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G. VIARD

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TELECOMMUNICATION SYSTEM

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Fig. 1

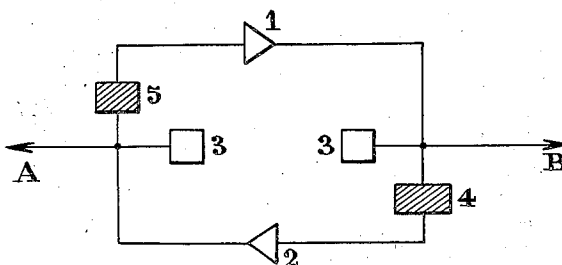


Fig. 2

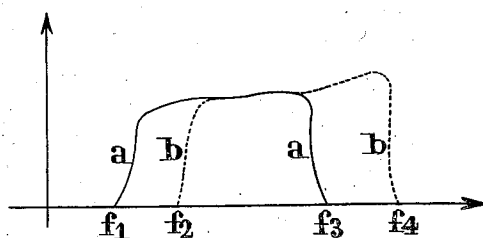
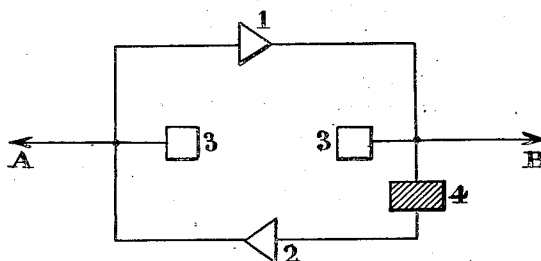


Fig. 3



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TELECOMMUNICATION SYSTEM

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3 Claims. (Cl. 178-44)

The balancing networks employed with two-wire amplifiers on pupinised cables can be readily devised only for frequencies considerably lower than the cut-off frequency of the circuit. Balancing at low frequencies also offers difficulties. In practice, the frequencies are limited to those required for telephony, for instance, the frequency band 300-2,300 cycles per second. The band 0-300 cycles per second, as well as that extending from about 2,300 cycles per second upwards to a frequency less than the cut-off frequency, remain unused in two-wire circuits.

An object of this invention comprises a new method of transmission for two-wire circuits, in which the two side bands, ordinarily not employed, are allotted to simultaneous additional signalling transmissions.

A feature of this invention consists in the provision in a telecommunication system of two-wire amplifiers which can transmit in each direction a frequency band greater than that necessary for normal two-wire telephonic transmission, the bands transmitted by each amplifier being different for each of the directions, but comprising a common middle part. Other features and purposes of the invention will be apparent from the following detailed description.

In order that the invention may be better explained, reference will be had to the following description taken in conjunction with the accompanying drawing, in which

Fig. 1 diagrammatically represents a two-wire circuit embodying the invention,

Fig. 2 illustrates the frequency characteristics of the amplifiers according to the invention, and

Fig. 3 diagrammatically represents a modification of the circuit shown in Fig. 1.

In Figs. 1 and 3, numeral 1 represents an amplifier adapted to transmit in the direction AB, 2 an amplifier adapted to transmit in the direction BA, 3 the balancing networks or systems, and 4 and 5 the weakening devices.

Referring to Fig. 1, between the two end stations (not shown) a telephonic transmission is established by a two-wire circuit, and a two-way telegraphic transmission is superposed on this telephonic transmission. The amplifiers such as 1 associated with the weakening device 5, transmit in the direction AB the frequency band 300-3,000 cycles per second; the amplifiers such as 2 associated with the weakening device 4, transmit in the direction BA

the band 100-2,200 cycles per second. The amplification in each of the directions BA and AB are respectively represented by the curves *a* and *b* in Fig. 2.

The weakening devices due to which the amplifications represented by these curves are obtained, may comprise filters, for instance. The devices 4 will be low pass filters which pass the band 0-2,200 cycles per second and the devices 5 will be high pass filters having a lower cut-off at 300 cycles per second. The use of filters is, however, not indispensable. A less attenuated weakening will be sufficient and can be obtained, for instance, by means of a resonant circuit tuned to the mean frequency of the frequency band to be weakened, or even by a special arrangement of the input transformers of the amplifiers.

The common frequency band 300-2,200 cycles per second which is transmitted in both directions and for which the balancing systems are satisfactory is allotted for telephonic transmission.

The frequency band 2,200-3,000 cycles per second transmitted in the direction AB serves for telegraphic transmission from A to B; the frequency band 100-300 cycles per second transmitted in the direction BA serves for telegraphic transmission from B to A.

At the end stations the different bands are separated by means of suitable filters, as in the manner well-known in the art, per se.

Fig. 3 represents a modification, in which a one-way telegraphic transmission in the direction AB is superposed on the two-wire telephonic transmission. The amplification in the direction AB covers the band 300-3,000 cycles per second and that in the direction BA is limited to the band 300-2,200 cycles per second. The band common to both directions of transmission, viz. 300-2,200 cycles per second, is allotted for telephonic transmission and the upper band, 2,200-3,000 cycles, serves for telegraphic transmission from A to B. The weakening devices 4, of the kind described above, cause only the frequencies lower than 2,200 cycles to be amplified in the direction BA.

It is to be observed that the frequencies mentioned above have been given by way of illustration only.

In the foregoing, it has been supposed, for the purpose of explaining the invention, that the normal transmission is a telephonic transmission, but it is obvious that the scope of the invention will not be departed from, if a two-way

transmission of some other kind is effected on the common frequency band. The two supplementary bands may each be allotted to one or more one-way transmissions, each band being
5 allotted to one direction of transmission.

I claim:

1. The method of multiplex signalling of intelligence over a two-wire telecommunication system, which comprises transmitting a frequency band in each direction, said bands comprising a common frequency range for which
10 balancing networks for duplex signalling are effective and the one band comprising also a side band below the common band and the other band comprising also a side band above said
15 common band, said side bands lying outside the range for which balancing networks are effective, utilising said common band for duplex signalling of intelligence and utilising said upper and lower side bands for one-way signalling of intelligence simultaneously with said duplex signalling.

2. In a telecommunication system operating over a two-wire circuit, the combination of
20 means for transmitting overlapping frequency bands in opposite directions over said circuit,

each of said bands comprising a side band, one below and the other above, the band common to both said bands, means for effecting duplex signalling of intelligence on said common band, including balancing networks effective for frequencies comprised in said common band and ineffective for frequencies comprised in said side bands, means for one-way signalling of intelligence on said lower side band, and means for one-way signalling of intelligence in the reverse direction on said upper side band.

3. The method of multiplex signalling of intelligence over a two-wire telecommunication system, which comprises transmitting a frequency band in each direction over said system, said bands comprising a common frequency range for which balancing networks for duplex signalling are effective and one of said bands comprising also a side band adjacent said common band but lying outside the frequency range for which balancing networks are effective, utilising said common band for duplex signalling of intelligence and utilising said side band for one-way signalling of intelligence simultaneously with said duplex signalling.

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