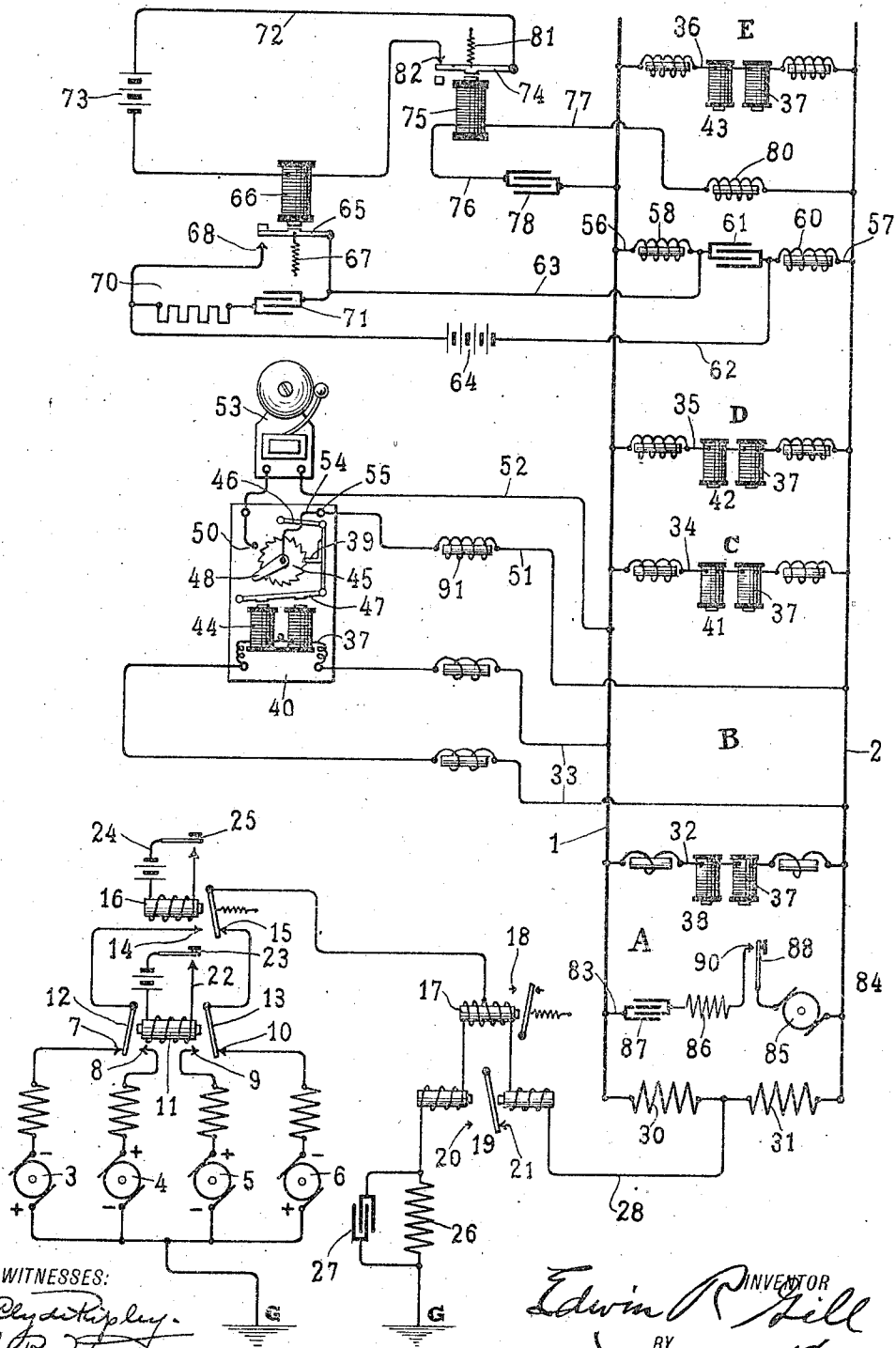


E. R. GILL.
 COMBINED TELEGRAPH AND SIGNALING SYSTEM.
 APPLICATION FILED OCT. 21, 1910.

1,063,193.

Patented June 3, 1913.



WITNESSES:
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UNITED STATES PATENT OFFICE.

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COMBINED TELEGRAPH AND SIGNALING SYSTEM.

1,063,193.

Specification of Letters Patent.

Patented June 3, 1913.

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To all whom it may concern:

Be it known that I, EDWIN R. GILL, residing at Yonkers, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Combined Telegraph and Signaling Systems, of which the following is a specification.

This invention relates broadly to signaling systems, and specifically to such systems as are especially adapted for telephone train despatching work.

The principal object of the present invention is to provide a practical and efficient manner of combining a selective telephonic signaling system with a system of multiplex telegraphy such as is now in common use.

Another object is to effect such combination of these systems that each system, while freely operative of itself, will in nowise affect or interfere with the operation of the other.

Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly consists of the features of construction, combination of elements and an arrangement of parts which will be hereinafter described, and the scope of the application of which will be set forth in the appended claims.

The accompanying drawing illustrates diagrammatically such a portion of a system constructed in accordance with my invention as will suffice to impart a clear understanding thereof.

Referring now to this drawing, 1 and 2 indicate opposite sides of a line, which may include a plurality of stations, certain of which are illustrated diagrammatically at A, B, C, D, and E, respectively. Connected in bridge of the line at the various stations are selecting apparatus and local signaling devices hereinafter more specifically described, whose operation is determined by signaling impulses impressed upon the line by apparatus controlled preferably from the calling station. This calling station in the present instance, I have indicated by the character "A".

Located in the calling station, in the present instance, is one end of a multiplex telegraph system, a part of which system comprises the wires 1 and 2. This telegraph system, which, as shown, is of the quadruplex type *per se* forms no part of my present invention and a brief description thereof

will therefore suffice. The manner in which this telegraph system is combined with the other signaling apparatus does form a portion of my invention and will hereinafter be more fully described. Inasmuch as the apparatus at each end of the line is exactly the same, a brief description of that employed in Station A will be given. The apparatus at the other end of the line has not been shown in the interest of clearness of illustration.

In the illustration of this apparatus appearing on the drawing, four dynamos 3, 4, 5, and 6, preferably of different voltage, are connected to the contact points 7, 8, 9, and 10, of an instrument 11, which may be termed a pole changer, having levers 12, 13 connected to the contact points 14, 15 of a transmitter 16.

17 represents a differentially wound ordinary relay which may be termed a "neutral" relay, having the back-stop 18, and 19 is a differentially wound polarized relay having the stops 20, 21. A local circuit 22 includes the coil of the pole changer 11, and 23 is a sending key for closing said local circuit, thereby operating the pole changer. 24 denotes another local circuit, and 25 a key for closing the local circuit and operating the transmitter 16.

26 and 27 respectively indicate resistance and capacity interposed between relay 19 and ground. Leading from the above described apparatus is the line wire 28, which is connected with the sides 1 and 2 of the metallic circuit through the resistances 30 and 31. If desired the resistances 30 and 31 may take the form of repeating coils.

In each of the stations A, B, C, D, and E, and connected in bridges denoted at 32, 33, 34, 35, and 36, respectively of the line are coils 37 of selecting devices 38, 40, 41, 42, and 43. The selecting apparatus at each of the stations preferably comprises an instrument similar to that disclosed in my Letters Patent No. 906,523, December 15th, 1908, to which reference is made for more complete description. In the present instance, I have shown diagrammatically at station B, an apparatus which, for the purposes of this specification, may be considered one of that type. It comprises the magnet 44 and the coils 37 thereon, which coils are connected in the bridge 33 of the main line, that is, in bridge with the sides 1 and 2. The selecting appa-

ratus is therefore in a closed bridge of the line. In this illustrative embodiment of selecting mechanism, I have provided a toothed wheel 45 which is adapted to be stepped up as by means of a pawl 39, one end of which is connected with the pivoted link 46, and the other with the armature 47 and the magnet 44. Wheel 45 carries a contact arm 48, which, when the wheel is stepped up to a predetermined position, will engage with the contact 50. This contact forms one of the terminals of a local bridge circuit across sides 1 and 2 of the line comprising the wires 51 and 52 and including a local signal which may take the form of an ordinary electric call bell, such as is shown at 53. A wire 54 connects a terminal 55 of the selecting device with the arm 48. Thus, it will be seen that when the wheel 45 is stepped up so that the arm 48 is engaged with contact 50, the bridge signaling circuit will be closed and the signal 53 operated directly from the main line. It will be understood, of course, that the signal 53 might be operated by an independent local circuit in the station which would be closed by the arm 48, in a manner similar to that which has been described.

It will be understood that the selecting apparatus at each station is actuated to step up the various contact devices when signaling impulses are impressed upon the line by means presently to be described, but that each selecting device is operatively responsive to but one series of codal impulses. In other words, when a single series of codal impulses is impressed upon the line, the selecting apparatus at one station will be operative to close the signaling circuit at that station to the exclusion of the others. It will also be understood that the selecting and local signaling apparatus in the various stations along the line are similar to that which has been described in the station indicated at B.

Located in the present instance between the stations D and E, is a bridge comprising the wires 56 and 57, and said bridge includes the inductive resistances 58 and 60, which are separated by the condenser 61. Connected in this bridge and between the inductive resistance 60 and the condenser 61 is a wire 62, and similarly connected in said bridge between the inductive resistance 58 and the condenser 61 is a wire 63. Wires 62 and 63 form portions of a circuit including a source of current supply for the line, comprising in the present instance a battery 64, said circuit, as shown, being normally open, but adapted to be closed as by means of a relay comprising an armature 65 and a coil 66, the armature being normally urged toward a contact 68, as by means of the spring 67. 70 and 71 respectively indicate resistance and condensance bridged across wires 62

and 63. This prevents sparking at the relay contact. It will be understood that when armature 65 is engaged with contact 68, the battery 64 will be applied to the sides 1 and 2 of the line.

The coil 66 is included in a closed circuit 72 including the battery 73 which normally constantly energizes the coil 66, thereby holding the armature 65 out of engagement with the contact 68, and the circuit 72 also includes an armature 74 of an alternating current relay having the coil 75 connected in the bridge, as by means of the wires 76 and 77 of the sides 1 and 2 of the line. Wire 76 includes the condenser 78, and wire 77 the inductive resistance 80. A spring 81 normally holds the armature 74 in engagement with the contact 82 of the circuit 72 whereby said circuit is maintained normally closed and the coil 66 energized.

Connected in a bridge formed by the wires 83 and 84 of the opposite sides of the line 1 and 2, and in the present instance located in the calling station A, is a source of alternating current shown diagrammatically at 85, said bridge including a suitable resistance 86 and condenser 87. This bridge is normally open, but may be closed to apply the source of alternating current 85 to the line, as by means of a key 88, which cooperates with an opposed contact 90. This key 88, when operated to close its bridge circuit will apply the alternating current to the line whereby the alternating current relay including the coil 75 will be energized and the armature 74 thereby disengaged from the contact 82, opening the circuit 72 and deenergizing the coil 66 whereby armature 65 will engage with contact 68, such engagement, as above described, applying the battery 64 to the line. Therefore, when the proper series of codal impulses is impressed upon the line by means of the key 88, the selecting apparatus responsive to that series of impulses will be actuated. For the key 88 which in the present instance is shown as an ordinary telegraph key, may be substituted any one of various sending apparatus well known in this art, or the same may take the form of that disclosed in my prior application No. 451,663, filed September 4th, 1908.

While in the present instance, the source of alternating current is shown located in a station which has been termed the calling station, it will be understood that such apparatus could be disposed in any station along the line, or in fact in every station, so that each could call independently of the others.

Located in each of the bridges which contain the selecting apparatus, are resistances, said resistances in the present instance being disposed at either side of the selecting apparatus, or between the same and the

line. In the present instance, the resistance is inductive and is graduated from a point intermediate the ends of the line toward either end thereof. That is the greatest resistance is interposed in the apparatus adjacent the point of connection of the current supply wires 62 and 63 with the line. In other words, the resistance is tapered from the point at which the signaling impulses are impressed upon the line in both directions toward the end of the line, the resistances being so proportioned that each selecting apparatus will be supplied with the proper amount of operating current. While the resistance in the present instance is shown as inductive, it will be understood that non-inductive resistance may also be interposed in these bridges.

Inductive resistance as shown at 91, is also located in each of the bridge signaling circuits, and it will be understood that the resistances of these bridges may likewise be partly inductive and non-inductive and that the resistances are graduated from the point at which the signaling impulses are applied to the line toward either end thereof.

As above described the signaling impulses are impressed upon the line from the battery 64 through the bridge comprising the wires 56 and 57 at a point intermediate the ends of the line in the present instance between the stations D and E. The current of the signaling impulses is therefore let out on the line in opposite directions from the point of connection of the battery 64 with the line. One of the reasons for this arrangement, in the present embodiment of the invention, is that if the signaling impulses were applied to the line in the sending station it would be necessary to make resistances 30 and 31 so high to prevent the current from flowing across the line at this point and not through the bridges including the selectors that it would be impractical to impress telegraphic impulses through these coils. By applying the signaling impulses, however, at a point intermediate the ends of the line, the resistances 30 and 31 may be made sufficiently low to permit of a successful operation of the telegraphic apparatus in connection with the line, comprising the sides 1 and 2.

It will be understood that the source of supply may be connected with the line at the center, or at any point intermediate the ends thereof, which will result in a uniform distribution of operating current for the apparatus at each of the various stations.

It will accordingly be seen that I have provided a system especially adapted to attain the ends and objects sought in a simple, efficient and practical manner. By means of my improved system, as above described the various signaling operations ma-

scribed the various signaling operations may be carried on simultaneously without one interfering with the function of the other. It will be understood that the suitable telephonic apparatus will be provided at the various stations, the same being omitted from the illustration in the interest of clearness.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the language used in the following claims is intended to cover all of the generic and specific features of the invention herein described and all statements of the scope of the invention, which as a matter of language, might be said to fall therebetween.

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

1. In a system of the class described, a line comprising a pair of metallic sides, telegraphic apparatus including a source of current supply interposed between ground and one end of the line, a plurality of signaling devices in bridge of the line, current supplying means located intermediate the ends of the line, said last named means being operated by current of a different characteristic.

2. In a system of the class described, a line comprising a pair of metallic sides, multiplex telegraphic apparatus including a source of current supply interposed between ground and one end of the line, a plurality of selective signaling devices in bridge of the line, means connected intermediate the ends of the line for supplying current to operate said selective signaling apparatus, and means for impressing a current of a different characteristic on the line to operate said last named means.

3. In a system of the class described, a line comprising a pair of metallic sides, a bridge comprising a pair of resistances at the end of the line, telegraphic apparatus connected with ground and with said bridge intermediate said resistances, a plurality of signaling apparatus connected in bridge of the line at various stations along the line, means for impressing signaling impulses on the line at a point intermediate said stations, and means for impressing a current of a different characteristic on the line to operate said last named means.

4. In a system of the class described, in combination, a line comprising a pair of metallic sides, telegraphic apparatus con-

nected with said line and operable there-
with for one part of the circuit, a plurality
of selective signaling devices connected in
bridge of said line, means for supplying cur-
5 rent of one characteristic to said line inter-
mediate the ends thereof to operate said se-
lector signaling devices, and means for ap-
plying a current of a different characteristic
to the line to determine the operation of said
10 last named means.

5. In a system of the class described, in
combination, a line comprising a pair of me-
tallic sides, telegraphic apparatus interposed
between ground and said line including suit-
15 ably proportioned resistances, a plurality
of selective signaling devices arranged in
bridge of the line, a source of direct cur-
rent supply connected in said line interme-
diate the ends thereof, and means for apply-
20 ing an alternating current to the line to
render operative said direct current supply-
ing means.

6. In a signaling system of the class de-
scribed, in combination, a line comprising a

pair of metallic sides, including a plurality 25
of called and calling stations, telegraphic
apparatus connected through suitably pro-
portioned resistances with one end of said
line and with ground, said telegraphic ap-
paratus being operable over the said line for 30
one side of the circuit and through ground
for the other side of the circuit, a plurality
of selective signaling devices connected in
bridge of the line, one signaling apparatus
being located in each of the various stations, 35
a normally open circuit connected with the
line at a point intermediate its ends and in-
cluding a source of current supply for the
line, a direct current relay for closing said
circuit, and an alternating current relay con- 40
nected with said direct current and adapted
to operate the same.

In testimony whereof, I affix my signa-
ture in the presence of two witnesses.

EDWIN R. GILL.

Witnesses:

A. S. HONIGSBERG,
N. THOMPSON.