May 27, 1947. J. HUBER 2,421,267

MECHANICAL SWITCHING DEVICE

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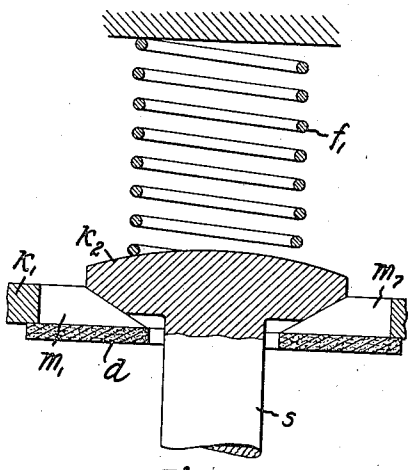


Fig. 1.

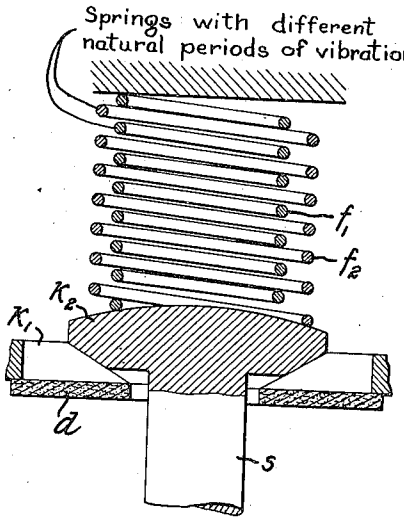


Fig. 3.

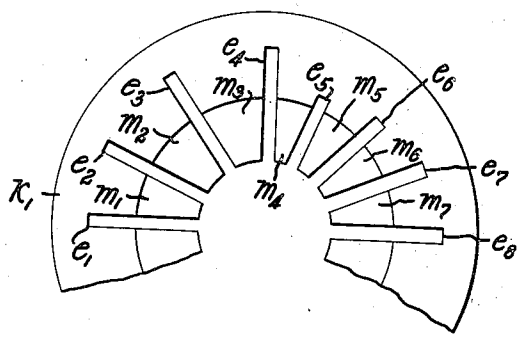


Fig. 2.

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MECHANICAL SWITCHING DEVICE

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2 Claims. (Cl. 200—165)

1

Switching devices are known having contacts which are actuated mechanically in synchronism with the alternating current which is to be switched, for instance so-called mechanical converters, where one of the contacts is spring-loaded and periodically lifted from the stationary contact by means of an eccentric driving element. The opening and closing speed of the lifting contact must be so selected that back arcs due to the rapid rise of the recurring voltage after the current is interrupted are prevented. The kinetic energy of the lifting contact results in a rapid mechanical destruction of the contacts due to the great number of switching operations which have to be performed and this is accelerated by the rebound of the contact elements. A reduction in the speed of the lifting contact which would diminish the rebound of the contacts is impossible if good switching conditions are to be maintained and commutating sparks are to be avoided.

The present invention concerns a switching device with contacts which are mechanically actuated in synchronism with the alternating current which is to be switched, particularly mechanical converters, where one of the contacts is a spring-loaded lifting contact, the rebound of the contacts being avoided or reduced to a negligible amount by causing means to act on the lifting contact which have different natural vibrations.

A constructional example of the invention is illustrated diagrammatically in the accompanying drawing where Fig. 1 shows a cross-sectional view of the contacts of a switching device and Fig. 2 a plan view of the stationary contact. A modified form of the invention is illustrated in Fig. 3.

In Fig. 1 k_1 is the stationary contact which is in the form of a disc with a central opening and radial slots extending from the edge of said opening. The mushroom shaped contact k_2 is kept in contact with the contact k_1 by means of the spring f_1 and periodically lifted from the latter against the action of the spring by means of a push rod s. The driving mechanism for the push rod s is not shown in the drawing because this is not necessary for an understanding of the invention; rod s can for instance be actuated by an eccentric located on a driving shaft. The slots e_1 to e_8 which divide the contact k_1 into the parts m_1 to m_7 having different sizes and different natural vibrations run perpendicular to the contact plane and radially from the edge of the central opening in the constructional example illustrated. In order to achieve differences in

2

the size of the parts of the stationary contact k_1, slots of various depth or located different distances apart with the same depth can be provided.

Due to subdividing the stationary contact in accordance with the present invention the rebound effect caused by the lifting contact when it moves back into the closed position is damped and suppressed, because the natural vibrations of the various parts of different size are not in synchronism with the oscillations of the lifting contact and thus disturb the movement of the latter.

It is expedient to arrange the contact surface of the contacts k_1, k_2 not perpendicular to the direction of motion of the lifting contact but inclined to this direction, as shown in Fig. 1. In order to achieve the desired suppression of the impact effect on the contacts it is advisable to adopt means whereby the oscillations of the stationary contact parts are damped. For this purpose a layer d of flexible material (felt) can be used. If carbon or graphite is used for the contacts the risk of drops of material forming on the contacts due to opening and closing arcs and also the danger of the contacts welding together is avoided.

The rebounding action of the contacts can, as shown in Fig. 3, also be avoided by maintaining the lifting contact k_2 by means of at least two springs f_1, f_2 in contact with the fixed contact k_1, these springs having different natural oscillation frequencies. These springs can be arranged concentrically one within the other and the effect is the same as that described in connection with the arrangement shown in Fig. 1.

I claim:

1. Contacts for a switching device for use in current converters of the mechanical type comprising a stationary contact element of annular form, a cooperating movable contact element having a lifting stem extending through said annular stationary contact element, and spring means tending to retain said contact elements in engagement, said stationary contact element being provided with a plurality of radial slots dividing the inner portion thereof into component parts of different size, and having natural frequencies of vibration which differ from the frequency at which said movable contact element is to be reciprocated.

2. Contacts for a switching device for use in current converters of the mechanical type comprising a stationary contact element of annular form, a cooperating movable contact element

having a lifting stem extending through said annular stationary contact element, and spring means tending to retain said contact elements in engagement, said stationary contact element being provided with a plurality of radial slots of different lengths dividing the inner portion thereof into component parts of different size and having natural frequencies of vibration which differ from the frequency at which said movable contact element is to be reciprocated.

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