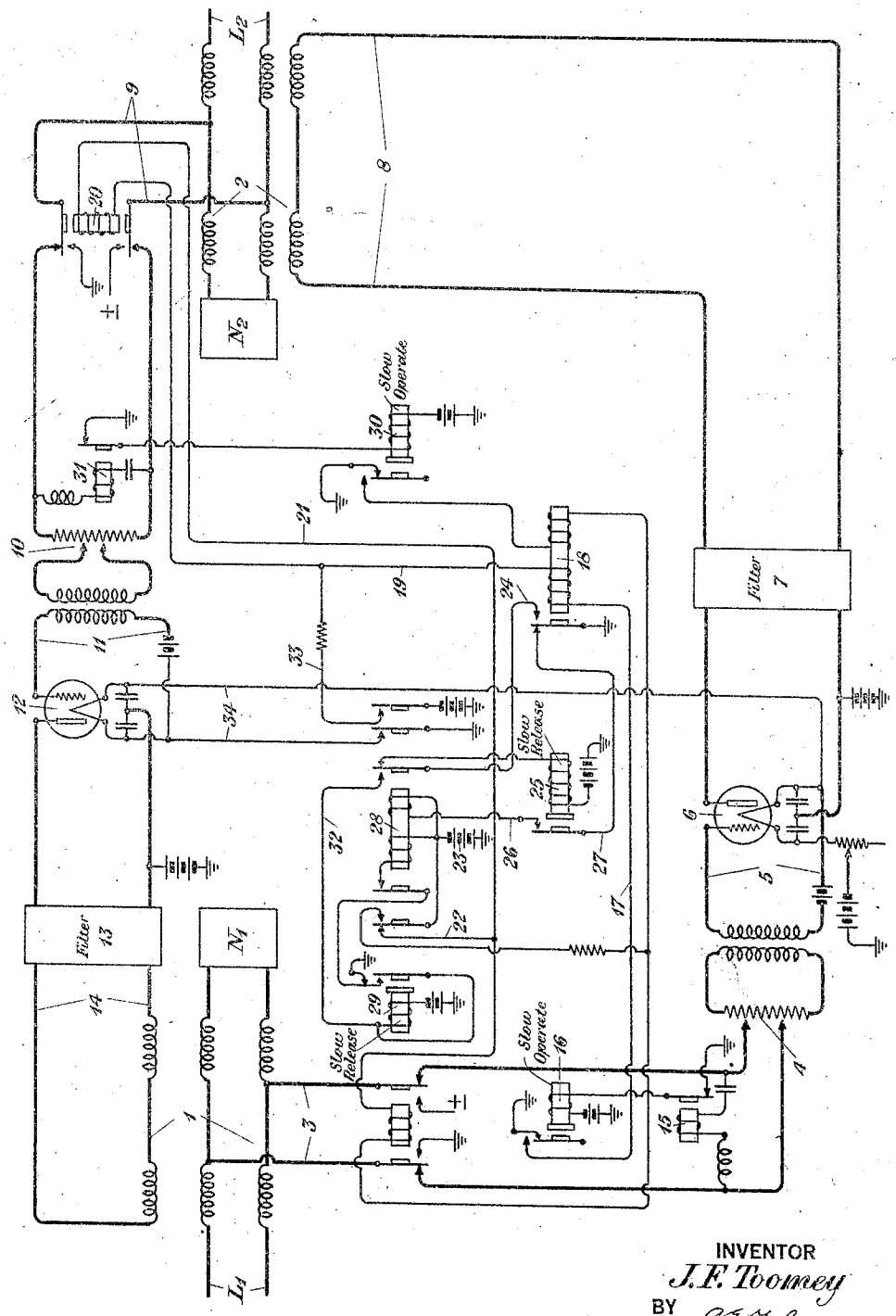
March 16, 1926. 1,576,561

J. F. TOOMEY

ARRANGEMENT FOR EXERCISING REMOTE CONTROL OVER REPEATERS

Filed June 2, 1925



INVENTOR

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BY

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Patented Mar. 16, 1926. 1,576,561

UNITED STATES PATENT OFFICE.

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ARRANGEMENT FOR EXERCISING REMOTE CONTROL OVER REPEATERS.

Application filed June 2, 1925. Serial No. 34,466.

To all whom it may concern:

Be it known that I, JOHN F. TOOMEY, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain Improvements in Arrangements for Exercising Remote Control Over Repeaters, of which the following is a specification.

This invention relates to signaling systems and more particularly to arrangements for exercising control over repeater apparatus included in such systems, said control being exercised over the repeater apparatus from a station remote therefrom.

In the arrangements of the invention, alternating signaling current is transmitted from a distant station to a station including repeater apparatus. This application of alternating current serves to energize the repeater elements and also to signal an operator at a farther distant station. A further novel feature of the invention consists in the fact that a second application of alternating signaling current to the line serves to de-energize the repeater apparatus, but does not again signal the operator at the farther distant station. Other purposes and features of the invention will appear more fully from the following detailed description thereof.

The invention may be more fully understood from the following description together with the accompanying drawing, in the figure of which is shown a circuit diagram illustrating a preferred arrangement of the invention.

In the drawing is shown a station including a two-way, two-element repeater interconnecting the lines L_1 and L_2. The line L_1 terminates in a balancing network N_1 and the usual three-winding transformer 1. Bridged across the line L_1 is an input circuit 3, including a potentiometer device 4 associated with the circuit 5 of a vacuum tube repeater device 6. In the output circuit 8 of the vacuum tube 6 there might be included a wave filter device 7 of a type well know in the art. The output circuit 8 is coupled to the line L_2 through the three-winding transformer 2. Bridged across the mid-points of the windings of transformer 2 is the input circuit 9, which includes a potentiometer device 10 and is associated with a circuit 11 including a vacuum tube device 12. The output circuit 14 of the vacuum tube 12 may include a wave filter 13 of a well known type and will be coupled to the line L_1 through the three-winding transformer 1. As the operation of the two-way, two-element repeater is well known, no further description thereof will be given.

The apparatus for exercising control over the repeater from a distant station such as the one connected to the line L_1 operates in the following manner: The operator at this distant station will apply alternating signaling current to the line L_1. This alternating signaling current will be transmitted over circuit 3 and will energize the alternating current relay 15, causing it to pull up its armature and break the normally closed circuit through the relay 16, which is a slow operating relay. This will cause the relay 16 to release and close the following circuit: from ground, contact of relay 16, conductor 17, winding of relay 18, conductor 19, winding of relay 20, conductor 21, conductor 22, contact and armature of relay 28 to battery 23, and ground. This will operate relays 18 and 20. The operation of relay 20 will cause signaling current to be applied to the circuit 9 and thence out over the line L_2 to signal the operator at a distant station connected thereto. The operation of relay 18 will close the following circuit: from ground, armature and contact of relay 18, conductor 24, armature and contact of relay 28, winding of relay 25, to battery and ground. This will operate relay 25, which will pull up its armature and prepare the following circuit: from ground and battery 23, right-hand winding of relay 28, conductors 26 and 27, to the left-hand contact of relay 18. When the operator at the station connected to line L_1 ceases to apply alternating signaling current thereto, the relay 15 is released, and the relay 16 will operate to open the previously traced circuit for relays 18 and 20, thereby de-energizing these relays. The de-energization of relay 20 will disconnect signaling current from the line L_2. When relay 18 is now de-energized, ground will be applied to the previously traced circuit prepared by the aforementioned operation of relay 25. This will cause relay 28 to operate. Relay 28 will now become locked up over its left-hand contact and armature and over the right-hand contact and armature of relay 29 to ground.

Relay 28 will have time to become locked up in this manner because the relay 25 is a

slow-release relay. The operation of relay 28 will apply ground from one of its right-hand armatures to the filament circuit 34 of the tubes 12 and 6, thereby placing the repeaters in condition for operation. After the conversation has terminated, the operator will again apply alternating signaling current to the line L_1. This will again operate relay 15 and cause relay 16 to release. Ground will now be applied over the contact of relay 16, conductor 17, winding of relay 18, conductor 19, conductor 33, right-hand armature and contact of relay 28, to battery and ground. The relay 20, however, will not operate at this time as the previously traced circuit therethrough over conductor 22 and contact and armature of relay 28 has been broken at said armature and contact by the operation of relay 28. Accordingly, the second application of alternating signaling current to the line L_1 will not cause signaling current to be applied to the line L_2 and to the operator at a distant station. Relay 18 will now operate and close the following circuit: from ground, armature and right-hand contact of relay 18, conductor 24, make contact of relay 28, conductor 32, winding of relay 29, to battery and ground. This will cause relay 29 to operate. The ground for the aforementioned locking circuit for the relay 28 will now be transferred without interruption from the right-hand contact of relay 29 to the left-hand contact of said relay, and accordingly the relay 28 will remain in energized condition at this time. When the operator now ceases to apply alternating signaling current to the line L_1, the relay 15 will release, the relay 16 will operate, and the circuit for relay 18 will be broken, causing said relay to become de-energized again. This will remove the ground from the left-hand contact of relay 29 and thus open the locking circuit for relay 28. The relay 29 is a slow-release relay, and accordingly the relay 28 will become deenergized before the relay 29 releases. The release of relay 28 will open the previously traced filament circuit 34 and render the repeater tubes inoperative.

Bridged across the input circuit 9 is an alternating current responsive relay 31, similar in function to the relay 15. This relay controls a relay 30, which is a slow operating relay and is similar in function to the relay 16. The operation, when control is exercised over the repeater apparatus from a station connected with the line L_2, is substantially the same as that already described, and no further description thereof will be given.

While the arrangements of the invention have been illustrated as applied to a two-way, two-element repeater station, they might equally well be applied to other types of repeater stations, such as the well known four-wire type. Furthermore, any desirable frequency of alternating signaling current may be utilized.

While this invention has been disclosed as embodied in a particular form and arrangement of parts, it is to be understood that it is capable of embodiment in other and widely varied forms without departing from the spirit and scope of the appended claims.

What is claimed is:

1. A transmission line comprising two line sections interconnected by repeater apparatus, a circuit associated with one of said line sections and controlled by signaling current coming in over said line section, a relay in said circuit, means controlled thereby for applying signaling current to the other of said line sections, a second relay in said circuit, means controlled by the initial operation and release of said second relay for rendering said repeater apparatus operative and for short circuiting said first relay, and means controlled by a second operation and release of said second relay for restoring said arrangements to normal.

2. A transmission line comprising two line sections interconnected by repeater apparatus, a control circuit including two relays associated with one of said line sections, said control circuit being so arranged that the initial application of signaling current coming in over said line section will cause both of said relays to respond, means controlled by one of said relays for applying signaling current to the other line section, and means controlled by the second relay for controlling said repeater apparatus and for preventing said first relay from responding to a successive application of signaling current coming in over said first line section.

In testimony whereof, I have signed my name to this specification this 29th day of May, 1925.

JOHN F. TOOMEY.