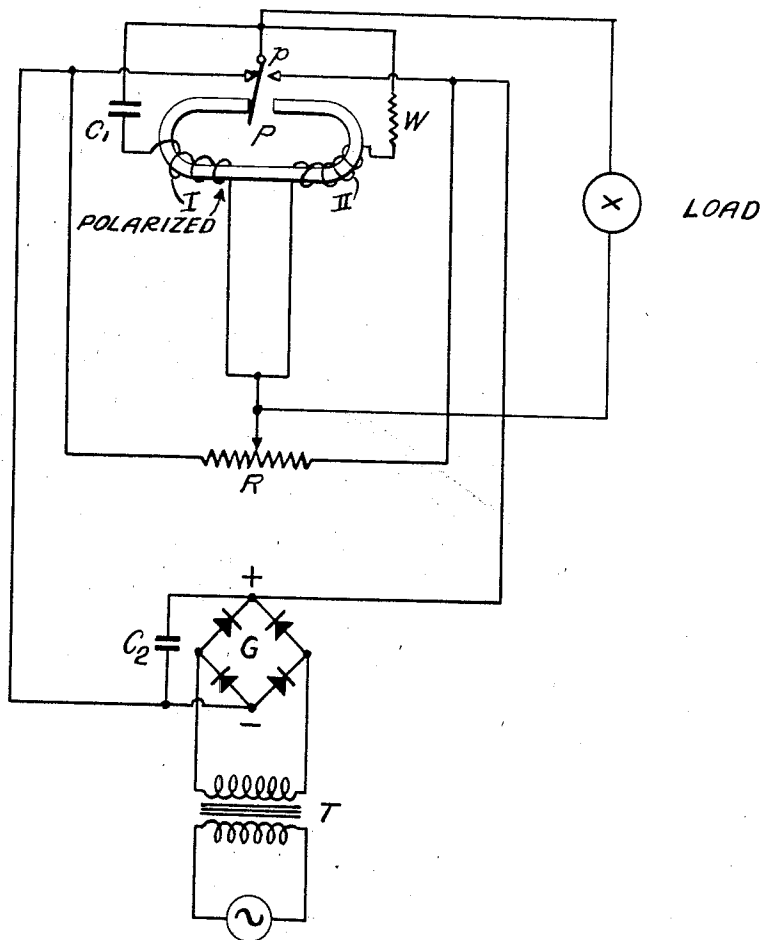


Oct. 23, 1945.

G. SCHMIDT
SELF-INTERRUPTER

2,387,616

Filed April 9, 1941



INVENTOR.
GERHARD SCHMIDT

BY

Amatoleoude

ATTORNEY.

UNITED STATES PATENT OFFICE

2,387,616

SELF-INTERRUPTER

Gerhard Schmidt, Berlin, Germany; vested in the
Allen Property CustodianApplication April 9, 1941, Serial No. 387,673
In Germany March 14, 1940

2 Claims. (Cl. 175-373)

This invention relates to a vibrating circuit for relays of the Gulstad type and has for its object to provide a relay circuit which will operate more uniformly than former circuits of the kind.

Vibrating relays are used for high speed telegraph circuits. Their use is well known and, generally speaking, they serve to anticipate incoming signals, to supply single unit impulses which, due to attenuation, are too weak to be effective at the receiver. A vibrating relay circuit is disclosed in the reissue patent to Finn, No. 14,304, reissued May 22, 1917.

In the prior art self-interrupters are known which comprise a polarized relay and means, such as resistance and condenser, arranged in addition to this relay to determine a desired frequency at which the self-interrupter is to operate, the dimensions of such resistance and condenser or the like being calculated to achieve this. However, the frequency condition so obtained is unsteady.

The present invention provides a novel circuit in which a ripple from a source of alternating current is used to synchronize the vibrating circuit.

One embodiment of the invention comprises means to rectify an alternating current for the self-interrupter and to smooth the resultant ripple current to such extent only that there is a residual ripple for effecting the said synchronization. It has been found that a ripple of 3% will be quite sufficient.

The drawing is a diagram showing an embodiment of this kind.

P denotes a polarized relay having two windings I, II and a contact p. C₁ indicates a condenser, W a resistance, R a voltage divider, C₂ a smoothing condenser for a rectifier G, while T denotes a supply transformer connected to an alternating current source. The series connections C₁, I and W, II are joined in parallel to contact p, and to voltage divider R which to such end is tapped in its center point. Relay P is preferably a relay of the so-called "Post Office" type which when provided with auxiliary windings as described in the Finn patent referred to above is known as a "combination" relay in the printing telegraph art. A relay of this kind is provided with a permanent magnet and the armature rests on the contact to which it was last moved until current of the required polarity flowing through one of its coils is effective to move the armature to the opposite position. In the present arrangement, windings I and II are

connected so as to oppose each other in their effect on the armature except during the brief interval when the tongue is in transit between the two contacts.

5 With contact p in the position shown in the drawing there is a circuit -(G), p, C₁, I, R, +(G) and a second circuit, namely, -(G), p, W, II, R, +(G).

While condenser C₁ is being charged, a current 10 flows over winding I pressing tongue p more firmly against its left hand contact. This current is much greater than the current over W, II which at this time tends to move the tongue to the right hand contact. When condenser C₁ 15 has been charged the current in winding I ceases. Consequently, winding II becomes effective so as to switch the contact p to the right hand contact. During the period of the contact changing from the position shown to the other or opposite position the condenser C₁ discharges over II, I in 20 series so that there is a flow of current also during that period of such polarity that the movement of the armature is accelerated towards the right. With contact p in the right hand contact 25 position, not represented in the drawing, the current in the self-interrupter flows in the direction which is the reverse of the former. The direction of the current through W is reversed tending to move the armature again to the left, but the current in I through condenser C₁ is also reversed 30 and now holds tongue p to the right until C' is charged, at which time winding II is effective to move the armature to the left. This time, therefore, the condenser C₁ discharges in the direction 35 likewise the reverse of the former direction of discharge, so as to accelerate the return of contact p to the position shown in the drawing. It will be seen that in this way the arrangement is suitable for interrupting and closing a circuit 40 continually.

In order that the vibrating circuit may be controlled by the frequency of the alternating current in transformer T, the values of resistance W and condenser C₁ are proportioned so as to 45 cause the relay to vibrate as closely as possible to the frequency or to a harmonic thereof. The method of making this adjustment is well known in the art. When so regulated, the relay will vibrate at its frequency with a fair degree of 50 stability independently of external control. Each time the relay tongue comes to rest on a contact, condenser C₁ has been discharged in transit and starts to charge to build up the holding current in winding I, but when the tongue initially engages the contact, the weaker current through 55

the resistance W and windings II starts to build up tending to move the tongue to the opposite contact. This condition tends to cause instability in the circuit but in the present invention a momentary surge in voltage due to a ripple from the rectifier is more effective on the condenser and coil I than on the parallel circuit, since the condenser is connected directly to the rectifier so therefor the action of the holding winding I becomes effective, before winding II can move the armature and the armature is held positioned until the condenser becomes fully charged, and then the cycle just described is repeated.

The vibrating circuit herein disclosed may be used to control a local telegraph relay over a circuit similar to that disclosed in the Finn patent referred to above or other circuit arrangements may be operated therefrom. One terminal of an external circuit may be connected to the armature, the return circuit being connected to the center tap on the voltage divider R.

What is claimed is:

1. A relay circuit comprising a polarized relay having opposed contacts and an energizing circuit therefor consisting of an alternating current source, rectifying means energized thereby and circuit connections from the rectifier means including a filter device effective only partially to smooth the ripple in the rectified current from said source, opposite polarity leads from the rectifying means to the relay contacts, an output

circuit connected to the relay armature, a voltage divider connected to the opposite polarity leads and parallel connections from the voltage divider to the relay armature having in series therein a relay coil and a condenser and a relay coil and a resistance, respectively, whereby the voltage peaks of the rectified current furnish an added initial charge to the condenser to stabilize operation of the relay.

2. A relay circuit comprising a vibrating polarized relay having opposed terminal contacts and an energizing circuit therefor comprising an alternating current source, a rectifier bridge network energized thereby and circuit connections therefrom for energizing the relay with a pulsating current including opposite polarity leads from the rectifier bridge to the relay terminal contacts, a condenser connected across the leads from the rectifier bridge to be effective only partially to smooth the ripple in the rectified current from said source, an output circuit connected to the relay armature, a voltage divider connected to the opposite polarity leads and parallel connections from a tap of the voltage divider to the relay armature, said parallel connections including in series therein a relay coil and a condenser and a relay coil and a resistance, respectively, whereby the voltage peaks of the rectifier current furnish an added initial charge to the condenser to stabilize operation of the relay.

GERHARD SCHMIDT.