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DEVICE FOR CONTROLLING POWER CIRCUITS

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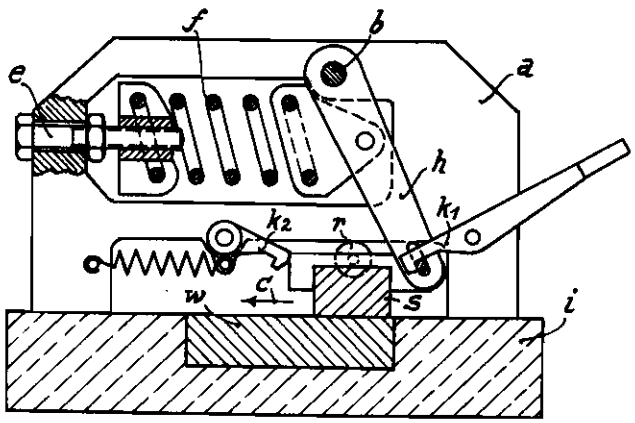

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DEVICE FOR CONTROLLING POWER CIRCUITS

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This invention relates to a device for controlling power circuits and is characterized by the fact that it comprises a continuously varying resistance lying in a circuit and a power storing device serving to drive and to brake the movable part of the resistance device, the power storing device being arranged in such a manner that it is unstressed, approximately in the center of the control path and acts in the first portion of this path as a driving device and in the second portion thereof as a braking device.

The disconnection is preferably effected in the manner that the resistance of the circuit of a small steady value varies rapidly to a great extent, for which the current is either negligible or may easily be interrupted by a residual current circuit breaker of small interrupting capacity. In the first case the device serves to effect the switching operation and in the second case to initiate the same. In this case the resistor is displaced in the shortest possible time approximately of the order of magnitude of a millisecond from the end position to the other position without mechanically or electrically over-stressing the device. The device according to the invention has proved to be suitable for this purpose. The desired uniform switching operation is ensured by the use of a continuously varying resistor and the speed of actuation mentioned above may be brought about only by means of a power storing device. Since the latter acts both as a driving and braking device, the extremely rapid control motion is brought to a standstill in the end position of the device without an undue pulsating action and without excessive development of heat.

The power storing device drives the movable part of the variable resistor preferably through a multiplication gear. In this manner the disadvantage is seemingly presented that the mass of the gear increases the masses to be moved, so that the speed cannot readily attain the desired high value. Under the present particular conditions the mass of the power storing device saved owing to the use of the multiplication gear is, however, greater than that added by the multiplication gear, since the multiplication gear may be designed as a simple lever, preferably as a single armed lever of a relatively small mass. The power storing device is preferably designed in the form of a spring whose mass is the less important the smaller the travel of the spring. It is the mass of the spring which constitutes the main cause for the inertia in connection with drives operating at high speeds. Consequently, the smaller the travel of the spring resulting from the choice of the gear, the smaller the work of acceleration to be expanded on the spring mass and the more energy is free for the acceleration of the movable part of the variable resistor.

In the accompanying drawing is shown an embodiment of the invention in diagrammatic form. Over a resistor w embedded in the insulating base plate i slides a contact s which in order to effect the switching operation is to be displaced at a high speed in the direction of the arrow c from one end position to the other. The contact is guided in the frame a supported by the base plate i by means of one or more rollers r and is connected through a single armed lever h with the spring f mounted in the frame a. The spring acts on the lever h with small lever arm and must therefore traverse only a short path. The spring has a few windings of large cross-section. In this manner the natural frequency of the spring may assume such a high value that no disturbing influences occur at the required speed at which the movement is effected. To this end, the half period of the natural vibration of the spring is preferably made smaller than the duration of the control motion. The tension of the spring may be regulated by rotating the bolt e.

In order that the parts of the device do not come into engagement with one another under sudden blows at the end of the movement the drive is so arranged according to the invention that the spring is unstressed in its central position and acts in the first portion of the control motion as a driving spring and in the second portion thereof as a braking spring. The movable contact s or the drive is latched in the end position by a catch k_1 or k_2 which must be released again in order to initiate the next control motion. In several cases the latching in the end position is sufficient so that the other catch may be dispensed with.

The resistor may also be periodically adjusted. The spring must be stretched at the end of each control motion either by hand or with the aid of any known drive, for instance, of an electromagnet or a compressed air piston.

Instead of the helical spring f shown in the drawing also a resilient rod may be employed which is in engagement with the pin b of the lever h. Also in this case the force of the spring is transmitted to the movable part of the device with a great ratio. The resilient rod has the advantage that its inertia is very small.

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