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ASYMMETRICAL WAVE GENERATING SYSTEM

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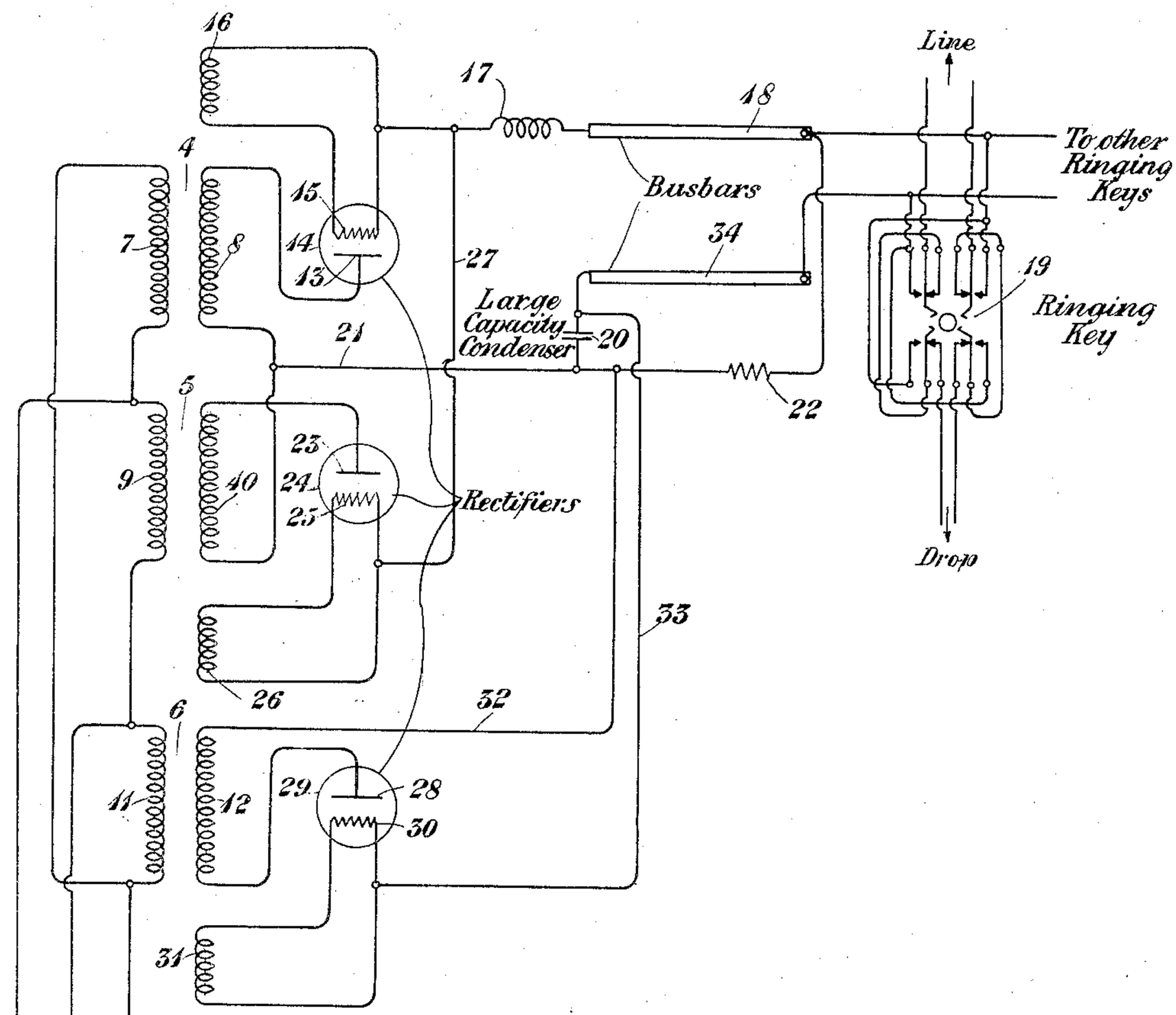

Fig. 1

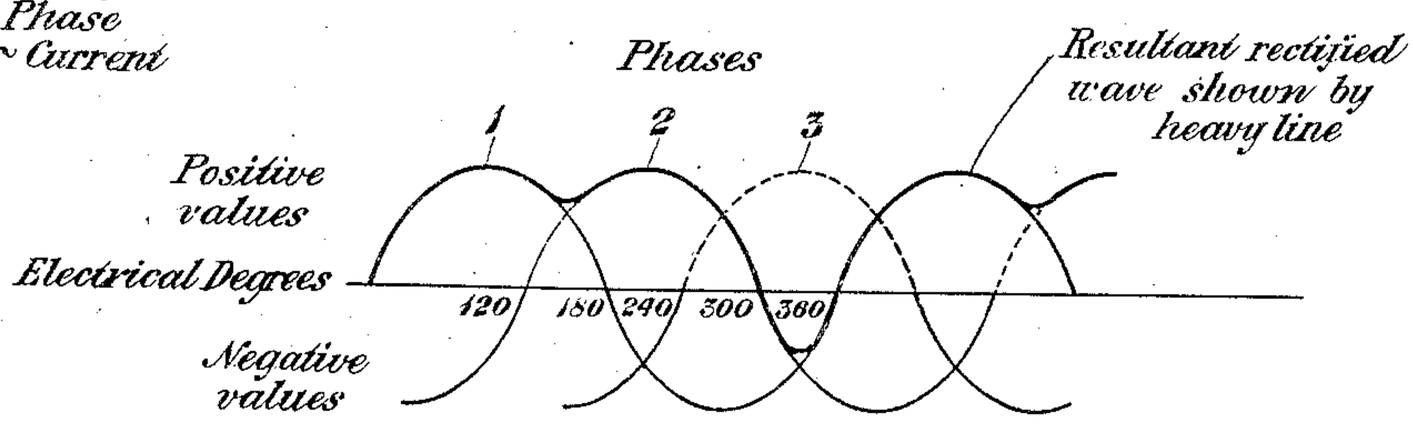

Fig. 2

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UNITED STATES PATENT OFFICE.

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ASYMMETRICAL WAVE-GENERATING SYSTEM.

Application filed August 19, 1924. Serial No. 733,028.

This invention relates to voltage generating devices and particularly to means for producing an asymmetrical voltage wave for selective ringing in a party-line telephone system.

In connection with telephone selective ringing systems, it is sometimes desirable to produce a voltage wave which is unsymmetrical in form, one half-cycle being of longer duration than the other half-cycle. This lengthening out of one half-cycle produces a sustained impulse for the energization of the magnet or relay of the ringing device, which insures greater accuracy of operation.

It is the object of this invention to provide a method and means for the production of an unsymmetrical voltage wave in which the amplitudes and durations of the two halves of the wave may be adjusted and controlled.

This invention will be clearly understood from the following description when read in connection with the attached drawing, of which Figure 1 shows a simple form of embodiment of the invention, and Fig. 2 shows graphically the manner in which the unsymmetrical wave is produced.

In Fig. 1, the windings 1, 2 and 3 represent a source of three-phase current, which may be of the frequency of 20 cycles since this is commonly used in telephone ringing systems. These windings are bridged across the primary windings 7, 9 and 11 respectively of the transformers 4, 5 and 6 respectively. One terminal of the secondary winding 8 of the transformer 4 is connected with the anode 13 of the rectifier 14, the cathode of which is connected with the choke coil 17, which in turn is connected with the bus-bar 18. A winding 16 of transformer 4 is connected with the cathode 15 for the purpose of energizing it. The bus-bar 18 is connected with contacts of the ringing key 19, by means of which ringing current may be applied to the line. The other terminal of the winding 8 is connected by conductor 21 with the condenser 20, which is in turn connected with the bus-bar 34. This bus-bar is connected with other contacts of the ringing key 19. The junction point of conductor 21 and the condenser 20 is connected with the bus-bar 18, the said connection including a resistance 22 of fairly high value.

One terminal of the secondary winding 10 of transformer 5 is connected with the anode 23 of the rectifier 24 and the other terminal with conductor 21. The cathode, which is energized by current from the secondary winding 26, is connected by conductor 27 with the choke coil 17. One terminal of the secondary winding 12 of transformer 6 is connected by conductor 32 with the junction point of conductor 21 and condenser 20 and the other terminal is connected with the anode 28 of rectifier 29. The cathode 30, which is energized by current from the winding 31, is connected by conductor 33 with the plate of condenser 20 opposite to that with which conductor 32 is effectively connected.

The manner in which this system operates to produce an unsymmetrical wave of the form shown in Fig. 2 is as follows: Three-phase current is applied to the windings 7, 9 and 11, which currents are as represented by the curves of Fig. 2. During the interval in which the wave of phase 1 is positive, current will flow from the winding 8 through the gap between the anode 13 and the cathode 15 of the rectifier 14 and through the choke coil 17 to the bus-bar 18, thence through resistance 22 and over conductor 21 to the opposite terminal of the winding 8. This will establish a positive potential between the bus-bar 18 and the bus-bar 34. When this wave of phase 1 reaches the 120 degree point, the wave of phase 2 will become positive, thereby causing current to flow from the upper terminal of winding 10, through the gap between the anode 23 and the cathode 25, thence over a circuit including conductor 27, choke coil 17, bus-bar 18, resistance 22, conductor 21 to the opposite terminal of winding 10. This maintains the bus-bar 18 still positive with respect to 34. When the wave of phase 3 becomes positive, current will flow from the lower terminal of winding 12, through the gap between the anode 28 and the cathode 30, thence over a circuit including conductor 33, condenser 20, conductor 32, to the opposite terminal of winding 12. This current will charge the condenser, making its upper plate positive and its lower plate negative. The voltage thereby created is opposite to that created by the phases 1 and 2 during their positive half cycles. It will be seen, therefore, that the positive half cycle of the third phase will be suppressed and the condenser 20, during

this interval, will impose upon the circuit a voltage opposite to that which would be placed upon it by the phase 1 and 2. The resultant wave of the three-phase current impressed across the bus-bars 18 and 34 will have the form represented by the heavy outline of Fig. 2, which is a wave having a fairly sustained positive value for approximately two-thirds of a cycle and a negative value for one-third of a cycle, which negative value is of smaller magnitude than the positive part of the wave. The duration of the positive and negative parts of the wave, as well as the amplitude, may be controlled by varying the capacity of the condenser 20 or the inductance of the choke coil 17, or by varying the transformer voltages. It is desired to point out that the condenser 20 should be of fairly large capacity in order to maintain its charge during the interval in which the waves of phases 1 and 2 are positive.

While this invention is embodied in a particular form and arrangement of parts it is to be understood that it is not so limited but is capable of embodiment in other forms without departing from the spirit and scope of the appended claims.

What is claimed is:

1. In a device for generating an asymmetrical voltage wave, the combination with a three-phase generator of a three-phase transformer, the primary windings of which are connected with the respective windings of the said generator, a rectifier individual to and connected wth each of the secondary windings of the said transformer, the rectifiers of two successive phases being connected in like manner with their respective windings, the rectifier of the third phase being connected oppositely, a condenser of large capacity connected with the said rectifiers so as to be charged by current of the third phase during the half-cycle in which the anode of the rectifier connected therewith is positive.

2. In a device for generating an asymmetric voltage wave, the combination with a line of a source of three-phase voltage, a condenser of large capacity relative to said line, rectifiers for translating currents of the three-phases, one of the said rectifiers being so poled and connected as to charge the condenser during one half-cycle of the wave of that phase, and the other rectifiers being arranged to impress upon the line a potential of oppos te polarity to that impressed thereon by the said condenser.

3. In a device for generating an asymmetric voltage wave, the combination with a source of three-phase voltage of three rectifiers each individual to and connected with one of the said phases, and a load in series with a condenser of large capacity, two of the said rectifiers being similarly connected with the said load and the said condenser, and the third rectifier being bridged across the said condenser in such manner as to oppose the voltage of the condenser created by the voltages of the other two phases.

4. In a device for generating an asymmetric voltage wave, the combination with a source of three-phase voltage of rectifiers each connected with one of the said phases of the said source, a circuit containing a load in series with an inductance and a condenser of large capacity and having a high impedance shunting the said load and the said condenser, two of the said rectifiers being similarly connected with the said circuit, the third rectifier being bridged across the said condenser in such manner as to oppose the voltage of the condenser created by the voltages of the other two phases.

In testimony whereof, I have signed my name to this specification this 18th day of August, 1924.

WILLIAM H. T. HOLDEN.