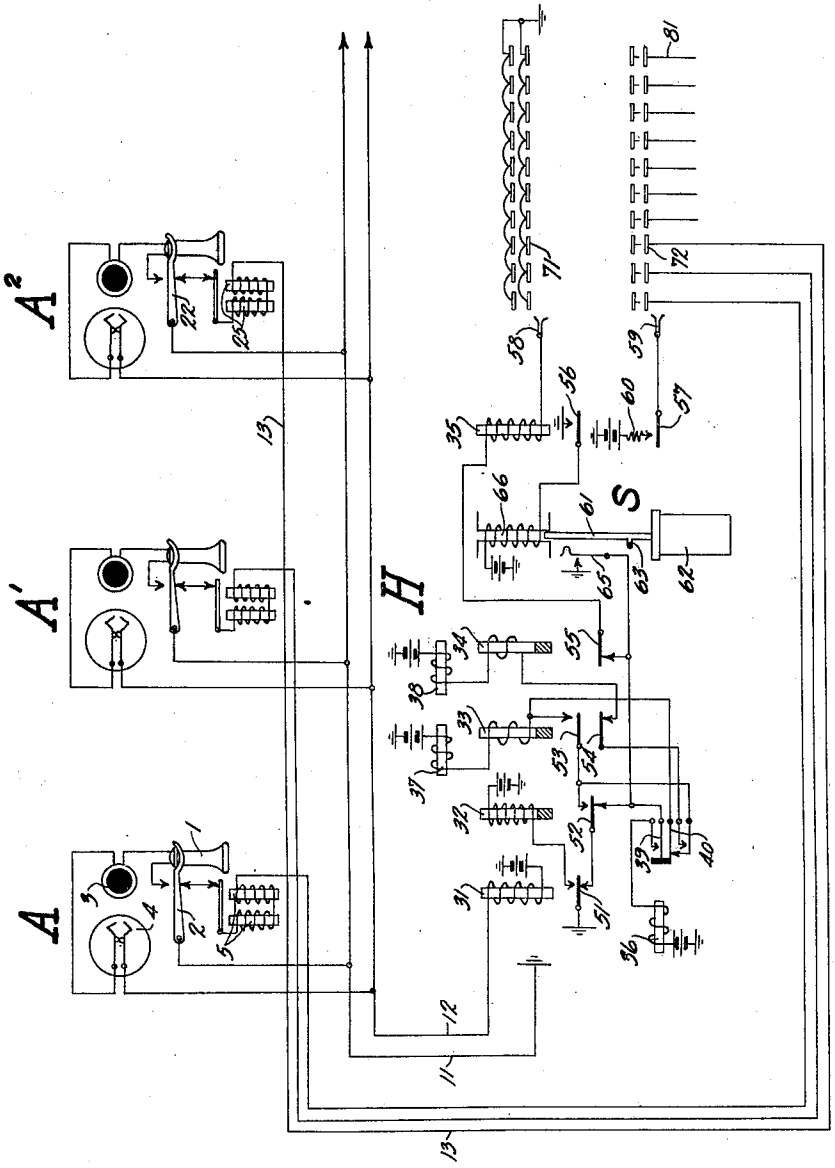
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AUTOMATIC TELEPHONE SYSTEM

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AUTOMATIC TELEPHONE SYSTEM.

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This invention relates in general to automatic telephone systems and its object, broadly stated, is to provide a new and improved common talking selective signalling system. More specifically, the object of the invention is to provide an inexpensive system for private installations, comprising a common talking line with a plurality of substations thereon, together with a connector switch to furnish individual or selective signalling.

To accomplish the foregoing and other useful ends this invention comprises means which will be fully described in the specification which is to follow, reference being had to the accompanying drawing, which shows diagrammatically the apparatus and circuits involved in a system embodying the invention.

The substation A, A^1, and A^2 are all connected in bridge of a single pair of talking conductors and may be of any approved automatic type. As shown at A, they comprise essentially the receiver 1, switch-hook 2, transmitter 3, calling device 4, and buzzer 5.

The common line conductor 11, of the substations, is grounded at the connector H, while the common line conductor 12 is connected to the line relay of the connector, which is mechanically of the well-known vertical and rotary type of switch and has its bank contacts arranged in horizontal rows or levels. All the contacts in the upper bank of the connector, the contacts adapted to be engaged by wiper 58, are grounded, while the contacts of the lower bank, associated with wiper 59, are connected to the individual signalling conductors such as 13 extending to the several substations, such as A^2.

Associated with the connector is a control mechanism S, consisting essentially of the solenoid 66, which pulls the plunger 61 up when current flows through the former. In order to secure the proper slowness of operation of the plunger the dash-pot 62 is associated with the lower end thereof. This dash-pot may be of any well known design.

Having given a brief description of the apparatus, the operation of same will now be explained more in detail. For this purpose, it will be assumed that the subscriber at station A desires to call the subscriber at station A^2, on the common talking line. In order to do this, the subscriber at station A removes his receiver and then dials the number of station A^2.

When the receiver is removed at substation A, line relay 31 energizes over a circuit from ground, line conductor 11, switch-hook 2 and its working contact, receiver 1, transmitter 3, calling device 4, line conductor 12, relay 31, to grounded battery. Upon energizing, line relay 31 closes a circuit at armature 51 for slow acting release relay 32. Release relay 32, upon energizing, prepares a circuit for the vertical magnet 37 at its armature 52.

The calling subscriber A may now proceed to operate his calling device in accordance with the first digit in the desired number, which in this case is 1. As a result one interruption is produced in the circuit of the line relay 31. In response to the single deenergization of line relay 31, an impulse of current is sent to vertical magnet 37 over the following circuit: from ground by way of armature 51 and its resting contact, armature 52 and its working contact, resting contact of off normal spring 40 and said spring, slow acting series relay 33, and vertical magnet 37 to grounded battery. Series relay 33, upon energizing, opens the circuit to the rotary magnet 38 at armature 54; and closes a second circuit for itself and vertical magnet 37 at armature 53 for use after the off normal springs have shifted, as they do upon the first vertical step. By the operation of vertical magnet 37, the switch wipers 58 and 59 are raised opposite the first level of bank contacts. At the end of the vertical movement, relay 33 deenergizes and transfers the operating circuit from the vertical to the rotary magnet.

The calling subscriber may now operate his calling device in accordance with the second digit in the desired number, which in this case is 3. As a result three interruptions are produced in the circuit of the line relay 31. In response to each of the resulting deenergizations of line relay 31, an impulse of current is sent to rotary magnet 38 over the following circuit: from ground by way of armature 51 and its resting con-

tact, armature 52 and its working contact, normally open contacts controlled by off normal spring 40, armature 54 and its resting contact, slow acting relay 34, and rotary magnet 38 to grounded battery. By the operation of rotary magnet 38, the wipers 58 and 59 are rotated step by step into engagement with the contacts 71 and 72, respectively, the former being grounded and the latter being connected with the signaling conductor of the called substation. Relay 34, upon energizing, opens the circuit of relay 35 at armature 55 and, being slow acting, retains its armature attracted throughout the rotary movement, thus preventing relay 35 from energizing during rotation.

At the end of the rotary movement, relay 34 deenergizes and closes a circuit for relay 35 at armature 55 as follows: from ground by way of contact 71, wiper 58, relay 35, armature 55 and its resting contact, off normal spring 39 and its working contact, and release magnet 36 to grounded battery. Magnet 36 will not energize in series with relay 35 due to the high resistance of the latter. Relay 35, upon energizing, closes the signalling circuit for the called station A^2 at armature 57; and closes the circuit to the solenoid 66 of the control mechanism S at armature 56. Buzzer 25 is actuated over the signalling circuit as follows: from grounded battery by way of resistance 60, working contact at armature 57 and said armature, wiper 59, contact 72, signalling conductor 13, buzzer 25, switch-hook 22, and line conductor 11 to ground. Solenoid 66, upon energizing, pulls the plunger 61 up until the insulated wiper 63 operates the spring 65. The pull up of the plunger 61 is retarded by the dash pot 62 to the required time signalling interval—about two seconds. Spring 65, upon being operated, closes the circuit for the release magnet 36 by way of off normal spring 39; and short circuits relay 35. Relay 35, upon deenergizing, opens the signalling circuit at armature 57 and stops the buzzer 25 from operating; and opens the circuit for solenoid 66 at armature 56. Release magnet 36, upon energizing, restores the wipers 58 and 59 to normal position, and its circuit is opened at off normal spring 39 by the switch shaft when the wipers reach their normal position. Solenoid 66, upon deenergizing, permits the plunger 61 to drop back to normal, which in turn permits spring 65 to return to normal.

When the subscriber at station A^2 responds to the actuation of his buzzer by removing his receiver, his telephone is connected across the common talking line, whereby he and the calling subscriber A may now converse with each other as desired.

If the subscriber at station A^2 does not respond to the first actuation of his buzzer the subscriber at station A may actuate it a second time, or as many times as he desires, by redialling the number, with his receiver off, as in the first instance; when the same operation takes place as already described.

At the end of the ensuing conversation, both subscribers replace their receivers thereby opening the bridges across the common line conductors 11 and 12. Line relay 31 deenergizes and opens the circuit of the release relay 32, whereupon relay 32 deenergizes. The connector H is now in normal position and the common line is ready for use again.

The principal advantage in a system similar to the foregoing lies in the fact that a large number of subscribers, within limited distances and having a very low calling rate, can have inter-communicating telephone service very cheap and still have individual signalling. The system is inexpensive since only one of the large type switches, a connector, is used and stations can be added or rearranged without the customary wiring rearrangements in a multiple system.

Having described 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 is:

1. In a telephone system, a common talking line provided with a plurality of subscribers' stations, a plurality of individual signalling conductors, an automatic switch, means controlled from one of said stations for operating said switch to connect to any one of said conductors, automatic signalling equipment in said switch, and means operative responsive to the establishment of said connection for connecting said signalling equipment to apply signalling current to said conductor for a pre-determined interval to signal a station on said line.

2. In a telephone system, the combination with a common talking line provided with a plurality of subscribers' stations, of an automatic switch, a plurality of individual signalling conductors extending to said stations, respectively, and automatic means controlled over said lines for connecting said switch to any one of said signalling conductors to signal the station individual to that conductor.

3. In a telephone system, a common talking line having a plurality of subscribers' stations thereon, and selective signalling apparatus common to said stations for enabling one subscriber on said line to call another, said signalling apparatus comprising means for transmitting signalling current from the selective signalling apparatus to the called subscriber's station over a con-

ductor separate from said line and individual to the called station.

4. In an automatic telephone system, a common talking line, a plurality of subscribers' stations, a signalling terminal and conductor and a grounded terminal for each of said stations, signalling apparatus for enabling one subscriber to signal another, said apparatus comprising means operated over said grounded terminals for signalling the stations on said line by projecting signalling current over said signalling terminals and conductors individual to the stations, and also comprising means for stopping the signalling operation after a pre-determined interval.

5. In a telephone system, an automatic switch, a signalling conductor, means for operating said switch to connect to said conductor, means in said switch for applying signalling current to said conductor for a predetermined interval, and means for automatically releasing said switch at the termination of said interval.

6. In a telephone system, a called substation, a pair of talking conductors and a signalling conductor for said substation, an automatic switch, means for operating said switch to connect to said signaling conductor, means in said switch for applying signalling current to said conductor, and means for disabling said second means at the termination of a predetermined interval.

7. In a telephone system, a line terminating at a common switching point, a plurality of subscribers' stations on said line, individual signalling conductors extending from said common switching point to said stations, respectively, and a signalling circuit for each of said stations including one of the conductors of said line and the individual signalling conductor of the station in series.

8. In a telephone system, a common talking line having a plurality of substations thereon, a battery for supplying talking current, one conductor of said line being connected directly to one side of said battery and the other conductor of said line being connected through an impedance to the other side of said battery, individual signalling conductors extending to said substations, respectively, and a signalling circuit for each of said substations including the said first conductor, the individual signalling conductor of the substation, and said battery in series.

9. In combination with a plurality of telephone stations having common talking and individual ringing conductors, a connector, means for operating the connector over a common talking conductor to select a desired ringing conductor, and time delayed means effective when the connector has been operated and independent of control over a talking conductor, for releasing the connector.

10. In a telephone system the combination with a plurality of stations on a party line, of a connector, individual conductors extending from each station to the connector, means for operating the connector to select any of said conductors and project ringing current thereover, and means effective a predetermined period of time after the operation of the connector for releasing the same and cutting off the ringing current.

In witness whereof, I hereunto subscribe my name this 16th day of August, A. D. 1923.

DONALD R. MIDDLETON.