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SWITCH AND BLADE THEREFOR HAVING MEANDERING SECTIONS FOR CONTACT PRESSURE

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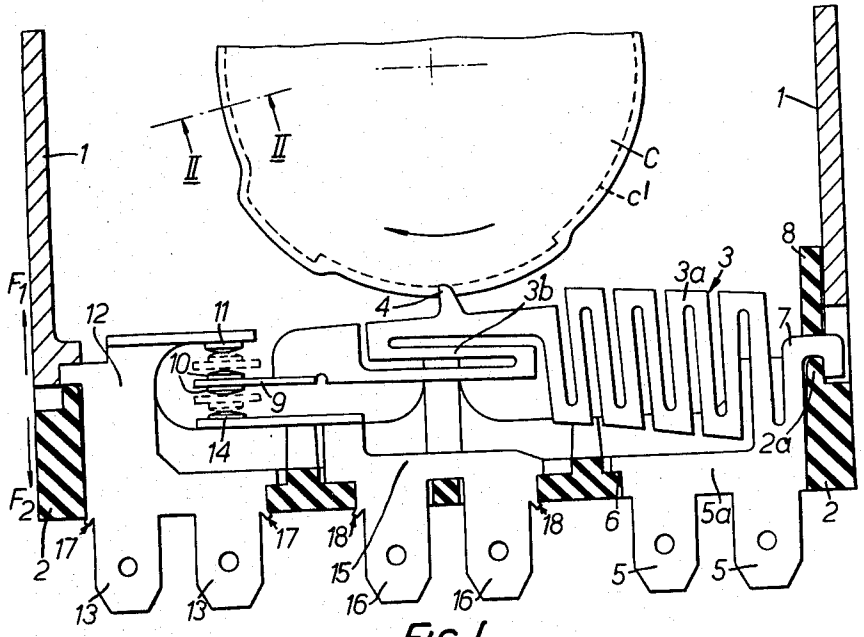


FIG. 1.

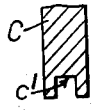


FIG. 2.

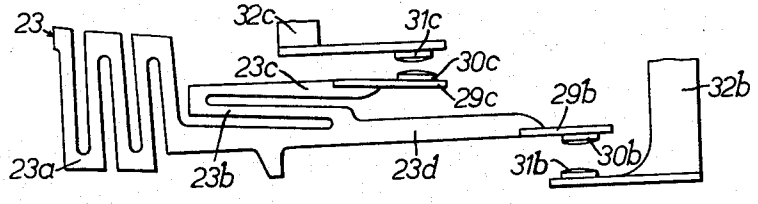


FIG. 3.

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SWITCH AND BLADE THEREFOR HAVING MEANDERING SECTIONS FOR CONTACT PRESSURE

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7 Claims. (Cl. 200—166)

This invention relates to switch blades for electric switches and in particular to switching devices incorporating such switch blades. One particular application of such blades is in timers for controlling the operations of a washing machine, the switches incorporating such blades being controlled by rotary cams driven by the timing motor of the timer to open and close circuits containing devices such, for example, as the washing machine motor, the water-fill valve and the drain pump.

Conventional switch blades are adapted to flex in the plane perpendicular to the width of the blade, but when such blades are arranged in side-by-side relationship, the width of the blades, which must be sufficient to provide the desired rigidity and contact pressure, limits the number of blades which can be accommodated in a given distance. The number of blades thus accommodated could be substantially increased by arranging them in parallel planes and causing each blade to flex edgewise, i.e. in the plane containing its edges, but the flexibility of a conventional switch blade in the edgewise direction is insufficient to permit the blade to be so used, particularly in the case of a reversing switch where the flexibility must be such as to permit the blade to open and close contacts in two directions.

In order to permit flexibility in the plane of the blade, a switch blade has been previously proposed which is of serpentine or meandering construction formed by transverse slits alternate ones of which extend across the blade from opposite edges thereof, the blade terminating in a cam follower which positively controls the movement of the free end of the blade and, therefore, positively controls the movement of a switch contact located on the blade between the cam follower and the fixed end of the blade. This blade configuration is limited to single throw uses, being incapable of sufficient contact pressure in double throw uses.

The present invention is characterized in that the cam follower is disposed at the outer end of a proximal blade portion of serpentine construction, and a distal blade portion also of serpentine construction extends beyond the cam follower and supports the moving contact or contacts adjacent its outer end. This design can be used for double throw action.

The flexibility of the blade according to the invention makes it particularly applicable in a reversing switch wherein the blade is provided with twin contacts and is movable in one direction to engage a first fixed contact for controlling the forward motion of a motor and is movable in the opposite direction to engage a second fixed contact for controlling the reverse motion of a motor. In a washing machine, the contacts operated by such a switch blade can be used to control any of the machine functions including reversing of the main motor.

Two embodiments of the present invention will now be particularly described with reference to the accompanying drawings, in which:

FIGURE 1 is a partial section through a switching device in a plane parallel to the plane of the blades of a cam-controlled reversing switch;

FIGURE 2 is a detailed sectional view of the cam along the line II—II in FIGURE 1; and

FIGURE 3 is an elevational view of a modified switch blade.

The switching device of FIGURE 1 comprises a casing 1 containing a bank of cams C, of which only one is shown, this casing being closed by an insulating cover 2 serving as a support for a reversing switch.

The reversing switch comprises a plurality of blades 3, of which only one is shown, the blade comprising a proximal portion 3*a* having transverse slots opening alternately at the two sides of the blade, to form a serpentine construction whose intrinsic elasticity provides a pressure bias in the direction of arrow F1.

Integral with the portion 3*a* is the distal portion 3*b* of the blade in which slots are formed in the longitudinal direction to provide a pressure bias in the direction of the arrow F2.

The distal portion 3*b* of the blade is formed integrally with a projection 4 forming a cam follower which permanently engages in a peripheral groove C′ in the cam C, the sides of the groove serving to guide the cam follower 4 and thereby maintain the blade 3 in its plane.

At the free end of the proximal portion of the blade are two tags 5 integral therewith which project through slits in the covering 2, the tags being joined by a bridge 5*a* which is supported by a shoulder 6 formed on the cover 2. In addition, a hook 7, integral with the blade, engages a flange 2*a* of cover 2, and is held in position on the flange by a movable insulating bar 8 slidably mounted in the casing 1, to facilitate installation and removal of the blades.

The blade 3 at its free end has a portion 9 which is bent perpendicular to the plane of the blade, and supports twin contacts 10.

Each of the contacts 10 can move into engagement with one of two fixed contacts 11 and 14, the contact 11 being mounted on a plate 12 provided with two tags 13, and the contact 14 being mounted on a plate 15 provided with tags 16, the tags of the plates 12 and 15 extending through the cover 2, and being locked in position by small tongues 17 and 18 respectively.

In the modification shown in FIGURE 3, the blade 23 comprises a proximal portion 23*a* formed with transverse slots, similar to those shown in FIGURE 1, and a distal portion 23*b* formed with longitudinal slots. However, the distal portion is divided to form two separate arms 23*c* and 23*d* at the free ends of which are small plates 29*c* and 29*b* respectively, each bent into a plane normal to the plane of the blade and carrying a contact 30*b* and 30*c* respectively.

These movable contacts cooperate with fixed contacts, 31*b* and 31*c* respectively, the first of which is carried by a small fixed plate 32*b* and the second by a small fixed plate 32*c*.

One advantage of the particular serpentine constructions of the blade described above is that it facilitates adjustment of the blade, in that adjustment of the contact pressure can readily be effected by suitably bending the proximal portion of the blade, whilst adjustment of the position of the movable contacts can readily be effected by suitably bending the distal portion of the blade.

It will be evident that the abovedescribed embodiments of switch blade and switching device are given by way of example only and that these embodiments can be substantially modified without departing from the scope of the invention which is defined by the claims appended hereto.

I claim:

1. A switch blade which is adapted to be supported at one end and to flex in the plane containing its longitudinal edges in order to open and close switch contacts, said blade being planar and having proximal and distal portions, the proximal portion of the blade being of serpentine shape defined by slots extending transversely thereof, a blade actuating point carried by the blade and adapted

to receive a pressure impulse to flex said blade, switch contacts carried by the blade with at least one of said contacts being disposed on the distal portion of the blade and facing in the direction in which the blade moves in response to a blade flexing impulse, the distal portion of the blade having at least one slot formed therein which, for a major portion of the length thereof, extends longitudinally of said blade, said blade actuating point and said one contact being respectively disposed laterally of and on opposite sides of said slot.

2. The switch blade described in claim 1 wherein said blade actuating point is disposed on the blade in transverse alignment with respect to that part of the blade that is traversed by said one longitudinally extending slot.

3. A switching device comprising, a support, a planar switch blade mounted on the support and flexible in the plane of its longitudinal edges with its proximal portion formed with meanders extending transversely of the blade and a distal portion formed with meanders which extend longitudinally of the blade, the blade being provided with a blade actuating point disposed thereon in transverse alignment with said longitudinally extending meanders therein and adapted to receive a blade flexing pressure impulse whereby the blade may flex transversely within said plane, oppositely facing spaced fixed contacts on the support and oppositely facing moving contacts on the blade generally normal to the plane thereof and respectively disposed in operative alignment with said fixed contacts for engagement therewith, one of the moving contacts being carried by the distal portion of the blade and facing in the direction in which the blade moves in response to a pressure impulse applied to said blade actuating point whereby transverse flexure of the blade across the portion thereof provided with said longitudinally extending meanders occurs when the contact carried by the distal portion of the blade engages that fixed contact positioned to be engaged thereby in response to a blade flexing pressure impulse applied to said blade actuating point thus to insure proper contact pressure therebetween.

4. A switching device according to claim 3 wherein the actuating point is a cam follower, and including a cam engaged by the cam follower and contoured to actuate the blade in said plane, said blade being mounted with the cam follower in engagement with said cam and the proximal portion of the blade stressed to cause the cam follower to follow the cam and to bias one of the moving contacts towards one of the fixed contacts when the cam contour allows the blade to move under influence of said bias, the cam also being contoured to flex the blade in the opposite direction to engage said one moving contact carried by the distal portion of the blade with that fixed contact disposed to be engaged therewith.

5. A switching device comprising, a support, a planar switch blade mounted on the support and flexible in the plane of its longitudinal edges with its proximal portion formed with meanders extending transversely of the blade and a distal portion formed with meanders which extend longitudinally of the blade, spaced contacts fixed on the support, a first moving contact carried by the blade beyond the meanders of the proximal portion of the blade in position to engage one of said fixed contacts, the blade being mounted to stress the proximal meanders to bias the blade so the first moving contact abuts said one of the fixed contacts, a second moving contact carried by the blade beyond the meanders of the distal portion of the blade and facing in the direction opposite to that of the first moving contact, and an actuating point on the blade spaced from the second contact with the longitudinal meanders of the distal portion lying between the actuating point and said second contact so as to flex the blade transversely within the plane thereof as the actuating point is moved beyond a position necessary to move the second moving contact into engagement with the other of said fixed contacts.

6. In a cam operated switch, support means therefor, an elongated switch blade mounted on the support means for oscillatory movement in the plane of its longitudinal edges, the proximal portion of the blade being formed with transversely extending slots to impart flexibility thereto, a cam follower carried by the blade outwardly beyond the slotted portion thereof, a cam engaged with the cam follower for driving the blade in one direction, a switch contact carried by the blade outwardly beyond the slotted portion thereof, said contact being generally normal to the plane of the switch blade and facing in the direction of blade movement when driven by said cam, a stationary contact positioned to be intermittently engaged by the blade-carried contact when the blade is actuated by said cam, the cam follower and said blade-carried contact being disposed in spaced relation on the blade with the portion of the blade therebetween being formed with at least one longitudinally extending slot to render that portion of the blade transversely flexible thereby to limit pressure between said contacts under the drive of the cam.

7. The switch described in claim 6 wherein the blade carries a second contact, generally normal to the plane of the blade and facing in the opposite direction to that of said first-mentioned blade-carried contact, a second stationary contact cooperating therewith, said blade being mounted with the proximal portion thereof stressed normally to bias said second-mentioned contacts into engagement with each other and the blade into engagement with the cam, whereby the switch is double throw in action and switch contact pressure in either direction is limited by tension within the blade.

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