(No Model.)

W. H. CLEWLEY.

RAILWAY TELEPHONE SYSTEM.

No. 549,491. Patented Nov. 12, 1895.

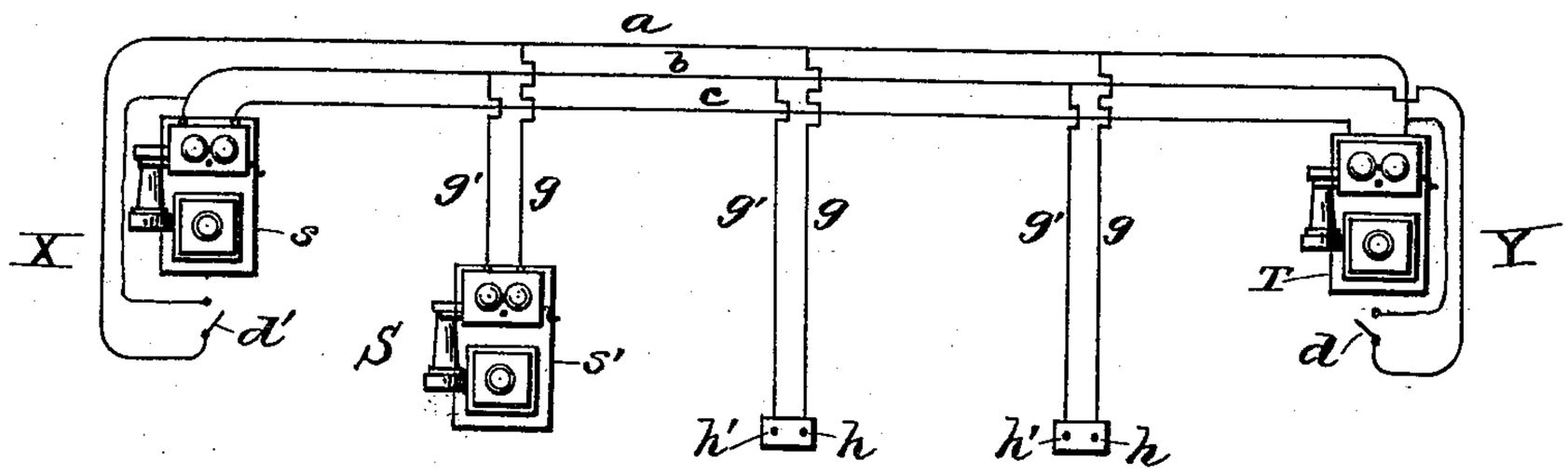

FIG. 1.

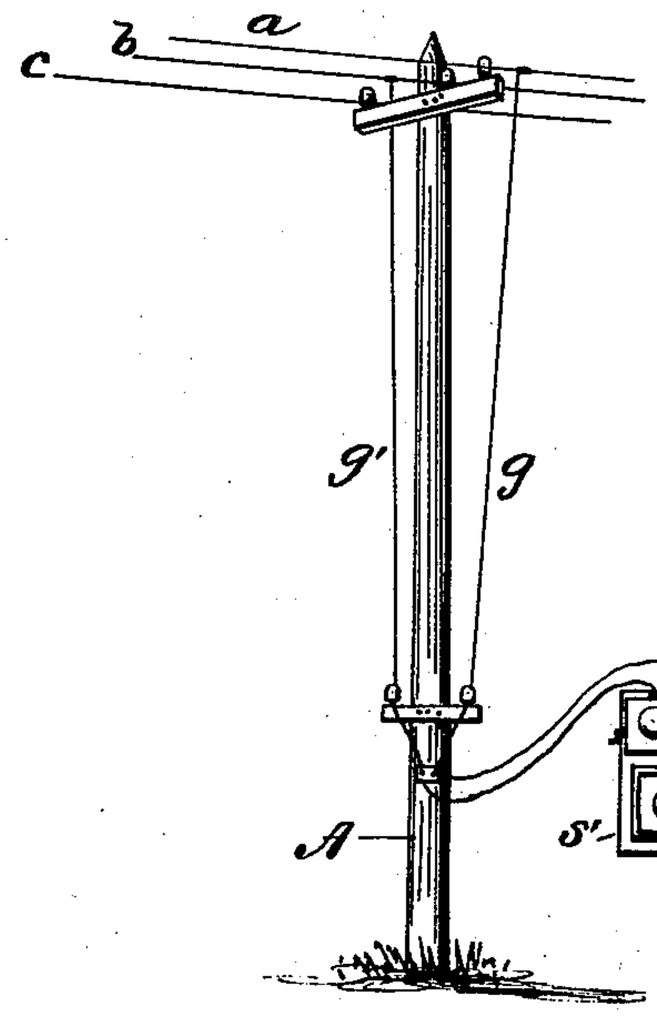

FIG. 2.

WITNESSES:

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RAILWAY TELEPHONE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 549,491, dated November 12, 1895.

Application filed April 10, 1895. Serial No. 545,123. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. CLEWLEY, a citizen of the United States, residing in Providence, in the county of Providence and State of Rhode Island, have invented a new and useful system of wiring to facilitate communication between one or more principal terminal points and sub-stations upon the line, of which the following is a specification.

The principal object of my invention is to facilitate communication between the terminal stations of a given section or block upon a railway and a disabled train, a track-inspector, or other person having occasion at any point upon that block to communicate with the persons located at the terminals of the block and having charge of that portion of the railway, without interfering at other times with communication between the terminal stations, free from possibility of participation at any sub-stations and yet carried on by the use of a portion of the same system of wires. The manner in which I accomplish this will be understood by a reference to the drawings.

Figure 1 shows the arrangement of the wires employed by me, communication being effected by means of telephones; and Fig. 2 is a view of a single post on the line of a railway, showing the manner in which the open-loop wires of one of the sub-stations of Fig. 1 are arranged upon the poles.

By reference to Fig. 1 it will be seen that as there shown, and as I prefer to construct it, there are three essentially-parallel wires *a*, *b*, and *c* between the terminal stations at X and Y, at which terminal stations are located the telephones S and T, respectively. One of these wires, as *c*, is connected at either end to one pole of each of the terminal telephones. Each of the other wires, as *a* and *b*, are connected at one end to the other pole of one of the two terminal telephones, so that only one of these wires is normally connected with either of these telephones, the other end of each of these wires being left normally open. Thus wire *b* is connected to telephone S at the opposite pole to that to which is attached wire *c*, and, running thence down the line, finally ends in the normally-open switch or circuit breaker *d* at the other station Y. In a similar manner the third wire *a* is connected to the terminal telephone T at the opposite pole to which is attached the common wire *c*, and after proceeding to the opposite station X ends in the similar normally-open switch *d'*. Both these switches *d* and *d'* are preferably constructed to automatically break the circuit except when intentionally closed—as, for example, by means of a spring-actuated push-button. When closed they form electrical connections, respectively, with those poles of the two terminal telephones to which the common wire *c* is not attached, either by connecting with the other normally-open wire before it reaches the telephone, as shown in the drawings, or in any other way preferred to effect the same result.

From each of the wires *a* and *b*, at various points along the line of railway and as numerously placed as desired, extend branch-wires *g* and *g'* in pairs, preferably carried down the poles A, Fig. 2, upon which all the wires of the system are strung, as shown in Fig. 2, each pair of wires terminating at any convenient height from the ground at the points *h* and *h'*, these letters representing any convenient means by which portable apparatus for communications is to be attached. These points *h* and *h'* must not be in electrical connection one with the other, except when connected through such apparatus. When the portable instrument, as S', is connected with any pair of these branch wires it evidently becomes electrically connected, as in multiple, with the wires *a* and *b*.

The operation of the system is as follows: In case the conductor of a wrecked train, a track-inspector, or other person desires to communicate with the officers in charge of that portion of the road located at the stations X and Y through the telephones S and T at those stations, he connects a portable telephone, as S', with the pair of branch wires *g* and *g'* at the points *h h'* at the nearest sub-station, and at once communicates with both terminal stations, the sound undulations traveling the following course: through one of the branches *g* to line *a* and by that line to telephone T, thence the switch *d* being open by line *c* to and through telephone S, and thence by line *b* back to

that branch wire g', connected with the sub-station used. It will be seen that the sound undulations thus traverse in both directions the entire distance between the terminal stations by means of the metallic circuit thus established; but not only this, but it traverses practically no more than this circuit, at whatever point the portable telephone is inserted, since as the length of one of the wires a or b is increased as one passes along the line the length of the other of these is decreased to the same extent, one portion of both wires from any given place of communication being a dead wire when used in this way. Accordingly whatever sub-station is used, be it one mile or fifty miles from either end, the resistance of the line is always the same.

The switches d and d' are used for ordinary communication between the terminal stations. As the system is shown in Fig. 1, no communication is possible between these terminal stations; but by either operator closing the connection at his own end of the line he at once establishes a closed circuit to the other end passing through both terminal instruments only. Thus the operator at Y by closing the switch d has the metallic circuit composed of wires c and b, in which both telephones S and T are included in series, and the operator at X by closing d' has, in a similar manner, the circuit composed of wires c and a; and if both d and d' are closed at the same time no harm is done. Thus the same system of wiring will serve for communication between the terminal stations themselves and also between any one of a number of sub-stations along the line and both the terminal stations; but this is not all. Two further points deserve attention: First, that the resistance of the circuits between the terminal stations X and Y, either by line a or line b, is always the same as that from any one of the sub-stations, and two of the instruments are always the same. Accordingly it is impossible for any user of one of the sub-stations to make the excuse that he was too far away to make himself heard. The answer would be that the resistance of the circuit is no greater than that in constant use between the terminal stations. Second, that the closing of either switch or circuit breaker d or d' of itself destroys all communication between any sub-station and the terminal stations, and renders it impossible for any person at any one of the sub-stations to overhear any conversation carried on by means of the terminal telephones, since it short-circuits this entire system. Thus assume the switch d' to be closed and a portable telephone S' connected to any one of the sub-stations. Now upon speaking into this portable instrument the sound undulations will travel the path of the least resistance, and will simply pass by the wire a and switch d' back by the wire b without passing through the telephone S; and in the same manner, if switch d is closed, the undulations will not pass through telephone T. It is only when these switches are open that that the undulations are compelled to pass through the greater resistances of the terminal instruments. In the same way, upon the operator at either end closing his switch to communicate with the operator at the other end, his circuit is always made up in part of wire c, which has no connection with any of the sub-stations, and thus no conversation between the terminals can reach the sub-stations. Even if both switches happen to be closed at the same time, yet the only wires having any connection with the sub-stations—viz., a and b—both connect with the same pole of each terminal telephone, and accordingly any instrument inserted between them must remain unaffected by those terminal instruments.

It is evident that the wire c may be replaced, if desired, by ground connections at the terminal stations. A metallic circuit is, however, very much to be preferred and is alone shown in the drawings. It is also evident that any other means of electrical communication may be used with this system of wiring in place of telephones, the latter, particularly in the magneto form, being, however, preferable from the absence of batteries necessary for instruments of other kinds, and batteries being objectionable from their weight, danger of breakages, &c. It is further evident that I am not confined to two instruments, one at either terminal, but may insert any number desired in line c without affecting the invention, and if it is at any time desired one of these terminal instruments may be omitted.

I have described my invention as applied to railway purposes; but it is evident that it is not wholly confined to such use.

I claim as my invention—

1. A system of wiring for electrical communication which consists of two parallel conductors each normally electrically open in one direction but at opposite ends of the system, means at various points along said conductors by which an instrument for electrical communication may be inserted between them, an electrical connection between the other ends of said conductors, one or more instruments for electrical communication inserted in said electrical connection, and means for electrically connecting one or both of said conductors at its normally open end with the other of said conductors, as and for the purpose described.

2. A system of wiring for electrical communication which consists of three essentially parallel conductors, two of which are each normally electrically open in one direction but at opposite ends of the system, and the third of which connects the other ends of said normally open conductors, means at various points along said normally open conductors by which an instrument for electrical communication may be inserted between them, one

or more instruments for electrical communication inserted in said third conductor, and means for electrically connecting one or both of said normally open conductors at its open end with the other of said open conductors, as and for the purpose described.

3. A system of wiring for electrical communication which consists of three essentially parallel conductors, two of which are each normally electrically open in one direction but at opposite ends of the system, and the third of which connects the other ends of said normally open conductors, open branch loops at various points along said normally open conductors by which an instrument for electrical communication may be inserted between said conductors, one or more instruments for electrical communication inserted in said third conductor, and means for electrically connecting one or both of said normally open conductors at its open end with the other of said open conductors, as and for the purpose described.

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Witnesses:
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