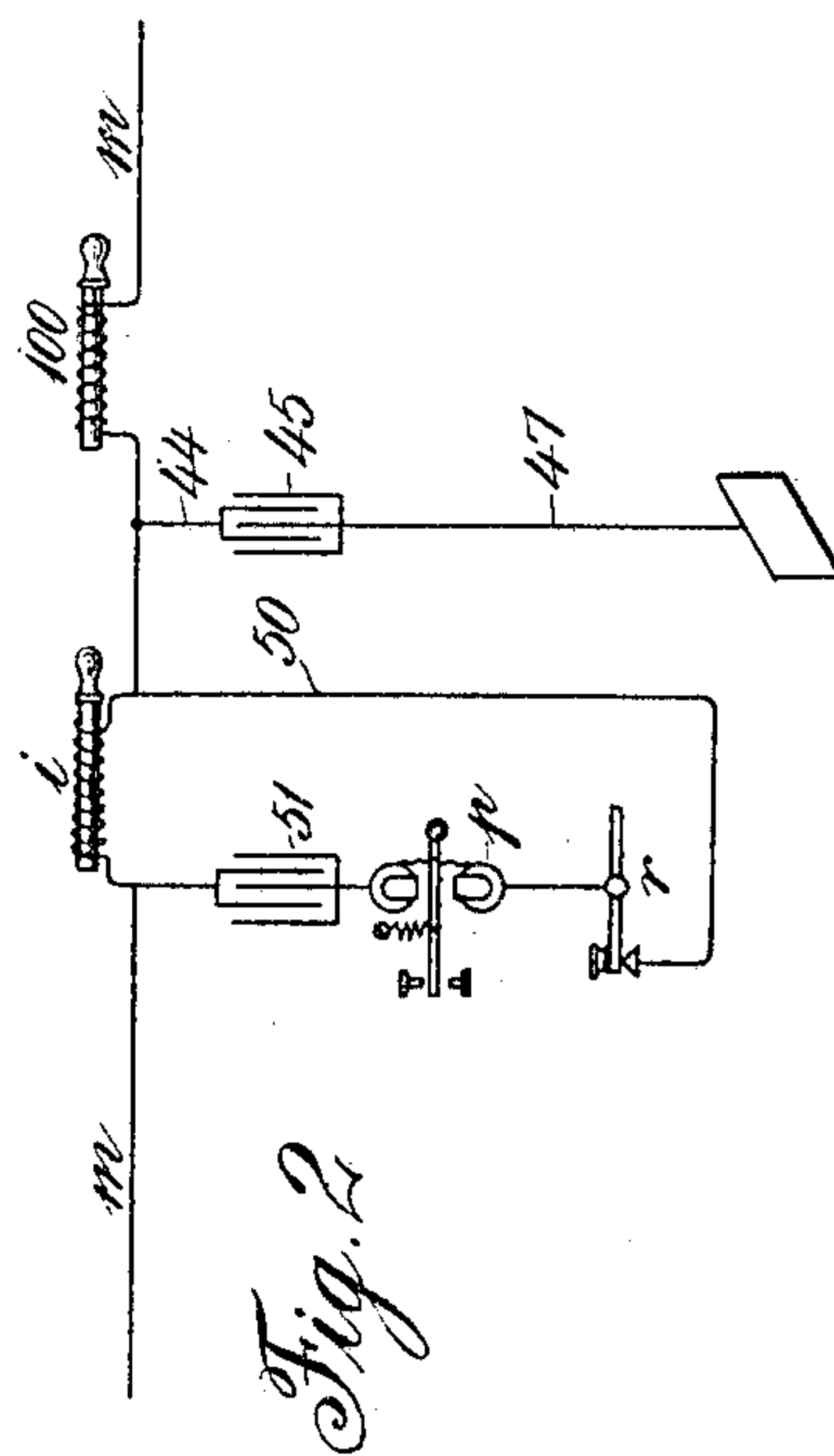
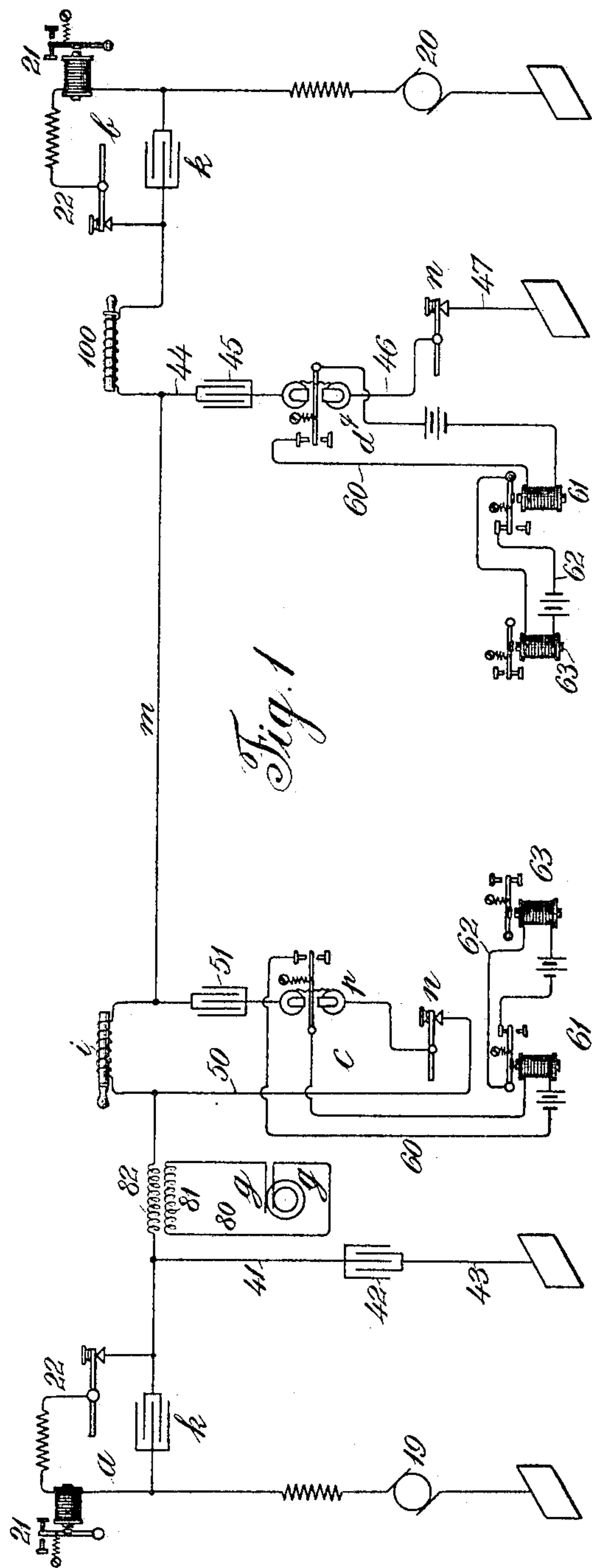


S. F. JONES.
TELEGRAPHY.

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Witnesses
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UNITED STATES PATENT OFFICE.

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TELEGRAPHY.

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To all whom it may concern:

Be it known that I, STERNS F. JONES, a citizen of the United States, residing in the borough of Brooklyn, city of New York, county of Kings, State of New York, have made certain new and useful Improvements in Telegraphy, of which the following is a specification.

My invention relates to that class of telegraph apparatus in the operation of which two or more stations exchange signals by means of impulses of continuous current, each impulse being coterminous with an elemental signal, and two or more stations on the same circuit simultaneously exchange signals by means of short and rapid alternations of current divided into groups of varying length and sequence.

The object of my invention is to improve the effectiveness of the signals and the speed of transmission, so that the carrying capacity of the circuit is greatly increased.

My invention consists in employing a telegraph-circuit having means for signaling by continuous-current impulses. This may be a simple Morse circuit, in which the current is made and broken, or the apparatus operating by reversals in polarity of a straight current, or by variations in the amperage of a straight current, or by combinations of the two last-named arrangements, and superposing upon said circuit so equipped an alternating current consisting of short rapidly-recurring impulses. Normally these alternating impulses are on the line, and signals are made by discontinuing or interrupting the circuit in which said impulses are perceptible, such circuit consisting of the main line and branches or by-paths around the straight-current instruments, each branch containing a condenser with separate circuits for the alternating-current instruments inductively connected with the main line.

The accompanying drawings illustrate my invention.

Figure 1 is a complete schematic view of the double transmission arrangement of apparatus in which two normally closed circuits are employed. Fig. 2 is a modification of the arrangement at one station.

m is a main telegraph-line containing a generator 19 at one terminal and a generator 20 at the other terminal, arranged with coöper-

ating polarities. These generators are shown as dynamo-electric machines, although chemical generators might be employed.

There are two stations a and b at or near opposite terminals, and there is a relay 21 and a Morse key 22 at each station. These instruments are bridged by a branch circuit containing a condenser k .

At two intermediate stations c and d there are instruments for signaling by means of short rapidly-recurring impulses of current alternating in polarity.

At station c , g is an alternating-current generator developing alternating impulses at the rate of three or four hundred per second. It is in a permanently-closed separate circuit 80 with the primary 81 of an induction-coil, the secondary of which 82 is in the main line m . There is a main-line branch 41 connected to one plate of a condenser 42. The opposite plate of the condenser is connected to the ground-wire 43.

At station d there is a main-line branch 44 connected to one plate of the condenser 45, the other plate of which is connected, through the coils of the polarized relay q , with the conductor 46, transmitter n , to the ground-wire 47. These grounded condenser branches complete a circuit for the alternating impulses including a part or portion of the main line m .

At station c there is an inductance i included in the main line, and a branch circuit 50, containing a condenser 51, the coils of a polarized relay p , and a key or circuit-breaker n , all in series in said branch. The branch 50 is connected to the main line m at the opposite terminals of the inductance i , and when the transmitter n is operated the inductance i is included and excluded with respect to the main line m . The polarized relay p operates a local circuit 60, containing a repeating-sounder 61. Sounder 61 operates a local circuit 62, containing a reading-sounder 63. The polarized relay q at station d operates the same arrangement of local circuits. The coils of relay q , as stated, are in the grounded condenser branch 44 46 47 in series with the transmitter n and the condenser 45. Outside the alternating circuit there is an inductance 100, which impedes or chokes the flow of alternating impulses and confines said impulses to the circuit including the grounded condenser branches 41 44, &c.

In Fig. 2 I show a modified arrangement for stations to be located intermediate the stations *c* and *d*. The arrangement of the receiving and transmitting circuit is like that shown at station *c*, including the inductance *i* in the line *m*, the condenser 51, polarized relay *p*, and transmitter *n* in the separate circuit 50, connected to the line *m* at opposite terminals of the inductance *i*. The grounded condenser branch 44 47, including the condenser 45, in this case contains no instruments and is connected to the main line between the inductance 100 and the last one of a series of intermediate stations.

The operation of the apparatus is as follows: The stations *a* and *b* exchange signals in either and both directions, and simultaneously with these the stations *c* and *d* exchange signals over the circuit including the grounded condenser branches 41 44 and the main-line section of *m* between said branches. The generator *g* is constantly operating in a permanently-closed circuit and the alternating-current circuit is normally closed and energized by these impulses. If now the key *n* at station *d* be opened, the inductance 100 would so weaken the effect of the alternating impulses as to permit the tongues or armatures of the relays *p* and *q* to take their biased positions under control of their retracting-springs and close the local circuit 60, at the same time opening the circuits of the reading-sounders 63. It is to be understood that under normal conditions with the generator *g* in operation the alternating-current circuit is closed and the tongues or armatures of the relays *p* and *q* assume an intermediate position between the contact-stops, so that when the circuit is interrupted, as by the introduction of a sufficient inductance, the circuit of the reading-sounder is opened, as described. The station *d* in this manner attracts the attention of station *c* and station *c* in response opens its key *n*, thus introducing the inductance *i* directly into the circuit. The station *d* immediately notices this interference or interruption and closes the key *n* at said station *d*. Thereafter signals are exchanged by opening and closing the keys *n* at either station in the act of transmitting, as described.

In the arrangement shown in Fig. 2 the operation of the key *n* includes and withdraws the inductance *i* at a way-station and the circuit of the alternating-current generator is thereby interrupted or has its current strength or the effect of the alternating impulses reduced as described.

By the arrangement shown and described I am enabled to maintain two normally closed operatively-independent circuits, over each of which signals may be exchanged in either direction between two or more stations.

The maintenance of a constantly-operating alternating-current generator at one station only is economical in many ways and permits of the location of this generator at any point on the line—as, for instance, a point or station where power is readily obtainable for its operation.

What I claim, and desire to secure by Letters Patent, is—

1. The combination of a telegraph-line, means for exchanging signals between separated points by varying a continuous current and means for simultaneously exchanging signals between separated points by groups of alternating-current impulses, said means consisting of a grounded condenser branch, a constantly-operating source of rapidly-alternating current impulses in a separate circuit inductively connected with said main line, a receiving instrument, a condenser and a transmitter in a branch or separate circuit connected to the main line and the terminals of said inductance, at one station, and at a second station a receiving instrument and a transmitting device in a branch or separate circuit inductively connected with said main line, and an inductance in the main line between said station and the terminal of said line.

2. The combination of a suitable telegraph-line, means for exchanging signals between separated stations by varying a continuous current and means for exchanging signals simultaneously by dividing alternating-current impulses into groups of varying lengths said means consisting of grounded condenser branches at opposite terminals of the alternating-current circuit, a constantly-operating source of alternating current inductively connected with the main line, an inductance in the main line at each station, with a receiving instrument, a transmitting device and a condenser in series in branch or separate circuits connected to the main line in such relation to said inductances that the operation of a transmitting device includes and excludes an inductance with respect to the alternating-current circuit.

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Witnesses:

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