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CIRCUIT ARRANGEMENTS FOR ORIGINATING ELECTRIC CURRENTS OR POTENTIALS FOR SIGNAL OR CONTROL PURPOSES

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Fig. 1

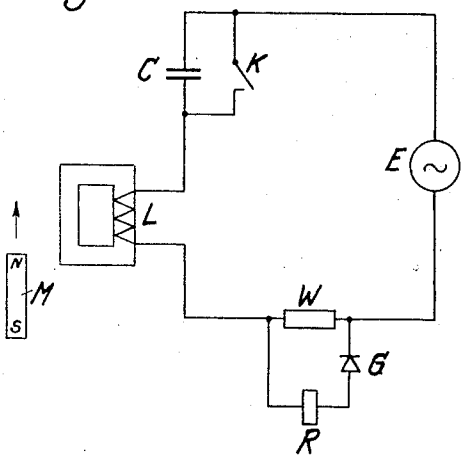
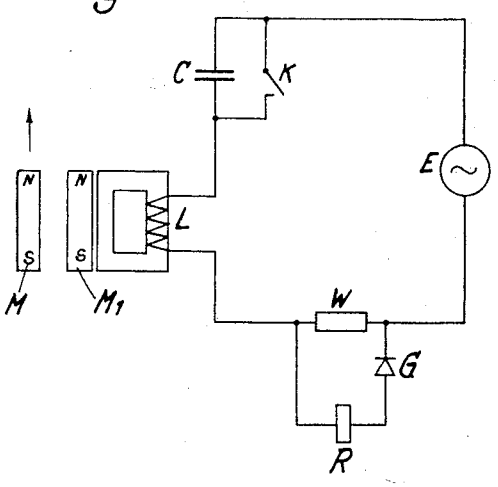


Fig. 2



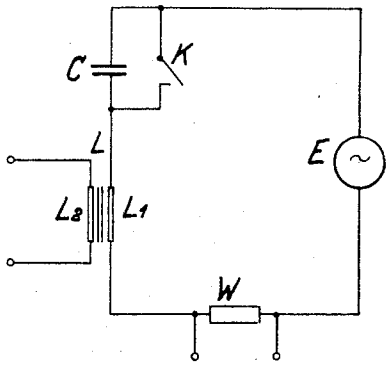


Fig. 3

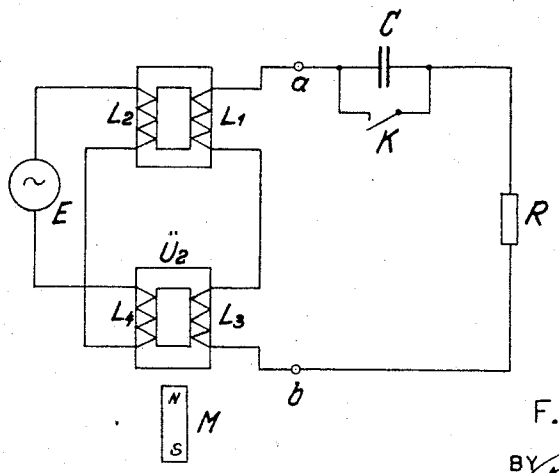


Fig. 4

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CIRCUIT ARRANGEMENTS FOR ORIGINATING ELECTRIC CURRENTS OR POTENTIALS FOR SIGNAL OR CONTROL PURPOSES

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2 Claims. (Cl. 323—76)

The invention has for its object to provide an arrangement by means of which it is possible in a simple and reliable manner to originate an electric current or potential, for signaling or control operations. Electromagnetic relays, excited by short pulses, have been used in such arrangements. If, however, the control pulses for these relays be too small to operate them, the pulse duration being too short or the amplitude of the pulses too small, such devices are not suitable for use. In these cases electron tubes have been used. Preferably, the tubes employed to this end are gas-filled, these becoming ignited by the pulse and then carrying a relatively strong current.

In many cases the use of electron tubes is undesirable because their heating current must flow as long as they have to be ready for service, and because their life is limited in duration. It has also been proposed, in order to originate an electric current for signaling or controlling purposes to use a magnetic amplifier and to provide means for varying momentarily its magnetic field.

According to the present invention an iron-core choke constitutes the inductance, or part thereof, of an electric oscillatory circuit which with the inductance in one of its two states is in resonance, or nearly so, with an alternating voltage of a certain frequency. One of these states is the at-rest or normal condition, in which the iron-core choke is uninfluenced. The other or working condition is that in which the inductivity of the choke has been altered by the field set up by a control device. The choke when in its at-rest state, is out of resonance with the A.C. source. By changing the inductivity of the choke, the circuit will be brought to be resonant to the voltage source. The current in the circuit now rises. Preferably it should be made to rise to such extent that the choke will become saturated. The increased current will continue after the magnetic influence on the choke has been removed, since current itself will have decreased the inductivity of the choke. This current may then be used to initiate a control or signaling operation.

It will be appreciated that the signal or control indication could also be initiated by bringing the oscillatory circuit from resonance to non-resonance.

The invention will be more fully understood from the following description, reference being had to the accompanying drawings in which:

Fig. 1 illustrates the mode of controlling an oscillatory circuit by influencing an iron-core choke thereof,

Fig. 2 shows a further development of the arrangement of Fig. 1,

Fig. 3 represents an embodiment which may be used for the storage of signals, and

Fig. 4 is a further embodiment of the invention.

In the embodiment according to Fig. 1 the oscillatory circuit is a series circuit comprising an iron-core choke L, a capacity C, an alternating voltage source E, and a resistance W. G. denotes a rectifier and R a relay connected across the resistance W. Capacity C can be shorted by a contact K.

In its normal or rest condition, the oscillatory circuit is out of resonance with the frequency of the voltage source E. When a magnet M is introduced into the magnetic field of choke L, the inductivity of its winding is thereby so changed that the oscillatory circuit is then resonant to the frequency of source E. The current in the oscillatory circuit now rises to a maximum value so that a high voltage appears across the resistance W. This voltage is rectified by rectifier G and applied to the energizing winding of relay R. The state so established will not be changed when the magnet M is removed from the field of choke L, because the change of the inductivity is now maintained by the increased current in the oscillatory circuit. The normal or rest condition of the circuit will not be re-established until one of the frequency-determining elements, in this case the capacity C under the control of contact K, is momentarily disconnected or shorted. Preferably the circuit should be so dimensioned that in its working condition, that is, in its condition of resonance, a saturation current will flow in the choke L. Instead of a magnet, introduced into the field of the iron-core choke L, a field produced by a continuous current may be employed. Moreover, the oscillatory circuit may be arranged as a parallel circuit in which case the condenser C would be connected across the choke L.

Where the arrangement is required to respond only to magnets or a field of a predetermined directivity, the iron-core choke may be provided with a permanent magnet arranged to cause premagnetization.

Such an arrangement is shown in Fig. 2. Here, an additional permanent magnet M1 is provided adjacent the choke L. The exciting magnet is again designated M. If magnet M is so introduced into the field of choke L that the effects of the magnets M, M1 are additive, the inductivity of coil L will thereby be decreased in a manner to bring about resonance of the oscillatory circuit. In the other case, however, in which the effect of magnet M is subtracted from that of magnet M1, the inductivity of L will be increased, with the result that resonance will not occur. In this way the polarity of magnet M will determine the control action to be brought about.

One application of the invention is in connection with devices which serve to operate control or signaling arrangements in railways. In this case magnet M may be carried by a vehicle whilst the iron-core choke may be mounted in the path of the vehicle, although in certain cases, particularly where the vehicles are manned, the reverse procedure is recommended. By this means through the mutual movement between magnet M and choke L a control or a signaling operation is initiated either on the vehicle or at a point in its path, as the case may be. When so employed, the arrangement will be of particular utility when the vehicles are not manned. The control action may thus serve to set routing switches and/or to stop the vehicles. In particular this mode of control may be employed in pneumatic dispatch tube systems in order to set the routing switches thereof.

The arrangement may also be employed to store signals. A circuitry suitable in this respect is shown in Fig. 3. Here the iron-core coil L comprises coils L1, L2, A short pulse applied to coil L2 acts to change the state of the arrangement in the same manner as does the magnet M. The arrangement may be used to store a single pulse. The storage time is unlimited as long as the voltage source is effective. In this case also the at-rest or normal state is established by varying one of the elements of the oscillatory circuit. Preferably, the capacity C may be shorted to that end by means of the contact K.

In the previously described arrangements the oscillatory circuit has always a small current flowing in it. Where this is undesirable, for example in the case of

indications required to be of high precision, the circuit of Fig. 4 may be employed to avoid this drawback.

The oscillatory circuit in this embodiment comprises a condenser C, a resistance R, and the secondaries L1, L3 of the transformers Ü1, Ü2. The primaries are designated L2, L4. E denotes the voltage source. The primaries L2, L4 are connected in series opposing. The secondaries L1, L3 are connected in series aiding. Hence no voltage appears at the terminals *a, b* because the voltages across the coils L1, L3 annul each other. If now the magnetic field of one of the transformers becomes affected, as, for instance, through the approach of a permanent magnet M, then the inductivity of the coils L3, L4 decreases. Consequently a voltage arises at the terminals *a, b*, since the voltages across L1, L3 are now different from each other. The voltage at *a, b* may assume such a value that the current then flowing through the coils L1, L3 acts to so change the inductivity that the circuit becomes in resonance. Thereby a current is caused to flow in the oscillatory circuit, and produces a voltage across resistor R. Such voltage continues to exist even though the magnet M is removed and no longer influences the transformer Ü2, since the voltages across L1, L3 remain unequal. The at-rest or normal state will not be reestablished until the oscillatory circuit is disturbed by any one of its elements becoming altered. For example, condenser C may be shorted to that effect through closing the contact K.

It will be seen that with the arrangement not excited, no current is flowing through resistance R while with the arrangement excited the current flowing in it assumes its maximum value. The arrangement thus operates with great safety even if the sensitivity of the indicating instruments or of the relays to be controlled is small.

While I have described above the principles of my invention in connection with specific apparatus, it is to be clearly understood that this description is made only by way of example and not as a limitation to the scope of my invention as set forth in the objects thereof and in the accompanying claims.

What is claimed is:

1. Circuit arrangement for originating an electric current or potential for signalling or control purposes, comprising an oscillatory circuit, a source of alternating current voltage of a predetermined frequency for exciting said circuit, an iron-core inductance connected to form part of said oscillatory circuit the constants of said circuit being so chosen that it is normally non-resonant at said frequency a movable permanent magnet adapted to be moved past said iron core inductance in juxtaposed relation to it whereby a predetermined effect is produced on the inductivity of said iron core inductance such as to bring said oscillatory circuit from a condition of non-resonance to resonance, means for maintaining said oscillatory circuit in said condition of resonance after the passage of said permanent magnet past said iron core inductance and switch means for restoring said oscillatory circuit to said condition of non-resonance.

2. Circuit arrangement for originating an electric current or potential for signalling or control purposes comprising an oscillatory circuit, a source of alternating current of predetermined frequency coupled to said circuit, an iron core choke of rectangular shape having on one limb an inductive winding which is connected to form part of said circuit the constants of said circuit being so chosen that it is normally non-resonant at said frequency, and a movable permanent bar magnet adapted to be moved past said choke in juxtaposed relation to the limb thereof opposite to said first-mentioned limb whereby a predetermined effect is produced on the inductance of said inductive winding dependent upon the direction of polarization of said bar magnet such as to bring said oscillatory circuit from a condition of non-resonance to resonance, means for maintaining said oscillatory circuit in said condition of resonance after the passage of said bar magnet past said iron core inductance, and switch means for restoring said oscillatory circuit to the condition of non-resonance.

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