June 5, 1934. E. T. BURTON 1,961,334

SIGNAL SHAPING DEVICE

Filed May 7, 1931

FIG. 1.

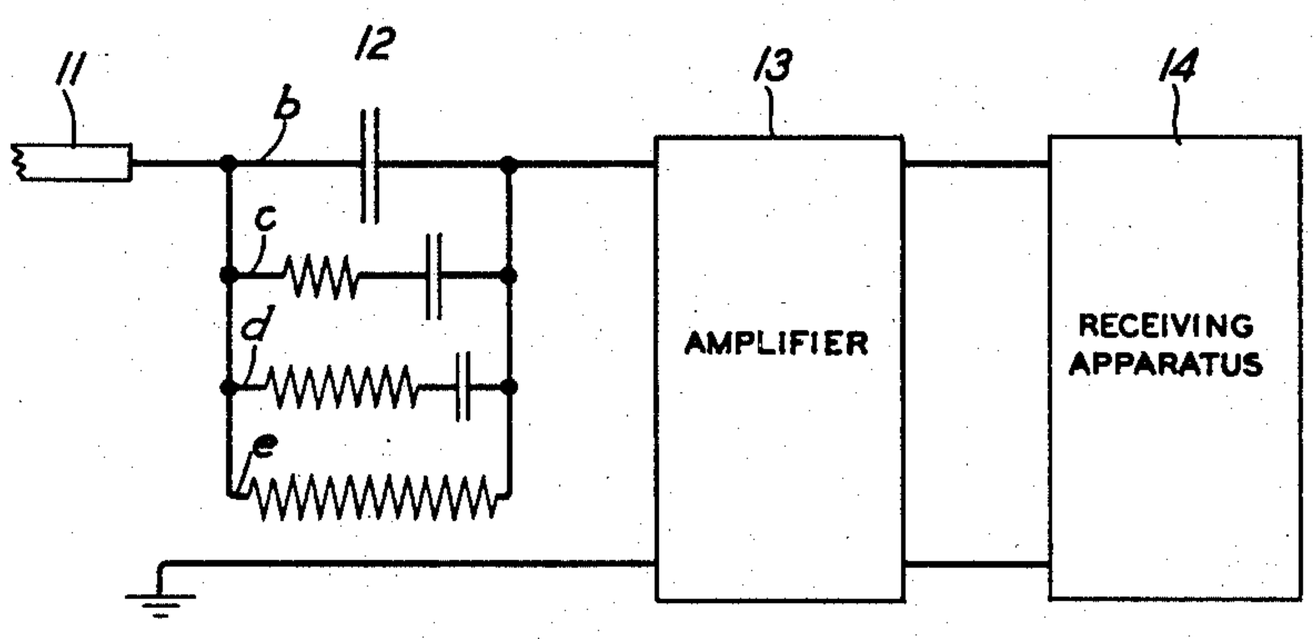


FIG. 2.

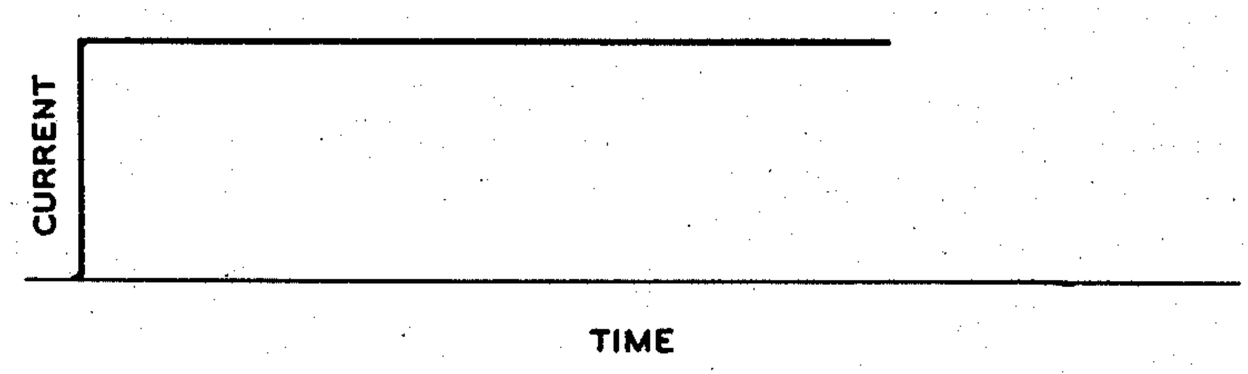
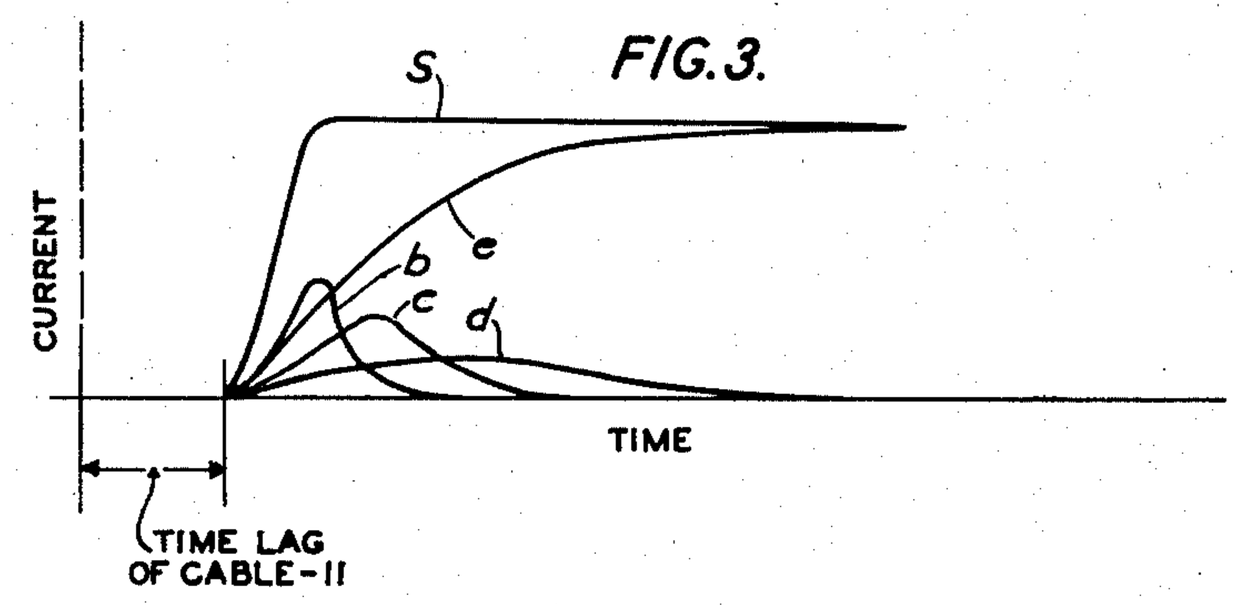


FIG. 3.



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SIGNAL SHAPING DEVICE

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3 Claims. (Cl. 178—63)

This invention relates to signaling systems and more particularly to shaping networks for use at either the sending, the repeating or the receiving points of a signal transmission system.

An object of the invention is to correct the wave form of signaling impulses which have been distorted by the effect of transmitting or receiving apparatus, or the transmission line, in a simple and efficacious manner.

In impulse transmission systems, particularly those employing submarine cables, the transmitting voltages at the sending end may be represented by a curve of rectangular, square-topped form, while the wave received at a distant point is a very sloped curve which requires a relatively long time to build up to its steady value. For receiving purposes it is important to have an arrival curve whose wave form approximates that of the voltage impressed on the sending end.

According to the present invention a wave, sufficiently restored in shape to be satisfactory for actuation of signal receiving apparatus, is obtained from a wave of slowly varying intensities by means of a network comprising a condenser connected in series with the transmission line and shunted by a plurality of parallel paths, one of which consists of a pure resistance for passing the direct current component of the wave of slowly varying intensities and the others consist of different resistance-capacity values for passing wave components of different shapes, but so graduated that the accumulated components at the output end of the network form a flat-topped wave somewhat similar to that originally transmitted.

A better understanding of the invention will be had from the following detailed description and appended claims when taken in conjunction with the accompanying drawing of which:

Fig. 1 shows the shaping network in a receiving circuit;

Fig. 2 represents the transmitted wave as it is at the distant end of cable 11; and

Fig. 3 represents the wave components resulting when the wave of Fig. 2 passes through the network of Fig. 1 and the combined effect of the accumulated components after they pass through the network.

Referring to Fig. 1, incoming signal impulses are received over a submarine cable 11 in a badly distorted condition due to the attenuation characteristic of the cable. In order that these impulses may be changed in form to satisfactorily operate the receiving or repeating apparatus, they are passed through a shaping network 12 comprising parallel paths *b*, *c*, *d* and *e*. Path *b* includes a condenser; paths *c* and *d* each includes a resistance and a condenser in series; and path *e* includes a pure resistance. The condenser in path *b* and the resistance in path *e* may be of relatively high values, and the condensers in paths *c* and *d* are of lower values, graduating from the value of the condenser in path *b*, and the resistances in paths *d* and *c* are of lower values, graduating from the value of the resistance in path *e*.

A transmitted signal wave at the distant end of cable 11 is assumed to have a square-topped shape as shown in Fig. 2. This wave is received in network 12 at a time to be determined by the lag of the cable, and impressed on the four parallel paths *b*, *c*, *d* and *e*. Each path produces, in response to the incoming wave, a voltage component corresponding to a curve bearing its corresponding letter in Fig. 3. These components are combined in the input circuit of amplifier 12 to form a wave represented in Fig. 3 by curve S. The amplifier increases the amplitude of the combined components sufficiently high to operate the receiving apparatus 14.

It is understood that the shaping network 12 may be used just as well at the transmitting end of the cable, particularly when the transmitted impulses are, before being impressed on the cable, passed through a vacuum tube amplifier or similar device which tends to round off the edges of the transmitted impulse waves. In this event the shaping network will be inserted in the output of the amplifying device.

When it is desired to use the shaping network in a repeater a repeating device is connected in place of the receiving apparatus 12.

What is claimed is:

1. In an impulse transmission system, a transmission circuit and an impulse shaping network comprising at least two parallel paths connected in series with one side of said circuit characterized in this that each said parallel path has a capacity and resistance and that their capacity and resistance values are different.

2. In an impulse transmission system, a transmission circuit and an impulse shaping network comprising a plurality of parallel paths connected in series with one side of said circuit, said paths having resistive and capacitative impedance of successively graduated values.

3. In an impulse transmission system, a transmission circuit and an impulse shaping network comprising a plurality of parallel paths connected in series with said circuit, one of said paths having a condenser only, another having a resistance only and the intermediate paths having resistances of successively increasing values and capacities of successively decreasing values.

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