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C. S. RHOADS

2,375,136

TELEPHONE SYSTEM

Filed May 5, 1944

2 Sheets-Sheet 1

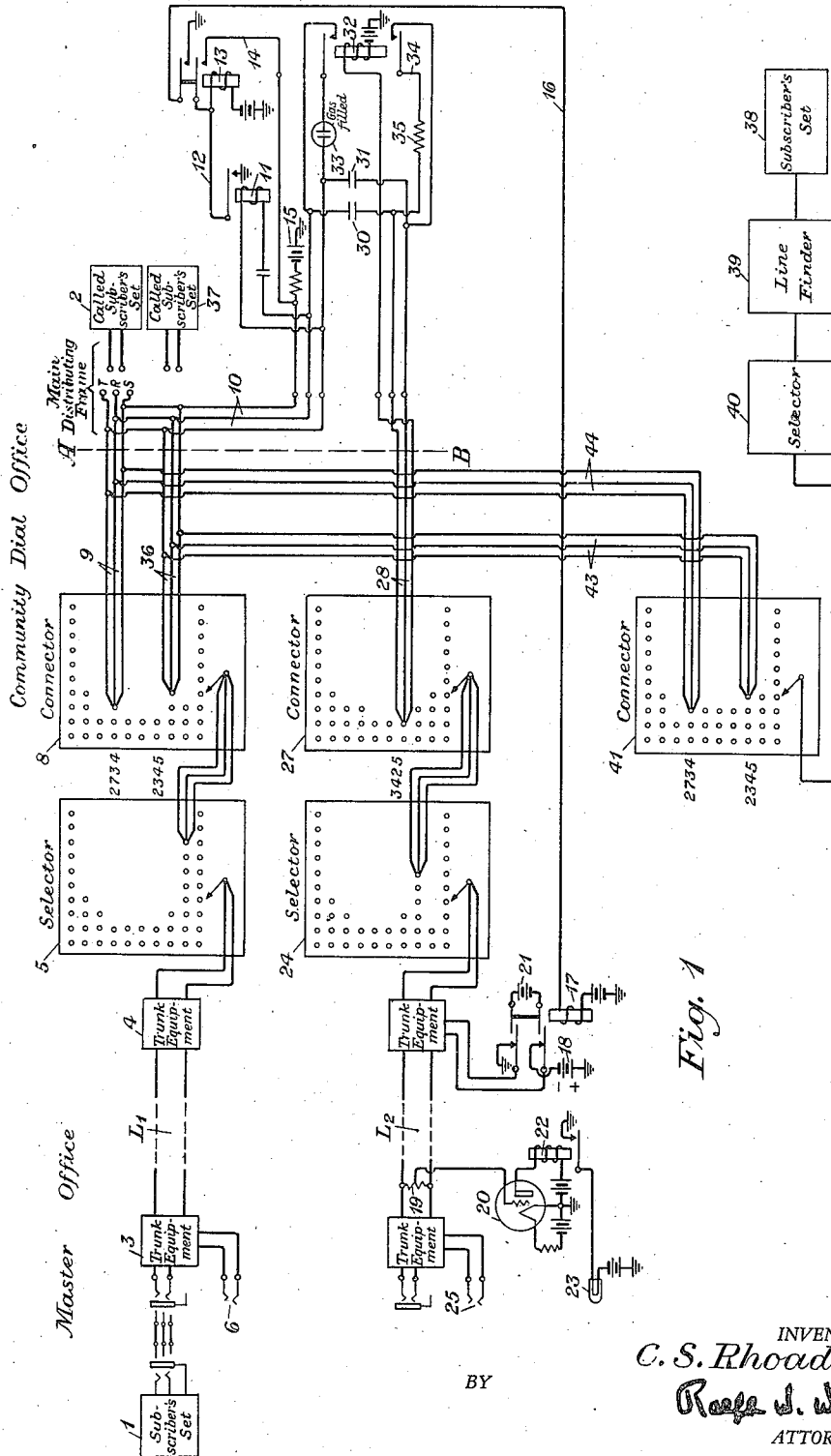


Fig. 1

BY

INVENTOR
C. S. Rhoads
Ralph W. Wolf
ATTORNEY

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2 Sheets-Sheet 2

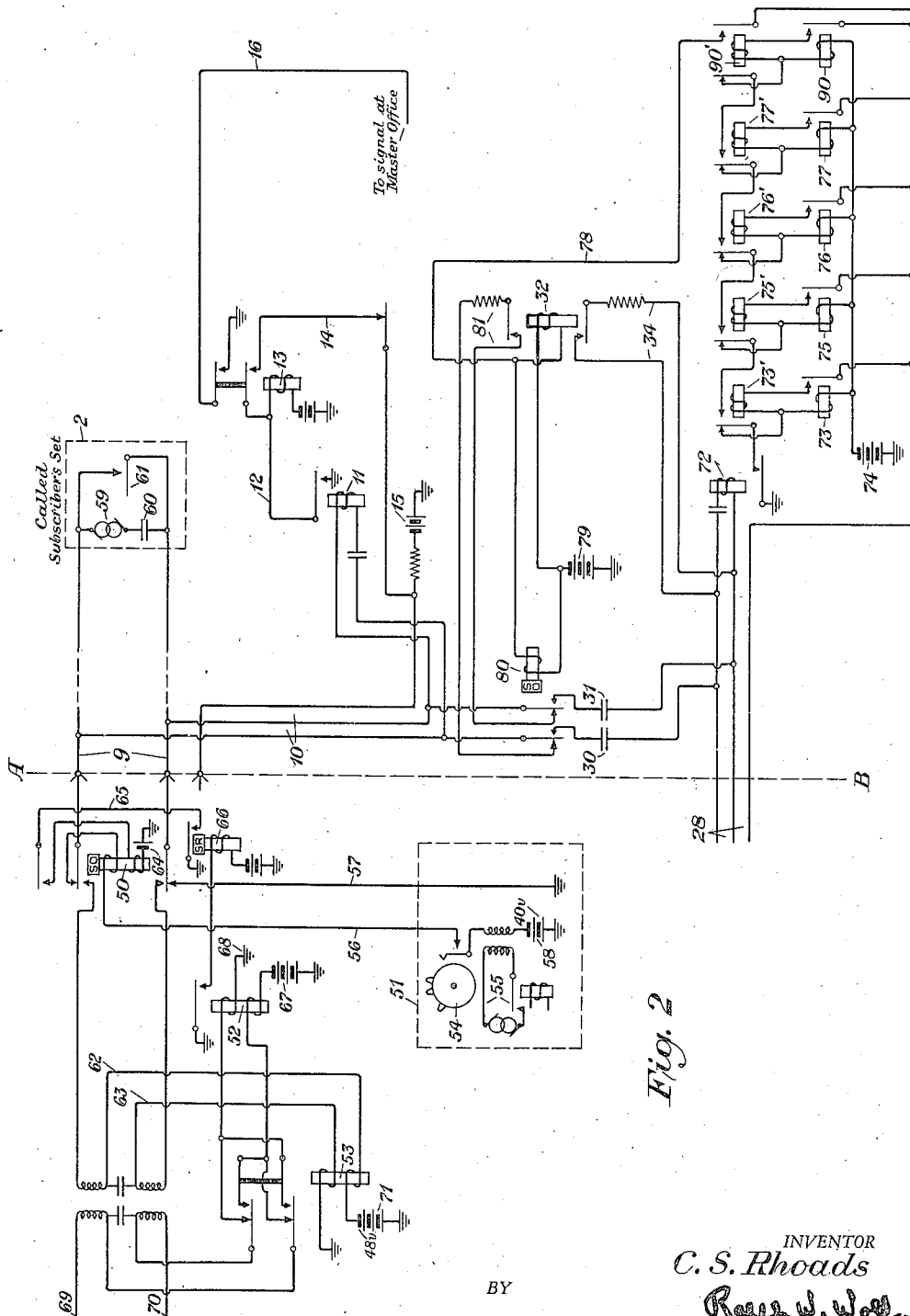


Fig. 2

INVENTOR
C. S. Rhoads
Ray W. Woy
ATTORNEY

UNITED STATES PATENT OFFICE

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TELEPHONE SYSTEM

Charles Stanley Rhoads, Albany, N. Y., assignor
to American Telephone and Telegraph Com-
pany, a corporation of New York

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13 Claims. (Cl. 179—27)

This invention relates to telephone systems and, more particularly, to telephone systems of the machine switching type.

It often happens due, for example, to directory errors or a subscriber moving away from a locality, that calls coming in for his former number must be intercepted by an operator so that the calling party can be informed that such a subscriber is not to be reached at such a number. It is one of the primary objects of this invention to provide arrangements for furnishing an intercept service of this type. The arrangements of the invention are particularly adapted for use at unattended exchanges utilizing machine-switching equipment, which exchanges would be connected to an office having attendants. An example of an exchange of this type would be a community dial office which is usually an office serving a small community by means of step-by-step, panel or cross-bar machine-switching equipment and normally having no attendants. This community dial type of office would be connected with a so-called master office in another locality which would have attendants. With the arrangements of the invention, a call originating either at the master office or at the community dial office and intended for a number at the community dial office may be intercepted by an attendant at the master office. Arrangements have been provided in the past for intercepting a number at an unattended office, but these arrangements have been relatively expensive and have usually been provided only in exchanges having more than five hundred stations. The arrangements of the invention are exceedingly simple and inexpensive and hence can be used to provide intercept service at smaller offices where the expense of other types of apparatus would be prohibitive. Other objects and features of the invention will appear more fully from the detailed description thereof hereinafter given.

The invention may be more fully understood from the following description together with the accompanying drawings in Figures 1 and 2 of which are shown circuit diagrams embodying a preferred form of the invention and a modification thereof. Like reference characters have been used to denote like parts in both of the figures.

In Fig. 1 are shown a number of trunks, such as L_1 and L_2 , connecting a master office, which is the type of office which would have attendants, with an unattended office such, for example, as a community dial office. At the master of-

5 fice is shown a subscriber's set 1. Let it be assumed that the subscriber having this set wishes to call a subscriber such as the one having subscriber's set 2 at the community dial office. The subscriber at the master office would give the called subscriber's number to the operator at the master office. Let it be assumed that the number, for purposes of illustration, would be 2734. The operator at the master office through trunk equipment 3 would connect the subscriber to the trunk L_1 and trunk equipment 4 at the community dial office would connect this trunk to a selector 5. The selector 5 would return a dial tone to the operator at the master office and she would plug dialing equipment into the jack 6 and commence to dial the number 2734. The first group of two dial impulses would cause the switching mechanism of the step-by-step selector to move to its second level of terminals 20 and hunt until an idle trunk, such as 7, was found leading to the connector 8. The connector 8 for purposes of illustration is shown as of the step-by-step type and is well-known in the art. The next group of seven dial impulses 25 would cause the switching mechanism of the connector 8 to move to the seventh level of terminals, and the succeeding group of three impulses would cause it to move to the third terminal in that level whereupon the calling subscriber would be connected to the circuit 9 which would normally lead through a main distributing frame to the called subscriber's set 2. The fourth group of four dialing impulses is used to control ringing apparatus which will be referred to in more detail in the description given hereinafter with respect to Fig. 2. However, for the purpose of illustrating this invention, it will be assumed that the called subscriber's set 2 has been disconnected at the main distributing frame because the subscriber has moved to another locality or for some other reason. Accordingly, it would be desirable to intercept this call so that the subscriber at the master office could be informed that the subscriber's set 2 could not be reached. Accordingly, a circuit connection 10 is provided from the circuit 9 to certain apparatus which will function as follows: When a connection is established between circuits 9 and 10, ringing current will be sent out over the tip and ring conductors of circuits 9 and 10 and will actuate the ringing relay 11. This will close a circuit from ground, contact of relay 11, conductor 12, winding of relay 13 to battery and ground. Relay 13 will operate and lock up over a circuit

completed over its inner upper armature and contact, conductor 14, to ground placed on the sleeve of circuit 9 by the connector. The operation of relay 13 will also complete the following circuit: From ground, upper armature and contact of relay 13, conductor 16, winding of relay 17 to battery and ground. This will operate the relay 17. Before the relay 17 is operated ground is applied to the ring side of the trunk L₂, and the negative pole of battery 18 is connected to the tip side of the trunk L₂. At the master office the midpoint of a resistance 19 is connected to the grid of a vacuum tube 20. Due to the connection of battery 18 to the trunk a negative bias will be applied to the grid of vacuum tube 20 and it will be maintained in an inoperative condition. When relay 17 operates, however, ground and negative battery 18 are disconnected from the trunk 12, and battery 21 is connected across the trunk L₂ in such a manner that the negative bias will be removed from the grid of the tube 20 and it will operate and cause the operation of relay 22. This type of signaling circuit is more completely disclosed in a co-pending application, S. N. 527,914, filed March 24, 1944, in the name of C. S. Rhoads. However, it is understood that any desirable arrangement for signaling over the trunk L₂ by means of the actuation of relay 17 may be utilized. The operation of circuit 22 will operate the signal lamp 23. When the signal lamp 23 operates an operator at the master office will know that a call has originated either at the master office or at the community dial office which must be intercepted because it is for a number not in active use. At the community dial office a certain unlisted number or numbers will be set aside for the intercept service. For example, let it be assumed that the unlisted number 3425 has been set aside for this service. Accordingly, when the lamp 23 lights, the operator will plug into an idle trunk, such as L₂, which will be connected at the community dial office with a selector 24. This will send dialing tone back to the operator at the master office and she will plug dialing equipment into the jack 25 and commence to dial the number 3425. The first group of three impulses will cause the switching mechanism of selector 24 to move to the third level of terminals and select an idle trunk, such as trunk 26, leading to the connector 27. The next group of four dial impulses will cause the switching mechanism of the connector to move to the fourth level of terminals and the succeeding group of two dial impulses will cause it to move to the second terminal thereof, whereupon a connection will be established with the circuit 28. The fourth group of five dialing impulses is used to control ringing apparatus which will be referred to in more detail in the description hereinafter given with respect to Fig. 2. The tip and ring conductors of circuit 28 are connected through condensers 30 and 31 to the tip and ring conductors of the circuit 10 which in turn are connected to the tip and ring conductors of the circuit 9. This will establish a connection from the operator at the master office back over the trunk L₁ to the subscriber having the subscriber's set 1. When the connection is established with circuit 28 by connector 27, ground is applied to the sleeve conductor of circuit 28 which will cause relay 32 to operate. The operation of relay 32 at its upper armature and contact will break the previously traced circuit extending over conductor 16 to the relay

17 and this will release relay 17. This will reconnect the negative side of battery 18 to the tip of trunk L₂, and ground to the ring side of trunk L₂ and replace a negative bias on the grid of tube 20 and cause the tube 20 to become extinguished, whereupon the signal lamp 23 at the master office will be extinguished. The operation of relay 32 at its upper inner contact will bridge a circuit for the gas-filled discharge tube 33 across the tip and ring conductors of circuits 10 and 9. The voltage of the ringing circuit will discharge the tube 33 and this will trip the ringing current on circuits 9 and 10. The operation of relay 32 will also close over its lower armature and contact a circuit 34 across the tip and ring conductors of circuit 28. This will trip the ringing current on circuit 28. The tripping of the ringing current will cause connectors 8 and 27 to complete talking paths therein. The operator at the master office may now inform the subscriber at the set 1 that the called subscriber at the set 2 cannot be reached by using the number 2734, and give him the reason therefor.

The arrangements of the invention may also be used to intercept other calls such, for example, as a call for the number 2345 which would result in a connection being established by connector 8 with circuit 36. This circuit would normally extend from the main distributing frame to a subscriber having the subscriber's set 37. However, this set will have been disconnected from circuit 36 at the main distributing frame. Accordingly, a call coming in for number 2345 would be extended from circuit 36 to circuit 10, whereupon, in the same manner as previously described, the signal lamp 23 at the master office would operate and the operator would dial the unlisted number, such as 3425, whereupon circuit 28 would be connected to circuits 10 and 36 and the operator would then be connected with the subscriber having the set 1 at the master office. She could then inform the said subscriber that the subscriber having set 37 at the community dial office could not be reached for certain reasons.

A subscriber having a subscriber's set 38 at the community dial office might desire to reach the subscriber having the set 2 by dialing the number 2734. In a well-known manner, through the line finder 39, the selector 40 and the connector 41, a connection would be established between the subscriber having set 38 and the circuit 42. This circuit would be connected in multiple with the circuit 9 which, as heretofore pointed out, is connected to the circuit 10. Accordingly, when such a connection is established signal lamp 23 at the master office would light in the same manner as heretofore pointed out, and the operator would then again proceed to dial an unlisted number such as 3425. This would cause the operator to be connected to circuit 28 which in turn is connected to circuits 10 and 9, and circuit 9 is connected to circuit 42. The operator would then be connected to the subscriber having the set 38 and could inform him that the subscriber 2 could not be reached by dialing the number 2734. In a similar manner if the subscriber having set 38, dialed another number, such as 2345, the operator would be connected to him eventually over circuit 43 and could inform him that she was intercepting his call for certain reasons.

Obviously, while the arrangements of the invention have been shown as being able to inter-

cept only two numbers, it would be possible to intercept other numbers by merely establishing connections from connectors 8 and 41 to the circuit 10. When either the subscriber having set 1 or the subscriber having the set 39 is trying to establish a connection with a number such as 2734, and in the process thereof is connected to circuit 9, ground on the sleeve conductor of circuit 9 will connect through the sleeve conductor of circuit 10 to the sleeve conductor of the circuits 36 and 43, and if the number 2345 is called by any other subscriber while the number 2734 is being intercepted by the arrangements of the invention, the subscriber calling such number 2345 will receive a busy tone. When this number 2345 is again called after the interception of the number 2734 is completed, the apparatus will then function to intercept the call for number 2345.

In Fig. 2 certain of the signaling means usually associated with a line, such as 9, are shown in more detail. When a line, such as 9, is seized by a connector there will be associated therewith a tripping relay 50, ringing apparatus 51, a pulsing relay 52 and a relay 53 for reversing the direction of current flow over the line, all of which are well known in the art. As heretofore pointed out the fourth group of impulses of the dialed number controls the application of the proper ringing code to the called line. This fourth group of impulses would cause mechanism (not shown) to pick out a desired code interrupter 54. As this code interrupter rotates its cams would close conductor 56 and ringing current from circuit 55, which was closed when the connector was seized, would be applied to conductor 56 and through an upper winding of tripping relay 50 to the tip of line 9. Ground is connected to the ring side of the line by conductor 57. This ringing current would be applied over line 9 to the bell 59 and condenser 60 at the called subscriber's set 2. The switch-hook contacts are indicated as 61. When the subscriber answers switch-hook contacts 61 would close and this would complete the following circuit: From ground, battery 58 (which might be a 40 volt battery), conductor 56, upper winding of tripping relay 50, tip side of line 9, switch-hook contacts 61, ring side of line 9, conductor 57 to ground. This would operate the tripping relay 50 which is slow to operate. It would lock up over the following circuit: From ground and battery 64, lower winding of relay 50, upper armature and contact of relay 50, conductor 65, to ground over the armature and contact of a slow release relay 66. The relay 66 would have been previously operated over a circuit completed over an armature and contact of the pulsing relay 52. The operation of the tripping relay 50 would disconnect the ringing apparatus from the line 9 and connect the tip and ring conductors thereof over the make contacts of relay 50 to the conductors 62 and 63 which are connected through the windings of relay 53 to ground and talking battery 71 which might have a potential of 48 volts. This would cause relay 53 to operate. Before relay 53 operates battery 67 is connected over an armature and contact of relay 53 to the tip conductor 69 of a line adapted to be extended to the master office and ground 68 is connected over an armature and contact of relay 53 to the conductor 70 of said line. When relay 53 operates this condition is reversed and battery 67 is connected to conductor 70 and ground is connected to conductor 69. This reverses the direction of current flow over the line to the master office and operates a supervisory signal thereat to inform the oper-

ator thereat that the subscriber has answered. If the call originated at a pay station this reversal of current would, when the called party answered, operate mechanism at the pay station to collect the deposited coin. Obviously, if the pay station was calling a party whose set had been removed from the line and which call was to be intercepted, it would be undesirable to have the tripping apparatus of this invention reverse the direction of current flow back over the line to the pay station and cause the coin to be collected. The tripping arrangements of this invention are arranged to prevent this from happening. For example, in the arrangements of the invention shown in Fig. 1 the tripping, as heretofore pointed out, is accomplished by operating relay 32 and bridging across the tip and ring conductors of line 9 a circuit including the gas-filled discharge tube 33. The break down voltage of such a tube would be between 70 and 80 volts and its sustaining voltage might be of the order of 60 volts. Normally, the only voltage across this tube, when relay 32 operates, would be that of battery 58 of Fig. 2. As the voltage of battery 58 is only 40 volts it would neither break down the tube nor hold it operative after breakdown. The ringing current applied to the line by apparatus 51 of Fig. 2 will, however, apply a voltage of approximately 90 volts to the tube 33 and cause it to operate. When it operates it completes a circuit for the tripping relay 50 which cuts off the ringing current. This immediately causes the tube to go out. This happens with sufficient rapidity to prevent the tripping circuit from closing a circuit for relay 53. Hence relay 53 will not operate to reverse the direction of current flow back to the calling pay station and the coin collect apparatus thereat will not function.

In a modification of the arrangements of the invention, shown in Fig. 2, provision is made whereby the tripping of the ringing on the called subscriber's line may be accomplished during the so-called silent period, namely, that period between rings rather than during the ringing period because in certain instances this is more desirable. In Fig. 2 the arrangements to the right of the dotted line A—B would be substituted for the arrangements to the right of the dotted line A—B of Fig. 1. In these arrangements ringing current coming in over a line such as 9 on which the call is to be intercepted, would be transmitted over circuit 10 and would actuate relay 11. Relay 11 in the same manner as described with respect to Fig. 1, would cause the relay 13 to operate and lock up. The operation of relay 13 would close a circuit from ground and its upper contact and armature over circuit 16 to a signal lamp at the master office in the same manner as shown in Fig. 1. When this signal lamp is lighted the operator at the master office would connect with an idle trunk and would dial an unlisted number such as number 3425, referred to in Fig. 1. This would cause a connection to be established through a connector such as 21 at the community dial office with a circuit such as 28. As heretofore pointed out, the fourth group of dialing impulses controls the application of the proper code signal to the circuit 28. The ringing code chosen by the last group of dialing impulses in an instance where it is desired to ring during the so-called silent period might be five short rings which is the longest code in the office. These rings would actuate the relay 72. The first actuation of relay 72 would close a circuit to battery 74 for the

relay 73. The operation of relay 73 would close a circuit from battery 74 through the windings of relays 73 and 73' and over the contact and armature of relay 73 to ground (not shown) connected to the sleeve of circuit 28. This would lock up relay 73'. The next operation of the relay 72 would close a circuit over the armature and make contact of relay 73' for the relay 75. This would operate the relay 75 which in turn would cause the relay 75' to lock up. The next three succeeding impulses would cause the relays 76 and 76', 77 and 77' and 90 and 90' to operate and lock up. This would connect ground on the sleeve of circuit 28 over the armature and contact of relay 90' to the conductor 78 and thence through the winding of relay 32 to battery 79. It would also complete a parallel circuit through the winding of relay 80 which is a slow-operate relay. Accordingly, it will be seen that the relay 32 will not operate until a definite interval after the ringing code has been applied to circuit 28 or until the so-called silent period has been reached. When relay 32 operates it closes a tripping circuit 81 over the break contacts and armature of relay 80. This will trip the ringing current on the line 9. As relay 80 is slow-operate it will not function at the same instant as relay 32 but will operate a short interval thereafter. This will disconnect the tripping circuit 81 from the line 9 and prevent the operation of the relay 53. As relay 53 is not operated the current transmitted back over the line to the calling station is not reversed and if the calling station happens to be a coin box the coin collect apparatus thereat will not function. The operation of relay 80 in addition to removing the tripping circuit 81 from the line 9, also connects circuit 10 through condensers 30 and 31 to the circuit 28 thereby establishing a talking path between circuits 9 and 28 and enabling the operator at the master office to inform the calling party the reason for intercepting the call. The operation of relay 32 will also close a tripping circuit to trip the ringing on circuit 28.

It is pointed out that the arrangements of the invention have been disclosed as particularly applicable to a community dial office. However, it is understood that they are not so limited but may be used with other types of offices. While the arrangements of the invention have been disclosed as embodied in certain specific forms, it is understood that they are capable of embodiment in other and widely varied forms without departing from the spirit of the invention as defined by the appended claims.

What is claimed is:

1. A telephone system including an unattended exchange having two connectors, a telephone line on which incoming calls are to be intercepted connected to a terminal in one of said connectors which may be reached by dialing a designated number, means for connecting said telephone line to a terminal in the other connector which may be reached by dialing another designated number, and means responsive to the dialing of said first number for transmitting a signal to an attended exchange.

2. A telephone system including an unattended exchange having two connectors, a telephone line on which incoming calls are to be intercepted connected to a terminal in one of said connectors which may be reached by dialing a designated number, means for connecting said telephone line to a terminal in the other connector which

may be reached by dialing another designated number, means responsive to the dialing of said first number for applying ringing current to said telephone line to cause the transmission of a signal to an attended exchange, and means responsive to the dialing of said second number for tripping said ringing current.

3. A telephone system including an unattended exchange having two connectors, a telephone line on which incoming calls are to be intercepted connected to a terminal in one of said connectors which may be reached by dialing a designated number, means for connecting said telephone line to a terminal in the other connector which may be reached by dialing another designated number, means responsive to the dialing of said first member for applying ringing current to said telephone line to cause the transmission of a signal to an attended exchange, and means responsive to the dialing of said second number for bridging a circuit including a gas filled discharge tube across said telephone line to trip said ringing current.

4. A telephone system including a trunk interconnecting two exchanges, operator's equipment adapted to be connected to said trunk at the first exchange, a connector at the second exchange, a circuit on which incoming calls are to be intercepted connected to one of the terminals of said connector, means responsive to an incoming call on said circuit for transmitting a signal to said operator's equipment, a second connector at the second exchange, and means for connecting said circuit on which calls are to be intercepted to one of the terminals of said second connector whereby when a connection is established over said trunk between said last mentioned terminal and said operator's equipment said calls may be intercepted.

5. A telephone system including a trunk interconnecting two exchanges, operator's equipment adapted to be connected to said trunk at the first exchange, a connector at the second exchange, circuits on which incoming calls are to be intercepted connected to certain of the terminals of said connector, means responsive to an incoming call on any of said circuits for transmitting a signal to said operator's equipment, a second connector at the second exchange, and means for connecting all of said circuits on which calls are to be intercepted to a designated one of terminals of said second connector whereby when a connection is established over said trunk between said last mentioned terminal and said operator's equipment said calls may be intercepted.

6. A telephone system including trunks interconnecting two exchanges, a calling subscriber's set at the first exchange and a called subscriber's set at the second exchange, a connector at the second exchange adapted to be connected to the calling subscriber's set, a circuit connected to one of the terminals of said connector and adapted to be extended to the called subscriber's set, a second connector at the second exchange adapted to be connected to operator's equipment at the first exchange, a circuit extending from one of the terminals of said second connector to said first mentioned circuit, and means responsive to signaling current transmitted over said first circuit for transmitting a signal over one of said trunks to the operator's equipment at the first exchange.

7. A telephone system including trunks interconnecting two exchanges, a calling sub-

scriber's set at the first exchange and a called subscriber's set at the second exchange, a connector at the second exchange adapted to be connected to the calling subscriber's set, a circuit connected to one of the terminals of said connector and adapted to be extended to the called subscriber's set, a second connector at the second exchange adapted to be connected to operator's equipment at the first exchange, a circuit extending from one of the terminals of said second connector to said first mentioned circuit, means responsive to signaling current transmitted over said first circuit for transmitting a signal over one of said trunks to the operator's equipment at the first exchange, and means responsive to signaling current transmitted over said second circuit for causing the transmission of said signal to cease

8. A telephone system including a trunk interconnecting two exchanges, operator's equipment adapted to be connected to said trunk at the first of said exchanges, a connector at the second exchange adapted to be connected to a calling subscriber thereat, a circuit connected to one of the terminals of said connector and adapted to be extended to a called subscriber at said second exchange, a second connector at the second exchange adapted to be connected by said trunk to said operator's equipment at said first exchange, a circuit extending from one of the terminals of said second connector to said first mentioned circuit, and means responsive to signaling current transmitted over said first circuit for transmitting a signal over said trunk to said operator's equipment at said first exchange.

9. A telephone system including trunks interconnecting two exchanges, a calling subscriber's set at the first exchange and a called subscriber's set at the second exchange, a connector at the second exchange adapted to be connected to the calling subscriber's set, a first circuit connected to one of the terminals of said connector and adapted to be extended to the called subscriber's set, means responsive to the establishment of a connection with said first circuit at said connector for applying ringing current to said first circuit, means responsive to said ringing current for transmitting a signal over one of said trunks to operator's equipment at the first exchange, a second connector at the second exchange adapted to be connected to operator's equipment at the first exchange, a second circuit extending from one of the terminals of said second connector to said first circuit, means responsive to the establishment of a connection with said second circuit at said second connector for applying ringing current to said second circuit, and means operated when a connection is established with said second circuit at said second connector for tripping the ringing current applied to said first and second circuits.

10. A telephone system including an unattended exchange having two connectors, a telephone line on which incoming calls are to be intercepted connected to a terminal in one of said connectors which terminal may be reached by dialing a designated number, said telephone line having apparatus associated therewith and operative when the line is seized at said connector for applying ringing current to the line and apparatus for reversing the connection of talking battery to the line at the expiration of a certain interval after the ringing current is tripped, means responsive to the application of said ring-

ing current to said line for transmitting a signal to an attended exchange, a normally open circuit for connecting said telephone line to a terminal in the other connector which terminal may be reached by dialing another designated number, a tripping circuit connected to said normally open circuit, means responsive to the dialing of said second number for closing said tripping circuit, for subsequently disconnecting it from said normally open circuit and for closing said normally open circuit, said last mentioned means being adapted to function before said apparatus for reversing the connection of talking battery to said line has functioned.

11. A telephone system including an unattended exchange having two connectors, a telephone line on which incoming calls are to be intercepted connected to a terminal in one of said connectors which terminal may be reached by dialing a designated number, said telephone line having apparatus associated therewith and operative when the line is seized at said connector for applying ringing current to the line and apparatus for reversing the connection of talking battery to the line at the expiration of a certain interval after the ringing current is tripped, means responsive to the application of said ringing current to said line for transmitting a signal to an attended exchange, a normally open circuit for connecting said telephone line to a terminal in the other connector which terminal may be reached by dialing another designated number, a slow operate relay, a tripping circuit for tripping the ringing current applied to said line connected to said normally open circuit over the break contacts of said relay, a second relay, means responsive to the dialing of said second number for operating said slow operate relay and said second relay, means controlled by the operation of said second relay for closing said tripping circuit and means controlled by the subsequent operation of said slow operate relay for closing said normally open circuit and for disconnecting the tripping circuit therefrom.

12. A telephone systems including an unattended exchange having two connectors, a telephone line on which incoming calls are to be intercepted connected to a terminal in one of said connectors which terminal may be reached by dialing a designated number, said telephone line having apparatus associated therewith and operative when the line is seized at said connector for applying ringing current to the line and apparatus for reversing the connection of talking battery to the line at the expiration of a certain interval after the ringing current is tripped, means responsive to the application of said ringing current to said line for transmitting a signal to an attended exchange, a normally open circuit for connecting said telephone line to a terminal in the other connector which terminal may be reached by dialing another designated number, a slow operate relay, a tripping circuit for tripping the ringing current applied to said line connected to said normally open circuit over the break contacts of said relay, a second relay, means responsive to the dialing of said second number for operating after a definite time interval said slow operate relay and said second relay, means controlled by the operation of said second relay for closing said tripping circuit and means controlled by the subsequent operation of said slow operate relay for closing said normally

open circuit and for disconnecting the tripping circuit therefrom.

13. A telephone system including an unattended exchange having two connectors, a telephone line on which incoming calls are to be intercepted connected to a terminal in one of said connectors which terminal may be reached by dialing a designated number, said telephone line having apparatus associated therewith and operative when the line is seized at said connector for applying ringing current to the line and apparatus for reversing the connection of talking battery to the line at the expiration of a certain interval after the ringing current is tripped, means responsive to the application of said ringing current to said line for transmitting a signal to an attended exchange, a normally open circuit for connecting said telephone line to a terminal in the other connector which terminal may be reached by dialing another designated number, a slow operate relay, a tripping circuit for tripping the ringing current applied to said line connected to said normally open circuit over the break contacts of said relay, a second relay, a chain of counting relays adapted to be operated successively in response to the dialing of said second number, means controlled by the operation of the last relay in said chain for operating said slow operate relay and said second relay, means controlled by the operation of said second relay for closing said tripping circuit and means controlled by the subsequent operation of said slow operate relay for closing said normally open circuit and for disconnecting the tripping circuit therefrom.

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CHARLES STANLEY RHOADS.