of its movement, means controlled by either one of said contacts for generating an end-of-message signal, and means for selecting one of said contacts to control said generating means in accordance with the length of the message to be transmitted.

9. In a facsimile transmitter, a message bearing sheet to be scanned, a scanning mechanism having a linearly movable member, a signaling device for generating an end-of-message signal, a contact disposed to be actuated by said movable scanning member, means for conditioning said contact for operation after the completion of a scanning of said message, means including said operatively conditioned contact for operating said signaling device, and means controlled by said contact to render the contact inoperative after the operation of said signaling device.

10. In a facsimile transmitter, a message bearing sheet to be scanned, a scanning mechanism having a linearly movable member, a signaling device for generating a signal, a plurality of contacts disposed to be individually actuated by said movable member at different stages of its movement, means for selecting one of said contacts to operate said signaling device at the completion of a scanning of said message, and means for restoring said selected contact to normal after the operation of said signaling device.

11. In a facsimile system, the combination for preselecting the facsimile signal transmitting time in accordance with the length of the message to be transmitted comprising scanning mechanism having a linearly movable member, a pair of contacts disposed in the path of said movable member to be actuated at different stages of the movement of said member, a signaling device normally connected to be operated by the actuation of the last to be engaged one of said contacts, a switch to connect said contacts in multiple whereby the signaling device is operated by the actuation of the first to be engaged one of said contacts, and means controlled by said signaling device to disconnect said contacts from one another.

12. In a facsimile system, a scanning mechanism having a linearly movable member, a contactor supported by said movable member, a series of conducting segments engageable by said contactor, means including a relay for arresting said movable member during a scanning operation, a plurality of contacts individually operable and each associated with one of said segments, means for selectively operating one of said contacts in accordance with the length of the message to be scanned, means including a selected contact and its associated segment to operate said relay, and means controlled by said relay for restoring the selected contact to normal.

13. In a facsimile transmitting device, a movable scanning member, an electrical contacting member mounted on said member for energizing in sequence a plurality of circuits, a contact included in each of said circuits, a push button operable for closing one of said contacts, means for locking said pushbutton in its operated position, an electro-responsive means commonly associated with said circuits, means including said operated contact and said contacting member for actuating said electro-responsive means at a predetermined point in the movement of said scanning member as determined by the operated push button, and means controlled by said electro-responsive means for unlocking the operated push button.

14. In a facsimile transmitter, scanning apparatus including a movable member, means for presenting a message bearing sheet to said scanning apparatus, a chute to convey said sheet to said presenting means, a closure for said chute, a transparent opening in said chute whereby a message bearing sheet disposed within said chute and held therein by said closure may be inspected, a mechanism including an indexing member extending parallel to the message carried by said sheet, an electrical contact also carried by said mechanism and disposed in the path of said movable scanning member, means for moving said mechanism to align said indexing member with the end of said message, means for latching said mechanism in the selected position, and means controlled by said contact when actuated by said movable scanning member to interrupt the scanning operation and to unlatch said index bearing mechanism whereby it may be restored to its normal position.

15. In a facsimile system, a transmitting device having a scanner, conveying means for delivering a message bearing sheet to said transmitting device, means in said transmitting device for presenting said sheet to said scanner, a closure for said conveying means, means for maintaining said closure in a blocking position in said conveying means to prevent the conveying means from delivering another message bearing sheet to the transmitting device while the first sheet is in scanning position, means responsive to a completed scanning operation for removing said first sheet from scanning position, and means for removing said closure a predetermined time after the initiation of said removal operation.

16. In a facsimile system, a transmitter, a recorder, means in said transmitter for receiving a

message bearing sheet and automatically transmitting signals representative of the message on the sheet to said recorder, means in said transmitter for discharging said sheet from said transmitter, means for generating a control signal following the transmission of said message representative signals, and means at said recorder responsive to said control signal to control the operation of said sheet discharging means.

17. In a facsimile system, a transmitter, means for supplying said transmitter with a succession of message bearing sheets, a recorder, means for supplying said recorder with a succession of record sheets, control signaling apparatus providing communication between said transmitter and said recorder, and means including said control signaling apparatus to govern the operation of said transmitter supplying means in accordance with events occurring at said recorder and to govern the operation of said recorder supplying means in accordance with events occurring at said transmitter.

18. In a facsimile system, a transmitter having a scanner, means in said transmitter operable to present a message bearing sheet to said scanner whereby facsimile signals representative of the message on said sheet may be transmitted, means in said transmitter for generating a control signal indicative of the completion of a scanning operation, means in said transmitter for removing said sheet from said scanner, a receiver having recording apparatus responsive to said facsimile signals, means in said receiver responsive to said control signal for removing a record sheet bearing a reproduction of a message from said recording apparatus and presenting a blank record sheet to said recording apparatus, means responsive to said receiver means to operate said transmitter sheet removing means, and means actuated at the completion of said transmitter sheet removing operation to operate said transmitter sheet presenting means.

GARVICE H. RIDINGS.
RALEIGH J. WISE.