No. 743,512. PATENTED NOV. 10, 1903.

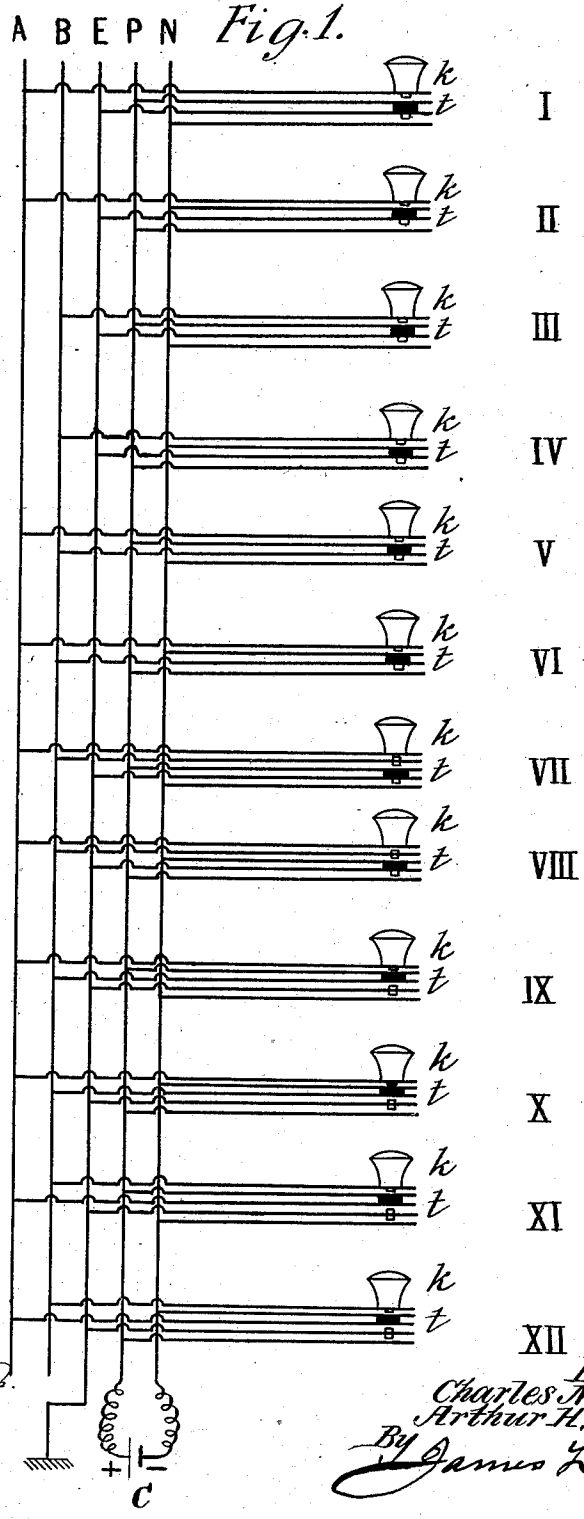
C. M. JACOBS & A. H. NICHOLSON.

APPARATUS FOR TRANSMITTING ELECTRICAL COMMUNICATIONS.

APPLICATION FILED AUG. 2, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.




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

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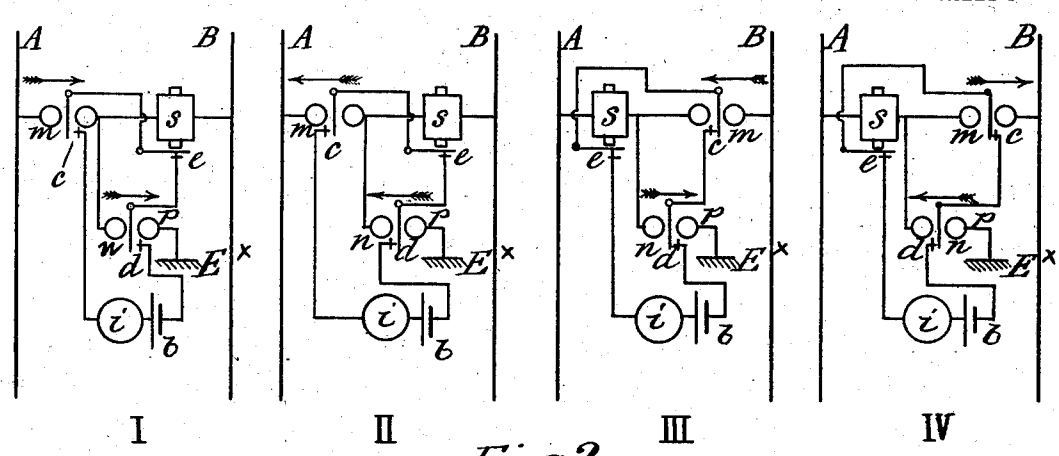
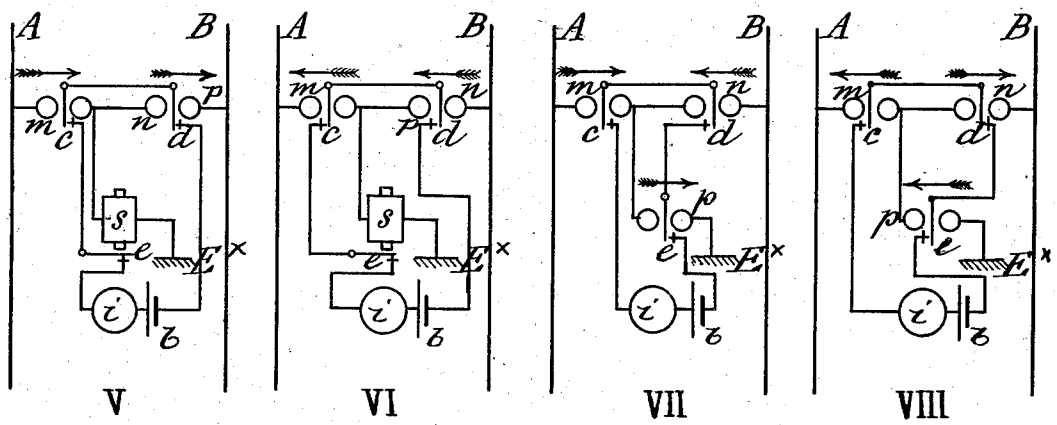
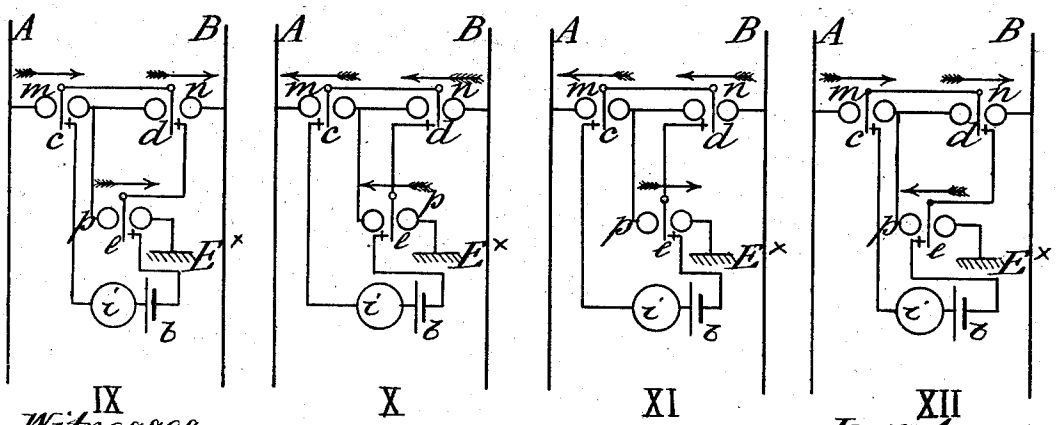



Fig. 2.




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

No. 743,512. Patented November 10, 1903.

# UNITED STATES PATENT OFFICE.

CHARLES M. JACOBS, OF MAIDENHEAD, AND ARTHUR H. NICHOLSON, OF WENDOVER, ENGLAND.

## APPARATUS FOR TRANSMITTING ELECTRICAL COMMUNICATIONS.

SPECIFICATION forming part of Letters Patent No. 743,512, dated November 10, 1903.

Application filed August 2, 1902. Serial No. 118,157. (No model.)

*To all whom it may concern:*

Be it known that we, CHARLES MARK JACOBS, electrical engineer, residing at 110 Grenfell road, Maidenhead, in the county of Berks, and ARTHUR HAROLD NICHOLSON, electrical engineer, residing at 5 Chiltern road, Wendover, in the county of Bucks, England, both citizens of England, have invented a certain new and useful Apparatus for Transmitting Electrical Communications, (for which we have applied for a patent in Great Britain, No. 146, dated January 2, 1902,) of which the following is a specification.

This invention relates to apparatus for transmitting electrical communications.

The object of the invention is to utilize two conducting-lines and the earth for the transmission of a number of different electrical communications, which may be calls or signals.

With the above and other objects in view, as will appear as the nature of the invention is better understood, the same consists, generally stated, in providing at a transmitting-station keys or other means of sending either a positive or a negative current by either of the conductors or by both of them together or a positive current by one and a negative current by the other. At each receiving-station the two conductors are connected with each other and to the earth, and in the three connections are placed relays, certain of which are so polarized as to be operated by positive currents, certain of which by negative currents, and others are not polarized. Where there are a number of receiving-stations with which communication is to be established, there is placed in each a different combination of relays, and at the transmitting-station there is provided means for transmitting to each receiving-station the particular combination of positive and negative currents suited to the particular combination-relays at that station. The relays are in each case applied in such manner as to bring into action a local battery and apparatus by which the signaling telegraphic or telephonic communications are effected.

In the accompanying drawings, forming a part of this specification, and in which like characters of reference indicate corresponding parts, there is illustrated diagrammatically the manner in which the invention may be carried into effect where two wires and the earth are employed, it being understood that in all cases a return-wire may be employed in lieu of the earth.

In the drawings, Figure 1 is a diagram illustrating an arrangement of keys and contacts for sending twelve different combinations of currents. Fig. 2 exhibits diagrammatically twelve receiving arrangements corresponding to the twelve transmitting arrangements of Fig. 1, the corresponding transmitters and receivers being indicated by the same number.

As shown in Fig. 1, twelve keys *k* are arranged in a row over spring-contacts *t*, each of which is connected to one or the other of the line-wires A B E P N, of which A B are two line-wires, P and N wires from the positive and negative poles, respectively, of a battery C, and E an earth connection. According as one or the other of the keys is depressed, the lines A, B, and E are connected to the positive or to the negative wire, or two of them are connected to either the positive or the negative wire, or one is connected to the positive and another to the negative wire.

In the diagram exhibited in Fig. 2, in which the direction of the current and the motion of the tongues of the relays are shown by arrows, *b* designates the battery at the receiving-station; *i*, the indicator or signaling instrument; *m*, *n*, and *p*, polarized relays; *s*, non-polarized relays; *c*, *d*, and *e*, contacts, and $E^{\times}$ the earth.

As exhibited in Diagram I, a current from the line A actuates the relay *m*, from which it passes through relay *n* to the earth $E^{\times}$, the tongues of both relays making contact at *c* and *d* and completing the circuit of the battery through the indicator. In this case as no current flows through *s* its armature remains on the contact *e*.

As exhibited in Diagram VI, a current passes from line B to line A through the polarized relays *m* and *n*, and as no current passes through the non-polarized relay *s* to the earth $E^{\times}$ the contact *e* remains closed. The circuit of the battery *b* is closed through the contacts *c*, *d*, and *e*.

As exhibited in Diagram VII, currents from both lines A and B actuate the polarized re-

lays *m* and *n* and also the relay *p*, through which the currents pass on their way to the earth. The circuit of the battery is closed through the contacts *c*, *d*, and *e*.

By changing at the different receiving-stations the positions of the contacts *c*, *d*, and *e* relatively to the tongues of the relays the closing of the circuit at any station can be effected only when the particular combination of currents transmitted is such that all the tongues are deflected toward the contacts. Eight such changes may be made when there are two lines and either the earth or a wire return, but only two relays at each station, and twelve changes may be made when there are three relays. Where a greater number of line-wires are employed, and consequently a greater number of relays actuated at each receiving-station, there can be a greater variety in the position of the contacts, and also a greater number of stations can be communicated with independently without a communication addressed to one being received by another.

Having thus fully described our invention, what we claim as new, and desire to secure by Letters Patent, is—

In an apparatus for selective electric signaling, the combination of a number of transmitting-keys with a like number of receivers, one at each signaling-station, each of the said receivers having its circuit broken by more than two relays, each of which relays is connected with a separate transmitting-lead, so that there are as many leads as there are relays at each station.

In testimony whereof we have hereunto set our hands in presence of two subscribing witnesses.

C. M. JACOBS.
ARTHUR H. NICHOLSON.

Witnesses:
GERALD L. SMITH,
EDWARD GARDNER.