July 7, 1942. W. M. LAYTON 2,289,131

SNAP-ACTING LINK

Filed Nov. 4, 1939

Fig. 1.

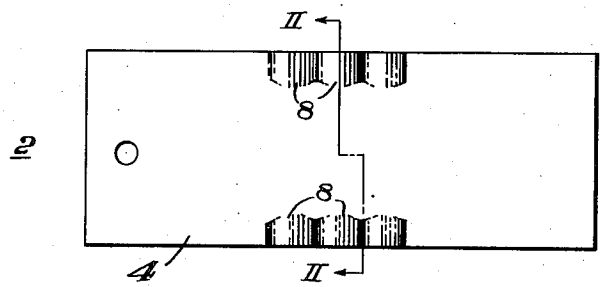


Fig. 2.

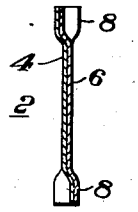


Fig. 3.



Fig. 4.

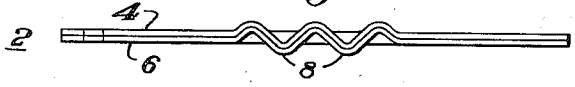
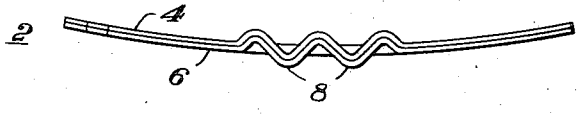


Fig. 5.



WITNESSES:
Edward Michaels
K. G. Kepler

INVENTOR
William M. Layton.
BY
W. R. Coley
ATTORNEY.

Patented July 7, 1942 2,289,131

UNITED STATES PATENT OFFICE

2,289,131

SNAP-ACTING LINK

William M. Layton, Mansfield, Ohio, assignor to Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., a corporation of Pennsylvania

Application November 4, 1939, Serial No. 302,939

4 Claims. (Cl. 297—15)

My invention relates to snap-acting members, and more particularly to snap-acting bimetallic members.

An object of my invention is to provide a member which has a plurality of frills or corrugations formed within opposite edges to produce a snap-acting movement thereof as the member flexes from one position to another.

A further object of my invention is to provide a simple inexpensive sensitive snap-acting bimetallic thermostatic element which will produce a heavy contact pressure with a strong snap action.

A further object of my invention is to provide a snap-acting bimetallic thermostatic element which will produce a given contact pressure with a substantially thinner element than any heretofore known.

Other objects of my invention will either be pointed out specifically in the course of the following description of a device embodying my invention, or will be apparent from such description.

In the accompanying drawing,

Figure 1 is a plan view of a thermostatic element or link embodying my invention,

Fig. 2 is a sectional view taken along the line II—II of Fig. 1, and

Figs. 3, 4 and 5 are side elevational views of the structure shown in Fig. 1, illustrating the link in its various operating positions.

Referring to the accompanying drawing, I show an elongated flexible bimetallic sheet member 2 made of a suitable low expansive component 4 and a suitable high expansive component 6 rigidly attached together in a well known manner having a plurality of frills or corrugations 8 formed therein at the sides.

The bimetallic sheet member 2, void of apertures within the central portion thereof, is adapted to flex in a plane substantially normal to the surface thereof, from, say, a convex to a concave position due to changes in temperature thereof. Such member flexes with a snap acting action due to the formation of a plurality of alined sets of frills or corrugations 8 located within oppositely positioned sides or edges thereof and to the formation of a general curvature in the member.

The bimetallic sheet member or plate 2 is formed with a predetermined overall curvature (by the well-known heat-treatment in clamps, for example) depending upon the operating characteristics desired. The low expansive component 4 of the member 2 is preferably formed in a convex manner for an operating temperature which is above the ambient temperature (see Fig. 3) and the high-expansive component 6 is formed in a concave manner for an operating temperature of the member which is below the ambient temperature (see Fig. 5). The relatively short frills or corrugations 8 are then formed as illustrated within the member to produce suitable internal stresses and strains within the composite member 2 so as to decreasingly resist the movement of the member as it moves from say a convex upward position, see Fig. 3, to a neutral or substantially horizontal position, see Fig. 4, at which time they increasingly assist the member as it continues on to a concave upwardly position, see Fig. 5. In other words, the presence of the frills or corrugations 8 within the member 2 and the curvature thereof alone causes such member to flex from one operating position to another operating position with a snap action.

Each set of corrugations or frills 8 preferably occupies substantially the central third of its respective side or edge, and extends transversely into the member substantially one-sixth the width thereof. This proportionment, it has been found by experimentation, is the most desirable arrangement of the frills to produce the most efficient snap-acting member.

The exact arrangement and degree of strain within the member resulting from the presence of the frills or corrugations 8 is unknown. However, it has been found by test that such member produces a contact pressure substantially three times as great as well known snap acting strip or link type bimetallic members for a given thickness thereof, and in addition produces a snap action with a considerably greater accelerating force than any bimetallic strip member heretofore known. A correspondingly thinner material may thus be used in my bimetallic members for a given required contact pressure.

It is to be understood that, as an alternative, a device in accordance with my present invention may be formed of a single resilient sheet member or plate in lieu of the composite bimetallic sheet member hereinabove described. Such a resilient member must have an external force applied thereto in order to move from one position to another with a snap action. However, the operating characteristics of such a resilient member having an external force applied thereto are similar to those of a bimetallic member having the same configuration and physical dimensions.

Various other modifications may be made in the device embodying my invention without departing from the spirit and scope thereof, and I desire,

therefore, that only such limitations shall be placed thereon as are imposed by the prior art and the appended claims.

I claim as my invention:

1. A snap-acting element comprising a sheet member having a mounting portion and an imperforate main body portion contiguous therewith, said body portion having a curvature and relatively short frills formed within opposite edges separated by a smooth intermediate area, said curvature and frills alone producing a snap action.

2. A bimetallic thermo-responsive plate having a mounting portion and an imperforate main body portion contiguous therewith, said main body portion having a curvature and also having frills formed within an edge thereof, said curvature and frills alone producing a cupping of the bimetal to provide a snap action and said frills extending into the plate only substantially one-sixth the width thereof.

3. A bimetallic thermo-responsive plate having a mounting portion and an imperforate main body portion contiguous therewith, said main body portion having a curvature and also having frills formed within the edge thereof, said curvature and frills alone producing a cupping of the bimetal to provide a snap action and said frills extending along only substantially the central third of the edge of said plate.

4. A bimetallic thermo-responsive plate having a mounting portion and an imperforate main body portion contiguous therewith, said main body portion having a curvature and also having frills formed within an edge thereof, said curvature and frills alone producing a cupping of the bimetal to provide a snap action and said frills extending into the main body portion of the plate only substantially one-sixth the width thereof and along only substantially the central third of the edge of said plate.

WILLIAM M. LAYTON.