

H. S. OSBORNE.
 SIGNAL TRANSMITTING SYSTEM.
 APPLICATION FILED JUNE 21, 1918.

1,405,428.

Patented Feb. 7, 1922.

Fig. 1

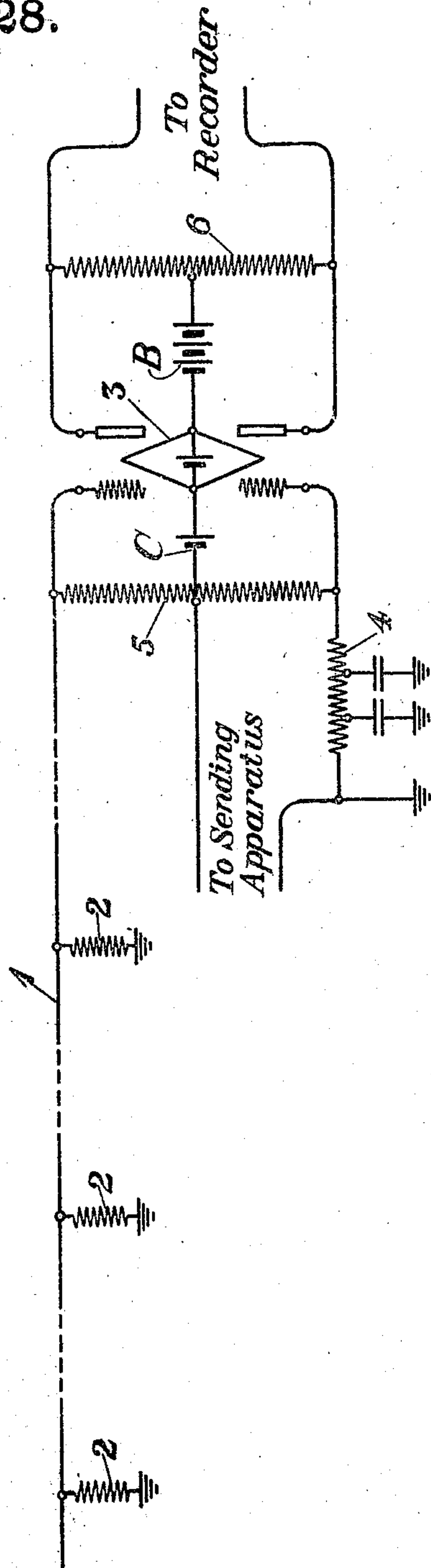
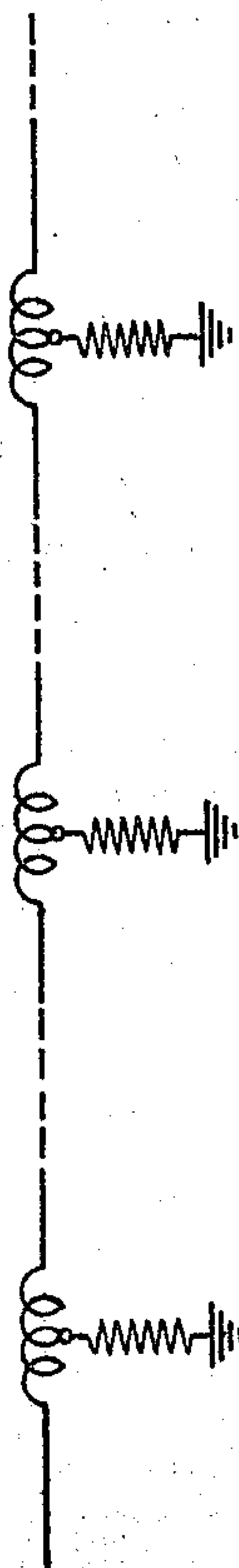


Fig. 2



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UNITED STATES PATENT OFFICE.

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SIGNAL-TRANSMITTING SYSTEM.

1,405,428.

Specification of Letters Patent.

Patented Feb. 7, 1922.

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To all whom it may concern:

Be it known that I, HAROLD S. OSBORNE, residing at New York, in the county of New York and State of New York, have invented certain Improvements in Signal-Transmitting Systems, of which the following is a specification.

This invention relates to signalling over circuits in which the distortion and attenuation incident to the transmitting line seriously impair the speed and efficiency of operation. Ocean cables are instances of such circuits and it is a matter of common knowledge that the speed of signalling over such cables is extremely slow compared with that over land lines. The object of the invention is to provide a method and means for improving the signalling speed over such circuits. The invention will be described in connection with the accompanying drawing in which Figure 1 diagrammatically illustrates one embodiment thereof, and Figure 2 shows a modification.

It has long been known that if leaks are provided across the transmission circuit at suitable intervals, as between the main line and the ground in ocean cables, there is less distortion of the current wave. If such leaks are used as a means for preventing distortion instead of series inductance loading, such as is now commonly employed in telephone lines, an increase in the speed of signalling does not increase the loss in the amplitude of the received impulses. The loss, however, in amplitude for all speeds of signalling is comparatively great. According to the present invention it is proposed to maintain the form of the signal impulses by utilizing properly distributed leakage, increase the speed of the signalling to the desired point which, as above noted, may be done without further increase in the attenuation and amplify the rapid though attenuated signal impulses at the receiving end by an amplifier designed to give a large amplification without introducing distortion of its own. Referring to the drawing, the main circuit is provided at suitable intervals with leakage connections 2, which may be ohmic or inductive resistances. At the receiving end the line is connected to an amplifier 3. In the present instance this is shown as a duplex thermionic amplifier arranged symmetrically

4, thus avoiding the unbalance incident to the use of a single three element amplifier and thereby making it unnecessary to use a transformer between the main line and the amplifier. Such a transformer may be undesirable because of its distorting effect upon the received impulses. In some cases, however, it may be permissible, or even desirable, to introduce such a transformer as where the circumstances permit of its being designed to alter the impulses only by way of correcting such distortion as has unavoidably crept in, or for emphasizing the signal impulses. The opposing grids of the duplex amplifier are connected directly to the main line and artificial line respectively. Across these grid terminals is connected a high resistance 5 and between its midpoint and the filament the C battery for the two halves of the amplifier may conveniently be connected. The sending apparatus for duplex operation may be connected between the central point of the resistance 5 and the ground, as indicated. On the output side of the amplifier another high resistance 6 may be connected across the circuit to provide a neutral point for connection of the B battery and to prevent short-circuiting of the signal impulses.

In some cases it may be desirable to combine a certain amount of series loading in the form of inductance, with the leakage above described as shown in Figure 2 and obviously this may be done without sacrificing the benefit of the leakage used with the amplifier as herein described.

It will be obvious from the foregoing that by the arrangement described, current impulses may be transmitted in practically their original form at greatly increased speed without adding to the attenuation, and amplified at the receiving end, without introducing any substantial distortion. The invention is not to be considered as limited to the details of the circuit connections shown, as various modifications within the spirit of the invention will readily suggest themselves to those skilled in the art.

What is claimed is:

1. The method of increasing the efficiency of transmission in circuits of normally great distortion, which consists in correcting the wave form of transmitted impulses at intervals along the line as the wave progresses at

reducing the speed of the signals, and amplifying the wave form of the faint received impulses without substantial alteration of wave form.

- 5 2. A signal transmitting system having a main line of normally high distortion, means for preventing the distortion of the signals

without limiting the signalling speed and means for amplifying the received impulses without substantial alteration of wave form. 10

In testimony whereof, I have signed my name to this specification this 20th day of June, 1918.

HAROLD S. OSBORNE.