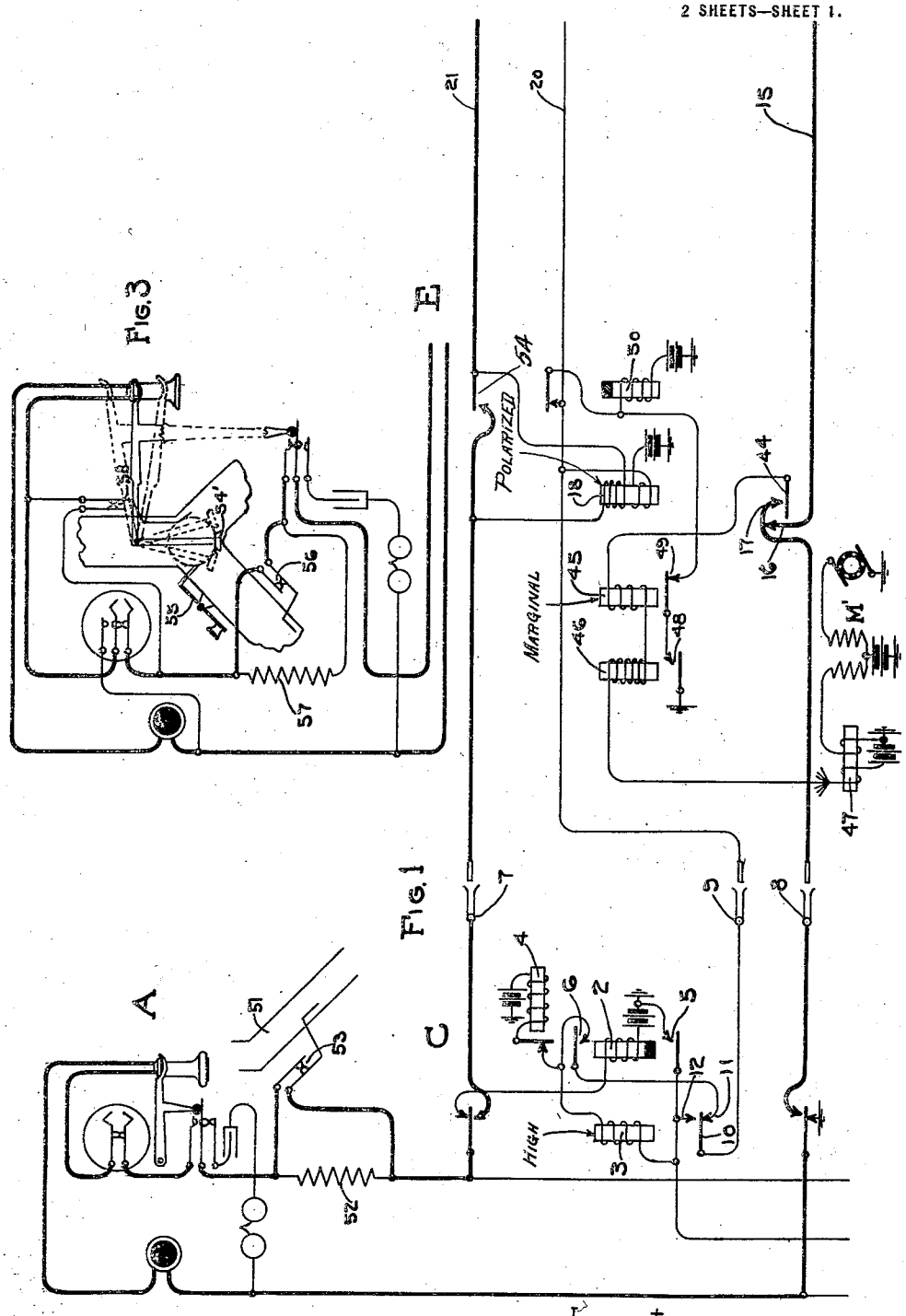
E. JACOBSEN.

MEASURED SERVICE TELEPHONE SYSTEM.

APPLICATION FILED FEB. 12, 1919.

1,376,814. Patented May 3, 1921.

2 SHEETS—SHEET 1.



—Inventor—

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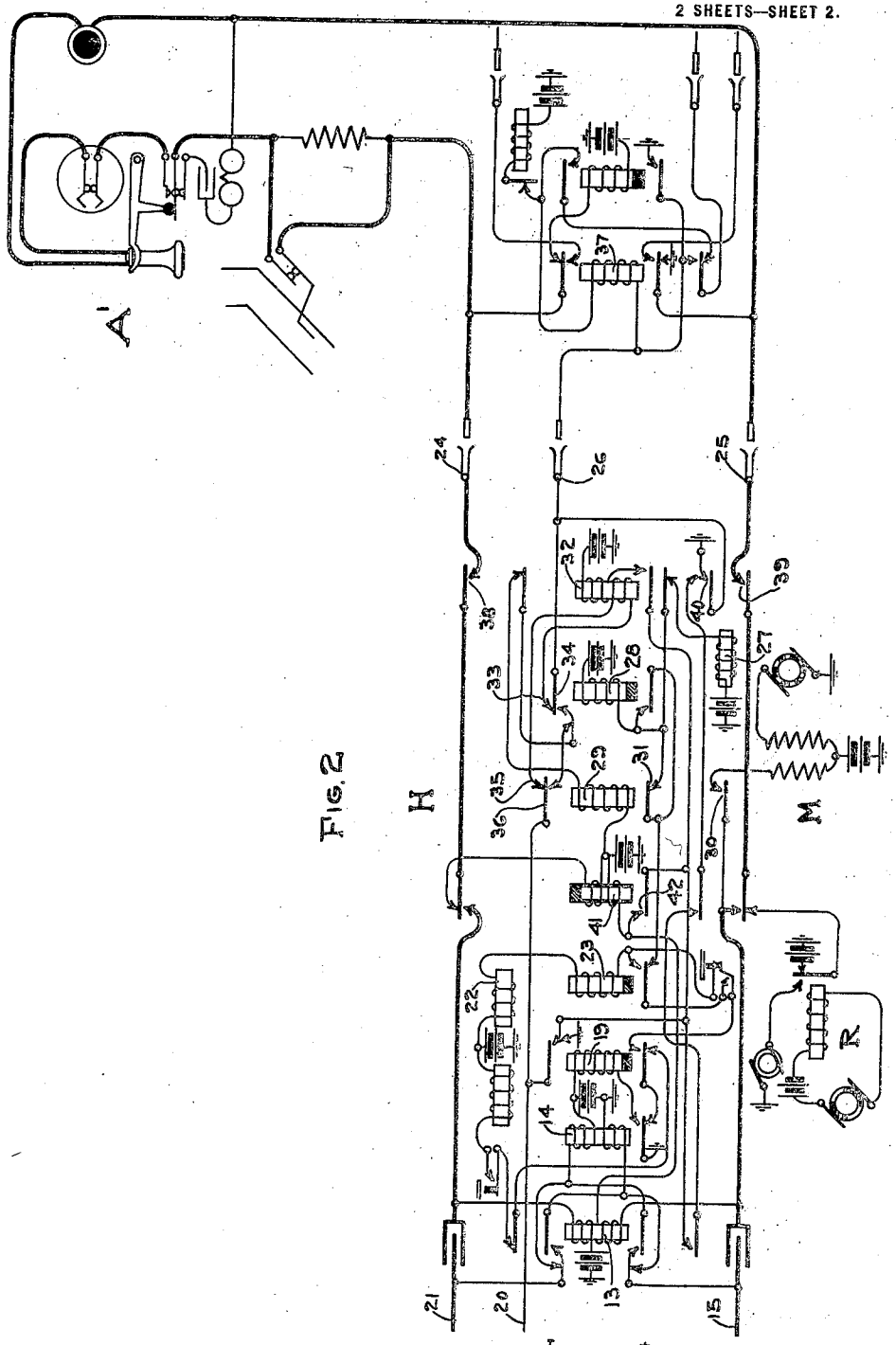


FIG. 2

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UNITED STATES PATENT OFFICE.

EMIL JACOBSEN, OF NEW YORK, N. Y., ASSIGNOR TO AUTOMATIC ELECTRIC COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

MEASURED-SERVICE TELEPHONE SYSTEM.

1,376,814. Specification of Letters Patent. Patented May 3, 1921.

Application filed February 12, 1919. Serial No. 276,623.

To all whom it may concern:

Be it known that I, EMIL JACOBSEN, a citizen of the United States of America, and a resident of borough of Bronx, county of Bronx, city and State of New York, have invented certain new and useful Improvements in Measured-Service Telephone Systems, of which the following is a specification.

My invention relates in general to measured service telephone systems or others in which paystation service is desired and in which a calling subscriber must deposit a token of some sort before he can converse with a called subscriber.

Objects of my invention are to provide an improved paystation device of much more simple construction than that used in the past and to so arrange the controlling mechanism thereof, that instead of a complete paystation device being individual to each telephone, only a small part of such a device may be necessary to each phone, while the controlling apparatus may be installed at the central office in connection with trunk lines. And as such trunk lines are common to a number of subscribers, it will be seen that only a few of these so called controlling mechanisms will be necessary for a number of phones, depending upon the trunking percentage. A saving of this sort will of course be of considerable value as the usual paystation device in use in the past has been a complicated mechanism which adds considerable to the cost of a subscriber's instrument.

In my improved device the only addition necessary to the substation is a coin chute which controls a single pair of springs as a coin drops down to remove a short circuit from a high resistance for a purpose to be pointed out. Associated with each trunk line is a group of relays for accomplishing the results previously accomplished by the paystation, that is, the rendering inoperative of the subscriber's instrument on the calling line after the called subscriber answers and until a coin is deposited. I will now point out in detail the circuits and method of operation by reference to the accompanying drawings in which I have illustrated my invention.

Figures 1 and 2 represent one embodiment of my invention in connection with a telephone system of the well known Strowger type of automatic telephone although it is to be understood that it may be used as well in any other type of system. In Fig. 1 is shown a substation A equipped with the usual transmitter and receiver and a calling device with the addition of a coin chute which will carry a coin into contact with a pair of springs which normally short circuit a resistance in series with the line circuit. A line switch C of the well known rotary type has access to a number of trunk lines leading to connectors such as H (Fig. 2).

Associated with each trunk line is a group of relays E which control the line circuit. Fig. 3 shows a modification of the device of Fig. 1, which may be used in the same manner except that in Fig. 3 the coin must be deposited before a call and is then either returned or collected depending upon the result of the call.

When a subscriber at substation A removes his receiver to initiate a call a circuit is closed for the line relay 2 of the line switch C which energizes to close a series circuit for switching relay 3 in series with the operating magnet 4 at the springs 5 and also to close a short circuit at springs 6 around relay 3. Now if the wipers are standing upon a busy trunk line, a ground will be present on the private trunk conductor which passes over the private wiper 9 through springs 10 and 11, springs 6, and through the rotary magnet 4 to battery. Magnet 4 will operate to step the wipers 7, 8 and 9 over busy contacts until an idle trunk line is found, at which time no ground will be present at private wiper 9 and relay 3 being no longer shorted out will energize over the series circuit above traced, its high resistance preventing magnet 4 from energizing. Relay 3 upon energizing, connects the line of substation A through to the wipers 7 and 8 and disconnects the line relay 2 and ground from the line circuit. Relay 2 being slow acting maintains the springs 5 closed to hold relay 3 energized until ground is supplied from the switch ahead over wiper 9 to hold said relay energized through springs 10 and 12. As soon as the line is cut through in this manner a circuit is closed for the line relay 14 of connector H from ground through its lower winding, springs of back bridge relay 13, conductor 15, springs 16 and 17, wiper 8, substation

A, wiper 7, upper winding of a polarized relay 18, conductor 21, upper springs of relay 13, and upper winding of line relay 14 to battery. Relay 14 immediately energizes and closes a circuit for release relay 19 which in turn connects ground to the holding trunk 20. This ground passes through the lower polarizing winding of the relay 18 to neutralize the same and prevent its energization and also holds relay 3 of switch C energized.

As the calling subscriber now operates his calling device for the first digit of the called number, relay 14 responds to deliver a corresponding number of impulses to the vertical magnet 22 through springs of relay 19 and through slow relay 23 in series. The wipers 24, 25 and 26 are thereby stepped up to a desired level in the connector banks and relay 23 upon deenergizing after this series of impulses prepares a circuit for the rotary magnet 27 and slow relay 28 in the usual manner. Relay 14 in response to the next series of impulses, responds to operate the rotary magnet 27 to step the wipers 24, 25 and 26 to a set of contacts corresponding to the desired line and relay 28 remains energized for an interval after this series of impulses to hold the busy test relay 29 in connection with the private wiper 26, so that, if the called line is busy and ground is present on wiper 26, relay 29 will energize and lock energized to connect a busy tone to the calling line through springs 30 and open the rotary magnet circuit at springs 30.

If the called line is idle, however, and no ground is present on the private conductor thereof then relay 29 will not energize and relay 28 upon falling back closes a circuit for the cut on relay 32 from wiper 26, through springs 33 and 34, lower winding of relay 32, springs 35 and 36, and springs of selector 19 to ground. Relay 32 energizes in series with the relay 37 of the called line switch, which also energizes to disconnect the magnets of the called line. Relay 32 closes the springs 38 and 39 in the talking circuit, connects ground direct to the private wiper through springs 40, opens the circuit of rotary magnets 27, and closes a locking circuit for itself through its upper winding independent of wiper 26. As soon as springs 38 and 39 close contact the ringing machine R becomes effective to intermittently connect ringing current and battery to the called line through the winding of a ring cut off relay 41. As soon as the called subscriber responds and removes his receiver relay 41 energizes to disconnect the ringing circuit and its own winding from the called line and connect said line instead to the windings of the usual back bridge battery supply relay 13. Relay 41 also closes a locking circuit for itself at springs 42 and connects ground through said springs to one winding of back bridge relay 13. Relay 13 will now energize to reverse the connections of the line relay 14 with regard to the trunk conductors 21 and 15, thereby reversing the current flow in the calling line and through the upper winding of the electro polarized relay 18 in the group of relays E.

Relay 18 which has not energized heretofore, now has the current in each winding in such a direction as to assist each other and will therefore attract its armature to open the springs 16 and 17 in the talking circuit and close the springs 17 and 44 in contact. The result is that the circuit from springs 44, through relays 45, 46 and one winding of a common coil 47 is substituted in series with the calling line circuit in place of the upper winding of the line relay 14 of connector H. This circuit extends from ground through the lower winding of relay 14, front contact of relay 13, conductor 21, upper winding of relay 18, substation A, and back through wiper 8 of switch C, through springs 17 and 44, relay 45, relay 46, and left hand winding of relay 47 to battery. Relays 45 and 46 both energize over this circuit and the line relay 14 remains energized to prevent the release of the switches. The other winding of the common relay 47 is connected in a local circuit with a busy machine M′ of a tone usually of a different character than the machine M (Fig. 2) so that they may be distinguished. This tone will of course be supplied to the calling subscriber and will indicate to the subscriber that the called for party has answered and that he must now deposit a coin before he may converse. It will be seen that the calling man cannot converse with the called man as long as the springs 16 and 17 are open. Relay 46 upon energizing closes one point at springs 48 in the circuit of the slow relay 50 while relay 45 at the same time opens another point at springs 49 in the same circuit.

The calling subscriber will, upon hearing the tone from the machine M′ deposit a coin in the chute 51 at the substation. This coin in passing down the chute momentarily opens the shunt around the high resistance 52 by opening the springs 53. The inclusion of this high resistance 52 in the line circuit in series with the relays 45, 46 and 14 has no effect on relay 14 and 46 but causes the relay 45 which is marginal to fall back and close the springs 49 to complete the circuit of the relay 50. Relay 50 now energizes and locks itself to ground on the release trunk 20 and closes the springs 54 which shunt out the upper winding of the polarized relay 18. Relay 18 is so constructed that it will not energize or remain energized when its lower winding alone is energized nor will it energize when its two windings are in opposition so it will fall back when its upper winding

is shorted out and again open the circuit of relays 45 and 46 and complete the talking circuit at springs 16 and 17. The subscribers may now converse in the usual way over the heavy conductors shown and upon hanging up their receivers the switches will be released in the usual manner by the falling back of the line relay 14 of the connector H, which closes a circuit for the release magnet of the connector and removes ground from conductor 20 to release the line switch and also to allow relay 50 to deënergize.

Referring now to the substation shown in Fig. 3, this substation is similar to that shown in Fig. 1 except that it is arranged to receive the coin before a call is extended, and will be used with the same equipment E as is shown in Fig. 1. In this case I use a three position switch hook, that is, one which when the receiver is removed passes to intermediate position as shown, where it is held by a catch and when the catch is removed, passes to third or upper position as shown by dotted lines. In making a call over such a substation the receiver is first removed and the coin deposited in the chute. The coin comes to rest on the part 54′ of the switch hook and is thus held from passing down either the return or collect chutes. Now as the receiver is allowed to pass to its third position the part 54′ stands as shown in dotted lines, so that the return chute is effectively closed, while the coin is now held from passing down the collect chute only by the end of a push button 55. Now after a call has been made over a trunk line having relays such as E (Fig. 1) and after the relay 18 has opened the line circuit and given a tone to the calling subscriber he will then press the button 55 to release and collect the coin. The coin in passing down the collect chute opens the springs 56 as in Fig. 1 and includes the resistance 57 in the line circuit to operate relay 45 and relay 50. If the call were unsuccessful then when the receiver is hung up the part 54′ will be tipped in the opposite direction so that the coin may be returned. It will be seen that the coin must be deposited before the call, as it must open the springs 58 and remove the short circuit controlled thereby around the calling device springs.

It will be seen therefore that I have provided a very efficient method of handling pay-station calls without the usual expensive and intricate pay-station device. The substation having only the coin chute and the high resistance while the relays E are common and less in number than the lines and altogether provide a satisfactory method of charging.

Having fully described and ascertained the features and aspects of my invention what I consider to be new and desire to have protected by Letters Patent will be pointed out in the appended claims.

What I claim as my invention is:

1. In a telephone exchange system, subscribers' lines, means for establishing a talking circuit between said lines through the central exchange, means for opening said talking circuit at the exchange when a called subscriber answers, and means controlled by the calling subscriber for again closing the said talking circuit.

2. In a telephone system, subscribers' lines, means for establishing a talking circuit between said lines including a trunk line, means for opening a conductor of said trunk line and signaling the calling subscriber when a called subscriber answers, and means controlled by the calling subscriber for again closing the said talking circuit.

3. In a telephone system, a calling line, a switch for said line, means for extending a talking circuit from said switch over a trunk line to a called line, a coin chute on the calling line, means in said trunk line controlled from the called line to render the calling line inoperative by opening a conductor of said trunk line, and means controlled by the calling subscriber through the medium of said coin chute for rendering said talking circuit operative.

4. In a telephone system, a calling line, a switch for said line, means for extending a talking circuit from said switch to a called line, a coin chute on the calling line, means in said talking circuit controlled from the called line to render the calling line inoperative by opening the talking circuit between said switch and the called line and give the calling subscriber a signal, and means controlled by the calling subscriber through the medium of said coin chute for rendering said talking circuit operative.

5. In a telephone system, a calling line, a switch for said line, means for extending a talking circuit from said switch to a called line, a coin chute on the calling line, means in said talking circuit controlled from the called line to render the calling line inoperative by opening the talking circuit at a point between said switch and the called line, and means controlled by the calling subscriber through the medium of said coin chute for rendering said second means inoperative.

6. In a telephone system, a plurality of subscribers' lines, a group of trunk lines common to said subscribers' lines for extending connections therefrom, means individual to each trunk line controlled by a called subscriber when a connection is extended over the associated trunk line for preventing the calling subscriber from conversing with the called subscriber, and means controlled by the calling subscriber for rendering said first means inoperative.

7. In a telephone system, a subscribers'

line, means for extending a talking circuit from said line to a called subscriber, means controlled by the called subscriber for opening said talking circuit, a marginal relay in said talking circuit, and means controlled by a calling subscriber for operating said marginal relay to again close said talking circuit.

8. In a telephone system, a calling line, a resistance in series with said line normally short-circuited, means for extending a talking circuit from said line to a called subscriber, means controlled by the response of the called subscriber for opening said talking circuit without releasing the extended connection, and means controlled by the calling subscriber for removing the short circuit from said resistance to again close said talking circuit.

9. In a telephone system, a substation having a coin chute for receiving a coin, means in the path of the coin for including a resistance in the line circuit of the substation, means for extending a connection from said line to a called line over a trunk line, a relay associated with said trunk line for rendering the calling substation inoperative for talking when a called subscriber answers, and means responsive to the inclusion of said resistance for restoring said substation for talking.

10. In a telephone system, a plurality of lines, an automatic switch for each line, a plurality of trunks common to said switch and accessible thereto for extending connections from said line, a polarized relay for each trunk line, means controlled by a called subscriber for operating said relay to prevent conversation between a calling and a called line, and means at a calling substation for rendering said relay inoperative and allowing conversation to proceed.

11. In a telephone system, a plurality of lines, an automatic switch for each line, a plurality of trunks common to said switches and accessible thereto for extending connections from said line, a polarized relay for each trunk line, means controlled by a called subscriber for operating said relay to prevent conversation between a calling and a called line, and a coin controlled device at a calling substation for rendering said relay inoperative and allowing conversation to proceed.

12. In a telephone system, a calling line, means for extending a talking circuit from said line to a called subscriber, means controlled by the response of the called subscriber for disconnecting one side of said talking circuit from the called substation and connecting it to a signaling circuit, a marginal relay and means controlled by the calling subscriber for operating said relay to disconnect said talking circuit from said signaling circuit and connect it again to the called subscriber.

Signed by me at New York, county of New York, State of New York, this 4th day of February, 1919.

EMIL JACOBSEN.