March 10, 1931. H. RÜHLEMANN 1,795,972

CHARGING DEVICE FOR ELECTRICAL FUSES

Filed Dec. 16, 1929

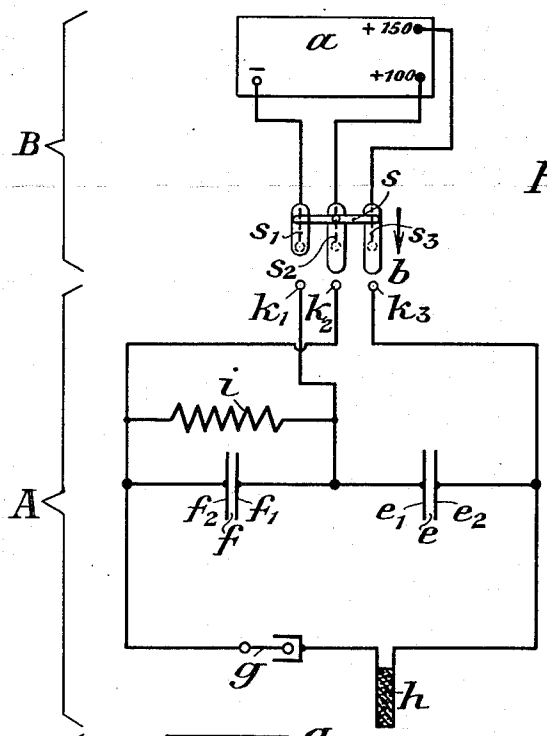


Fig.1.

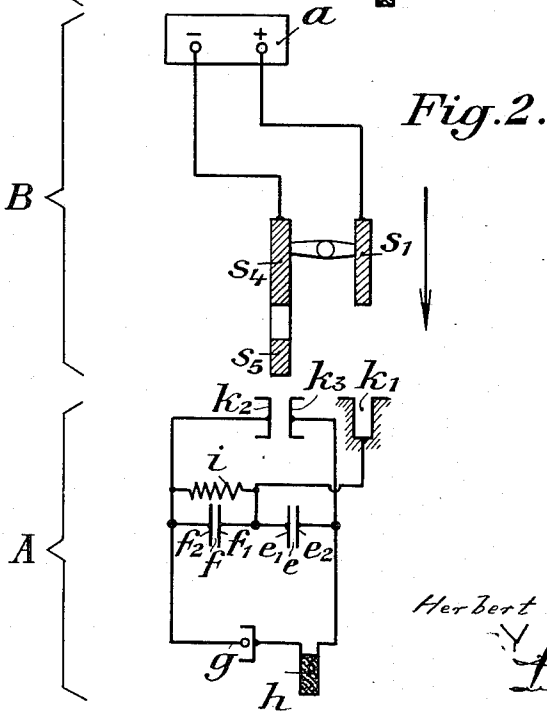


Fig.2.

INVENTOR:
Herbert Rühlemann
BY
ATTORNEY.

Patented Mar. 10, 1931

1,795,972

UNITED STATES PATENT OFFICE

HERBERT RÜHLEMANN, OF SOMMERDA, GERMANY, ASSIGNOR TO RHEINISCHE METALLWAAREN- UND MASCHINENFABRIK, OF DUSSELDORF-DERENDORF, GERMANY, A CORPORATION OF GERMANY

CHARGING DEVICE FOR ELECTRICAL FUSES

Application filed December 16, 1929, Serial No. 414,436, and in Germany June 6, 1929.

This invention is an improvement over my U. S. Patent No. 1,711,693, granted May 7, 1929.

The invention relates to a charging device for supplying electric current to electrical fuses, to be used as time, percussion or double fuses for projectiles, bombs, mines, or the like, and which are provided with two condensers, connected in opposition to each other and serving to supply the ignition current. An electrical diagram of such a fuse and the cooperating charging connections is represented in Fig. 1 of the drawing, while Fig. 2 illustrates a modified form of the invention.

The fuse A, for example, a percussion fuse, contains two condensers e and f, similar poles e_1 and f_1, of which are directly connected together, while their second poles, e_2 and f_2, are connected together through a percussion contact g and an electrical ignition substance h. Condenser f is also shunted by a high resistance i for the purpose of unequally varying its voltage relatively to that of condenser e.

The ignition energy is supplied to the fuse, before use of the latter, from a source of current provided in the charging device. For this purpose, the fuse is provided with three terminals k_1, k_2 and k_3, of which k_1 leads to the condenser coatings e_1 and f_1, k_2 to the coating f_2, and k_3 to the coating e_2.

To impose the voltage of the source a on the fuse, the charging device is provided with a three-pole switch s, movable in the direction indicated by the dotted lines, Fig. 1.

The object of the present invention is to prevent an incorrect charging, as well as the possibility of a premature ignition of the fuse. Such premature ignition might occur, for example, if, in the closing of the switch, contact were made only or at first with the poles k_1 and k_2 of the fuse. In that case, only the condenser f would be charged and there would be a difference of potential at the igniting substance h between the coatings f_2 and e_2 of the two condensers, which would cause immediate ignition of said substance if the percussion contact g were accidentally closed.

Such charging of one condenser only is prevented by the construction and arrangement of the contact terminals of the source of current according to the present invention.

In the form of Fig. 1, the three poles s_1, s_2 and s_3 of the switch s of the source a are so formed and connected together that the poles s_2 and s_3, when the switch is thrown in, will always first be connected to the contacts k_2 and k_3 of the two condenser coatings f_2 and e_2, which are connected together through the igniting substance h. Only then will the second pole of the battery a be connected through contacts s_1 and k_1 to the condenser coatings f_1 and e_1, which are directly connected together. Thus the similar poles s_2 and s_3 of the source, as is the case in the form illustrated, may have different potentials, although the difference must be less than the voltage necessary for ignition, or they may be separated from each other, or else short-circuited together at the same potential.

The operation of the igniter is, of course, obvious. After its removal from the source, in which the above described steps are reversed in order, the switch terminal s_1 will always be first disconnected, and afterwards the terminals s_2 and s_3 together. The condenser f discharges itself through the high resistance i, and a potential difference is built up between the condenser coatings f_2 and e_2, sufficient to ignite the substance h, but only after a predetermined period of time.

In the form of Fig. 2, the switch of the charging system B is formed, for example, as a plunger with two contacts s_1 and s_4. The contact s_4, which engages the igniter contacts k_2 and k_3, is extended at its forward end by a metal pin s_5, which is insulated from the current-conducting contact s_4.

In charging the condensers, that is, when the plunger is moved in the direction of the arrow, the pin s_5 will first make a short-circuit between the condenser poles f_2 and e_2, which are connected together through the igniting substance h and only thereafter will the condenser system be supplied with current. After the short-circuit is formed between f_2 and e_2, it is immaterial whether the contact s_1 is first closed on the common con-

tact k_1 leading to the condenser coatings f_1 and e_1, or whether the contact s_2 is first closed on the condenser poles f_2 and e_2, which are connected together. Due to the short-circuit caused by the pin s_5 just before the beginning of the charging operation, it is always assured that both condensers e and f will be safely charged at the same time.

I claim as my invention:—

1. Means for charging electric fuses provided with two oppositely-connected condensers, one pole of one condenser being directly connected to the pole of the same sign of the other, and the other poles being connected through an igniting substance, comprising fixed contact terminals for said condenser circuits, and cooperating movable contact terminals for the power circuit, one of said movable contact terminals having an insulated metal extension to first short-circuit the condenser circuit through said substance before the power circuit is connected to the condenser circuits.

2. Means for charging electric fuses provided with two condensers connected in opposition with one another for storing the igniting current, one pole of one condenser being directly connected to the pole of like sign of the other, and the other poles being connected to one another through an igniting means, containing fixed contact members connected with the condensers of the fuse, and a switch comprising suitable opposing contact elements connected with the poles of the source of current, the said contact elements of the source of current being mechanically connected with one another and varying in length in groups in correspondence with their polarity, the contact elements of the one polarity being lengthened with respect to those of the other, in order that in applying the switch the contact members leading to the condenser terminals which are connected to one another through the igniting means of the fuse may be the first to make contact.

In testimony whereof, I affix my signature.

HERBERT RÜHLEMANN.