

March 12, 1935.

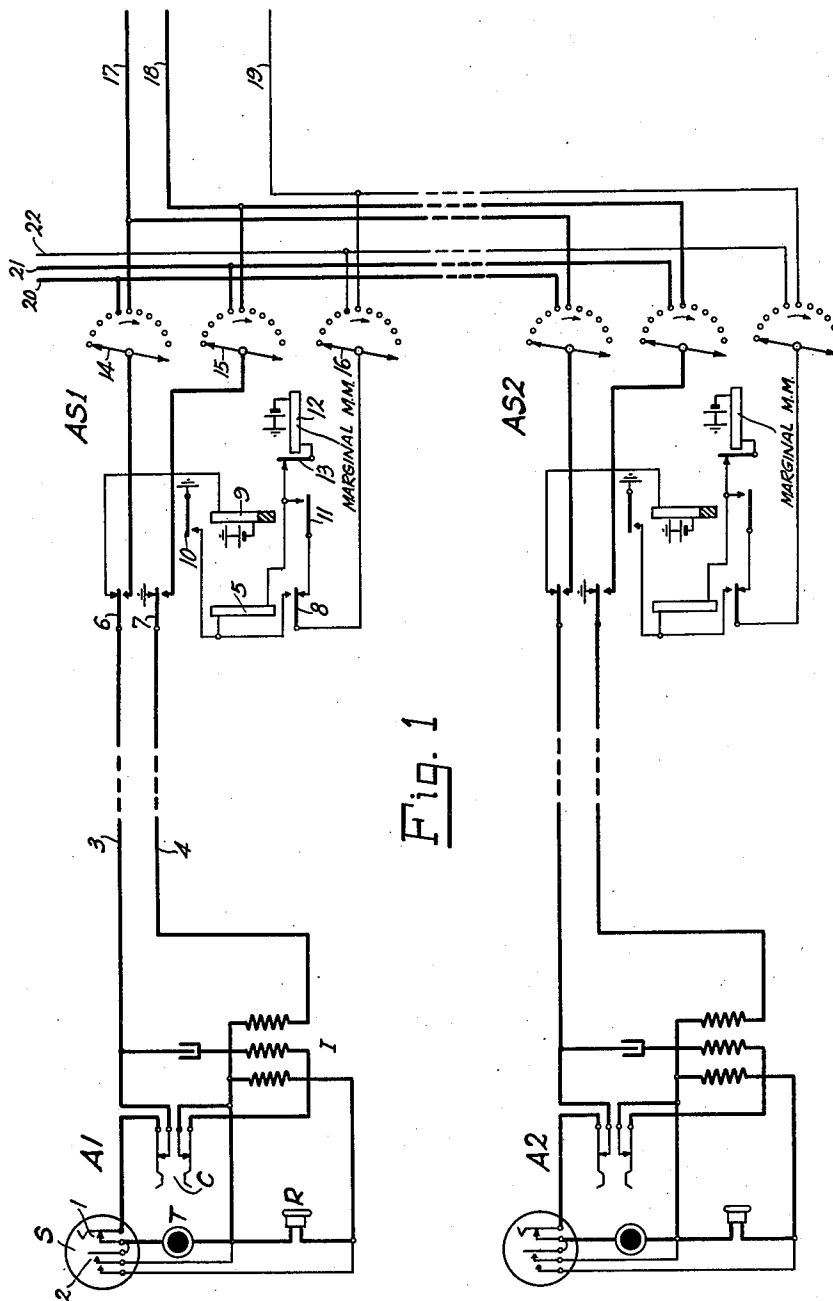
A. H. BELLIVEAU

1,993,870

RECORDING SYSTEM

Filed June 27, 1932

4 Sheets-Sheet 1



Inventor
Alfred H. Belliveau

Wm. Walter Curran

Att'y.

March 12, 1935.

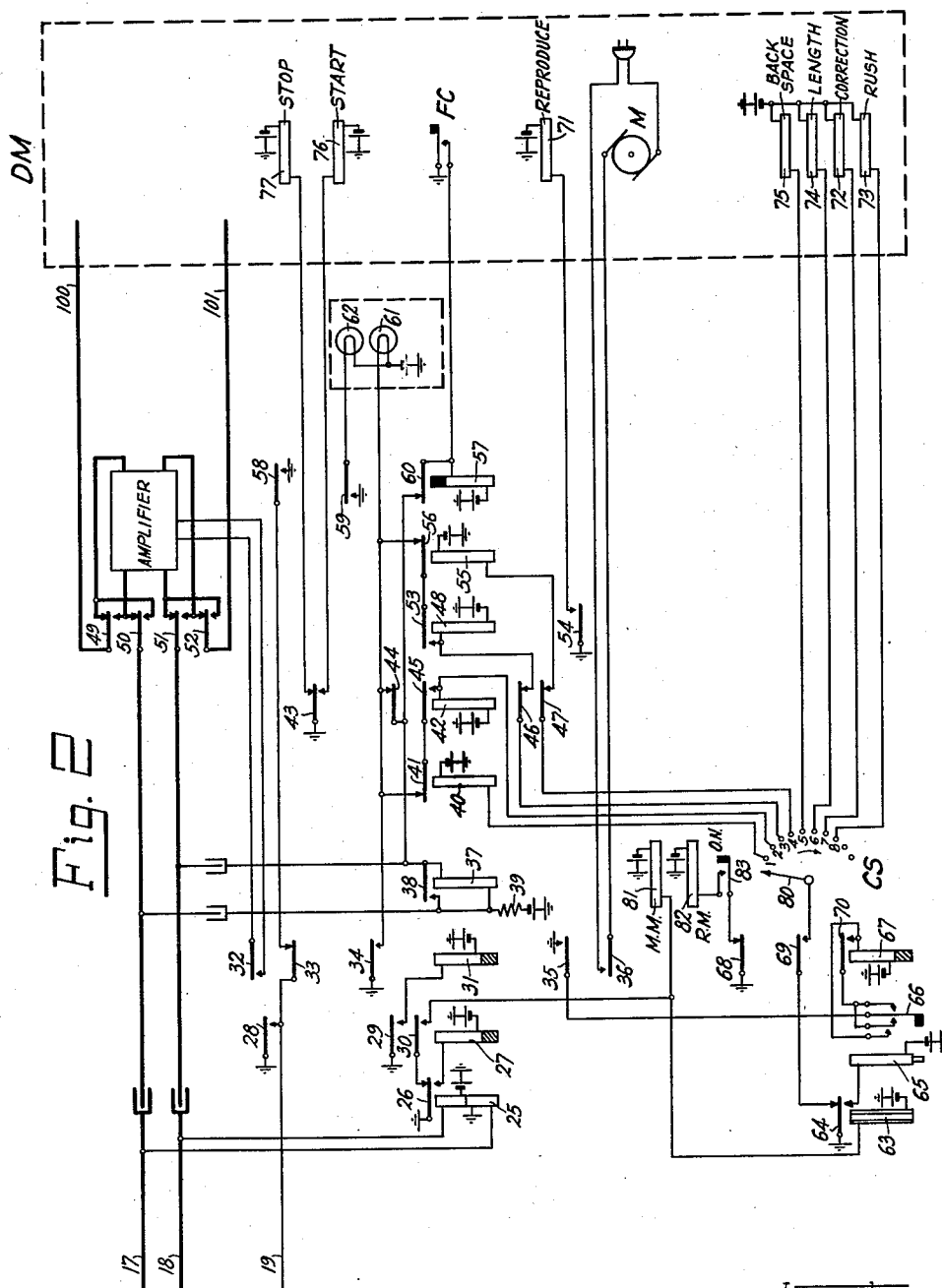
A. H. BELLIVEAU

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RECORDING SYSTEM

Filed June 27, 1932

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Inventor
Alfred H. Belliveau

W. H. C. C. C.

Att'y.

March 12, 1935.

A. H. BELLIVEAU
RECORDING SYSTEM

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4 Sheets-Sheet 3

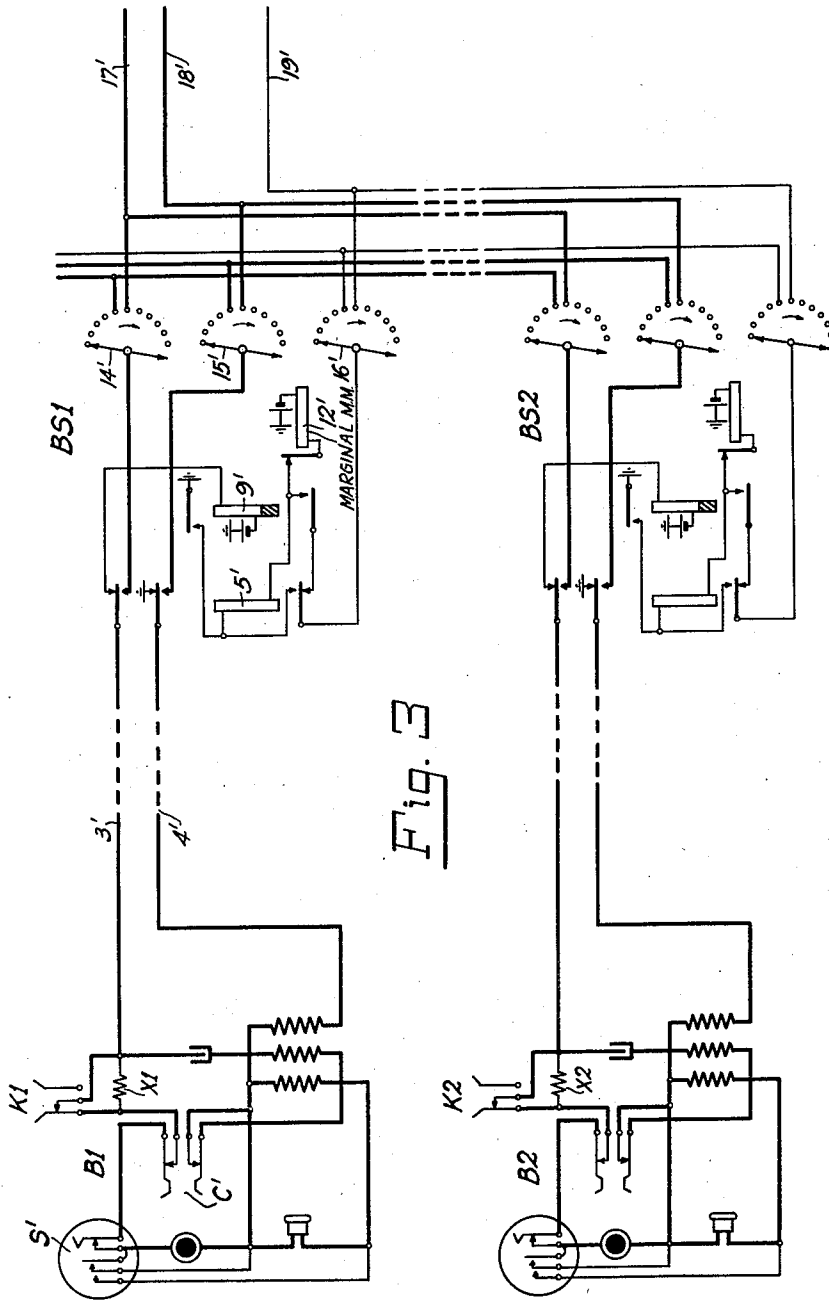


Fig. 3

—Inventor—
Alfred H. Belliveau

Wm. Walter Owsen.

Att'y.

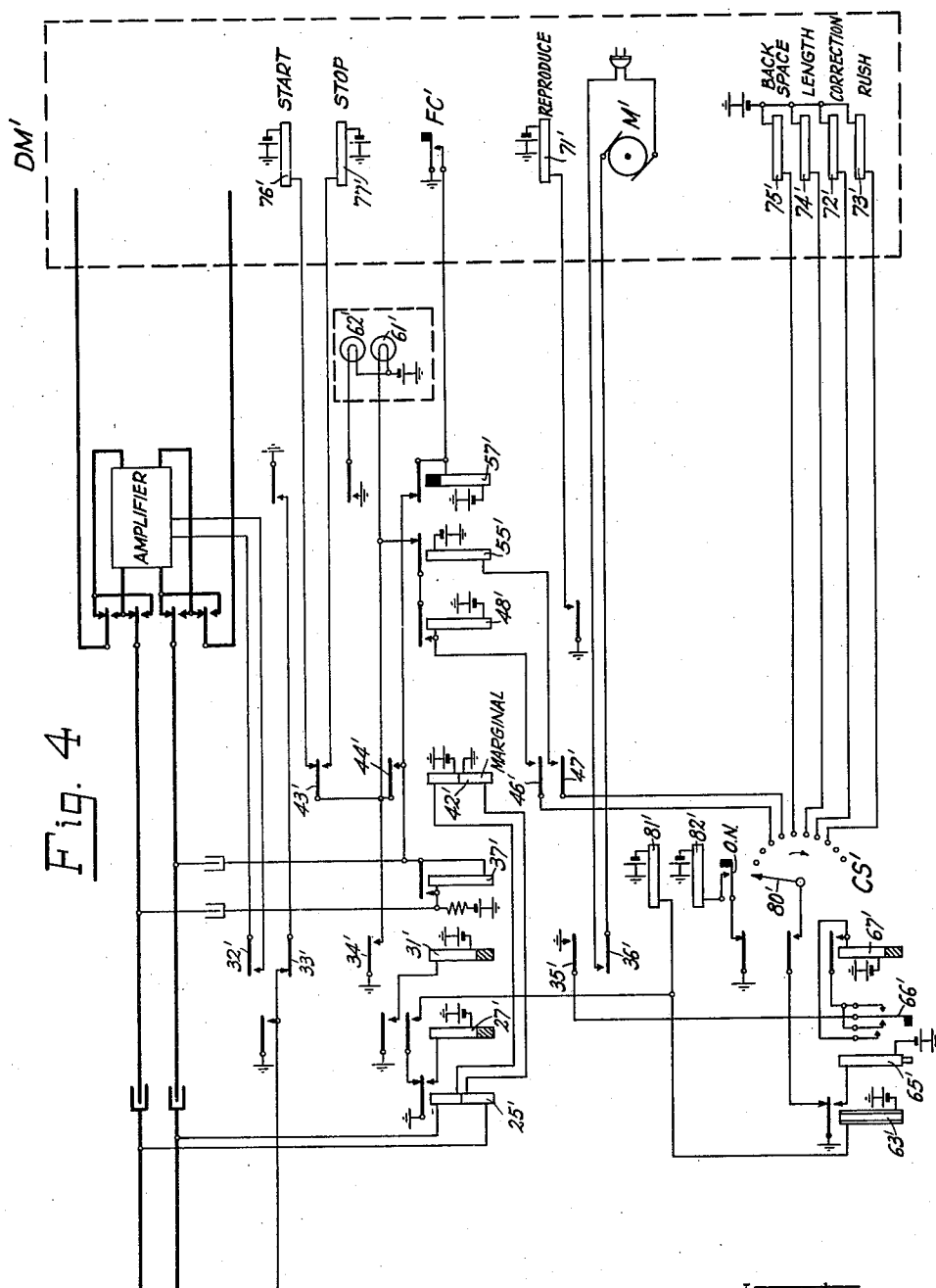
March 12, 1935.

A. H. BELLIVEAU
RECORDING SYSTEM

1,993,870

Filed June 27, 1932

4 Sheets-Sheet 4



Inventor
Alfred H. Belliveau

Wm. Walter Cowell.

Att'y.

UNITED STATES PATENT OFFICE

1,993,870

RECORDING SYSTEM

Alfred H. Belliveau, Chicago, Ill., assignor to Associated Electric Laboratories, Inc., Chicago, Ill., a corporation of Delaware

Application June 27, 1932, Serial No. 619,487

8 Claims. (Cl. 179—6)

The present invention relates to recording systems in general, but, more particularly it relates to systems of recording voice waves phonographically, and it is in the nature of an improvement of the system shown and described in the pending application of deBerard and Martin, Serial No. 467,854, filed July 14, 1930.

The principal object of the present invention is to provide a system wherein phonographic recorders of the dictating machine type are electrically controlled from a remote dictating station over a two-wire telephone circuit to perform the same function as would be performed by the machine under the manual control of dictators were such machines located in the immediate vicinities of the dictators.

One feature of the invention is the arrangement whereby the functions of a dictating machine are controlled by means of an impulse sender at the dictating station.

Other features of the invention, which are not particularly pointed out, will be understood and appreciated after a study of the following detailed description in conjunction with the associated drawings comprising Figs. 1 to 4, inclusive, in which, one system is diagrammatically represented in Figs. 1 and 2 and a modified system is diagrammatically depicted in Figs. 3 and 4.

In the system disclosed herein, it has been assumed that the type of phonographic recorder, or dictating machine, being electrically controlled from a remote point is that machine manufactured by Thomas A. Edison, Inc., Orange, New Jersey, and commonly known as the Ediphone. It is to be understood, however, that other types of dictating machines can be employed to equal advantage as will be evident from the following disclosure.

Description of drawings

In Fig. 1, there are shown two of the many dictating stations of the system, stations A1 and A2, each of which is represented by the dictator's equipment comprising a standard automatic telephone circuit including the usual transmitter T, receiver R, induction coil I, switch hook C, and calling device S having the impulse springs 1 and shunt springs 2. Each dictator's equipment takes the form of a regular telephone and is used when dictating the same as if the dictator were carrying on a telephone conversation.

Each dictating station, or rather each dictator's telephone instrument, is connected by line conductors, such as 3 and 4, to a rotary lineswitch LS individual thereto and like those commonly

employed in automatic telephone systems. All of the lineswitches are centered at a point near which the dictating machines are grouped, which point is remote with respect to the dictators' stations.

The lineswitches LS have access to dictating machines, such as DM, Fig. 2, over trunk lines such as those represented by conductors 17 to 19, inclusive, and conductors 20 to 22, inclusive. The number of trunks connected to the lineswitches depend upon the capacity of the lineswitches, which capacity is determined by the number of dictating machines required to provide service to all dictating stations.

At the right of Fig. 2 is a large rectangle designated DM. This rectangle represents an Ediphone of which only the mandrel stop and start magnets and the driving motor M have been shown. Ediphones are well known and it is thought, therefore, unnecessary to show them in detail. The new equipment added to the Ediphone to enable the machine to be electrically controlled comprises the magnets 71 to 75, inclusive, and the pair of contacts FC.

The sound box and diaphragm construction of the machine herein employed is assumed to be the usual form employed on certain dictating machines and well known in the art, that is, one which is transversely moved across the record, as the record rotates, by the usual form of feed screw mechanism and which is capable of recording matter on a record and, also, reproducing recorded matter. It is also assumed that this combined recording and reproducing mechanism is spring biased to the recording position and electromagnetically moved therefrom to the reproducing position as shown and described in the aforementioned deBerard and Martin application.

Although only one dictating machine has been shown to avoid unnecessary complication of the drawings, there are several dictating machines employed in the system, the number employed depending upon the requirements. These machines are grouped at one convenient location where they are under the supervision of either a single transcriber or a transcriber supervisor.

The rest of the equipment in Fig. 2 is the machine control equipment, individual to the machine DM and by means of which the dictator controls the dictating machine DM in the performance of its functions. This equipment comprises a group of relays, a control switch CS, and the amplifier represented by the rectangle in the upper central portion of the drawing. Each dic-

tating machine of the system will have similar equipment associated therewith.

In the modified system in Figs. 3 and 4, the equipment shown in Fig. 3 is similar to that shown in Fig. 1 and comprises the two dictator stations B1 and B2 and the lineswitches individual thereto. The difference in the dictators' equipment in the two systems is the addition of the key K and resistance X at each of the stations B. The difference between the equipment of Fig. 4 and that of Fig. 2 is found in the number of relays employed and in the circuits for controlling the stop and start magnets of the dictating machine.

Each individual lineswitch is of the type commonly used in automatic telephone systems. Lineswitches of this type have wipers which move in a forward direction only and in a step-by-step manner, remaining in the position last used. Their construction is well-known and, therefore, will not be described in detail.

The control switch CS, Fig. 2, is that type of switch commonly known as a minor switch in the telephone art and has been shown as having one wiper which is advanced in a step-by-step manner in the direction of the arrow by the operation of the motor magnet 81 and which is returned to its normal position in the reverse direction by the release magnet 82. The construction of this type of switch likewise is well-known and consequently will not be described in detail.

In the present disclosure, it is assumed that the dictator's telephone instrument is of the cradle type, since this type of instrument is more conveniently used in the present type of system. However, the ordinary pedestal type of telephone can be used to equal advantage therein.

The calling device or impulse sender S is assumed to be of the finger dial type well-known in the impulse-sender art. Briefly, however, this device comprises a dial rotatable varying degrees from a normal position depending upon the digit hole in which the finger is inserted each time the dial is turned off-normal. Upon the off-normal movement, the shunt springs 2 are closed to place a shunt around the transmitter and receiver to provide a low impedance impulsing circuit. Upon the return-to-normal movement of the dial, the impulse springs 1 are operated to transmit a number of impulses corresponding to the extent of the off-normal movement, the impulses constituting momentary interruptions in the line circuit.

It is to be understood that any type of impulse sender capable of transmitting series of impulses corresponding to the various digits may be employed in the present system without departing from the spirit and scope of this invention.

Immediately to the left of dictating machine DM, Fig. 2 (also machine DM', Fig. 4), there is a small rectangle enclosing the two lamps 61 and 62. This rectangle represents the supervisor's position at which the two lamps individual to each dictating machine are located. By means of these lamps, the supervisor is informed of which machines are being used and which machines have records thereon which should be replaced.

General operation

When a dictator desires to dictate some letters, for example, he removes the telephone instrument from the cradle, whereupon the lineswitch individual to this station automatically selects the trunk of an idle dictating machine. This selection results in the operation of the relays of Fig. 2 to close the circuit of the driving motor M to close the amplifier circuit, and to give a tone sig-

nal to the dictator, thereby preparing the machine to receive dictation and notifying the dictator that he may proceed with his dictation. The dictator thereupon operates his calling device, or impulse sender S, in accordance with a certain number, whereupon the code switch CS is positioned to cause the operation of the mandrel start-magnet 76, Fig. 2. This starts the mandrel rotating in order that any matter dictated into the telephone instrument at any dictator's station will be recorded in the well-known manner upon the record of the dictating machine by the recording stylus.

When the dictator has finished his dictation, he operates his calling device S in accordance with another digit, whereupon the control switch CS is operated to a different position to cause the operation of the stop-magnet 77 of the dictating machine to stop the rotation of the mandrel.

Should the dictator desire to hear what he has dictated into the telephone instrument, he operates his calling device S in accordance with a digit allotted to the reproducing function of the dictating machine, whereupon, the code switch CS is operated to still a different position to operate the reproduce-magnet 71 which causes the dictating machine to reproduce the last few words dictated, start-magnet 76 being operated immediately following the operation of the reproduce-magnet 71 by the dialling of the mandrel start digit.

A special digit is allotted to the back-spacing function of the dictating machine in order that the dictator may have as much of the dictated matter as desired reproduced. With the dictating machine in reproducing condition, operation of the calling device S in accordance with the back-space digit causes the operation of the control switch CS, whereupon, the back-space magnet 75 is operated to back-space the reproducing apparatus of the dictating machine. The calling device S can be operated repeatedly in accordance with the back-space digit in order to further back-space the reproducing apparatus. The manner in which the back-space magnet 75 functions to back-space the carriage and the mechanical details in connection with such function are assumed to be the same as the arrangement disclosed in Patent No. 1,178,014, issued April 4, 1916 to M. H. Holland. Therefore, the operation of the back-space magnet 75 will not be described in detail herein.

It is also being assumed that the dictating machines herein used are equipped with indicating pads, or record cards, and electromagnetically controlled pencils as shown and described in the United States Patent of E. D. Basch, No. 1,278,565, whereby the dictator can make indications for the transcriber concerning length of letter or matter dictated, points in the dictation where corrections occur, and indications concerning the dictator's desire to have letters rushed to him by the transcriber. The electromagnets by means of which these markings are placed on the indicating pad are magnets 72, 73, and 74 associated with the dictating machine DM. A different digit is allotted to each of these functions of the dictating machine and the machine is controlled by the dictator to perform the marking functions by means of the calling device S and the control switch CS which is directly operated by the impulses delivered by the calling device.

The difference in the systems disclosed in Figs. 1 and 2 and in Figs. 3 and 4 is embodied in the manner in which the mandrel start and stop magnets 76 and 77 are controlled. As has just

been explained in connection with Figs. 1 and 2, these magnets are controlled by the operation of the calling device S in accordance with the digits allotted to these functions. In the modified system in Figs. 3 and 4, the starting and stopping of the mandrel is controlled by the dictating key K at a dictating station. With a telephone instrument of the cradle type, the dictating key is conveniently located in the hand portion of the instrument between the transmitter and receiver so that it is easily controlled by the hand holding the instrument.

In the modified system, removal of the telephone instrument from the cradle causes the lineswitch to function to select an idle dictating machine as before described, whereupon, the dictator receives the tone to indicate the connection of his telephone instrument to an idle machine. In this case, instead of operating the calling device to start the mandrel of the dictating machine, the dictator depresses the dictating key, whereupon certain actions take place to cause the operation of the start-magnet 76 of the dictating machine. The dictator maintains the dictating key depressed as long as he is talking into the telephone instrument in order to maintain the continuous operation or rotation of the mandrel of the machine. Release of the dictating key upon the termination of the dictation, even for a short interval, results in the restoration of the start-magnet 76 and the operation of the stop-magnet 77, whereupon, the mandrel is brought to rest.

The dictating machines of the modified systems are controlled in their other functions in exactly the same way as those in the system of Figs. 1 and 2.

Detailed operation of Figs. 1 and 2

As a working basis for a detailed description of the operation of the system shown in Figs. 1 and 2, it will be assumed that dictator A1 desires to dictate several letters. Such being the case, dictator A1 picks up the telephone instrument from the cradle, or removes the receiver from the hook, thereby allowing the spring contacts C to engage and complete the following circuit: ground at resting contact of armature 7 of relay 5, armature 7, line conductor 4, right-hand winding of induction coil I, transmitter T, impulse springs 1 of calling device S, upper pair of contacts of switchhook contacts C, line conductor 3, armature 6 and resting contact of relay 5, and thence through the winding of relay 9 to battery.

Relay 9 energizes in this circuit and attracts its armature, thereupon, at its armature 10 completing the circuit for switching relay 5 in series with motor magnet 12 of lineswitch LS1; and at armature 11 and make contact, connecting the test wiper 16 to the junction of the windings of relay 5 and motor magnet 12.

Operation of relay 5 and motor magnet 12 at this stage depends upon whether or not the wipers of the lineswitch LS1 are standing upon the contacts to which is connected a busy dictating machine, that is, a machine which is being used by another dictator.

If the wipers of selecting switch LS1 are at this time standing upon contacts to which is connected a busy dictating machine, ground potential is encountered by wiper 16 and the winding of relay 5 is short-circuited since ground potential is connected to both terminals of its winding. The ground potential on wiper 16 causes motor magnet 12 to energize, however, whereupon, mo-

tor magnet 12 interrupts its own circuit at its interrupter springs 13, thereby functioning in the well-known manner to advance the wipers 14, 15, and 16 to the next set of contacts. This action will continue as long as wiper 16 engages contacts having ground connection thereto, indicating busy machines or vacant positions.

When a trunk line to an idle dictating machine is encountered, which it will be assumed is the trunk line represented by conductors 17, 18, and 19, wiper 16 no longer encounters ground and relay 5 thereupon operates in series with motor magnet 12. Motor magnet 12 is marginally adjusted in order that it will not operate in series with the comparatively high resistance winding of relay 5, whereupon the wipers of lineswitch LS1 are brought to rest on the contacts to which the conductors 17, 18, and 19 are connected.

Relay 5, upon operating, at the back contacts of armatures 6 and 7, opens the previously traced circuit of slow-to-release relay 9 and, at the make contacts of these armatures, extends the line conductors 3 and 4 through the wipers 14 and 15 to the line conductors 17 and 18, respectively, of the trunk line. At armature 8 and make contact, relay 5 prepares a locking circuit for itself by way of wiper 16 and conductor 19.

Extension of the line conductors 3 and 4 to the trunk conductors 17 and 18 completes the obvious loop circuit for line relay 25, Fig. 2, which relay thereupon operates and at its armature 26 and make contacts completes the obvious circuit for release relay 27. Release relay 27 operates and as one of its functions connects ground to conductor 19 at armature 28 and its make contact, thereby completing the locking circuit of relay 5 before slow-to-release relay 9 has had time to deenergize and open the original energizing circuit of relay 5.

Relay 27, at its armature 29 and make contact, completes the circuit of slow-to-release relay 31 and at its armature 30 and make contact, prepares an impulsing circuit for the motor magnet 81 of the control switch CS. Relay 31 operates when its circuit is completed and, at its armature 32 and make contact, completes the circuit of the amplifier, which circuit is assumed to be the filament circuit of an amplifier of the vacuum tube type. At armature 34 and make contact, relay 31 completes the circuit of tone relay 37 by way of resting contact and armature 44 of relay 42, winding of relay 37, resistance 39, to battery. Likewise, relay 31, at armature 36 and make contact, completes the circuit of the motor M of the dictating machine, whereupon the motor commences to run in order that the dictating machine might be operated.

Relay 37 operates immediately when its circuit is closed and, at its armature 38 and make contact, immediately short-circuits itself, whereupon the relay deenergizes and retracts its armature 38. Retraction of armature 38 opens the short-circuit of relay 37, whereupon, that relay again operates and again short-circuits its winding. This repeated operation of relay 37 generates a tone in the line conductors 17 and 18, which tone is received by the dictator indicating to him that he may now proceed with his dictation.

The circuit of slow-to-operate relay 57 is completed in parallel with that of relay 37, but, because of the short-circuiting action of armature 38 and make contact of relay 37, relay 57 does not have its circuit completed sufficiently long to allow it to operatively energize.

Dictator A1 upon receiving the tone caused by relay 37, operates the calling device S in accordance with the digit 2, whereupon two impulses are transmitted, resulting in two momentary deenergizations of line relay 25. Each momentary deenergization of relay 25 causes a current impulse to be transmitted by way of armature 26 and resting contact, armature 30 and make contact of relay 27, and in parallel through the winding of motor magnet 81 and the winding of slow-to-release relay 63 to battery.

Relay 63 operates on the first impulse and, at its armature 64 and make contact, completes the circuit of relay 65 which attracts its armature 66, completing the following circuit for relay 67: ground, make contact and armature 35 of relay 31, contacts to the left of armature 66 of relay 65 closed upon the attraction of armature 66, and thence through the winding of relay 67 to battery. Relay 67, thereupon operates and, at its armature 70 and make contact, completes a locking circuit for itself which excludes the inner left-hand springs of armature 66 of relay 65. Relay 63, being slow-to-release, operates on the first impulse of a series and remains operated throughout the series.

Motor magnet 81 is momentarily operated by each of the two impulses and, in the well-known manner, advances the wiper 80 of control switch CS from the normal position, in which it is shown standing, to contact No. 2. Movement of the wiper 80 of switch CS from its normal position permits the off-normal springs 83 to close to prepare the circuit of release magnet 82, which circuit is opened at this time at armature 68 of relay 67.

A short interval after the termination of the second impulse, relay 63 deenergizes and, at its armature 64 and make contact, opens the circuit of relay 65, while, at the resting contact of armature 64, it extends ground by way of armature 69 and make contact of relay 67, wiper 80 and bank contact No. 2 of switch CS, and through the winding of relay 42 to battery. Relay 42 thereupon operates, at its armature 43 and resting contact, opening the normally closed circuit of stop-magnet 77 of the dictating machine and at the make contact of that armature, completing the circuit of start-magnet 76 of the dictating machine, whereupon, the mandrel commences to rotate; at its armature 44 and resting contact, opening the circuit of tone relay 37; at its armature 45 and make contact, completing a locking circuit for itself by way of armature 47 and resting contact of relay 46 and make contact and armature 34 of relay 31; and at armatures 46 and 47, opening at those points the circuits of relays 48 and 55.

Now that the mandrel is rotating, the dictator, noticing that the tone generated by relay 37 has ceased, may proceed with his dictation, whereupon, the recording apparatus of the dictating machine functions in the well known manner to record the voice waves transmitted over the line conductors 3 and 4, the trunk conductors 17 and 18, and the output conductors 100 and 101 of the amplifier.

The armature 66 of relay 65 is provided with a weight and is of the vibrating reed type, therefore, vibrating for a suitable period between the two adjacent contacts following the deenergization of relay 65 upon the restoration of relay 63 as explained, thereby maintaining the locking circuit of relay 67 closed for an interval sufficient to insure complete operation of relay 42. When

weighted armature 66 comes to rest, the locking circuit of relay 67 is opened, whereupon, that relay deenergizes and, at its armature 68 and resting contact, completes the circuit of release magnet 82 of switch CS which then functions in the well-known manner to restore the wiper 80 to normal position. When wiper 80 reaches its normal position, the off-normal springs 83 are opened and the winding of release magnet 82 is deenergized.

The dictating machine will remain in the operating condition until dictator A1 takes the necessary steps to stop the rotation of the dictating machine mandrel.

Dictator A1, having completed his dictation, or the dictation of the first of a series of letters, may stop the mandrel of the dictating machine DM by operating the calling device S in accordance with the digit 1. This operation of the calling device results in a momentary deenergization of line relay 25, Fig. 2, resulting in the transmission of one impulse to the motor magnet 81 and to the slow-to-release relay 63. Relay 63 operates upon this impulse and motor magnet 81 responds to the impulse to advance the wiper 80 from its normal position to its No. 1 bank contact. When relay 63 restores a moment after the impulse, the circuit of relay 40 is completed from ground, armature 64 and resting contact of relay 63, armature 69 and make contact of relay 67, wiper 80, bank contact No. 1 of wiper 80, and thence through the winding of relay 40 to battery. Relay 40 thereupon operates, and, at its armature 41 and resting contact, opens the locking circuit of relay 42.

Armature 66 of relay 5 comes to rest after an interval, thereupon, opening the locking circuit of relay 67 which, at its armature 68 and resting contact, completes the circuit for release magnet 82, which magnet operates and restores the wiper 80 to its normal position. Restoration of relay 67, at its armature 69 and make contact, opens the circuit of relay 46 which thereupon restores.

Relay 42 deenergizes when its locking circuit is opened by relay 40 at armature 43 and make contact, opening the circuit of start-magnet 76 of the dictating machine and, at the resting contact of that armature, completing the circuit of the stop-magnet 77; at armature 44 and its resting contact, re-establishing the circuit for tone relay 7 which thereupon functions as before described; and, at its armatures 46 and 47, preparing the circuits of relays 48 and 55.

Dictator A1 may now indicate the length of the letter dictated, for the information of the transcriber, by operation of the calling device S in accordance with the digit 6. Operation of line relay 25 in response to the six impulses transmitted by the calling device results in the positioning of wiper 80 on its sixth contact and the completion of the circuit of length magnet 74, which magnet thereupon functions, as described in the aforementioned patent to Basch, to produce a pencil mark in the proper place on the indicating pad associated with the machine.

Whenever dictator A1 desires to indicate to the transcriber that a correction in the dictation has been made, he operates the calling device S in accordance with the digit 7, which results in seven impulses being transmitted to the line relay 25 and the completion of the circuit of the correction magnet 72 which is connected to the seventh contact in the bank of wiper 80 of control switch CS, which magnet then operates to place a correction indicating mark on the pad.

Likewise, should the dictator desire to indicate to the transcribed that the letter just dictated is to be returned to him in a hurry, he operates the calling device S in accordance with the digit 8, thereby operating the rush magnet 73 to make the proper mark on the indicating paper.

If the dictator at any time desires to listen to what has been recorded by the dictating machine, he may do so by first operating the calling device in accordance with the digit to stop the mandrel, if the machine is running, as before described. Of course, if he has already stopped the mandrel, this operation will not be necessary.

After having stopped the mandrel, the dictator operates the calling device in accordance with the digit 3, whereupon three impulses are transmitted and the circuit of the reproduce relay 48 is completed through wiper 80 as a result, which relay locks itself to ground by way of resting contact and armature 63, armature 56 and resting contact, and make contact and armature 34.

At armature 54 and make contact, relay 48 completes the circuit of reproduce-magnet 71 which operates to move the recording apparatus of the dictating machine from recording position to reproducing position. As is well known, this movement of the recording apparatus causes the last few words of dictation to be reproduced when the mandrel is again started.

At armatures 49 to 52, inclusive, relay 48 reverses the connection of the amplifier in the telephone circuit, that is, connects the input end to the reproducing apparatus connected to conductors 100 and 101 and connects the telephone line to the output end of the amplifier. By this means, the reproduced matter is sufficiently amplified to allow dictator A1 to easily hear it in his receiver R.

If dictator A1 desires to have more than just the last few words reproduced, he operates his calling device S in accordance with the digit 5, thereby operating the back-space magnet 75 which functions as described in the aforementioned patent to Holland to move the reproducing apparatus backwards a definite distance, the operation of magnet 75 being secured by the action of the motor magnet 81 and the relays 63, 65, and 67 in response to the five impulses transmitted by the calling device S. Repeated operation of the calling device S in accordance with the digit 5 results in the backward movement of the reproducing apparatus a corresponding number of steps.

Dictator A1 now operates his calling device in accordance with the digit 2 to start the mandrel, whereupon the recorded matter is reproduced and heard by the dictator.

When all matter has been reproduced, the dictator dials the digit 1 to stop the mandrel and then dials the digit 4 to operate relay 55. Relay 55, upon operating at its armature 56, opens the locking circuit of relay 48 which thereupon restores, restoring reproduce-magnet 71 and restoring the original connection of the amplifier. Reproduce-magnet 71, upon restoring, returns the apparatus of the machine to the recording condition.

If, now, the dictator desires to continue dictating, he dials the digit 2 to again start the mandrel and to stop the tone generated by relay 37. When he desires to stop dictating, he dials the digit 1 to stop the mandrel.

When there is more dictation than can be recorded on one record, the dictator is given a tone signal to indicate when the record is al-

most full so that he can stop his dictation before the recording stylus of the dictating machine runs off the end of the record. To provide this signal, the dictating machine is equipped with a pair of normally-open contacts FC, which are mechanically closed when the mechanism carrying the recording stylus has approached within a given distance of the end of its travel.

Closure of the contact FC completes the circuit of slow-to-operate relay 57 and, in parallel therewith, the circuit of tone relay 37 by way of armature 60 and resting contact of relay 57. During the time required for slow-to-operate relay 57 to energize sufficiently to attract its armature 60 and open the circuit of relay 37, relay 37 functions to transmit a short tone over the conductors 17-18 and 3-4 to the dictating station.

Upon operating, relay 57, besides opening the circuit of tone relay 37 at its armature 60, at its armature 58 prepares a circuit for marking the dictating machine DM busy and at armature 59, lights the lamp 52 at the supervisor's position to indicate that the record of machine DM should be changed.

The dictator, upon receiving the short tone signal transmitted by relay 37, brings his dictation to a close as soon as possible and either replaces his telephone instrument upon the cradle for a few seconds or operates the contacts C with his finger. In either event, contacts C open, thereby opening the loop circuit of line relay 25, which thereupon restores and opens the circuit of slow-to-release relay 27. During the time required for relay 27 to restore, following the restoration of relay 25, an impulse is transmitted to the motor magnet 8, of switch CS and to the relay 63 in parallel, whereby the wiper 80 is advanced to its first position and the circuit of relay 40 is completed. Relay 40 again opens the locking circuit of relay 42, which relay then restores, opening the circuit of start-magnet 76 and completing the circuit of stop-magnet 77, thus stopping the mandrel of the machine DM.

Upon restoring, relay 27, at its armature 28, removes ground from the holding conductor 19 and, at its armature 29, opens the circuit of slow-to-release relay 31. Removal of ground from conductor 19 opens the locking circuit of relay 5 of the lineswitch LS1, which relay then restores to disconnect the line conductors 3 and 4 from the conductors 17 and 18 at armatures 6 and 7, reconnecting relay 9 to the line circuit.

Relay 31 restores a short interval after its circuit is opened by relay 27 and, at its armature 33, extends ground from make contact and armature 58 of relay 57 to holding conductor 19, thereby marking the dictating machine DM busy in the bank contacts of all of the lineswitches. Because of the slow-to-release action of relay 31, relay 5 of lineswitch LS1 has sufficient time to deenergize and restore its armature 8 before ground is reconnected to conductor 19 by relay 31. Therefore, when ground is reconnected to conductor 19, the dictating machine DM is marked busy to lineswitch LS1 also.

Relay 31, upon restoring, at its armature 32, opens the circuit of the amplifier; at its armature 34, extinguishes the busy lamp 61 at the supervisor's position; at its armature 35, removes ground from the armature 66 of relay 65; and, at its armature 36, opens the circuit of the motor M of dictating machine DM.

The contact FC of dictating machine DM remains closed until the supervisor replaces the full cylinder with a new cylinder and restores the recording apparatus to the starting position.

Thus, the dictating machine DM is marked busy until such action on the part of the supervisor takes place and the full lamp 62 is maintained lighted.

After the few seconds have lapsed, the dictator A1 either removes the telephone instrument from the cradle or his finger from the contacts C, thereby permitting the contacts to close and permitting the relay 9 to again operate. Inasmuch as conductor 19 at this time has ground connected thereto, the relay 5 is short-circuited when relay 9 operates and consequently motor magnet 12 will function, as before described, to select an idle dictating machine. When the line of an idle dictating machine is encountered, the relay 5 will operate to switch through the line conductors 3 and 4 to the trunk line of the idle dictating machine, whereupon the relays 25, 27, 31, and 37 of the newly selected dictating machine will function and the dictator will be supplied with the dictating tone. The dictator now continues his dictation, controlling the newly selected machine in exactly the same manner as he controlled dictating machine DM.

Detailed description of Figs. 3 and 4

In describing the operation of the modified system, it will be assumed that dictator B1 desires to dictate. Upon removal of the telephone instrument, contacts C1 close, thereby completing the circuit of relay 9' over conductors 3' and 4', whereupon, the lineswitch BS1 is set in motion to select the line of an idle dictating machine. Assuming the dictating machine line comprising conductors 17', 18', and 19' to be the first idle trunk line to be encountered by the lineswitch BS1, test wiper 16' will encounter no ground potential on the holding conductor 19' and consequently switching relay 5' operates in series with motor magnet 12' to extend the connection of the dictating station D1 by way of wipers 14' and 15' to conductors 17' and 18'. When this occurs, the loop circuit of line relay 25', Fig. 4, is closed. This loop circuit includes the line conductors 17'—18' and 3'—4' and the two windings of marginal relay 42'. Relays 25' and 42' operate in series, relay 25' performing the same function as relay 25 in Fig. 2 and relay 42' preparing the circuit of stop-magnet 77' at armature 43' and make contact; preparing the circuit of tone relay 37' at armature 44' and its make contact; and, at armatures 46' and 47' and their make contacts preparing circuits for relays 48' and 55', respectively.

Operation of relay 31' following the operation of relay 27' by relay 25', in addition to completing the circuit of tone relay 37' and busy signal 61', at its armature 34' and make contact, completes the circuit of stop-magnet 77' by way of armature 43' and make contact of relay 42'. Relay 31', at its armature 32' and make contact, completes the circuit of the amplifier, and at its armature 36' and make contact, completes the circuit of the motor M' of dictating machine DM'. These and other functions of relay 31' are the same as those of relay 31 in the other system.

In this modified system, instead of dialling to start the mandrel and dialling to stop the mandrel, the dictator controls the starting and stopping of the mandrel by the dictating key K1.

This key has been shown in its normal position in the drawing, and it will be noted that in this position the resistance X1 in the line 3' is short-circuited by the closed contacts of the key K1. When the dictator desires to commence his dictation, he depresses the dictating key K1 and holds it depressed throughout his dictation. Depression of key K1 removes the short circuit of the resistance X1, thereby increasing the resistance of the loop circuit to the extent that the marginal relay 42' releases. Upon releasing, relay 42', at its armature 43', opens the circuit of stop-magnet 77' and completes the circuit of start-magnet 76', thereby starting the rotation of the mandrel, and, at its armature 44', opens the circuit of tone relay 37'. The dictator may now dictate into his telephone instrument, whereupon the voice waves are transmitted through the amplifier to the recording apparatus of the dictating machine DM' where the proper impressions are made on the machine record.

When the dictator desires to stop his dictation, he merely releases the dictating key K1, whereupon, the resistance X1 is short-circuited and the marginal relay 42' is permitted to operate to energize to open the circuit of start magnet 76', close the circuit at stop magnet 77', and close the circuit of tone relay 37'.

All of the other functions of the dictating machine in this system are controlled by operation of the calling device S' in exactly the same manner as in the other system. Likewise, the dictator is given a tone signal when the capacity of the record of the dictating machine is almost reached in order that he may stop his dictation and select a second dictating machine to which he can finish his dictation.

Inasmuch as ground potential is present on conductor 19' as long as dictating station D1 remains connected to the dictating machine DM', no other dictator can secure access to this machine and, consequently, if dictator B2 desires at this time to dictate, the lineswitch BS2 will automatically rotate over the contacts of its bank to which the conductors 17', 18', and 19' are multiply connected and will select a second machine over conductors 20' to 22', inclusive, for example.

From the foregoing description, it will be appreciated that the present invention provides a system wherein centrally located dictating machines, common to a plurality of dictators, are automatically selected for use and electrically controlled over two-wire telephone circuits from dictating stations remotely located with respect to the centralized locality of the dictating machines. It will also be appreciated that the present invention offers two practical methods of controlling the function of the dictating machines over the two-wire circuits.

The invention having been described, what is considered new and desired to have protected by Letters Patent is included in the claims which follow.

What is claimed is:

1. In a recording system, a phonographic recorder having a record and a record card, a dictator's telephone instrument equipped with an impulse sender, a telephone circuit connecting said recorder with said instrument, dictator-controlled means for controlling said recorder record on said record matter dictated into said instrument, and means associated with said machine and controlled by impulses transmitted over

said circuit by said impulse sender for placing marks on said card to supply certain information concerning matter recorded on said record.

2. In a recording system, a phonographic recorder having recording and reproducing mechanism normally conditioned to record and having separate electromagnetic means for conditioning said mechanism to reproduce and to back-space said mechanism, a remote dictating station having a telephone instrument and an impulse sender, a telephone circuit connecting said recorder with said station, dictator controlled means for controlling said recorder to record matter dictated into said instrument, and means directly controlled by impulses transmitted by said sender over said circuit for selectively operating said electromagnetic means to condition said mechanism for reproducing and for backspacing said mechanism to reproduce as much of the recorded matter as desired.

3. In a recording system, a phonographic recorder having a record and a record card and separate means for making marks on said card indicative of the lengths of recorded matters and indicative of the places in the recordings where errors occur, a remote dictating station having a telephone instrument and an impulse sender, a telephone circuit connecting said recorder with said instrument and said sender, whereby matter dictated into said instrument is transmitted to said recorder and recorded on said record, and means associated with said machine and controlled by impulses transmitted over said circuit by said sender for selectively operating said marking means, whereby length marks and correction marks can be made on said card as desired.

4. In a dictating system, a dictating machine having a record carrying mandrel and having an electric motor for driving said mandrel, a remote dictating station, a normally open two-wire telephone circuit connecting said machine with said station, means responsive to the closure of said telephone circuit at the dictating station for setting said motor into operation, and means controlled at will over said two-wire telephone circuit for starting and stopping the rotation of said mandrel by said motor.

5. In a dictating system, a combined recording and reproducing machine, a remote dictating station having a telephone instrument equipped with a dictating key and an impulse sender, a two-wire telephone circuit connecting said machine with said instrument, means associated with said machine and operated by impulses transmitted over said circuit by said impulse sender for conditioning said machine to record matter dictated into said instrument and for conditioning said

machine to reproduce recorded matter in said instrument, and means also associated with said machine and controlled over said telephone circuit by said dictating key for controlling the operation of said machine.

6. In a dictating system, a dictating machine having a record carrying mandrel and an electric motor for driving the mandrel, a remote dictator's station having a telephone instrument equipped with hook-switch contacts and a dictating key, a two-wire telephone circuit connecting said machine with said station and with the telephone instrument at the station when said hook-switch contacts are closed, means associated with said machine and responsive to the connection of said two-wire circuit to said instrument for closing the circuit of said motor to start it running, and means also associated with said machine and controlled by said dictating key over said two wire circuit for coupling and uncoupling said mandrel to the running motor.

7. In a dictating system, a dictating machine having a record carrying mandrel and an electric motor for driving the mandrel, a remote dictating station having a telephone instrument equipped with hook-switch contacts and an impulse sender, a telephone circuit connecting said machine with said station and adapted to be connected to said telephone instrument by the closure of said hook-switch contacts, means associated with said machine and responsive to the connection of said line to said telephone instrument upon the closure of said hook-switch contacts for closing the circuit of said motor to set it into operation, and means associated with said machine and directly operated by impulses transmitted over said telephone circuit by said impulse sender for controlling the coupling and uncoupling of said mandrel to said motor.

8. In a dictating system, a plurality of combined recording and reproducing machines, a remote dictating station having a telephone instrument equipped with an impulse sender, means responsive to the initiation of a call by said remote dictating station for automatically connecting an idle one of said machines to said station, electromagnetic means for controlling the recording and reproducing functions of the connected machine, and an automatic step-by-step switch associated with said connected machine directly controlled by impulses transmitted over said connection by the impulse sender of said station for selectively operating any one of said electromagnetic means to control said machine to record or reproduce over said connection.

ALFRED H. BELLIVEAU.