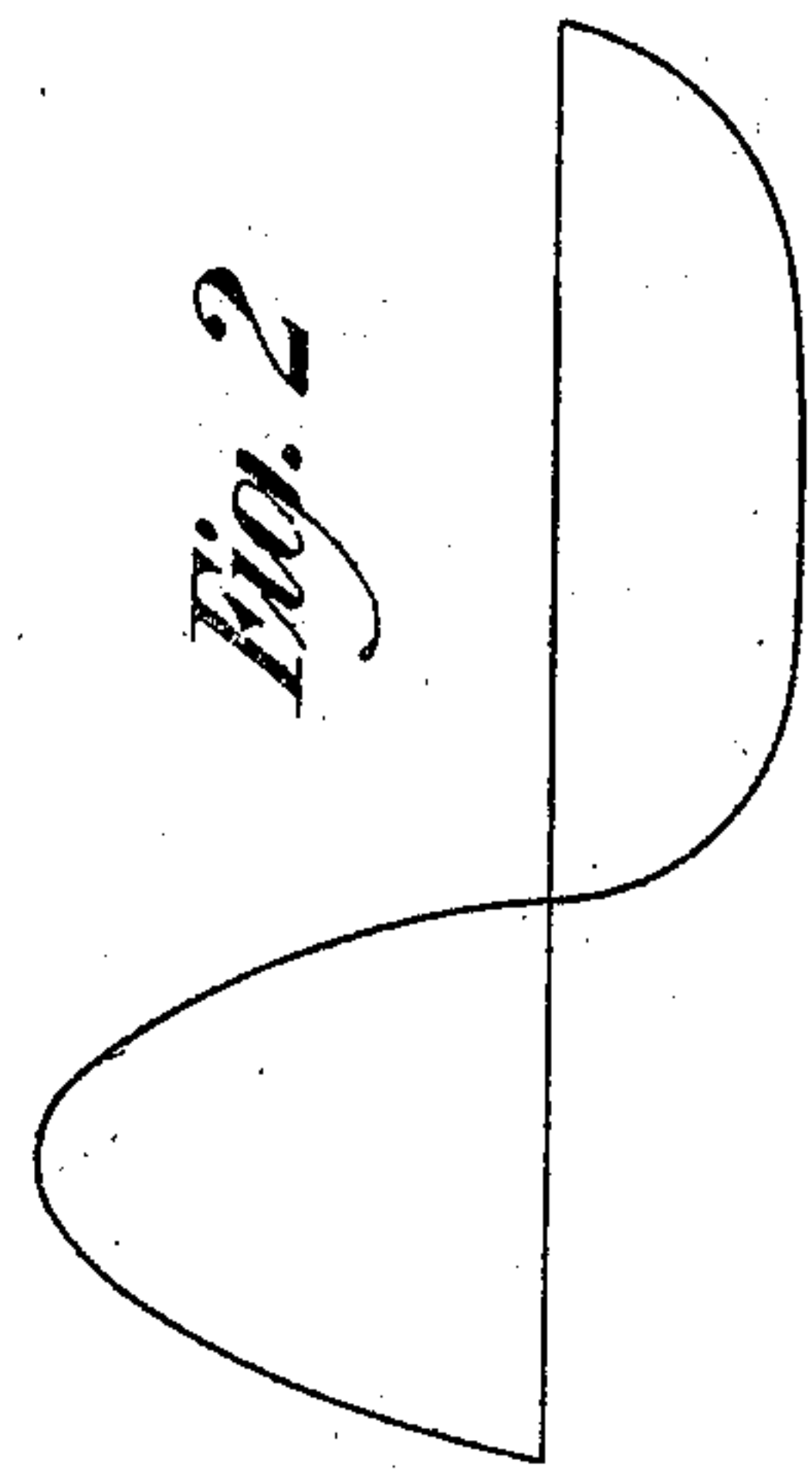
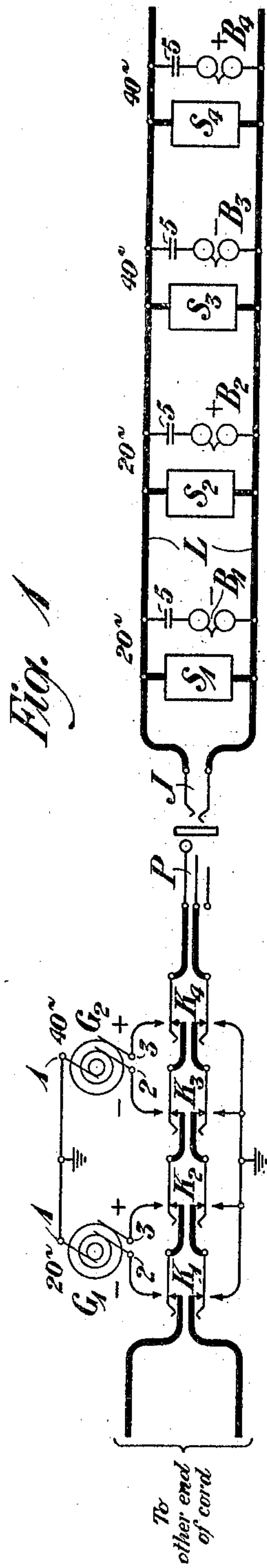


1,398,287.

G. K. THOMPSON.
SELECTIVE SIGNALING SYSTEM.
APPLICATION FILED JAN. 15, 1920.

Patented Nov. 29, 1921.



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SELECTIVE SIGNALING SYSTEM.

1,398,287.

Specification of Letters Patent.

Patented Nov. 29, 1921.

Application filed January 15, 1920. Serial No. 351,604.

To all whom it may concern:

Be it known that I, GEORGE K. THOMPSON, residing at Maplewood, in the county of Essex and State of New Jersey, have invented certain Improvements in Selective Signaling Systems, of which the following is a specification.

This invention relates to selective signaling systems, particularly to systems of the character which are adapted for use in connection with multi-station telephone lines.

It is an object of this invention to provide means for selectively signaling over a common battery line, by the use of currents differing in frequency and polarity, without necessitating the grounding of the line conductors at the subscribers' stations.

This object of the invention and certain other features thereof set forth below, are attained as described in the following specification which has reference to a certain specific form of embodiment of the invention illustrated in the accompanying drawing, in which—

Figure 1 is a diagrammatic view of one form and arrangement of circuits embodying the invention and Fig. 2, a graph showing the wave form of the current which may be caused to flow through the circuits of Fig. 1.

Reference character L in the drawing designates a telephone line having associated therewith four subscribers' substations S_1 , S_2 , S_3 and S_4 which may be of any of the types commonly employed and which are shown conventionally in the drawing for sake of simplicity. Associated with the substations and bridged across the line conductors are signaling devices illustrated as bells designated B_1 , B_2 , B_3 and B_4 , the former two of which are responsive only to current of one frequency, herein assumed as 20 cycles, and the latter two of which, to current of another frequency, 40 cycles, it being understood that any other suitable frequencies may be used. Bells B_1 and B_3 are biased negatively *i. e.*, so constructed that they respond only to current of negative polarity and bells B_2 and B_4 are biased positively. In series with the bells are condensers which serve to prevent the flow of battery current through the bells which current would otherwise cause decreased marginal operation of line and supervisory signal circuits (not shown).

The line terminates at the central office

in a jack J which is adapted to receive the plug P of an operator's cord, only one terminal of which has been illustrated in the drawing, it being understood that the cord is equipped with the common battery and the supervisory signaling apparatus usual in the art. The cord is also provided with a set of keys K_1 , K_2 , K_3 and K_4 arranged for signaling selectively to the subscribers' substations S_1 , S_2 , S_3 and S_4 respectively. The keys are for this purpose associated with generators G_1 and G_2 which may be of the type illustrated in the patent to Stanley S. A. Watkins for signaling system, No. 1,249,570 dated December 11, 1917. The waves of electromotive force of these generators are such that when the same are applied to a bell having a condenser in series therewith the current therethrough has a wave shape of substantially the form illustrated in Fig. 2. It will be observed in this diagram that the maximum ordinate in one direction or loop is far greater than that of the opposite direction, although the total current in one direction is equal to the current in the other direction, so that the average value of the current per cycle is zero. Each generator is provided with three terminals, and the windings are so arranged that the electromotive force between terminals 1 and 2 has a high negative ordinate whereas that between 1 and 3 has a high positive ordinate. The frequency of generator G_1 corresponds to that of bells B_1 and B_2 and the frequency of G_2 corresponds to that of B_3 and B_4 , as indicated in the drawing.

To ring the subscriber's station S_1 the operator associates the plug of her cord with the jack J and depresses the key K_1 so that current of a frequency of 20 cycles and a larger negative than positive ordinate flows into line L and through the bells. B_3 and B_4 fail to respond because of the frequency of the current and bell B_2 fails to operate because the maximum value of positive current is insufficient to overcome its bias. The bell B_1 , however, being of the right periodicity and bias responds to the current. The other substations on the line may be signaled selectively in similar manner by the remaining keys.

It will be observed that because of the connection of the bells across the line conductors inductive disturbances are avoided which would be present under certain line

conditions if the bells were connected to ground. The condensers in series with the bells are necessary as stated hereinbefore, to prevent the flow of battery current 5 through the bells and the consequent decreased marginal operation of the line and supervisory signal circuits. The condensers are necessary also to permit of the making of the usual insulation tests on the line con- 10 ductors. With the condensers in the circuit, however, the current produced through the circuit by an ordinary pulsating current generator is alternating with only a slight difference between the positive and negative 15 ordinates, which difference is not sufficient to operate selectively biased bells having commercial adjustments. The current used herein has, however, the maximum ordinate far larger in one direction than in the other 20 which permits of the selective operation of biased bells having commercial adjustments. The operation of this system depends therefore on the peculiar shape of the current wave and the selective feature is secured by 25 the frequency as well as the direction of the maximum value of the current.

Although I have herein shown and described only one form and arrangement of apparatus embodying the invention it is 30 readily understood that various changes and modifications may be made therein within the scope of the following claims, without departing from the spirit and scope of the invention.

35 What is claimed is:

1. In a selective signaling system, line conductors, biased frequency selective signaling devices associated therewith, condensers 40 in series with said devices, and means for associating with said line current of one frequency or another, having a larger ordinate in one direction than in the other.

2. In a selective signaling system, line 45 conductors, a plurality of biased signaling devices bridged across said conductors, cer-

tain of said devices being responsive to currents of one frequency and others to current of another frequency, condensers in series with said devices, a plurality of sources of current for said system, certain of said 50 sources being of said one frequency and others of said other frequency, the current from each of the sources having an average value substantially equal to zero but a larger ordinate in one direction than in the 55 other, and means for selectively associating said sources with the line.

3. In a common battery telephone system, line conductors, a pair of oppositely biased signaling devices bridged across said con- 60 ductors and responsive to one frequency, a second pair of oppositely biased signaling devices bridged across said conductors but responsive to another frequency, a generator of said one frequency for causing in said 65 line currents having an average value of zero per cycle but a larger ordinate in one direction than in the other, means for associating said generator with the line with the larger ordinate selectively in one direction 70 or the other, a second generator similar to the first mentioned one but having said other frequency, and means for associating said second generator with the line with the larger ordinate of current selectively in one 75 direction or the other.

4. In a selective signaling system, line conductors, biased signaling devices associated therewith, said signaling devices being directly selective to frequencies in pairs, 80 respective condensers in series with said devices, and means for associating with said line current of one frequency or another having a larger ordinate in one direction than in the other. 85

In testimony whereof I have signed my name to this specification this 14th day of January, 1920.

GEORGE K. THOMPSON.