

K. FISCHER.

ELECTRIC RELAY AND THE LIKE.

APPLICATION FILED AUG. 15, 1913. RENEWED JUNE 10, 1919.

1,328,041.

Patented Jan. 13, 1920.

Fig. 1

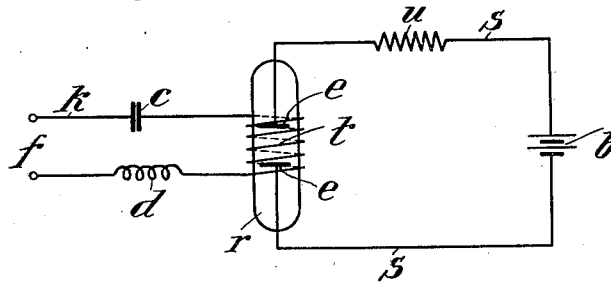


Fig. 2

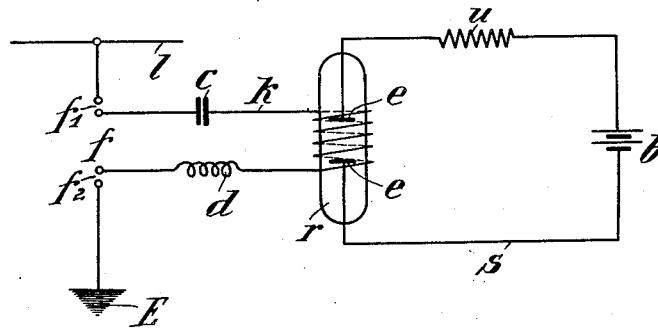
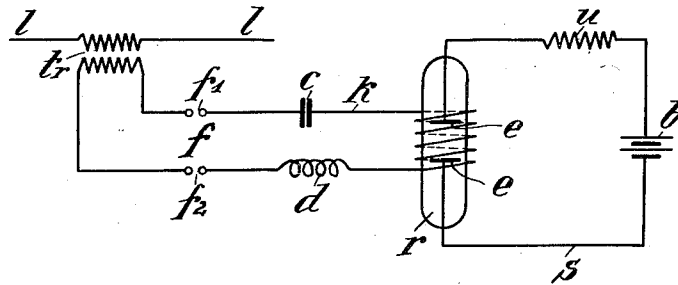


Fig. 3



Witnesses:
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UNITED STATES PATENT OFFICE.

KUNO FISCHER, OF BERLIN-CHARLOTTENBURG, GERMANY, ASSIGNOR TO SIEMENS-SCHUCKERT WERKE, G. M. B. H., OF BERLIN, GERMANY, A CORPORATION OF GERMANY.

ELECTRIC RELAY AND THE LIKE.

1,328,041.

Specification of Letters Patent.

Patented Jan. 13, 1920.

Application filed August 15, 1913, Serial No. 784,948. Renewed June 10, 1919. Serial No. 303,254.

To all whom it may concern:

Be it known that I, KUNO FISCHER, a German citizen, and resident of Berlin-Charlottenburg, have invented certain new and useful Improvements in Electric Relays and the like, of which the following is a full, clear, and concise specification.

My invention more particularly relates to a class of relays which are actuated by ionizing a gas gap inserted into a control circuit, by reason of which said circuit becomes closed so that controlling or switching devices of all kinds may be operated thereby.

One object of my present invention is to devise an apparatus of this character in which the ionization of the gas is effected in a novel and peculiar manner, viz. by high frequency oscillations which are generated in a special oscillating circuit.

Another object of my invention is to provide a simple and effective protective device for protecting electrical circuits such as transmission lines or cables from electrical disturbances, said device employing the aforementioned relay which is actuated by the ionization of a gas gap through high-frequency currents.

My invention will be more fully understood by reference to the accompanying drawing of which Figure 1 shows the general principle of my present invention to employ high frequency currents for ionizing a gas and rendering the same conductive to close a circuit for the above purpose, Fig. 2 is a modification of the arrangement of Fig. 1 for protecting cables from excessive voltages by causing said excesses of voltage directly to produce a spark through which high frequency oscillations are set up in the high frequency circuit. Fig. 3 shows a modified form of the arrangement illustrated in Fig. 2.

Referring now more particularly to the drawing, in Fig. 1 a tube r is shown in which a rarefied gas is inclosed and two terminals are molten into this tube and ending in the electrodes e which are positioned within said rarefied gas. Conductors s lead from the terminals of said tube to a battery b . In a second circuit k electrical oscillations are set up by means of a high frequency generating device such as the spark gap f , the natural frequency of which may be changed as desired by inserting a capacity c and a self-induction d into circuit. This high fre-

quency circuit includes a coil or a plurality of turns t , said coil or turns being placed around the tube r . If the voltage of the circuit with which spark gap f is intended to cooperate, exceeds a definite value, the spark gap f will operate and high frequency currents are produced in circuit k by the oscillatory spark gap discharges, which also pass through coil t . Thereby ionization of the gas in the tube is caused which renders the gas conductive. Thus a conductive link is inserted between the electrodes e and the circuit s will be closed.

The conductivity of the gas gap in its ionized state is very great in case the distance between the electrodes is not too large and in case the electrodes possess a sufficient diameter; it is in fact possible to attain by ionization a conductive path between the electrodes of a resistance which is practically negligible. The arrangement as shown in Fig. 1 may therefore be used in many cases as an efficient and reliable circuit closing device.

In Fig. 2 I have shown the above relay embodied in an arrangement for protecting cables against surges, excessive voltages, as well as excessive currents. With the spark gap f which is inserted in the oscillating circuit are associated two further spark gaps f_1 and f_2 connected with conductors of which one is grounded at E and the other connected to the cable l which is to be protected. If, now, the voltage of the cable l surpass a certain value the relay will come into play in the above described manner and may be used for operating all kinds of signaling devices, safety appliances or cut-out switches as indicated at u for the protection of the cable.

The arrangement according to Fig. 3 may be used for protection of the cable l against excessive current. In this case the fluctuations of current are transformed by means of a transformer tr into voltage fluctuations which if surpassing a certain value will operate the spark gaps in the well known manner.

Having thus described my invention I claim as new and desire to secure by Letters Patent of the United States:—

1. A circuit closing relay comprising a gas tube containing electrodes spaced a suitable distance apart and having corresponding outside terminals, a control circuit con-

ected thereto comprising a source of current and controlling means adapted to be actuated from said current source, said control circuit being normally interrupted by the spacing of said electrodes, and a circuit adapted to produce high frequency oscillations and having a coil surrounding said tube for ionizing the gas therein through said oscillations to close said control circuit at said electrode gap.

2. A circuit closing relay for electric transmission lines comprising a gas tube containing electrodes spaced a suitable distance apart and having corresponding outside terminals, a control circuit connected thereto comprising a source of current and means for controlling said transmission line, adapted to be actuated from said current source, said control circuit being normally interrupted by the spacing of said electrodes, and a circuit having a spark gap, a capacity and an inductance and being operatively connected with said transmission line, said circuit adapted to produce high frequency os-

cillations at an electric disturbance in said transmission line, said circuit also having a coil surrounding said tube for ionizing the gas therein through said oscillations, to close said control circuit at said electrode gap.

3. A circuit closing relay comprising a gas tube containing electrodes spaced apart, a normally interrupted control circuit including a source of current and outer terminals of said electrodes, and a circuit adapted to produce high frequency oscillations and having a coil surrounding said tube for ionizing the gases therein through said oscillations to close said control circuit across said electrode spacing.

In witness whereof I have hereunto set my signature in the presence of two subscribing witnesses.

KUNO FISCHER.

Witnesses:

HENRY HASPER,
HARRY L. WILSON.