

A. A. MONSON.
RAILWAY TELEPHONE SIGNALING APPARATUS.
APPLICATION FILED JULY 2, 1908.

950,004.

Patented Feb. 22, 1910.

2 SHEETS—SHEET 1.

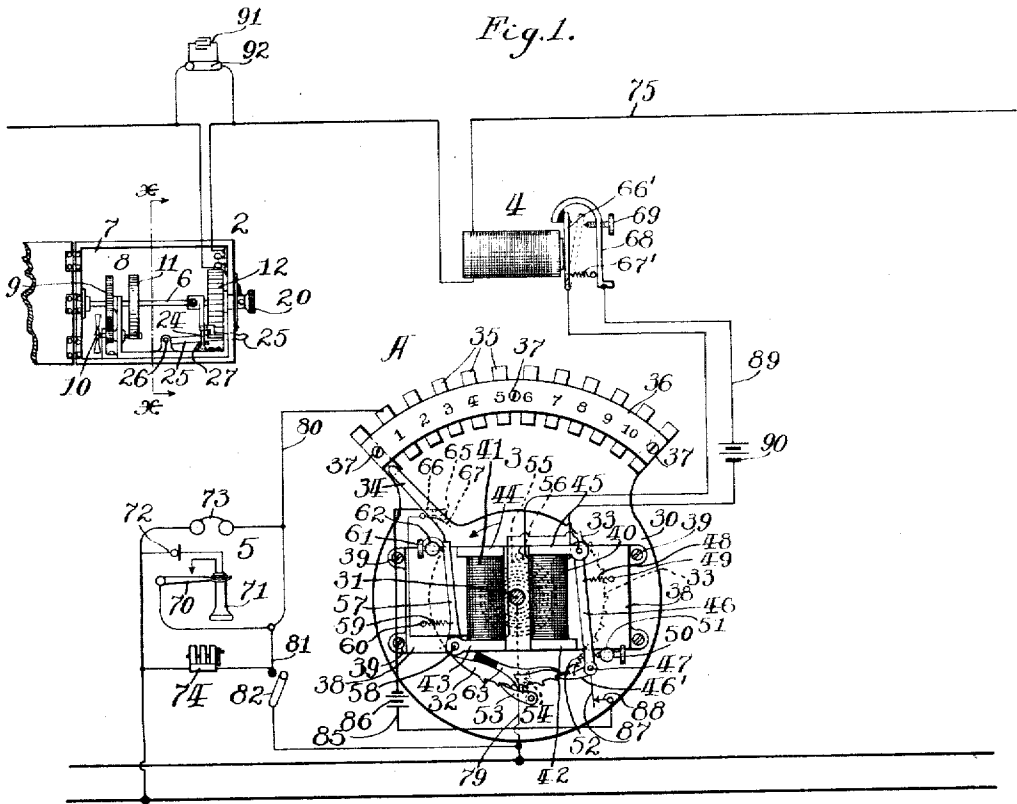


Fig. 3.

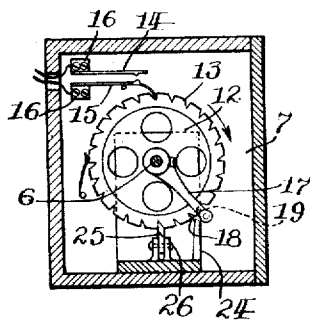


Fig. 4.

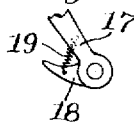
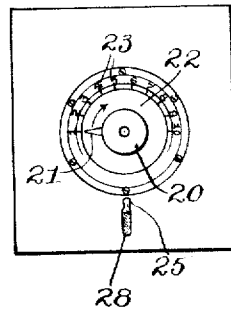


Fig. 2.



Witnesses:
R. A. Fischer.
H. Fischer

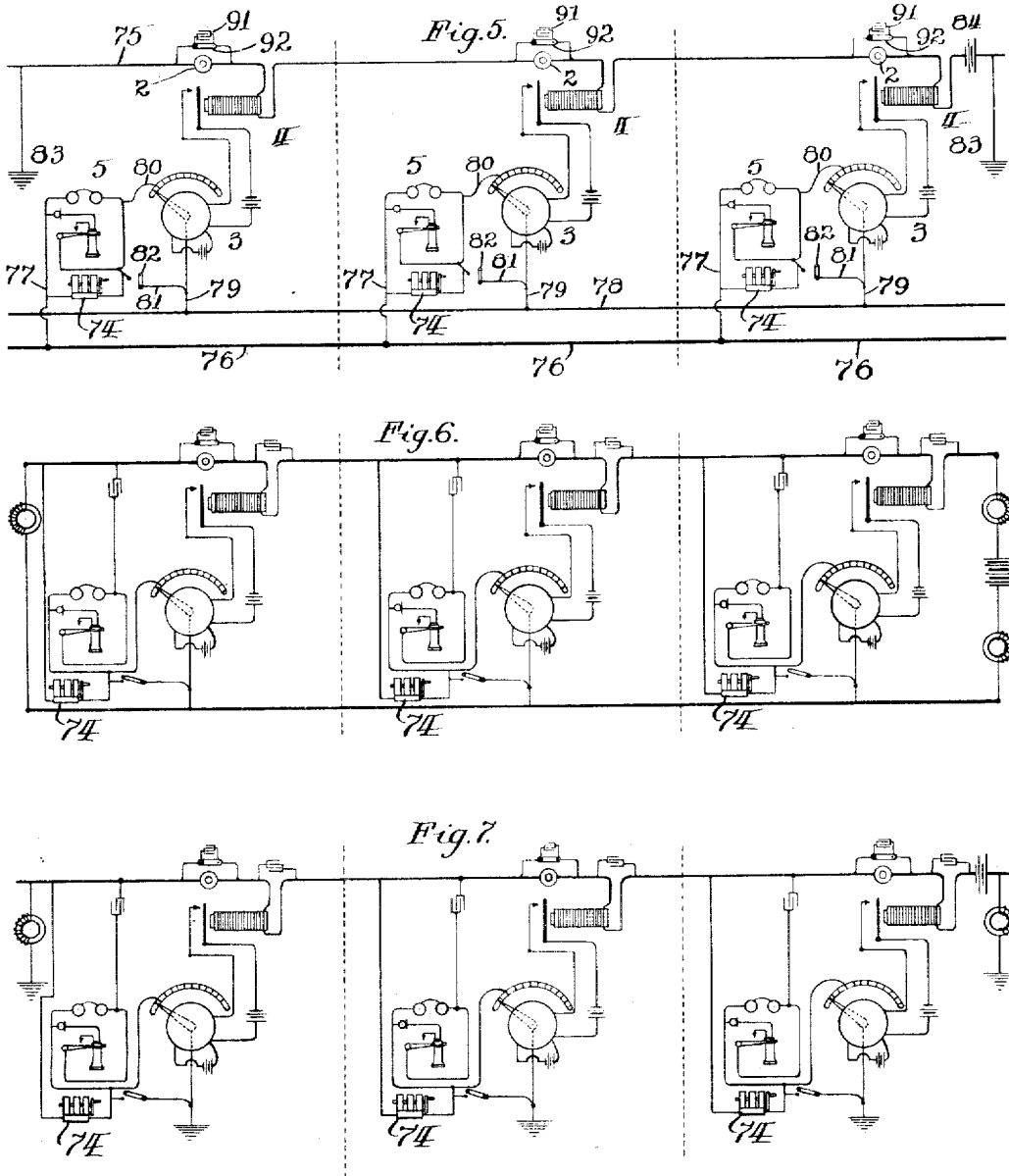
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Inventor:
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UNITED STATES PATENT OFFICE.

AUGUST A. MONSON, OF NORTH ST. PAUL, MINNESOTA, ASSIGNOR OF ONE-HALF TO
FRANK W. MOFFETT, OF ST. PAUL, MINNESOTA.

RAILWAY TELEPHONE SIGNALING APPARATUS.

950,004.

Specification of Letters Patent.

Patented Feb. 22, 1910.

Application filed July 2, 1908. Serial No. 441,636.

To all whom it may concern:

Be it known that I, AUGUST A. MONSON, a citizen of the United States, residing at North St. Paul, in the county of Ramsey and State of Minnesota, have invented a new and useful Improvement in Railway Telephone Signaling Apparatus, of which the following is a specification.

My invention relates to improvements in railway telephone signaling apparatus and has for its primary object to provide a selecting system, adapted especially for use for train despatching and transmitting train order messages between stations.

This invention has to do with that class of intercommunicative telephone apparatus in which each sub-station telephone set is capable of signaling and communicating with any other station without the intervention of a central station.

In the accompanying drawings forming part of this specification, Figure 1, is a plan of a subscriber's set connected with a circuit in accordance with my invention. Fig. 2, is a front view of the selector; Fig. 3, is a section of the selector taken on the line X—X of Fig. 1; Fig. 4, is an enlarged detail view of the carrier arm of the current interrupter; Fig. 5, is a diagrammatic view of a telephone system illustrating my invention, three subscribers' sets being shown although any number may be used; Fig. 6 is another diagrammatic view of an alternate construction in which two wires are employed, and Fig. 7 is another diagrammatic view of an alternate construction in which a single wire line conductor is employed.

In the drawings A represents a subscriber's station set having a current interrupter 2, selector 3, relay 4, and telephone set 5. Each of these instruments or parts is constructed in the following manner.

The current interrupter 2 is provided with a longitudinal shaft 6 which is suitably journaled in an inclosing frame 7, and carries actuating mechanism 8, by which it is adapted to be turned in one direction. The actuating mechanism is in the form of clockwork drive having the accustomed gearing 9, governor 10, and spring 11, all of which tend to return the shaft to normal position at constant speed when it has been turned forward by hand. Upon the shaft is also mounted a circuit breaking wheel 12, having a toothed periphery 13, against which one of a pair of

spring switch arms 14, and 15 sweeps. These switch arms are mounted upon supports 16 in the frame 7, and each time the free end of the arm 15 sweeps over a tooth of the wheel 12, a circuit with which the switch arms are connected is closed. Upon the shaft 6, is rigidly mounted a carrier arm 17, upon the end of which is a pivoted dog 18, having a spring 19, pressing it against the teeth of the wheel to engage them in one direction and sweep over them when reversed. At the outer end of the shaft 6, is a thumb piece 20, by which it can be turned and carrying an index pointer 21, which coöperates with a dial 22, on the end of the frame 7, having indicating numbers 23, for the telephone sets in the system. By turning the thumb piece in the direction of the arrow shown in Fig. 2, until the pointer is opposite the number of the station to be communicated with and then releasing the thumb piece, the dog 18, engages the teeth of the wheel 12, and turns the shaft in the direction of the arrow shown in Fig. 3, until the parts assume normal position. A stop 24, on the frame limits the return movement of the shaft by the arm 17, swinging against it. A lock arm 25, pivoted upon the frame at 26, is pressed upwardly into mesh with the teeth of the wheel to hold it stationary by means of the spring 27. This arm passes freely through a slot 28 in the frame and when depressed after the thumb piece has been set to call a subscriber releases the wheel and allows it to return to normal position, whereupon the circuit is interrupted a corresponding number of times to the station called.

The selector 3 is provided with a supporting back 30, upon which is journaled by means of a shaft 31, a disk 32, having a toothed periphery 33 and a contact arm 34, sweeping in contact with a plurality of commutator segments 35. These segments are mounted upon the frame and held by means of a plate 36 and screws 37 passing through said plate and into said frame. Upon the back is a skeleton frame 38, which is secured thereto by means of screws 39. This frame supports a pair of magnets 40 and 41 the coils of which are respectively of low and high impedance and having pole pieces 42, 43, 44 and 45. The magnet 40 has an armature 46 pivoted upon the pole piece and adapted to be drawn down against the pole piece 42. The free end of the armature has a dog

46' pivoted thereto at 47, and is drawn away from the pole piece 42 by means of a spring 48, one end of which is secured to the armature and the other end to a post 49 on the skeleton frame. An adjusting screw 50 in a post 51, serves to limit the outward movement of the armature. A spring 52 between the armature and dog 46 holds the dog in contact with the teeth on the disk, sweeping over the teeth when the armature is drawn out by the spring 48 and engaging the teeth and turning the disk forward a step each time the armature is depressed. Coöperating with the disk is a pawl 53 which sweeps over the teeth thereof when the disk moves forward and prevents the disk returning. This pawl is pivoted upon the skeleton frame and is pressed into contact with the teeth by means of a spring 54. A spiral spring 55 one end of which is connected to the shaft 31, and its other end to a post 56 on the back 30, reverses the shaft and tends to return the disk to normal position.

The magnet 41, has its pole 43 provided with an armature 57 which is pivoted thereto at 58 and swings against the pole 44. A spring 59, draws the armature 57 away from the pole 44 and is secured to said armature and a post 60 on the skeleton frame. A screw 61 in a post 62 on the skeleton frame limits the outward movement of the armature. The armature is formed with a trip 63 the ends of which serve to free the dog 46 and pawl 53 from engagement with the teeth of the disk and allow the spring 55 to return the disk to normal position. The arm 34 of the disk carries a pin 65 which impinges against one of a pair of spring switch arms 66 and 67 and limits the return movement of the disk. These spring switch arms are mounted upon the back and close together except when the arm 34 is out of contact with the switch arms. The impingement of the pin 65 against the lower switch arm opens the switch arms.

The relay 4 has an armature 66' which is drawn away from its coöperating pole of the magnet by means of a spring 67', one end of which is secured to the armature and the other end to a stop frame 68. A thumb screw 69 in the frame 68 limits the outward movement of the armature and also serves to complete a circuit passing between the frame and armature when the latter is drawn away from the magnet by the spring 67'.

The telephone set 5 may be of any suitable construction, that represented having the usual receiver switch arm 70, receiver 71, transmitter 72, call bell 73 and generator 74 or any other accessory desired.

In use as shown in Figs. 1, and 5 of the drawings three line wires constitute the line circuit with which the different subscribers' station sets are connected. Any number of subscribers' station sets may be used, one

segment on all of the selectors being provided for each subscriber. The line wire 75 is connected in series with all of the coils of the relay magnets 4 and with the switch arms 14 and 15 of the current interrupters 2, as shown. The line 76 is connected by branches 77 with one side of the telephone set 5 at each station and the line 78 is connected by branches 79, with the disks of the selectors. The other side of the telephone set is connected by the conductor 80 with the segment of the selector corresponding with the number of the station at which the entire set is located. A branch 81 of the conductor 80 is connected with the branch 79 as shown and has inserted therein a switch 82 by which the branch 81 can be opened or closed at will. The ends of the line 75 are grounded at 83 and in said line is connected a constant source of electric current supply such as the battery 84. The switch arms 66 and 67 are connected with a local circuit at each selector, comprising a conductor, 85, battery 86, coil of the magnet 41, thence passing through armature 46, contact spring 87 on the end of armature 46, contact point 88 mounted upon the back. The magnet coil 40 is included in another local circuit at the subscriber's instrument containing in its line 89 a battery 90 and the armature 65, frame 68, and contact screw 69. Bridged around each circuit breaker 2 in the line 75 is a condenser 91 and a switch 92.

In operation the pointer of the current interrupter is turned to the right over the dial to the required figure corresponding with the number of the station to be called. The lever 25 is then depressed and the toothed wheel thus released, the clock spring mounted on the spindle, by means of the ratchet arm and pawl, causing the wheel to pass as many teeth as the number indicates. Thus a certain number of impulses is produced in the line 75, the switch 92 during this operation remaining open. These impulses actuate the relay 4 at each subscriber's station which cause all of the selectors to respond the same number of times bringing the arm 34 on the selector to the required segment thus connecting the telephone circuit for the station called, when the sending station turning the generator 74 of its telephone will cause the bells of the called telephone to respond. As each station has its telephone connected successively to a different contact of the selector and all the rest of the contacts are left blank, it is impossible to make but one connection at a time thus disturbing no bells but the one called. The condensers 91 reduce the sparking effect produced by the breaking of the current at the contact springs 14 and 15. The selector is worked by reason of the line impulses in the relay making and breaking the local circuit of the selector magnet which

by means of its armature lever and dog moves the ratchet wheel against the tension of the spring on its spindle until the arm 34 moves onto a contact corresponding to the number of impulses given to the line, thus placing the proper telephone in the circuit. Before the arm 34 is moved the local circuit passing through contacts 66, 67 and battery 86 remains open. When the arm 34 is moved the local circuit is completed but the coil of the magnet being of high impedance and of sluggish action does not attain its full power during rapid oscillation of the armature 46 which moves the arm 34 forward. Consequently the pawls are not removed from the teeth of the ratchet wheel until the armature 46 is permanently released at the end of an interview. Upon such release the magnet 41 has time to attain full power thus releasing the pawls and restoring all of the parts to normal position. When the interview is over the operator at the sending station closes his switch 92 which causes current to pass through the relay, drawing its armature down and opening the local circuit 89. This action closes the second local circuit 85 and releases the dog and pawl out of contact with the teeth of the disk on the selector thus permitting the spring 55 on the selector to return the parts of the selector to normal position. The switch 82 and branch 81 are used only for cutting in on the talking circuit in case the line is in use. It is obvious that after the connections are established the talking circuit is through the lines 76 and 78 and the instruments which are in operative connection therewith.

In Fig. 6 the apparatus comprising my invention is shown applied to a single pair of line conductors and in Fig. 7 said apparatus is shown applied to a single line conductor employing a ground return, the differences shown from the preferred form being apparent from the diagrams to any one familiar with the art to which my invention is shown applied.

It will be noted that this invention has a normally closed signaling circuit and that by being open during operation it is impossible for a subscriber to interfere during the use of the line.

In accordance with the patent statutes, I have described the principles of operation of my invention together with the apparatus which I now consider to be the best embodiment thereof, but I desire to have it understood that the apparatus shown is only illustrative and that the invention can be carried out by other means and applied to uses other than those above set forth, within the scope of the following claims.

Having described by invention what I claim as new and desire to protect by Letters Patent is:—

1. Telephone apparatus of the class set

forth, comprising, in combination, a line circuit, a current interrupter in said line circuit at each station, a relay at each station having a coil in said line circuit, a selector having an electromagnet, an armature associated with said magnet, ratchet mechanism, carrying an arm, a ratchet dog on said armature adapted to engage said ratchet mechanism and move the latter a step forward each time the armatures of said relay and electromagnets are respectively released and drawn down, a local circuit passing through the coil of said magnet and the armature and armature contact of said relay, a pawl sweeping in contact with the teeth of the ratchet mechanism, a release electromagnet, a second local circuit passing through the coil of said release magnet and armature and armature contact of said first electromagnet, a switch in said second local circuit having contact terminals adapted to be opened by said arm when the latter is in normal position, commutator segments over which said arm is adapted to sweep, a trip carried by the armature of said release magnet and adapted to withdraw the dog and pawl from connection with said ratchet mechanism, means for returning the ratchet mechanism and its arm to normal position, a telephone set, and a telephone line circuit; said telephone set being included in said telephone line circuit and having associated therewith means for throwing it in and cutting it out of operation.

2. Telephone apparatus of the class set forth, comprising, in combination, a circuit line, a current interrupter having a revoluble toothed wheel, means for turning said wheel, means for holding said wheel in set position, a switch in said line having contact with the teeth of said wheel to make and break a circuit through said line as said wheel revolves, a relay at each station having a coil in circuit with said line, a selector at each station associated with said line and having an electromagnet and a ratchet wheel, an armature associated with said magnet, ratchet mechanism adapted to engage the teeth of said ratchet wheel and move the latter a step forward each time the armatures of said relay and electromagnet are respectively released and drawn down, a local circuit passing through the coil of said magnet and the armature and armature contact of said relay, a pawl sweeping in contact with the teeth of the ratchet wheel, a release electromagnet, a second local circuit passing through the coil of said release magnet and armature and armature contact of said first electromagnet, a switch in said second local circuit having contact terminals adapted to be opened by said arm when the latter is in normal position, commutator segments over which said arm is adapted to sweep, a trip carried by the arm of said re-

lease magnet and adapted to withdraw the pawl from contact with said ratchet wheel, means for returning the ratchet wheel and its arm to normal position, a telephone set, a telephone line circuit in which said set is adapted to be included and means for throwing in and cutting out of operation said telephone set.

3. Telephone apparatus of the class set forth, comprising, in combination, a normally closed line circuit; a current interrupter in said line circuit comprising a shaft, a spring motor for turning said shaft, a wheel on said shaft having a toothed periphery, a switch having terminals in said line circuit, and adapted to cooperate with said teeth to make and break a circuit through said line as said wheel revolves and means for holding said wheel in set position; a switch and condenser shunted around said interrupter; a relay having its winding connected in series with said line; a selector at each station; a local circuit passing through said selector and the armature and armature contact of said relay for operating said selector; a telephone line circuit, and a telephone set adapted to be put into connection with said telephone line circuit by said selector, for the purposes specified.

4. Telephone apparatus of the class set forth, comprising, in combination, a normally closed line circuit, a current interrupter in said line at each station, a switch shunted around said interrupter in said line, a relay at each station having a coil in circuit with said line, a selector, having an electromagnet, an armature, associated with said magnet, a ratchet wheel having an electric contact arm, a ratchet dog on said armature adapted to engage the teeth of said wheel and move the latter a step forward each time the armatures of said relay and electromagnet are respectively released and drawn down, a local circuit passing

through the coil of said magnet and the armature and armature contact of said relay, a pawl sweeping in contact with said teeth, a release electromagnet, an armature associated with said release magnet, a second local circuit, passing through the coil of said release magnet and the armature and armature contact of said first electromagnet, a switch in said second local circuit having contact terminals adapted to be opened by said arm when the latter is in normal position, a series of commutator segments with which said arm is adapted to sweep in contact, a trip carried by the armature of said release magnet and adapted to withdraw the dog and pawl from contact with said ratchet wheel, a spring for returning the ratchet wheel and its arm to normal position, a telephone set, and telephone line circuit; said telephone set being connected with said telephone line circuit and having included a hand operable switch, for the purposes specified.

5. In apparatus of the class set forth, a line-circuit, a relay having its magnet coil connected with said line circuit, a selector having two relays one of which is of comparatively high impedance and the other of low impedance, a local circuit connected with the armature and armature contact of said line relay and the coil of low impedance of said selector relay and a second local circuit connected with the selector relay coil of high impedance, whereby the action of said second local circuit is not completed until the line relay has permanently closed at the end of an interview.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

AUGUST A. MONSON.

Witnesses:

H. L. FISCHER,
J. G. BRADBURY.