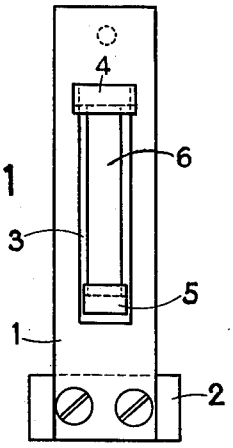
May 16, 1944. F. SAUTER 2,349,008

SNAP-ACTION ROCKER DEVICE

Filed July 17, 1941

Fig. 1



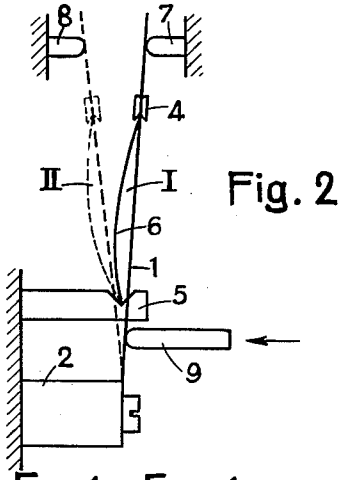


Fig. 2

Fig. 3a

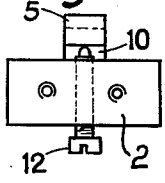


Fig. 3b

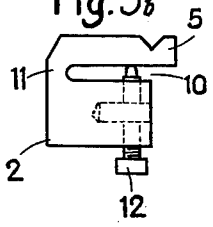


Fig. 4a Fig. 4b

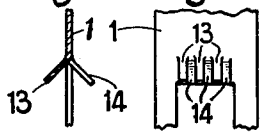


Fig. 5a Fig. 5b

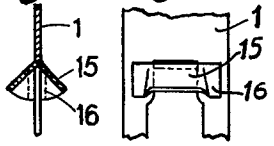


Fig. 8

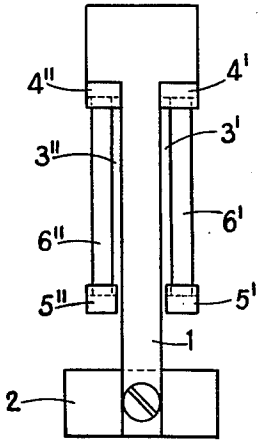
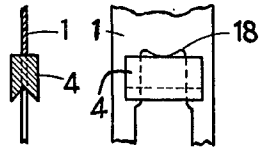


Fig. 6a Fig. 6b



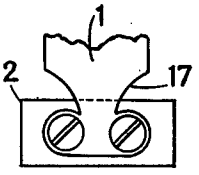


Fig. 7

Inventor
F. Sauter
By C. F. Wenderoth
Atty.

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SNAP-ACTION ROCKER DEVICE

Fritz Sauter, Basel, Switzerland

Application July 17, 1941, Serial No. 402,859
In Switzerland December 16, 1940

3 Claims. (Cl. 74—100)

The present invention relates to a snap-action rocker device having a spring rocking tongue loaded by at least one rocking spring and limited in its motion between two abutments, the tongue being so controlled by the spring that under an extremely small externally imposed movement, it snaps over the much larger operating distance between the abutments under the action of the loading of the spring which is lodged under load between a bearing in the tongue towards the free end thereof and another bearing located near the fixed end thereof.

Such a snap-action device can be used for switching separate contact members, mercury switches and mechanical locks in and out or on and off, or the tongue itself can serve as a switch member and the abutments as fixed contacts for example for thermostats or other analogous devices.

Such snap-action devices are already known in many forms. In contradistinction to these however, the construction according to the present invention is extremely simple, only an extremely small movement of an operating member is necessary to cause the tongue to snap over and pass from the one rocked position to the other and the work which has to be expended in effecting such rocking is extraordinarily small.

Some examples embodying the invention are diagrammatically illustrated in the accompanying drawing.

Figure 1 is a front view and

Figure 2 a side view of one example.

Figure 3*a* is a front view of a modified form of a fixed roller block.

Figure 3*b* is a side view of the form shown in Figure 3*a*.

Figure 4*a* is a side view of a modified form of the upper bearing for the spring on the tongue.

Figure 4*b* is a front view of the form shown in Figure 4*a*.

Figure 5*a* is a side view of a further modification of the upper bearing for the spring on the tongue.

Figure 5*b* is a front view of the form shown in Figure 5*a*.

Figure 6*a* is a side view of a still further modified form of the upper bearing for the spring on the tongue.

Figure 6*b* is a front view of the form shown in Figure 6*a*.

Figure 7 shows a particular form of the tongue at its place of fixation.

Figure 8 represents another embodiment of the device.

In Figures 1 and 2 of the drawing, 1 designates a rocking tongue which consists of a springy strip of sheet metal. This is secured at one end to a fixed block 2 by screws, while its other end is movable within limits determined by two abutments 7, 8. These abutments are here shown as fixed but they could be adjustably arranged, for instance as screws. The tongue 1 has a longitudinal slot 3 in it, in which at the end nearer the free end of the tongue is provided a bearing 4 adapted to receive one knife-like edge of a leak spring 6. At the other end a fixed counter-bearing 5, also adapted for a knife-like edge, projects into the slot 3 of the tongue 1. Between these two bearings 4, 5 is sprung in the leaf spring 6 which is sharpened off to a knife edge at both ends and serves as a rocking spring. The latter could, however, also be constructed as a helical compression spring and fitted at the ends with knife edge or pointed bearing members.

9 is a pressure pin which is movable against the tongue 1 in the rocking zone between the fixed bearing 5 and the point of attachment 2 of the tongue, and is operable by a thermostat rod or some other operating member. The movement can be a straight line thrust, or if the pin 9 is screw-threaded, a rotational movement.

With the abutments 7, 8 suitably set, the tongue 1 lies when at rest in the position I shown in full lines (Figure 2), and bears with a certain pressure against the abutment 7. If the pin 9 is pressed against the tongue 1 the latter begins to bend, its free end at first remaining in contact with the abutment 7 however while slightly swinging the spring 6 on the bearing point 5, but when the pressure has bent it far enough to pass the bearing point 5 of the spring 6, it snaps into the other rocked position II indicated in dotted lines in Figure 2 where it bears against the abutment 8. As soon as the pin 9 is withdrawn, a similar action takes place in the reverse direction and the tongue 1 snaps back into position I. Position I may be termed the rest position because the tongue 1 assumes it when not under external influence, and position II the pressure position because this is retained only so long as pin 9 presses against the tongue.

Owing to the spring 6 being held between the two knife edge bearings 4 and 5, the above described snap-action device is very easily moved, thereby rendering the necessary stroke and load upon the operating member 9 extraordinarily small.

Known snap-action devices of a similar kind differ essentially from that above described by

the feature that the rocking spring is not a separate, inserted spring, but is made integrally with the tongue and is only supported at one end by a fixed position knife edge bearing. The known devices suffer from the disadvantage that during the rocking action internal stresses between the spring and the tongue have to be overcome, which necessitates a much greater stroke of the operating member and also a multifold expenditure of energy, as compared with the present invention, assuming the same conditions and load capacity.

Other snap-action devices also, which function by the tongue or the spring being moved out of the one rest position with a relatively large stroke to the throwover point whereupon the device snaps into the other position, are not comparable with the present invention, for in the present case the necessary stroke of the operating member is of the order of a few hundredths of a millimeter.

The above described device presents in its construction the great advantage that with the spring and tongue separately made, a suitable material which may be the same or different can be used for each, or a suitable thickness which may be the same or different, which makes it possible, other conditions remaining the same, for the device to be made of smaller size.

As to obtain the optimum condition of the device in respect of the bearing pressure of the tongue 1 against the abutments 7 and 8 respectively (contact pressure) the thrust of the spring 6 must have a determined relationship to the transverse spring strength of the tongue 1, it is desirable that the fixed knife-edge bearing 5 should be adjustable so that the spring 6 can be loaded as desired.

In the modification shown in Figures 3*a* and 3*b* the fixed holding block 2 and the bearing 5 are made in one piece but are separated by a slot at 10 leaving a bridge 11 which acts within limits as a spring hinge. The block 2 carries an adjusting screw 12, by tightening which the part 5 can be forced away from the block 2 and the spring 6 further loaded, while by slackening the screw the part 5 retracts and the load of the spring 6 is correspondingly reduced.

In order that the bearing for the rocking spring can adjust itself exactly to the knife edge of the spring, provision may be made for the bearing to be easily tiltable, as in the modification shown in Figures 6*a* and 6*b* where the bearing 4 bears against a convex edge 18 at this end of the slot in the tongue 1. The convex abutment could instead be arranged on the bearing itself.

In Figures 4*a* and 4*b* a practical construction of the bearing 4 on the tongue 1 is illustrated. Here the metal of the tongue is provided with comb-like teeth 13, 14 which are alternately bent in opposite directions, the angle between them being of the order of 90°, to form a seat for the spring 6.

In Figures 5*a* and 5*b* a modification of this construction is illustrated. The bearing for the spring here consists of a right-angle-bent steel pocket, the ends of which slotted and pressed together to the thickness of the tongue 1, clamp it firmly to the tongue on both sides of the slot. This bearing could also be produced in any other desired way, for example by milling, stamping or pressing, in the form shown at 4 in Figures 6*a* and 6*b* and set in the slot in the tongue 1.

Figure 7 shows a modification of the fixed end of the tongue 1. The latter is reduced in width at 17, by which means owing to the resulting easier movement and easier bending, the action is improved.

Instead of a single rocking spring located in a slot in the tongue 1, as shown in Figure 8 two lateral notches 3', 3'' can be provided one on each side of the tongue 1 and two springs 6', 6'' located therein, which at one end bear with knife edges against the fixed bearings 5', 5'' and at the other end with knife edges against the bearings 4', 4'' on the tongue. The mode of operation is the same as that above described.

The present invention also operates excellently as a bimetallic snap-action device, in which case the tongue itself consists of a bimetallic blade, of which that metal layer which expands the more under heat is located in Figure 2 for example on the right hand side. When the temperature rises the bimetallic tongue bends to the left until it passes the rocking point 5 and thereupon snaps from the position I into the position II. Upon cooling the action is reversed, the tongue 1 straightens and when passing the point 5 snaps from position II into position I. In this case the operating pin 9 would be omitted. It could however be replaced by a screw and used to regulate the temperature at which the snap-action takes place.

The bimetallic snap-action device can be used to operate or release a mechanical lock or to actuate a contact system or for directly cutting in or out or switching over of an electric circuit, the abutments 7 and 8 and the free end of the tongue 1 being constructed as contacts.

Instead of knife edge bearings, point bearings can also be used.

What I claim is:

1. A snap-action rocker device, comprising a fixed support, a spring rocking tongue secured at one end to said support, abutments arranged to limit the motion of the other free end of said tongue, a fixed bearing near the secured end of said tongue, a bearing carried by said tongue near its free end, and a rocking spring held under endwise compressive load between said bearings, said fixed bearing being located between the ends of the tongue and in such position with respect to said abutments against which the tongue bears when at rest, that a very small transverse bending movement applied to said tongue by external influence causes it to move past said fixed bearing whereupon it is rocked with a snap-action from the one abutment to the other under the load of the said spring, said fixed bearing being adjustable to enable the spring load to be varied.

2. A snap-action rocker device, comprising a fixed support, a spring rocking tongue secured at one end to said support, abutments arranged to limit the motion of the other free end of said tongue, a fixed bearing near the secured end of said tongue, a bearing carried by said tongue near its free end, and a rocking spring held under endwise compressive load between said bearings, said fixed bearing being located between the ends of the tongue and in such position with respect to said abutments against which the tongue bears when at rest, that a very small transverse bending movement applied to said tongue by external influence causes it to move past said fixed bearing whereupon it is rocked with a snap-action from the one abutment to the other under the load of the said spring, said fixed bearing being integral with said fixed support but elastically movable with respect thereto in the longitudinal direction of

the spring and comprising means for controlling such elastic movement.

3. A snap-action rocker device, comprising a fixed support, a spring rocking tongue secured at one end to said support, abutments arranged to limit the motion of the other free end of said tongue, a fixed bearing near the secured end of said tongue, a bearing carried by said tongue near its free end, and a rocking spring held under endwise compressive load between said bearings, said fixed bearing being located between the ends of the tongue and in such position with respect to said abutments against which the tongue bears when at rest, that a very small transverse bending movement applied to said tongue by external influence causes it to move past said fixed bearing whereupon it is rocked with a snap-action from the one abutment to the other under the load of the said spring, said fixed bearing being adjustable to enable the spring load to be varied, and said bearing on said tongue being formed integrally therewith by means of teeth bent alternately in opposite directions.

FRITZ SAUTER.