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COMBINED TELEPRINTER AND TELEPHONE SYSTEM

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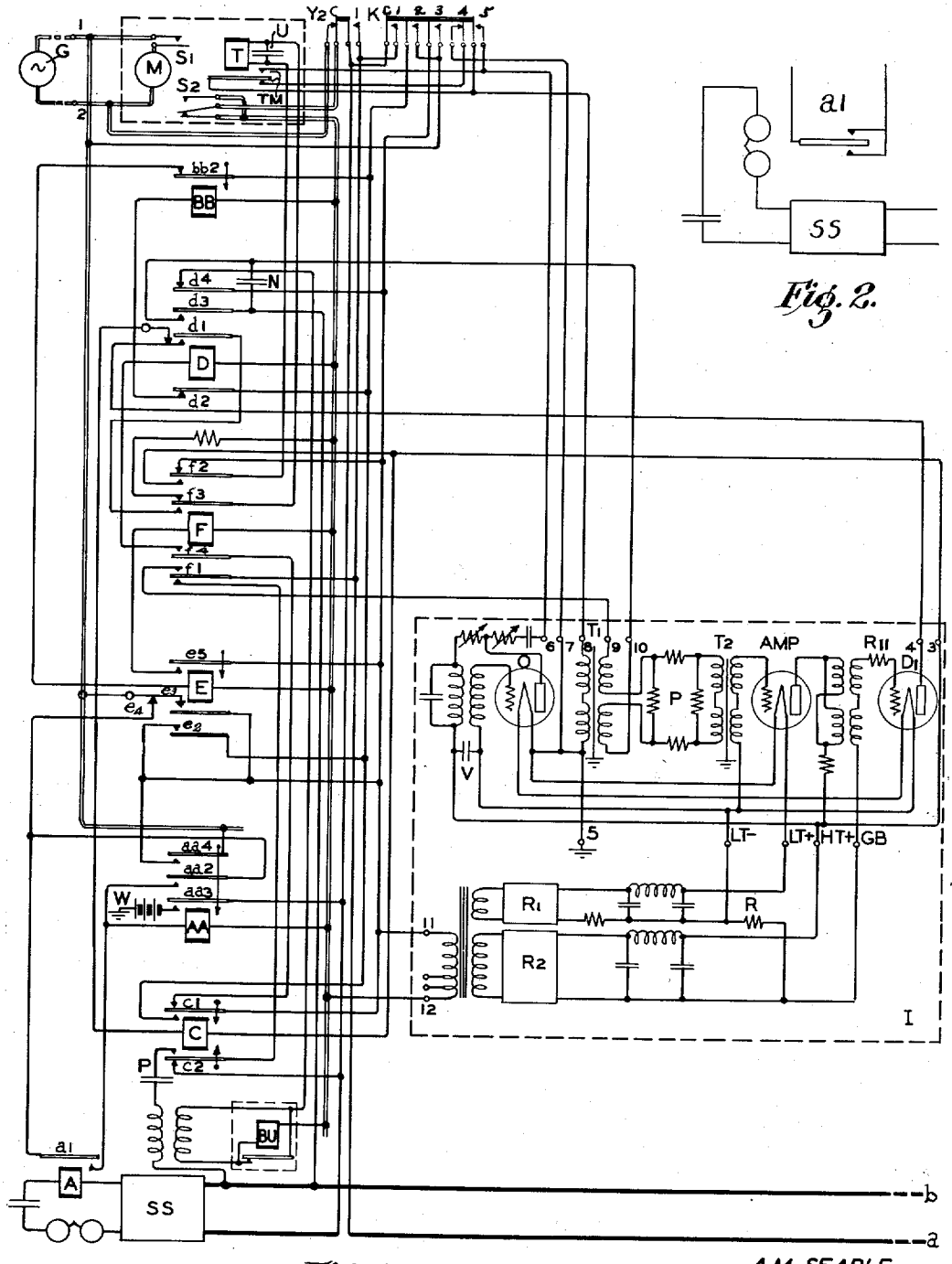


Fig. 1.

Fig. 2.

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COMBINED TELEPRINTER AND TELEPHONE SYSTEM

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9 Claims. (Cl. 179—4)

This invention relates to systems and apparatus for providing teleprinter or like communication over telephone lines.

The object of the invention is to provide means which can be installed at telephone subscribers' stations to permit teleprinter communication to be obtained without any addition to or modification of the exchange equipment.

Another object of the invention is to provide simple and reliable teleprinter mechanism for use at a telephone subscriber's station.

According to one feature of the invention a plurality of telephone subscribers' stations are provided with teleprinter equipment so constructed and arranged that connection between any two of said subscribers can be set up and teleprinter communication established without any addition to or modification of the telephone exchange equipment.

According to another feature of the invention a plurality of telephone subscribers' stations are provided with teleprinter equipment by means of which teleprinter communication can be carried on over the telephone circuits, characterized in this, that the teleprinter equipment is normally disconnected from and the telephone sub-station is normally connected to the subscriber's line circuit and that means are provided whereby in response to a manual operation by the subscriber the teleprinter equipment is connected to and the telephone substation is disconnected from the line.

According to another feature of the invention the teleprinter signals consist of impulses of a single voice frequency carrier current. The carrier current is preferably generated at the subscriber's station by an oscillator unit energized from the usual lighting current mains. By using a carrier current within the voice frequency range, teleprinting can be successfully carried on between any two points in a telephone network. For duplex working, however, it may be preferable to use different carrier currents for opposite directions of working.

According to another feature of the invention means are provided whereby if an unattended subscriber's station provided with teleprinter equipment is seized the teleprinter equipment can be rendered operative to receive a message; the equipment is capable of manual operation when both subscribers are present. In such a system a call from a subscriber not equipped with teleprinter equipment to an unattended teleprinter station is not metered, but a call from a teleprinter subscriber is metered as soon as message transmission to the unattended station begins.

According to another feature of the invention a subscriber's telephone desk set is provided with a key or keys, the contacts of which are adapted to be connected to the subscriber's equipment (telephone and/or teleprinter) and/or to the subscriber's line in such a manner as to control the connection of the subscriber's line to the telephone equipment or the teleprinter equipment.

According to another feature of the invention the subscriber's bell is provided with contacts operable by its armature.

Referring to the accompanying drawing:

Fig. 1 shows a subscriber's teleprinter equipment and circuit; and

Fig. 2 shows a modification of a portion of the circuit of Fig. 1.

In the circuit shown the subset SS is normally connected to line *a*, *b* via back contacts *c2*, *f1* of relays C and F respectively. In series with the subscriber's bell circuit there are connected a condenser and a relay A adapted to respond to ringing current.

In the teleprinter equipment is a source of voice frequency current and pulses of this current may be transmitted to the exchange line in accordance with the teleprinter code by means of the teleprinter transmitting mechanism. These pulses of voice frequency current pass to the receiving station and there are detected by some known detector, such as a valve amplifier detector or a voice frequency relay. The resultant pulses of current from the output of the detector are then used to control the flow of direct current through the receiving magnet winding of the teleprinter at the receiving station and this in turn controls the printing of the message.

I is a voice frequency equipment comprising rectifying systems R1 and R2 connected to the alternating current power mains at terminals I1 and I2 and having appropriate output circuit networks for filtering alternating current components from the direct current, an amplifying valve AMP, coupled to the line connections via a pad P, a detector valve D1, and an oscillator

O for generating voice frequency currents. Rectifying system R1 supplies cathode heating current and system R2 supplies space current to the various tubes. The power source G for operating the said equipment (supply mains, batteries or other source of power) is connected to terminals 1 and 2. 3 and 4 are terminals from which current, controlled by the output of the detector, may be obtained for operating the teleprinter receiving mechanism or other equipment. 6, 7 and 8 are terminals for controlling the flow of voice frequency current to terminals 9 and 10 which in normal operation are connected to the line *a*, *b* leading to the exchange. If terminals 6 and 8 are connected together and 7 is left free, voice frequency current will flow to the line *a*, *b* connected to 9 and 10. If terminals 7 and 8 are connected together and terminal 6 is left free, no voice frequency current will flow to the line connected to terminals 9 and 10.

The necessary connections to terminals 6, 7, 8 to allow pulses of voice frequency current in accordance with the teleprinter code, to flow to line from terminals 9 and 10, are controlled by the teleprinter transmitting contacts TM.

When transmission takes place, teleprinter contacts TM regulate the flow of voice frequency current from the oscillator valve O to the line through the transformer T1.

When the tongue of teleprinter magnet T rests on its upper or "space" contact, voice frequency current flows in the primary of the transformer T1; when the tongue rests on the lower or "mark" contact, the transformer T1 is disconnected from the plate of the oscillator valve and is also short-circuited. No current therefore flows in the primary winding of T1 during a marking signal.

The secondary winding of T1 forms part of a series circuit including the line and the input circuit of the amplifier. The input circuit to the amplifier is connected between the two halves of the secondary of T1 to preserve a symmetrical arrangement when looking from the line terminals.

When the teleprinter transmitting armature is on its "space" contact, voice frequency current will flow in the series output circuit of T1 so that a voltage will be developed across the line and also across the input terminals of the amplifier. This latter voltage after amplification and detection causes the operation of the local teleprinter so that a "home" record is obtained. Before describing the operation of the detector portion of the circuit it should be mentioned that the output of the oscillator to the line may be adjusted by means of the feed-back and output resistances shown. The grid of the oscillator valve is given a bias potential from the drop in voltage in the filament circuit, the detector filament being negative with respect to the oscillator since all filaments are connected in series.

When the circuit is used for reception, the teleprinter transmitting armature rests on "mark" so that the primary of T1 is short-circuited. Neglecting any losses in this transformer then, all voice frequency current from the line will be used to develop a voltage across the input circuit to the amplifier. This input circuit consists of the pad P and the step-up transformer T2. The purpose of the pad will be described later. The stepped-up voltage across the secondary of T2 is applied to the grid of the amplifier valve. This valve acts simply as a voltage amplifier, the amplified voltage across the secondary of the intervalve transformer being supplied to the grid of a curved plate characteristic detector. The winding T of the teleprinter magnet is adapted to be connected directly in the plate circuit of the detector valve and a condenser U is connected across the winding. This condenser normally forms part of the teleprinter itself. A resistance R11 is inserted between the intervalve transformer and the grid of the detector valve, the purpose of which is to limit the plate current of the detector valve when short lines are being worked over and the voltage across the input of the amplifier is large. Under such conditions, grid current tends to flow in the detector valve and this passing through the grid circuit resistance increases the negative bias on the valve. By the use of a suitable resistance the output current may be prevented from exceeding a definite value, thus preventing overloading.

The detector valve is biased from the voltage drop across a resistance R in the return lead of the high tension circuit of all the valves. The condenser V in the oscillator circuit connected between the positive high tension lead and the negative filament lead to the circuit prevents a large amount of voice frequency current from the oscillator traversing this resistance, and so applying a constant voice frequency voltage on the grid of the detector.

The pad P inserted before the input transformer T2 to the amplifier valve AMP is used to provide a definite termination to the line.

The normal grid bias and plate potentials of the tubes of the equipment I are so arranged that when voice frequency current flows from terminals 9 and 10 to the line, or from the line to terminals 9 and 10, no space current flows through the apparatus connected to terminals 3 and 4. If, however, no voice frequency current flows from terminals 9 and 10 to the line, or from the line to terminals 9 and 10, space current flows through the apparatus connected to terminals 3 and 4.

Although the invention is not to be limited except by the appended claims and its features are capable of utilization in various circuits, the particular organization of circuits described in this specification and illustrated in the drawing was developed for use with the well known Creed teleprinter machine. For a disclosure of the details of construction of the Creed mechanism which serves to start and stop the teleprinter motor, reference may be had to United States patent to Salmon 1,834,349, issued December 1, 1931. It is sufficient for an understanding of the present invention to note that the Creed machine is driven by a motor M which obtains its power supply for rotation only when the contacts S1 are closed. The closing or opening of contacts S1 is controlled by a mechanism (on the Creed teleprinter) which operates in such a way that it closes contacts S1 only when the armature of the teleprinter receiving magnet T makes a movement from one position (referred to as the "spacing" position) to a second position (referred to as the "marking" position). Operation of the armature in the opposite direction i. e. from the "marking" to the "spacing" position will not cause contacts S1 to close, but if these contacts are already closed they will not be opened by such a movement. Similarly they will not be opened, if already closed by movement of the armature from "spacing" to "marking".

The Creed mechanism also provides that if the

contacts S1 have been closed and the motor is running, and no movement of the teleprinter magnet armature from "spacing" to "marking" takes place for a period of approximately 1½ minutes, the tongue of the subsidiary contacts S2 leaves its lower contact and approximately one second later closes its upper contact. At the same time the contacts S1 are opened and the motor stops.

When, however, the mechanism operates (by a movement of the teleprinter magnet armature from "spacing" to "marking") to close contacts S1 and start the motor, the armature will engage the lower contact of S2 before it leaves its upper contact. The break at S2 therefore only occurs just before the motor stops and not when it starts.

The movement of the teleprinter magnet armature is controlled by the flow of current through the magnet winding T. When no current flows through winding T, the armature is held in its "spacing" position by a spring; when however, current flows through T, the armature moves over to its "marking" position, returning to the "spacing" position under the influence of the spring when current ceases to flow.

Consider first the equipment shown as an unattended subscriber's station. The teleprinter motor is not running since contacts S1 are open; armature S2 is closed on its lower contact and the equipment I receives no power supply and no voice frequency current is flowing from terminals 9 and 10. All relays are in their unoperated positions as shown, and the armature of teleprinter magnet T is held by the spring in the "spacing" position, since no current can flow through its winding T.

Connection to the unattended station is requested by a subscriber. The operator operates her ringing key and pulses of ringing current pass from the exchange over the ordinary lines *a*, *b* and contacts *f1*, *c2* to the telephone subset shown at SS. The bell rings and since relay A is arranged to operate on ringing current, it operates on each pulse received from the exchange. Operation of A closes the contacts *a1*. Closing contacts *a1* supplies power from the power source G via terminal 1, contacts *e4*, *a1* winding AA, lower contact of S2, contact Y2 and terminal 2 to relay AA which is of the slow-acting type and for a time does not operate. This is to allow time for the called subscriber to answer the ringing should he be present. After a time the successive pulses of current passed through AA under the control of relay A, will cause AA to operate. Operation of AA closes contacts *aa2* to lock the relay, and closes contacts *aa4* which connect the power supply to terminals 11 and 12 of the equipment I and also to buzzer Bu by way of terminal 1 contacts *aa4*, *d4*, winding of Bu, lower contact S2 contact Y2 and terminal 2. Contacts *aa4* also complete a circuit for current by way of contacts *f2* and *f3* to teleprinter magnet winding T which moves its armature to "marking" initiates the operation of the Creed mechanism which closes contacts S1 and thus starts the motor. Contacts *aa3* also close and connect to line *a* via contacts *c2* and *f1* a source W of voltage of —50 volts relative to earth. In the manner well known in automatic telephony this voltage serves to operate relays at the exchange which cut off the supply of ringing current from lines *a*, *b*. Relay A therefore ceases to operate. Since the power supply has already been connected to the equipment I and since no voice frequency current flows from, or to terminals 9 and 10, current flows from terminals 3 and 4 through slow-operating relay C which operates after four seconds. Relay C at its contact *c2* connects the output circuit from buzzer Bu to line via contact *f1* the buzzer oscillations indicating at the remote station that the teleprinting equipment is being connected. The tongue of contacts *c1*, engages with its lower contact and connects the power supply over the path 1, *aa4*, *c1*, *bb2*, E, S2—Y2—2, to relay E which operates. Contacts *e2* which are in shunt to the lower contacts *c1* close a circuit to lock relay E in the operated position. Relay D does not, however, operate as yet since its power supply circuit is interrupted at contacts *c1* and *f4*. Contacts *e3*, *e4* which act as make-before-break contacts, change over; *e3* first closes, maintaining the power supply to relay E and the equipment I and then *e4* opens, cutting off the power supply to relay AA. Relay AA therefore returns to its unoperated position and contacts *aa2*, *aa3*, *aa4* open. Contacts *e5* close the circuit of relay F which operates and at *f1* connects the equipment I to line and disconnects the buzzer from the line. Contacts *f2*, *f3* disconnect magnet winding T, and *f4* prepares a circuit for relay D.

Although the internal connections of I are arranged so that a direct current path exists between terminals 9 and 10, the lines *a* and *b* are not as yet bridged by a direct current loop since the condenser N is still interposed between the line *b* and terminal 10 of the equipment I. The call is therefore not yet metered to the calling subscriber.

Considering first the case when the calling subscriber is not equipped for teleprinter working, he will cease to hear ringing and after that nothing further happens; he therefore hangs up his receiver and breaks down the connection at his end.

Relays C, E and F are, however, still operated at the unattended station. After a certain time the current which has been passing through the slow-acting relay BB, which is in parallel with relay E, causes BB to operate. Contacts *bb2* then break the circuit of relay E, which returns to its unoperated position. Contacts *e4* close, contacts *e3* open cutting off the power supply to I and relays E, F, C and BB. Contacts *c2*, *f1* change over and the line *a*, *b* is connected to the subset SS instead of to the equipment I. Relay BB returns to its unoperated condition a few moments later. Contacts *bb2* close. The unattended equipment is therefore in a condition for starting up again when another call is received and the call has not been metered to the calling subscriber. Relay BB may not be provided, although it is preferably to save time, since the teleprinter is provided with contacts S2 which as previously explained open after 1½ minutes if no signal is sent or received, thus initiating release.

Considering now the case when the calling subscriber is provided with voice frequency teleprinter equipment, as soon as buzzer tone ceases he must send a pulse of voice frequency current over the line to the unattended station. The method of doing this and of starting up the equipment manually is described later.

The pulse of voice frequency current is received by the equipment I at terminals 9 and 10 (the condenser N is of such capacity that it offers little impedance to the passing of voice frequency current) and as previously described this cuts off the current flowing from terminals 3 and 4 through relay C. C therefore returns to its unoperated

position and the tongue of contacts *c1* engages with its normal or upper contact. Since contacts *f4* are also closed power supply is now connected to relay D which operates. Contacts *d1* which are make-before-break contacts, change over; the tongue first connects terminal 4 of equipment I to a terminal of the winding T of the teleprinter magnet and then disconnects the winding of relay C from terminal 4 of I. Contacts *d2* break the circuit of relay BB so that it cannot later operate and return relay E to its unoperated position. Contacts *d3* short-circuit the condenser N, so that a direct current loop is now bridged across the lines *a*, *b* and the call is metered to the calling subscriber. Contacts *d4* open the buzzer circuit.

When the pulse of voice frequency current stops, current can again flow from terminals 3 and 4 of the equipment I but it now flows through the winding T of the teleprinter magnet. The armature of the teleprinter magnet therefore moves over from its "spacing" position to its "marking" position.

The equipment is then ready for receiving the teleprinter message.

After the conclusion of the message no further voice frequency current pulses will be received from the line and approximately 1½ minutes after the last movement of the teleprinter magnet armature from "spacing" to "marking", the Creed mechanism operates to cause the tongue of contacts S2 to disengage its lower contact. This disconnects the power supply from relays D, E and F and from the equipment I. No current can therefore flow through the teleprinter magnet winding T and the armature returns to its "spacing" position. Relay D returns to its unoperated position and contacts *d1* reconnect terminal 4 of I to relay C, instead of to T. Contacts *d3* open to remove the short circuit from the condenser N. Relay E returns to its unoperated position and the tongue or contacts *e3* disengages its contact, thus preventing the supply of power, when the tongue of S2 engages its upper contact, a second later. Contacts *f1* change over, connecting the line *a* to the telephone subset instead of to the voice frequency equipment I. Finally the Creed mechanism allows the tongue of S2 to engage its upper contact, and opens the contacts S1, thus stopping the teleprinter motor. The unattended equipment is then in its original condition for the reception of further calls.

Considering the equipment shown in the drawing, as that of the calling subscriber, as soon as he has obtained the required connection by ordinary telephonic means, but receives no reply, when ringing has stopped he presses a push-button key K for a few seconds. This key will be referred to as the "print" key and is equipped with five separate sets of contacts K1, K2, K3, K4, K5. Contacts K1 maintain the direct current loop on the line, K2 supplies power to relay E and K3 supplies power to the equipment I, buzzer B*u* and to winding T, which initiates operation of the Creed mechanism to close contacts S1, so that the motor starts. Contacts K4 open the short circuit of the primary of the outgoing transformer while K5 closes the oscillator output circuit to transmit an impulse of voice frequency current on the line. After four seconds, relays E, F operate, and relay C releases when the pulse is sent out so that relay D operates and disconnects the buzzer. The print key K is then released. Since contacts *d1* disconnect relay C, contacts *c1* cannot break the power supply circuit to relay D and since contacts *f4* remain closed, relay D will remain operated when pressure is removed from the "print' key. The pulse of voice frequency current over the line to the (unattended) called station completes the starting up of the equipment there, as described above. Due to the method of operation of the voice frequency equipment I, this current pulse is also received by the detector D1 and hence stops current flowing in the winding T of the teleprinter magnet.

At the end of the pulse i. e. when pressure on the "print" key is removed, current again flows through T, the armature moves from its "spacing" to its "marking" position. The equipment is then in a condition for transmitting a teleprinter message.

It will be clear that the telephone receiver must not be replaced on its switch-hook until after the relays E, F have operated and through contacts *f1* disconnected the exchange line from the telephone subset SS; if the telephone receiver is replaced before this the call will be cleared.

Assuming that the telephone receiver has been replaced immediately after the teleprinter equipment has started up, no further action need be taken by the calling subscriber at the end of the teleprinter message, as his own equipment will close down (approximately 1½ minutes after the last signal has been transmitted) in exactly the same manner as the equipment at an unattended station.

It is clear that the equipment as described can be used for teleprinter communication between two subscribers who are both present at their stations.

In this case each subscriber starts up his own equipment by pressing his "print" key, after normal telephonic connection has been established.

Should the subscribers wish to revert to telephonic communication at the end of the teleprinter message, they must each first remove his receiver from the switch-hook (unless these have been left off during the teleprinter message) and then press momentarily a second push-button key Y referred to as the "phone" key.

This phone key carries two sets of contacts Y1 and Y2 the first of which (Y1) must close before the second set (Y2) opens. On pressing the key, Y1 maintains the direct current loop on the line and Y2 then breaks the power supply to the relays D, E and F which return to their unoperated positions. The contacts *f1* reconnect the exchange line *a*, *b* to the subscriber's telephone subset SS and telephonic communication may be carried on. The teleprinter motors continue to rotate for a short time until stopped by the Creed mechanism.

In lieu of the ordinary subscriber's bell and the relay A shown in Fig. 1, there may be substituted a bell having contacts on its armature. The bell contacts may then control the power supply to relay AA in place of the contact *a1* as shown in Fig. 2.

The circuit has the great advantage of simplicity, no alteration is required to existing telephone exchanges, the small amount of additional apparatus being equipped on the subscriber's premises; the ordinary telephone lines are used and, with the valve detector, teleprinter communication may be established with any subscriber similarly equipped over any line (trunk, toll, junction or local) on which telephonic communication is possible.

Any frequency in the range 400–500 cycles may be used for the voice frequency current, the de-

sign of the oscillator being such that this is easily possible. This frequency is well within the transmission range of repeaters so that the system can be used over trunk circuits. The power put into the line is five milliwatts, this value being fixed in consideration of the standard requirements for voice frequency telegraph systems.

What is claimed is:

1. A telephone system comprising a plurality of subscribers' stations each associated with a pair of talking circuit conductors and comprising telephone communication equipment connected thereto, each of said stations also comprising apparatus whereby, when connected to a similar station, teleprinter comunication unlimited in its content may be carried on over the talking circuit conductors, means at each subscriber's station connected to the talking circuit conductors at all times when the respective subscriber's station is idle for giving a call signal at a called station in response to calling currents incoming over the talking circuit conductors whereby a called subscriber may be summoned to his station to respond to a telephone call, and means whereby without previous disturbance of the normal connection of the telephone communication equipment to its talking circuit conductors, the teleprinter equipment at an unattended called station may be connected by remote control to the talking circuit conductors and may be conditioned to receive and record a telegraph message.

2. A telephone system comprising a plurality of subscribers' stations each provided with an incoming talking circuit, a subscriber's set normally associated therewith and teleprinter equipment by which teleprinter communication unlimited in its content may be carried on over the talking circuit, a movable contact device for alternately connecting the telephone subscribers' set and the teleprinter equipment to the incoming talking circuit, means at each subscriber's station connected to the incoming talking circuit at all times when the respective subscriber's station is idle for giving a call signal in response to calling currents received over the incoming talking circuit whereby the subscriber at the respective station may be summoned to respond to a telephone call, and remotely-controlled means whereby the teleprinter equipment at an unattended called station may be connected to the talking circuit and conditioned to receive and record a telegraph message.

3. A telephone system comprising a plurality of subscribers' stations each provided with a local telephone circuit, telephone subscribers' apparatus normally connected thereto, means at each subscriber's station connected to the local telephone circuit at all times when the respective subscriber's station is idle for summoning a called subscriber to the station in response to incoming calling currents, teleprinter equipment at each of said stations by means of which teleprinter communication unlimited in its content may be carried on over the telephone circuits associated with said stations, said teleprinter equipment including means for transmitting teleprinter signals as impulses of a single voice frequency carrier current and means whereby without previous disturbance of the normal connections of the telephone subscribers' apparatus at an unattended called station the teleprinter equipment thereat may be connected to the local circuit and conditioned to receive and record a telegraph message.

4. A telephone subscriber's station provided with teleprinter equipment including a subset or bell-box comprising a bell having contacts incorporated therein which are operable by the bell armature, a circuit connected to said contacts to be closed thereby and means connected to the teleprinter equipment and under the control of said circuit whereby operation of said contacts initiates operation of said teleprinter.

5. A plurality of subscribers' stations each including a subscriber's telephone set and teleprinter equipment, a telephone exchange, a pair of conductors constituting a subscriber's circuit leading from each of said stations to said exchange, means at said exchange for connecting any two of said subscriber's circuits either for telephone communication or teleprinter communication over the same path in the exchange circuit, and means permitting the telephone set to remain connected to the subscriber's circuit whereby the teleprinter apparatus at an unattended called station may be conditioned by remote control from the calling station to receive and record a teleprinter message.

6. A telephone system comprising a plurality of subscribers' stations each having an incoming telephone circuit, telephone apparatus normally connected thereto and teleprinter equipment associated therewith, time-delay means at a called station operative without previous switching of the normally connected telephone apparatus to connect to the telephone circuit and render operative the teleprinter equipment in response to a long call signal upon failure of the called party to answer, means at the calling station for transmitting a teleprinter message as impulses of a single voice frequency carrier wave and amplifying and detecting apparatus at the called station responsive to the incoming carrier wave impulses to operate the local teleprinter to receive and record an incoming telegraph message.

7. A telephone system as claimed in claim 6 in which a called subscriber's station is provided with delay means responsive to ringing current to connect the local teleprinter equipment to its line and additional means responsive to a subsequent signal from the calling subscriber to put the teleprinter equipment in condition to receive messages.

8. A telephone subscriber's station having an incoming circuit, telephone subscriber's apparatus normally connected thereto and teleprinter apparatus associated therewith, a bridge circuit including a series condenser connected to the apparatus at said station, means at said station while the telephone subscriber's apparatus remains in its normal connection to the incoming circuit for responding when said station is unattended to an incoming call to connect the teleprinter apparatus in said bridge circuit, and means controlled by received teleprinter impulses to establish a direct current circuit loop in lieu of the path through said condenser so that the call may be metered at a central office.

9. A combined telephone and telegraph system comprising a plurality of subscribers' stations, each provided with a printing telegraph transmitter and a printing telegraph receiver adapted for transmission of telegraphic messages of unlimited content, each of said stations also comprising telephone transmitting and receiving apparatus, a central office, talking circuit conductors connected to each of said subscribers' stations and terminating at said central office, means at

each of said stations to enable the subscribers at two connected stations to carry on either telephone communication or telegraph communication at will, means at each subscriber's station connected to the talking circuit conductors at all times when the respective subscriber's station is idle for giving a call signal at the subscriber's station in response to calling currents incoming over the talking circuit conductors whereby a called subscriber may be summoned to his station to respond to a elephone call, and means whereby the subscriber at a calling station without any previous disturbance of the normal connection of the telephone transmitting and receiving apparatus of a remote unattended called station to its local talking circuit conductors may directly control the apparatus of the unattended called station to connect up the printing telegraph receiver thereat and to cause it to record telegraphic messages of unlimited content.

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DISCLAIMER

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Hereby enters this disclaimer to claims 1, 2, and 9 of said Letters Patent.

[*Official Gazette June 28, 1938.*]

each of said stations to enable the subscribers at two connected stations to carry on either telephone communication or telegraph communication at will, means at each subscriber's station connected to the talking circuit conductors at all times when the respective subscriber's station is idle for giving a call signal at the subscriber's station in response to calling currents incoming over the talking circuit conductors whereby a called subscriber may be summoned to his station to respond to a elephone call, and means whereby the subscriber at a calling station without any previous disturbance of the normal connection of the telephone transmitting and receiving apparatus of a remote unattended called station to its local talking circuit conductors may directly control the apparatus of the unattended called station to connect up the printing telegraph receiver thereat and to cause it to record telegraphic messages of unlimited content.

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