

March 18, 1947.

W. S. KUNZLER
SNAP ACTION DEVICE

2,417,652

Filed Oct. 4, 1943

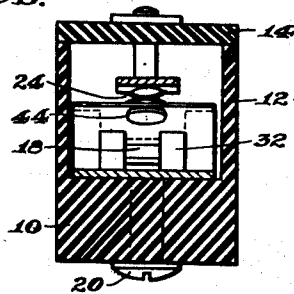
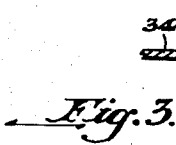
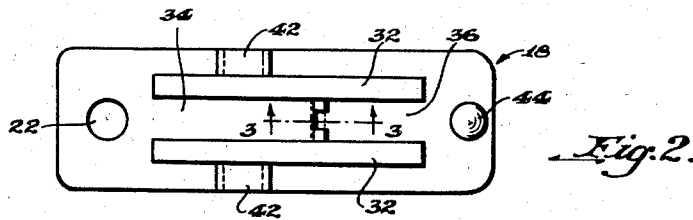
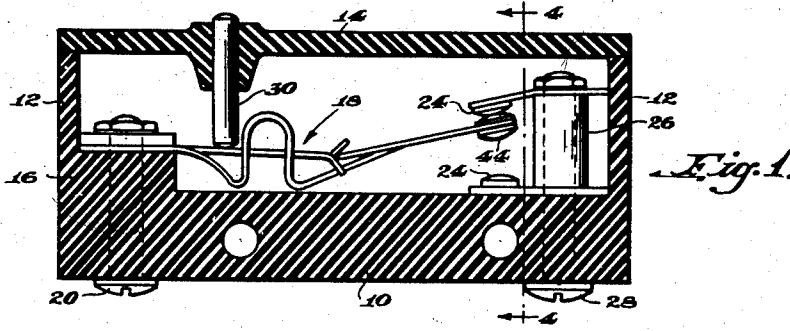


Fig. 4.

INVENTOR.

WILLIAM S. KUNZLER.

BY

Albert J. Henderson
his ATTORNEY.

UNITED STATES PATENT OFFICE

2,417,652

SNAP-ACTION DEVICE

William S. Kunzler, Greensburg, Pa., assignor to
Robertshaw Thermostat Company, Youngwood,
Pa., a corporation of Pennsylvania

Application October 4, 1943, Serial No. 504,860

10 Claims. (Cl. 74—100)

1

This invention relates to snap-action devices such as electric switches and, more particularly, to those of the thin leaf-spring type.

An object of this invention is to fabricate the snap-action device out of a single sheet of flexible material.

Another object of the invention is to simplify and improve the construction of such devices while retaining their sensitive operating characteristics.

Another object of the invention is to permit various operating means to be used in conjunction with the device without departing from the simplicity of construction and economy in manufacture.

Other objects and advantages will become apparent from the following description taken in connection with the accompanying drawings, wherein:

Fig. 1 is a longitudinal sectional view of a snap-acting electric switch embodying the invention;

Fig. 2 is a plan view of the improved snap-action device;

Fig. 3 is a partial longitudinal sectional view taken on the line 3—3 of Fig. 2 but showing the parts separated;

Fig. 3a is an end view of the portion shown in Fig. 3;

Fig. 3b is a plan view of the same, and

Fig. 4 is a cross-section taken on the line 4—4 of Fig. 1.

Referring more particularly to the drawing, the improved snap-action device is shown in Figs. 1 and 4 as being embodied in a switch construction comprising a base 10 of insulating material generally rectangular in form and having upstanding sides 12 with which a cover 14 cooperates to form a box-like structure of closed, dust-proof construction. The base 10 is provided at one end with a projection 16 extending toward the cover 14 and which is adapted to support one end of the snap-action device housed within the structure and designated generally by the reference numeral 18.

The snap-action device may be secured in position on the projection 16 by means of a screw 20 extending through a perforation 22 provided in the device 18 for this purpose. The opposite end of the base 10 carries a pair of overlying fixed contacts 24 spaced one from the other by an insulating post 26 and secured to the base by means of a screw 28. Operating means for the snap-action device may comprise a plunger 30 mounted in the cover 14 for this purpose.

The snap-action device 18 may be formed from

2

a single sheet of thin flexible material, such as phosphor bronze or spring steel, and is generally rectangular in form. This sheet of flexible material is provided with a pair of elongated slots 32 extending lengthwise thereof and being spaced laterally one from the other. That portion of the material remaining between the slots 32 is severed transversely on a line lying slightly nearer one end of the slots 32 than the other, thus leaving two portions 34, 36 of unequal length. The width of the separation between portions 34, 36 may vary as will hereinafter be apparent and such portions form opposed leaf springs positioned in end-to-end relation. The opposing end of the leaf spring 36 is preferably formed with a knife-edge 38 while the related end of the leaf spring 34 is split longitudinally for a short distance to enable the median portion to be turned downwardly and the side portions upwardly to form a suitable bearing 40 for end 38, such as a knife-edge, although the positions of these parts may be reversed.

It will be apparent that the end 38 and its bearing 40 are spaced one from the other when formed and must be moved into and maintained in engagement in order to achieve the purposes of this invention. To this end, the side portions of the sheet 18 are each formed by pressing or other means with U-shaped portions 42 preferably located midway between the bearing portion 40 and the adjacent end of the slot 32. It will be apparent that S-shaped portions could alternatively be provided or any other shape imparted to the side portions which will serve to place them under tension and the portions 34, 36 in what may be termed longitudinal compression and maintain operative engagement between the end 38 and the bearing 40 wherein it is pivotally mounted.

The unsupported or free end of the sheet 18 is provided with contact elements 44 disposed on opposite sides thereof for cooperation with the fixed contacts 24. The contacts 24 or either of them may be used to complete an electric circuit from the screw 20 through the snap-action device 18 by way of contact 24 and any additional contacts may be provided as desired to vary the circuit arrangement. Either of the contacts 24 may be replaced by a stop and a plurality of contacts 44 may be provided on each side of the snap-action device in place of the single contacts 44. Such modifications are considered obvious within the scope of this disclosure.

The operation of the device is effected by manual or other pressure applied to plunger 30

3

which is so located in cover 14 as to engage and depress the leaf spring 34. The leaf spring movement carries the bearing 40 thereon beyond dead center of the pivotal mounting of end 38 whereupon the free end of the device carrying contacts 44 moves with a snap action in an upward direction until fixed contact 24 surmounting post 26 is engaged. Upon release of pressure on plunger 30 the reverse action takes place and the free end of the device snaps downwardly against the contact 24 on base 10 where it will remain until the plunger is again operated.

While the embodiment of the invention disclosed herein utilizes manual pressure to operate the device from one position to another it will be apparent that other modes of operation may be substituted. The leaf spring 34 could be made of bimetal and move in response to thermal changes occurring therein. In such embodiment the leaf spring 34 would necessarily not be integral with the remaining portion of the snap-action device but could be secured thereto by soldering or other suitable securing means.

As the device would remain the same in all essential respects and still be equivalent to a single sheet of material, such modifications are considered within the scope of the appended claims. Many other changes may be made in the details of the invention and modes of construction and operation without departing from the spirit of the invention as expressed in the appended claims.

I claim:

1. A snap-action device comprising a thin leaf spring portion adapted to be supported at one end, a second leaf spring portion having one end pivoted on the first said spring portion and the other end free to move, and spring means connecting said free and supported ends of said leaf spring portions together and exerting sufficient force thereon to cause said free end to move with snap action when pressure is applied to the first said leaf spring portion beyond said supported end.

2. A snap-action device comprising a thin leaf spring portion adapted to be supported at one end, a second leaf spring portion having one end pivoted on the first said spring portion and the other end free to move, and spring means connecting said free and supported ends of said leaf spring portions together, said means being bowed for placing said leaf spring portions in longitudinal compression sufficient to cause said free end to move with snap action when pressure is applied to the first said leaf spring portion beyond the supported end.

3. A snap-action device comprising a thin leaf spring portion adapted to be supported at one end, a second leaf spring portion having one end pivoted on the first said spring portion and the other end free to move, and a pair of spring strips connecting the free and supported ends of said leaf spring portions together and extending on opposite sides thereof, said strips being bowed intermediate said ends for placing said leaf spring portions in longitudinal compression sufficient to cause said free end to move with snap action when pressure is applied to the first said leaf spring portion beyond the supported end.

4. A snap-action device comprising a pair of thin leaf spring portions positioned in end-to-end relation, means formed integral with said spring portions for pivoting the related ends of said spring portions, and a pair of spring strips operatively connecting the opposite ends of said spring

4

portions together, the arrangement being such that upon supporting one of said opposite ends and applying pressure to one of said leaf springs, the other leaf spring portion and associated ends of said spring strips are caused to move with snap action.

5. A snap-action device comprising a pair of thin leaf spring portions positioned in end-to-end relation, means formed integral with said spring portions for pivoting the related ends of said spring portions, and a pair of spring strips adapted for placing said leaf spring portions in longitudinal compression and operatively connecting the opposite ends of said spring portions together, the arrangement being such that upon supporting one of said opposite ends and applying pressure to one of said leaf spring portions, the other leaf spring portion and associated ends of said spring strips are caused to move with snap action.

6. A snap-action device comprising a pair of thin leaf spring portions positioned in end-to-end relation, means formed integral with said spring portions for pivoting the related ends of said spring portions, one opposite end of one said spring portion being adapted for stationary mounting and that of the other said spring portion being free to move, and a pair of spring strips extending in parallel relation on either side of said leaf spring portions and connecting said free and supported ends together, said strips being bowed intermediate said ends for placing said leaf spring portions in longitudinal compression sufficient to cause said free end to move with snap action when pressure is applied to one of said leaf spring portions.

7. A snap-action device comprising a single sheet of flexible material provided with a pair of elongated openings therein, a portion of said sheet being formed with knife-edge mounting means intermediate to the ends of said openings, a portion of said sheet opposite said mounting means being formed with knife-edge means, said portions being under longitudinal compression causing operative engagement between said knife edge and mounting means.

8. A snap-action device comprising a single sheet of flexible material provided with a pair of elongated openings therein, said openings being spaced one from the other leaving side and middle strip portions, at least one of said strip portions intermediate the ends of said openings being formed with knife-edge mounting means, the last said strip portion opposite said mounting means being formed with knife-edge means, and at least one of the other strip portions being formed with a bowed section operative for placing said last strip portion under longitudinal compression causing operative engagement between said knife-edge and mounting means.

9. A snap-action device comprising a single, generally rectangular sheet of thin flexible material provided with a pair of elongated slots extending lengthwise thereof, said slots being spaced one from the other leaving two side and one middle strip portions connected at their opposite ends, said middle strip portion being transversely separated forming a pair of thin leaf springs positioned in end-to-end relation, the opposing ends of said springs being formed with a knife-edge mounting and a knife edge respectively, said side strips having U-shaped portions intermediate the ends thereof placing said side strips under tension and said middle strip portion under longitudinal compression and main-

5

taining said knife edge in engagement with its mounting.

10. A snap mechanism comprising a single, generally rectangular sheet of thin flexible material provided with a pair of elongated slots extending lengthwise thereof, said slots being spaced one from the other leaving two side and one middle strip portions connected at their opposite ends, said middle strip portion being transversely separated forming a pair of thin leaf springs positioned in end-to-end relation, the opposing end of one said spring having upturned and downturned portions forming a knife-edge bearing and the related end of the other said spring having a knife-edge thereon cooperable with said bearing, said side strips having U-shaped portions intermediate the ends thereof placing said side strip portions under tension and said middle strip portion under longitudinal compression and maintaining said knife-edge in said bearing, engageable means positioned adjacent the free end of the spring having the knife-edge,

6

and means for supporting the opposite end of said sheet, whereby pressure applied to the spring having the knife-edge bearing will cause the free end to move with snap action to engage or disengage said engageable means.

WILLIAM S. KUNZLER.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,286,053	Bletz -----	June 9, 1942
2,260,964	Wilms -----	Oct. 28, 1941
2,237,705	Kohl -----	Apr. 8, 1941
2,246,724	Eaton -----	June 24, 1941
1,960,020	McGall -----	May 22, 1934
1,959,205	Hanel -----	May 15, 1934
2,036,295	Piffath -----	Apr. 7, 1936
2,332,911	Hausler -----	Oct. 26, 1943