

H. O. RUGH.
TELEPHONE AND TELEGRAPH SYSTEM.
APPLICATION FILED JUNE 26, 1908.

981,120.

Patented Jan. 10, 1911.

Fig. 1.

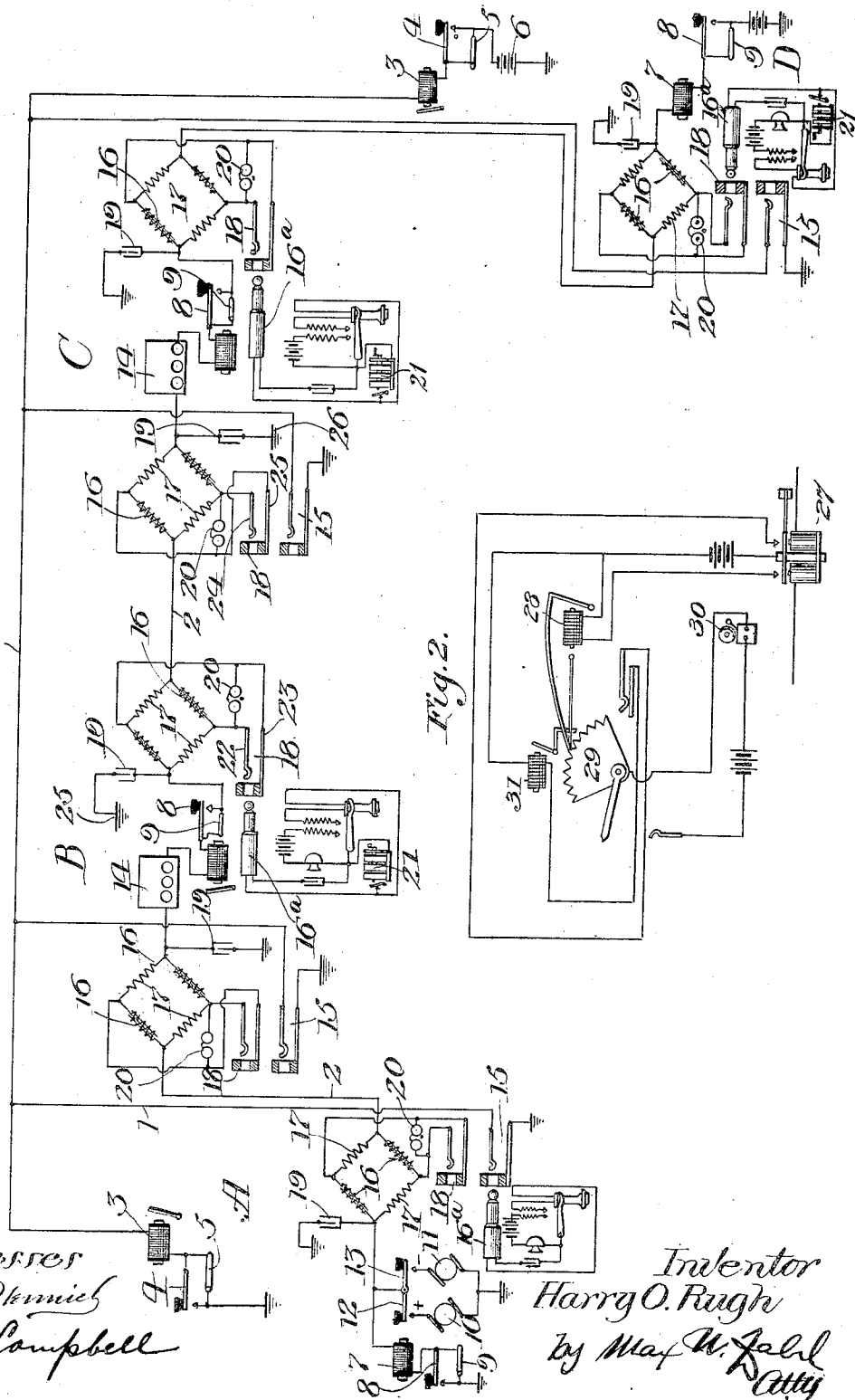


Fig. 2.

Witnesses
C. W. Harnick
C. B. Campbell

Inventor
Harry O. Rugh
by Max W. Fahl
Catty

UNITED STATES PATENT OFFICE.

HARRY O. RUGH, OF SANDWICH, ILLINOIS, ASSIGNOR TO SANDWICH ELECTRIC COMPANY, OF SANDWICH, ILLINOIS, A CORPORATION OF ILLINOIS.

TELEPHONE AND TELEGRAPH SYSTEM.

981,120.

Specification of Letters Patent.

Patented Jan. 10, 1911.

Application filed June 26, 1908. Serial No. 440,571.

To all whom it may concern:

Be it known that I, HARRY O. RUGH, a citizen of the United States, residing at Sandwich, in the county of Dekalb and State of Illinois, have invented a certain new and useful Improvement in Telephone and Telegraph Systems, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to telegraph and telephone systems, and has for its object the provision of a system permitting simultaneous telegraphy and telephony over a given circuit, together with other advantages which will be apparent from the arrangement and construction which I will now describe, in connection with the accompanying drawing illustrating one embodiment thereof, in which—

Figure 1 is a diagrammatic view of my improved system, and Fig. 2 is a detail view of the selector mechanism employed.

I have shown four stations, A, B, C and D, united by two line conductors, 1 and 2. Line conductor 1 is shown as having at each end thereof a telegraph relay 3, with its associated key 4, and a short circuiting switch 5. Batteries 6 are included, as is well understood. I have not shown any intermediate stations on line wire 1, although the arrangement as shown does not prohibit their inclusion. In association with line wire 2 I have also shown telegraph relays 7, with their associate keys 8 and short circuiting switch 9.

In order to effectively establish telephone communication, it is necessary to call various stations B, C and others along the line that may be added, from the station A. To this end I have shown generators 10 and 11, having one terminal grounded, which by means of the keys 12 and 13 are adapted to send positive or negative impulses respectively over line wire 2 and the ground. These positive impulses actuate a selecting mechanism 14, provided at these stations, which is of the step-by-step variety, and is shown in other applications of mine now pending, and may be of any suitable form. The selecting mechanism 14 which will be described more in detail hereinafter operates a signal when properly selecting at the predetermined station. The negative impulses over the line wire 2 serve

to restore the selecting mechanism 14 after the particular station has been called.

At each station I provide a jack 15, which is connected between the line wire 1 and the ground. At each station likewise I provide a plug 16^a, connected to a preferably local battery telephone substation set, which can be inserted in the jack 15, so that communication over line wire 1 and the ground can be held from either station with the main calling station A. At each station A and D I provide an arrangement of coils, comprising the impedance coils 16, 16 and the non-inductive resistances 17—17, which are included in the circuit as shown in what might be called "a Wheatstone bridge" arrangement. At stations B and C I provide two sets of these Wheatstone bridge arrangements between which the selectors 14 are connected serially with the line wire 2. From the two opposing terminals of these Wheatstone bridge arrangements, I provide a jack 18 and the inner terminal of each Wheatstone bridge arrangement is connected, as shown, by means of condensers 19 to ground. Telephone substation sets connected with the plug 16^a are provided at each station, and which can be used in either jack 18 or jack 15, as desired. Suitable call bells 20 are provided in association with each jack 18. The reasons for this arrangement and its method of operation will now be apparent. Suppose for instance station A wished to call either of the stations—it is necessary to operate keys 12 and 13 so as to operate the desired selective mechanism 14. Having called the station, plug 16^a at the station called and at the station calling, is inserted in jack 15 and telephonic communication can be had over the other line wire 1. Now should station B wish to communicate with station C, for instance, the plug 16^a at station B is inserted in the right-hand jack 18, and by means of the generator 21 suitable call signals are transmitted over line wire 2 to ground to the call bell 20 of the left-hand jack 18 of station C. The telephone circuit can then be traced as follows: from the ground 25, through the condenser 19, through the right-hand non-inductive resistance 17 at station B, to the spring 22 of the spring-jack 18, through the telephone set, through spring 25 through the second non-inductive re-

sistance 17, over the line wire 2, toward station C, through the non-inductive resistance 17 of the left-hand Wheatstone bridge arrangement of station C, through spring 24, through telephone set, back over the spring 25 through the second non-inductive resistance 17 to ground 26, through the condenser 19. These telephonic currents between stations B and C are not transmitted over the line wire 2 either to the left of station B or to the right of station C, because the inductive resistances 16 substantially prevent such telephone transmission. The selector mechanism 14 is shown more in detail in Fig. 2, and comprises a polarized electro-magnet 27, which closes contact through the magnet, 28, when energized by positive impulses to rotate the step up mechanism 29 to call the desired station by operating its associated local signal 30. A negative impulse causes a reverse operation of relay 27, thereby to operate the magnet 31 to release the step up mechanism 29. It will thus be seen that stations A and B can communicate in a similar manner over line wire 2. Stations C and D can similarly communicate over line wire 2, and these three conversations arranged tandem-like along line wire 2 are non-interfering by reason of the Wheatstone bridge arrangements, as specified. Simultaneously with these telephonic circuits, telegraphic signals, by virtue of the keys 8 and relays 7 can be carried on over the line wire 2, as the telegraph current divides nearly equally between all the resistances 16 and 17. The telephone currents, of course, do not divide equally and the inductive resistances 16 are of such size that they prevent telephone current from going through at all in an operative manner. In summing up, it is thus apparent that station A can by means of the instrumentalities on the line wire 2 signal either station, can communicate by telephone with one or more stations as desired, using line wire 1 for this purpose; any two adjacent stations can carry on independent conversation, the various stations being arranged in tandem along said line wire 2, which various telephone conversations over line wire 2, do not conflict, and at the same time telegraphic service can be maintained over both wires 1 and 2.

While I have herein shown and particularly described my invention, I do not wish to limit myself to the precise construction and arrangement as herein set forth.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A telegraph and telephone system, comprising two line wires and a plurality of stations, means at one station for selectively calling over the first line wire any one of the

other stations, telephone instruments for communicating over the second line wire between the calling station and any station selectively called, telegraphic instruments connected for operation over the second line wire aforesaid, telephone instruments for communicating over the first aforesaid line wire, telegraph instruments connected for operation over the first-aforesaid line wire, and means associated with said first aforesaid line wire to prevent interference between simultaneously operating telephone and telegraph instruments.

2. A combined telephone and telegraph system comprising a line circuit and a return circuit, three or more sets of telegraph receiving and transmitting devices associated with said line circuit, a pair of telephone instruments associated with said line circuit intermediate of each pair of adjacent telegraph devices, reactive means interposed in said line circuit at each station to substantially confine the telephone currents to the telephone instruments of each pair and that portion of the line circuit connecting them, said reactive means consisting of a plurality of impedance coils, the arrangement of the reactive means being such as to permit through telegraphic service over the entire line circuit without injuriously interfering with the operation of the various telephone circuits, selective signal receiving devices interposed at intervals in said line circuit, switching means in combination with current supplying means for selectively operating said devices, a second line circuit paralleling the first aforesaid line circuit, telegraph instruments associated therewith, and switching devices for connecting the telephone instruments aforesaid between said second line circuit and the return circuit.

3. A telegraph and telephone system, comprising two line wires and a plurality of stations, means at one station for selectively calling over a line wire any of the other stations, telephone instruments for communicating over the other line wire between the calling station and any station selectively called, telegraphic instrumentalities connected for operation over the line wires aforesaid independently of the station signaling means aforesaid, switching means for connecting the telephone instruments aforesaid to the first aforesaid line wire, and reactive means interposed in said first aforesaid line to permit of operative telephonic communication between adjoining stations but not beyond.

4. A telegraph and telephone system, comprising two line wires and a plurality of stations, means at one station for selectively calling over the first wire any of the other stations, telephone instruments for communicating over the second line wire between the calling station and any station

selectively called, telephone instruments for communicating over the first aforesaid line wire, telegraph instruments adapted for operation over said first-aforesaid line wire and reactive means interposed in said line wire at each station to prevent interference between simultaneously operating telephone and telegraph instruments.

5. A telegraph and telephone system, comprising two line wires and a plurality of stations, means at one station for selectively calling over the first line wire any of the other stations, selective signal-receiving means at each station associated with the first aforesaid line wire, telephone instruments for communicating over the second line wire between the calling station and any station selectively called, telegraphic instrumentalities connected for operation over the second line wire aforesaid, telephone instruments adapted for operation over said first aforesaid line wire, and means associated with said first aforesaid line wire to prevent interference between simultaneously operating telephone and telegraph instruments.

6. A telegraph and telephone system, comprising two line wires and a plurality of stations, means at one station for selectively calling over the first line wire any of the other stations, selective signal receiving means comprising step by step mechanism at each station associated with said first aforesaid line wire, telephone instruments for communicating over the second line wire between the calling station and any station

selectively called, telegraphic instrumentalities connected for operation over the second line wire aforesaid, telephone instruments for communicating over the first aforesaid line wire, telegraph instruments adapted for operation over said first aforesaid line wire, and means associated with said first aforesaid line wire to prevent interference between simultaneously operating telephone and telegraph instruments.

7. A telegraph and telephone system comprising two line wires and a plurality of stations, means at one station for selectively calling over the first line any of the other stations, selective signal receiving means comprising step-by-step mechanism at each station associated with said first aforesaid line wire, telephone instruments for communicating over the second line wire between the calling station and any station selectively called, telegraphic instrumentalities connected for operation over the second line wire aforesaid, telephone instruments for communicating over the first aforesaid line wire, telegraph instruments adapted for operation over said first aforesaid line wire and reactive means interposed in said line wire at each station to prevent interference between simultaneously operating telephone and telegraph instruments.

In witness whereof, I hereunto subscribe my name this 15th day of June A. D., 1908.

HARRY O. RUGH.

Witnesses:

E. B. CAMPBELL,
O. M. NENNICK.