No. 727,060. PATENTED MAY 5, 1903.

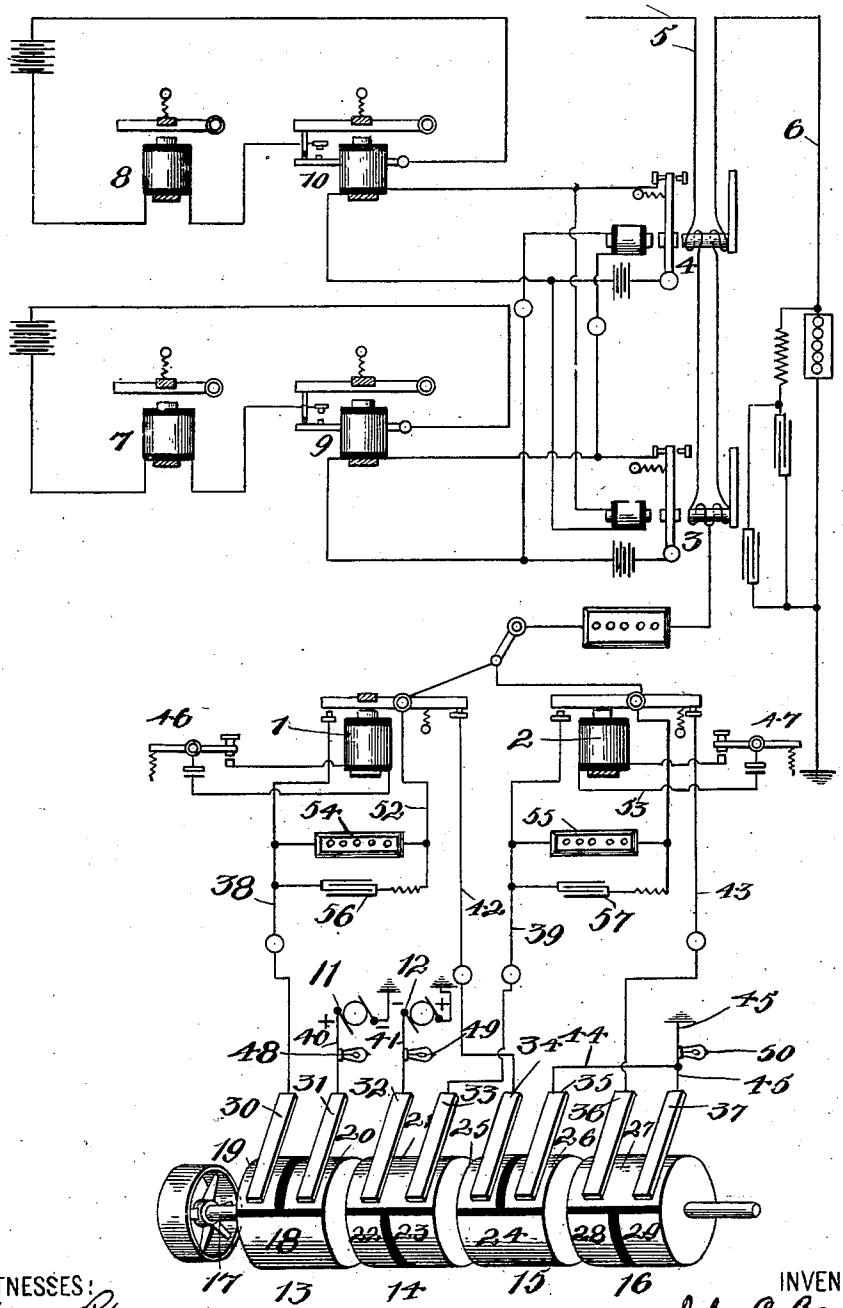
J. C. BARCLAY.

TELEGRAPH APPARATUS.

APPLICATION FILED JAN. 10, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.



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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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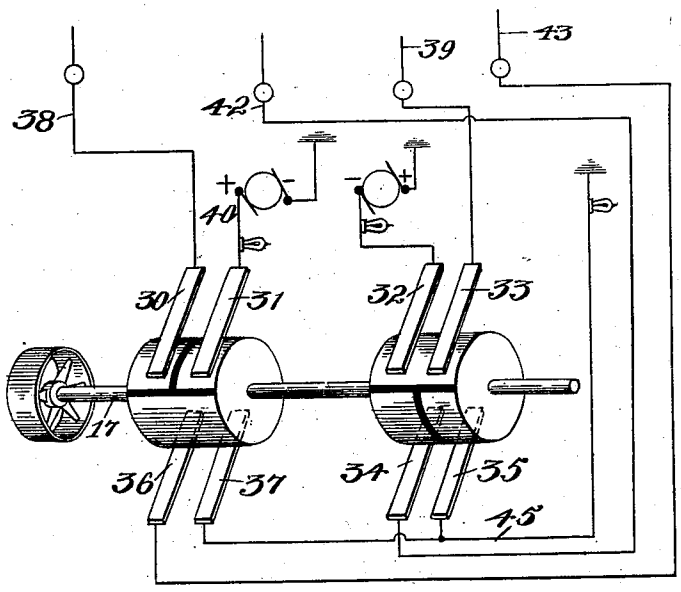
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TELEGRAPH APPARATUS.

APPLICATION FILED JAN. 10, 1903.

NO MODEL. 2 SHEETS—SHEET 2.

Fig 2



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UNITED STATES PATENT OFFICE.

JOHN C. BARCLAY, OF NEW YORK, N. Y., ASSIGNOR TO WESTERN UNION TELEGRAPH COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

TELEGRAPH APPARATUS.

SPECIFICATION forming part of Letters Patent No. 727,060, dated May 5, 1903.

Application filed January 10, 1903. Serial No. 138,451. (No model.)

To all whom it may concern:

Be it known that I, JOHN C. BARCLAY, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Telegraph Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to telegraph apparatus, and resides in means for converting direct current into alternating current for operating quadruplex and other telegraph and signaling systems employing pulsatory currents of two directions.

My invention consists in novel means for converting direct current into alternating current, as above mentioned, and for maintaining ground connections for the line during the operation of the transmitters.

My invention is particularly intended for use in quadruplex-telegraph systems, such as the well-known Roberson system, which is substantially described in Patent No. 583,418, dated May 25, 1897; but I do not limit myself to the use of my invention in that system only. In the said Roberson system as heretofore employed current has been supplied to the line by alternating-current dynamos, and at each station there have been two transmitters having front contacts, one connected to the positive and the other to the negative brush of the home dynamo, and having also back contacts connected to brushes of a commutator-ring which is connected to ground, the corresponding receiving instruments comprising two line-relays, one arranged to respond to positive current pulses and the other to negative current pulses.

The use of alternating-current dynamos is undesirable for various reasons, among which are that telegraph-offices are not usually equipped with alternating-current dynamos of the size and frequency required for such telegraph systems, whereas the larger offices are already equipped, as a rule, with direct-current dynamos suitable for use with the converting device hereinafter described, and that in systems such as the Roberson it is necessary to use a separate alternating-current dynamo for each quadruplex line, thus requiring the use of an objectionable number of small dynamos, which because of their small size are inefficient and must themselves, as a rule, be driven by small inefficient direct-current motors. Such installations are not economical in the use of current, but require an excessive amount of power for their operation. According to my invention, however, two direct-current dynamos may supply current for any desired number of lines, the number of commutator segments and brushes being increased as required. All of the commutator-segments may be mounted upon a single shaft, corresponding generator-brushes of each set being connected to the same generators, and in this way the apparatus may be made very simple, compact, and efficient.

The objects of my invention are to avoid the use of alternating-current dynamos, to supply current to any desired number of lines from a single generating set, to utilize the direct-current generators now in common use in telegraph-offices, and to make the whole apparatus simple, efficient, and economical.

I will now proceed to describe my invention with reference to the accompanying drawings, in which the invention is illustrated diagrammatically in connection with the circuits used in the Roberson quadruplex system, and will then point out the novel features in claims.

In the said drawings, Figure 1 is a diagram showing the circuits and instruments at one end of a quadruplex line and showing in connection therewith my rotary converting device. Fig. 2 is a similar view of the converting device and the parts immediately associated therewith, showing an alternative arrangement of brushes and commutator-segments.

Referring now to the accompanying drawings and at first to Fig. 1, the said figure shows transmitters 1 and 2 of substantially ordinary type connected through differentially-wound line-relays 3 and 4 with the main line 5 and artificial line 6, which latter is connected to ground and is provided with the usual condensers and resistances. Line-relays 3 and 4 are of the type described in the said Rober-

son patent and control, respectively, sounders 7 and 8 through repeating sounders 9 and 10.

Numerals 11 and 12 designate direct-current generators for supplying current to the line. These generators may be of ordinary construction. The negative brush of generator 11 and the positive brush of generator 12 are connected to ground, as shown. The positive brush of generator 11 and the negative brush of generator 12 are connected to brushes of the converting apparatus now to be described. Said converting apparatus in the form shown in Fig. 1 comprises a plurality of disks 13, 14, 15, and 16, mounted upon and arranged to rotate with a rotatable shaft 17. Disk 13 has commutator-segments 18, 19, and 20, of which 18 may be termed a "conductive" segment, being of metal and having such width that it makes contact simultaneously with both brushes, hereinafter mentioned, and so connects the same. Segments 19 and 20 are usually formed of metal for the sake of durability, and therefore are separate segments insulated from each other and from segment 18, as shown; but, in effect, they form a single insulating-segment, and so far as the operation of the commutator is concerned a single segment of insulating material might be employed in place of them. The other disks have corresponding commutator-segments numbered 21 to 29, inclusive.

Two contact-brushes are provided for each disk, the said brushes being numbered 30 to 37, inclusive. Brushes 30 and 33 are connected, respectively, to the front contact-stops of transmitters 1 and 2 through conductors 38 and 39. Brushes 31 and 32 are connected, respectively, to the positive brush of generator 11 and the negative brush of generator 12 through conductors 40 and 41. Brushes 34 and 36 are connected to the back-stops of transmitters 1 and 2, respectively, through conductors 42 and 43. Brushes 35 and 37 are connected to ground through conductors 44 and 45.

Since segments 18 and 24 occupy corresponding angular positions, as do segments 19 20 and 25 26, the front and rear contact-stops of transmitter 1 are connected to the generator and to ground, respectively, at the same time. The same is true with respect to the segments of disks 14 and 16 and the contact-stops of transmitter 2; but since segments 21 and 27 occupy angular positions opposite segments 18 and 24 transmitter 1 is disconnected from its generator and from ground when transmitter 2 is connected to its generator and to ground, and vice versa. It will be seen, therefore, that the depression of the key 46 of transmitter 1 will cause a succession of positive current pulses to be transmitted through the line, that the depression of the key 47 of transmitter 2 will cause the transmission of a succession of negative pulses through the line, and that the simultaneous depression of both keys will cause the transmission of a succession of alternately positive and negative pulses through the line. When neither key is depressed, the line is connected to ground alternately through the rear contact of transmitter 2, wire 43, brushes 36 and 37, and wire 45 and through the rear contact of transmitter 1, wire 42, brushes 34 and 35, and wires 44 and 45. When either key is depressed and the armature of the corresponding transmitter attracted, ground connection is obtained through the front contact of that transmitter and the corresponding brushes and generator instead of through the rear contact. If both keys be depressed simultaneously, then the line is connected to ground alternately through the two generators.

Wires 40 and 41 include resistances 48 and 49, which are used to prevent sparking at the brushes of the generators. In the ground connection 45 there is a similar resistance 50 employed to make the line resistance the same whether the line be connected to ground through the front or the rear contacts of the transmitters. The resistance of the armatures of the generators is so small that it is negligible.

Transmitters 1 and 2 are shown as provided with shunt connections 51 and 52, respectively, connecting their armatures with their respective front contact-wires 38 and 39, and these shunt connections comprise resistances 54 and 55 and condensers 56 and 57, all as is customary in the Roberson system.

In Fig. 1 I have shown the commutator arranged to supply current to only one line from the generators 11 and 12; but it is obvious that the set of commutator-segments may be duplicated on shaft 17 as many times as desired and corresponding brushes and connections employed for supplying current from the same generators to other lines and for connecting such other lines to ground.

By placing the ground-line brushes on the side of the commutator opposite the generator-brushes the number of commutator-segments may be reduced by one-half. This is illustrated in Fig. 2, in which the ground-line brushes 36 and 37, corresponding to transmitter 2, are placed opposite brushes 30 and 31, corresponding to transmitter 1, and brushes 34 and 35, corresponding to transmitter 1, are placed opposite brushes 32 and 33 of transmitter 2. The operation is the same as that of the arrangement shown in Fig. 1.

It is obvious that the commutator may be constructed in various ways and various arrangements of segments and brushes employed, and I do not limit myself to any particular construction or arrangement of the parts.

What I claim is—

1. In a telegraph system, the combination of a line conductor, two transmitters connected therewith having each two contacts, one of which is closed when the other is open, two direct-current generators, one for each of said transmitters, having opposite poles connected

to ground, and commutating means connected to both contacts of each transmitter, to both generators, and to ground, arranged to connect one contact of each transmitter to its respective generator and the other contact to ground, at intervals, and to so connect the contacts of the two transmitters in alternation.

2. In a telegraph system, the combination of a line conductor, two transmitters connected therewith having each two contacts, one of which is closed when the other is open, two direct-current generators, one for each of said transmitters, having opposite poles connected to ground, and commutating means comprising two sets of similar but oppositely-timed contacts, one set for each transmitter, each set comprising means for connecting one contact of its respective transmitter to the corresponding generator, at intervals, and for simultaneously connecting the opposite contact of that transmitter to ground.

3. In a telegraph system, the combination of a line conductor, two transmitters connected therewith having each two contacts, one of which is closed when the other is open, two direct-current generators, one for each of said transmitters, having opposite poles connected to ground, and commutating means comprising conductive and insulating commutator-segments and two sets of commutator-brushes, one for each transmitter, each set comprising brushes connected to both contacts of the corresponding transmitter, to the corresponding generator, and to ground, the brushes and commutator-segments relatively positioned and arranged to connect the contacts of one transmitter to the generator and to ground in alternation with the corresponding contacts of the other transmitter.

4. In a telegraph system, the combination with a line conductor, two transmitters connected therewith having each two contacts, one of which is closed when the other is open, and two direct-current generators, one for each of said transmitters, having opposite poles connected to ground, of a current-reversing commutator having four commutator-brushes for each transmitter, arranged in pairs, one brush of each pair connected to one of the contacts of the transmitter, the second brush of one pair connected to the corresponding generator, the second brush of the other pair connected to ground; said commutator having also conductive and insulating commutator-segments, the segments and said brushes being relatively positioned and arranged to connect the contacts of one transmitter to the generator and to ground in alternation with the corresponding contacts of the other transmitter.

In testimony whereof I affix my signature in the presence of two witnesses.

JOHN C. BARCLAY.

Witnesses:
G. R. BENJAMIN,
HARRY M. MARBLE.