

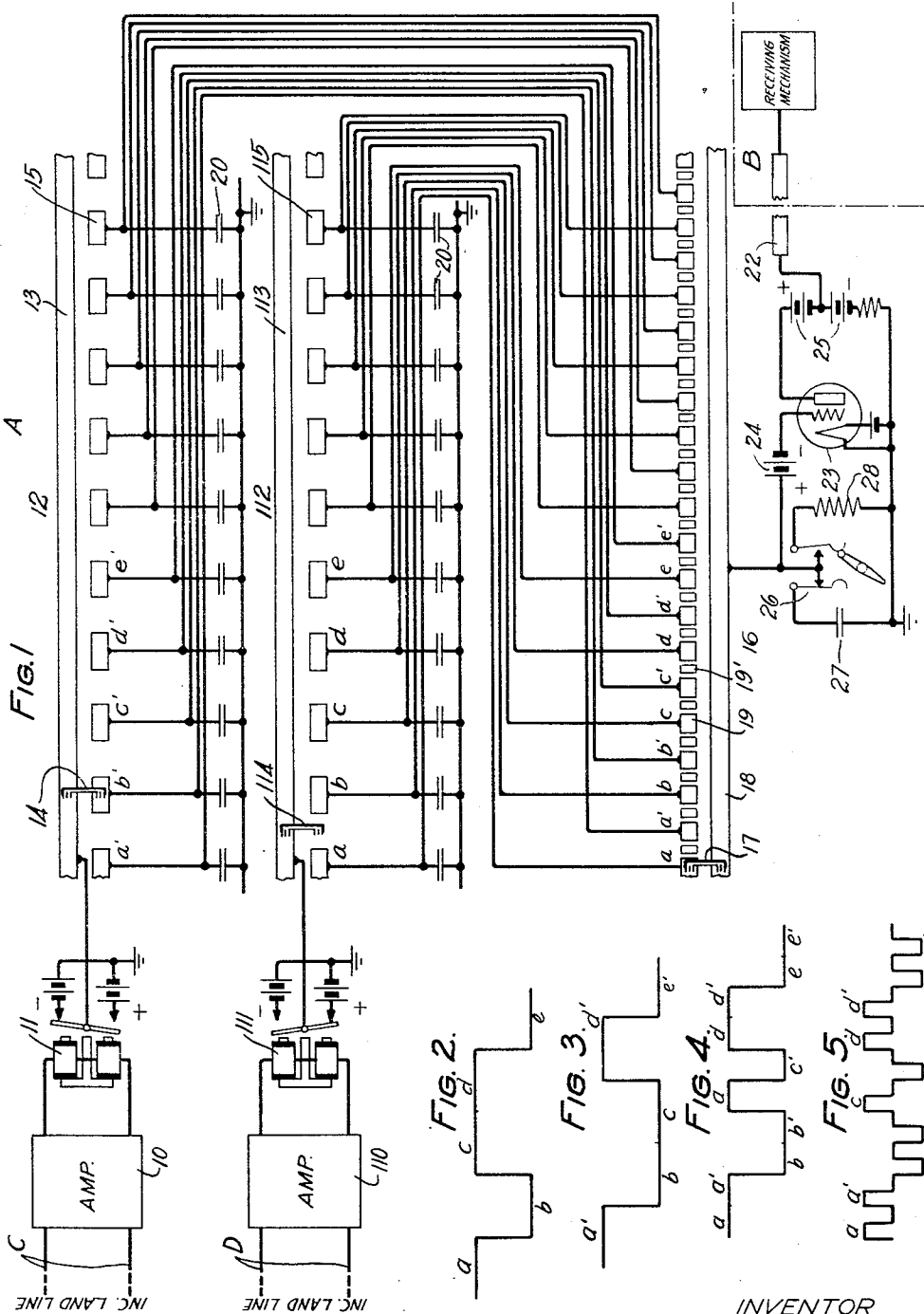
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PRINTING TELEGRAPH SYSTEM

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PRINTING TELEGRAPH SYSTEM

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This invention relates to signaling systems and more particularly to submarine telegraph systems adapted for high speed transmission.

5 An object of this invention is to provide a simplified signaling system wherein messages originating from a plurality of branch stations may be transmitted over a single conductor.

10 Another object of this invention is to provide a system for collecting from a plurality of branch lines signals bearing no accurate phase relationship to each other, and repeating the respective signals in proper phase relation over a single conductor.

15 This result is accomplished through the use of condensers to store signals upon the respective segments of a cable distributor, where they are picked up by a revolving brush. The condensers provide a complete overlap between the impulse selections received from each branch line and the corresponding impulse selections transmitted by the cable distributor.

25 A further object of this invention is to provide, in a submarine telegraph system, an improved method of connecting sending distributor segments respectively to a plurality of branch lines. In telegraph systems, where the Baudot or five unit code is employed, it is customary to arrange the sending distributor in consecutive groups of five segments each. A revolving brush, during each revolution, passes over five consecutive segments connected to one land line, then to five others connected to a second line, and so forth. The impulses from a single land line are thus sent out in rapid succession while the brush passes over the corresponding segments. During a subsequent interval, and until the distributor brush completes a revolution, no impulses are sent out from the said land line. In case the impulses from a land line are received in substantially continuous succession, it is desirable to retransmit the impulses in substantially the same order of time as they are received. This invention contemplates an arrangement whereby the
50 sending distributor segments are alternately

connected to the respective land lines, so that the signal impulses from one land line are interspaced with those of the other or others.

A feature of this invention is a grounded 55 condenser connected to the continuous ring of a transmitting distributor having active and dead segments, whereby impulses are transmitted even while the brush is passing over the dead segments. 60

A still further object of this invention is to employ a vacuum tube transmitter for repeating signals which have been stored by means of a bank of condensers. This arrangement is desirable because the impulses 65 produced from stored charges upon the distributor segments are often too feeble to energize the usual type of mechanical relay.

Other objects and features of this invention will more clearly appear from the following description and claims, taken in connection with the accompanying drawings, which disclose an embodiment of the invention. 70

Fig. 1 of the drawings is a schematic diagram of a circuit arrangement involving the invention; 75

Fig. 2 is a diagram illustrating a succession of message impulses received by one of the receiving distributors; 80

Fig. 3 illustrates a succession of message impulses as received by another receiving distributor;

Fig. 4 represents diagrammatically the impulses transmitted to the cable when a condenser is connected across the input circuit of the vacuum tube transmitter; 85

Fig. 5 represents the impulses transmitted to the cable when a resistor is substituted for the condenser. 90

Referring now to Fig. 1, a central station A is connected to communicate with a distant central station B by means of a submarine cable 22. The station A is adapted to receive code combinations of message impulses from a plurality of branch lines C and D and repeat corresponding impulses over the cable. 95

The land line or branch line C may be connected to an amplifier 10 having its out- 100

put terminals connected to the windings of a relay 11. This amplifier may be omitted. A receiving distributor 12 has a continuous ring 13 connected to the armature of relay 11, and is adapted to receive positive and negative impulses from the relay armature contacts. The distributor 12 further comprises a revolving brush 14 adapted to pass over the continuous ring 13 and a segmented ring 15. The ring 15 consists of a number of spaced segments designated consecutively a' , b' , c' , d' and e' .

In a similar manner, currents received from the branch line D pass through the amplifier 110 to the relay 111. The armature of relay 111 is connected to the continuous ring 113 of a distributor 112. A revolving brush 114 on said distributor is adapted to pass over the continuous ring 113 and a segmented ring 115. The segmented ring is shown as comprising spaced segments designated a , b , c , d , and e , respectively.

The central station A further includes a sending distributor 16 comprising a revolving brush 17, a continuous ring 18 and a segmented ring 19. The segmented ring comprises a number of active segments designated a , a' , b , b' , c , c' , etc., there being one such segment for each segment of distributors 12 and 112. The successive active segments of the sending distributor are connected alternately to the respective receiving distributors, as shown in Fig. 1. Each active segment of the sending distributor is connected to a receiving distributor segment and also to a grounded condenser 20, for a purpose to be explained subsequently. Separating the active segments 19 are inactive or dead segments 19'. These dead segments prevent the brush 17 from connecting two condensers of opposite polarity.

The current impulses sent out by the sending distributor 16 are transmitted, by means of a vacuum tube relay, to the submarine cable 22. The said relay comprises a vacuum tube 23 having a grid connected to the negative terminal of a battery 24, whose positive terminal is connected to the continuous ring 18. The plate of the vacuum tube is connected to the positive terminal of a grounded battery 25. The battery 25 comprises a number of cells in series, and connected between two adjacent cells is a conductor which leads to the cable 22.

The positive terminal of battery 24 is connected to a key 26 whereby the former may be connected to either a grounded condenser 27 or a grounded resistor 28 or both in multiple. The condenser should have a lower capacitance than any of the condensers 20.

At the distant end of the cable is another central station B. At this station means are provided for receiving the signals transmitted by distributor 16 and repeating said

signals in channels corresponding to those of the branch lines C and D. Mechanism suitable for this purpose is well known in the art. One such arrangement is disclosed in applicant's copending application, Serial No. 329,439, filed December 31, 1928.

Operation

The signal impulses from the land line C pass through the amplifier 10 to the winding of relay 11. The armature of the relay sends positive and negative impulses to the continuous ring 13 of distributor 12. As these impulses are received, the brushes 14 transfer them to segments a' , b' , c' , d' , and e' . In a similar manner, the impulses received from land line D are transferred to the segments a , b , c , d , and e , respectively of distributor 112.

The receiving distributors 12 and 112 and the sending distributor 16 are all operated in synchronism by means well known in the art.

The signal impulses which are received by the segments 19 cause a charge to be stored upon these segments. The charges are stored by means of the condensers 20 and remain upon the segments until some time subsequent to the passage of the brush 17 over the same. The condensers are subsequently discharged through the segments 15 of distributor 12 and the armature of relay 11, when the brush 14 reaches the proper position to impart to the segment 15 a succeeding charge of different polarity.

It is not essential for the successful transmission of signals that the distributors be in phase with each other. The distributors 12, 112 and 16 may operate in any relative phase relation as long as the brush 17 continues to trail brushes 14 and 114.

The current impulses sent out from the sending distributor 16 pass through the battery 24 and vary the potential of the grid of vacuum tube 23 in accordance with the characteristics of the impulses. The variation of the grid potential is effective to regulate the plate current, which in turn causes impulses of current to flow through battery 25 and cable 22.

Fig. 2 shows a succession of impulses received by the distributor 112. For the purpose of illustration, the signals are shown as consisting of one positive, one negative, two positive and one negative impulses, designated a , b , c , d , and e , respectively.

Fig. 3 illustrates a signal wave received by distributor 12. It consists of a succession of impulses of positive, negative, negative, positive and negative polarities, respectively, and the impulses are designated in Fig. 3 as a' , b' , c' , d' , and e' , respectively.

Figs. 4 and 5 illustrate a succession of signal impulses transmitted to the cable 22. The impulses derive their polarities from

the impulses indicated in Figs. 2 and 3. The first two impulses in Fig. 4 are both positive, corresponding to impulse *a* indicated in Fig. 2 and impulse *a'* of Fig. 3. The succeeding two impulses are negative, corresponding to negative impulses *b* of Fig. 2 and *b'* of Fig. 3. Thus, it will be seen that the signal impulses coming from land line C are interpolated with those from land line D and transmitted over the cable 22 in interspersed relation.

If the key 26 be set in such position that the condenser 27 is shunted across the input circuit of vacuum tube 23, the condenser stores a charge across the input circuit while the brush 17 is passing over a dead segment. This condition is illustrated in Fig. 4. The voltage of condenser 27 is reversed when the brush 17 connects it across a condenser 20 of greater capacitance and opposite polarity.

When the resistor 28 is substituted for the condenser the transmitted current has the wave form illustrated in Fig. 5. The resistor discharges the vacuum tube grid so that no impulse is transmitted to the cable when brush 17 passes over a dead segment.

The invention is not limited to the details of the structure herein described. For example, the number of branch lines feeding into a common sending distributor is not limited to two but may be increased depending upon the traffic carrying capacity of the cable and other modifications may be made.

What is claimed is:

1. In a signaling system, a repeater comprising a transmitting distributor mechanism having a plurality of segments, said segments being adapted to receive successive code combinations of message impulses from a plurality of separate sources, and electrostatic means connected directly to said segments for simultaneously storing upon the respective segments, records of the impulses received from said plurality of sources, whereby to provide an overlap between the selections received from either source and the corresponding selections transmitted by the distributor mechanism.

2. In a signaling system, a repeater comprising a transmitting distributor mechanism having a plurality of segments, said segments being adapted to receive successive code combinations of message impulses from a plurality of separate sources, and electrostatic means connected directly to each of said segments for storing thereon the charge received thereby until the segment is impressed with a charge of different polarity.

3. In a signaling system, a repeater comprising a transmitting distributor mechanism adapted to receive successive code combinations of message impulses from a plurality of separate sources, and means for simultaneously storing records of the im-

pulses received from said plurality of sources upon the distributor mechanism, whereby to provide an overlap between the selections received from either source and the corresponding selections transmitted by the distributor mechanism, said means comprising a plurality of grounded condensers connected directly to said distributor mechanism.

4. In a signaling system, a plurality of receiving distributor mechanisms, each adapted to receive successive code combinations of message impulses from a separate source, a sending distributor mechanism adapted to transmit the selections received by each of said receiving distributor mechanisms over a single conductor, and electrostatic means connected directly to said sending distributor mechanism for storing thereon records of the impulses received by each of said receiving distributor mechanisms until corresponding impulses are transmitted over said single conductor.

5. In a signaling system, a repeater comprising means adapted to receive successive code combinations of message impulses from a plurality of separate sources, a mechanism adapted to transmit impulses received from all of said sources over a single conductor, and in such relation that the impulses from one source are individually interpolated with those of the other source or sources, and means for simultaneously storing records of the impulses received upon the transmitting mechanism, until corresponding impulses are transmitted over said single conductor.

6. In a signaling system, a repeater comprising a rotary distributor adapted to receive successive code combinations of message impulses from a plurality of separate sources, said distributor comprising a continuous ring and a segmented ring, said continuous ring being connected to a single conductor, and respective segments of the segmented ring being successively connected to alternate sources whereby the impulses from the plurality of sources are individually retransmitted over said single conductor in interspersed relation, and means for storing upon the respective segments of the distributor the signals received thereby.

7. In a signaling system, a repeater comprising a rotary distributor adapted to receive successive code combinations of message impulses from a plurality of separate sources, said distributor comprising a continuous ring and a segmented ring, said continuous ring being connected to a single conductor and the respective active segments of the segmented ring being successively connected to alternate sources, whereby the impulses from said plurality of sources are retransmitted over said single conductor in interspersed relation, and a group of

- grounded condensers, one connected to each active segment of the distributor and adapted to store upon said segment the charge received thereby until the segment is impressed with the charge of different polarity. 70
8. In a signal repeater system, a plurality of receiving distributor mechanisms, each adapted to receive successive code combinations of message impulses from a separate source, a sending distributor comprising a plurality of segments, means for connecting successive segments of the sending distributor to alternate receiving distributor mechanisms, whereby the impulses from the respective receiving distributor mechanisms are retransmitted in interpolated relation, and means for simultaneously storing records of the impulses received from said plurality of sources upon the sending distributor whereby to provide a complete overlap between the selections received from either source and to corresponding selections transmitted by the sending distributor. 75
9. A signaling system as described in claim 8, in which said means comprise a plurality of grounded condensers connected directly to the respective segments of the sending distributor. 80
10. In a signaling system, a repeater comprising a transmitting distributor mechanism adapted to receive successive code combinations of message impulses from a plurality of separate sources, means comprising a group of condensers for simultaneously storing records from the impulses received from said plurality of sources upon the distributor mechanism, and means comprising a vacuum tube connected successively to the individual condensers for repeating the signals transmitted by said distributor mechanism. 85
11. In a signaling system, a plurality of receiving distributor mechanisms each adapted to receive successive code combinations of message impulses from a separate source, of a sending distributor comprising a plurality of segments, means for connecting successive segments of the sending distributor to alternate receiving distributor mechanisms, whereby the impulses from the respective receiving distributor mechanisms are retransmitted by the sending distributor in interspersed relation, means for simultaneously storing records of the impulses received from said plurality of sources upon the sending distributor, and means comprising a vacuum tube for repeating the signal impulses transmitted by the sending distributor. 90
12. In a signaling system, a repeater comprising a rotary distributor having a continuous ring, a segmented ring comprising spaced active segments, and a rotary brush adapted to connect the continuous ring successively with each of said segments, the latter being adapted to receive successive code combinations of message impulses, a grounded condenser connected to each segment for storing thereon the charge received thereby until corresponding impulses are transmitted by the continuous ring, and a grounded condenser connected to the continuous ring and of lesser capacitance than any of the first mentioned condensers for storing charges upon the continuous ring while the brush is passing from one segment to the next. 95
- In witness whereof, I hereunto subscribe my name this 10th day of June, 1929. 100
- WILLIAM A. KNOOP. 105
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