

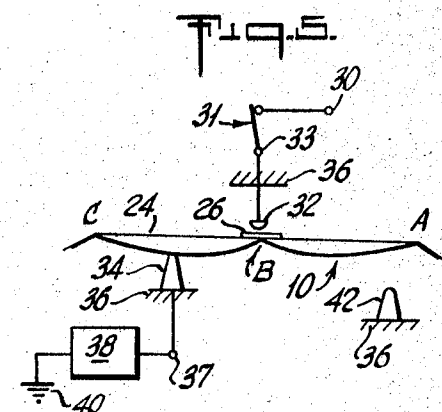
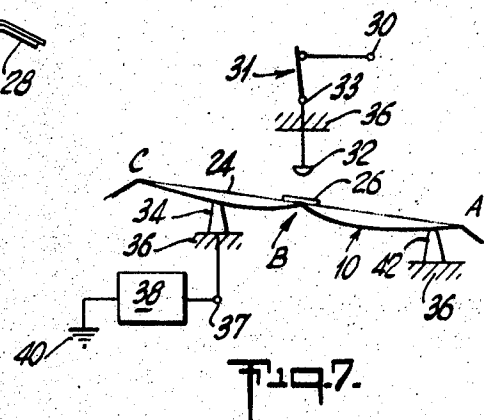
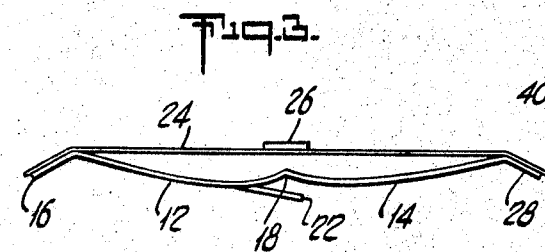
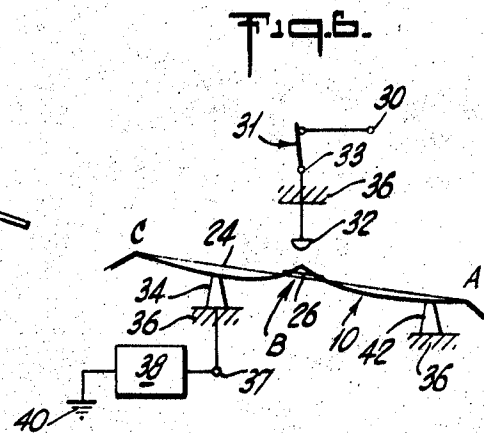
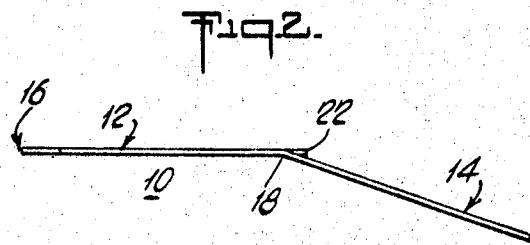
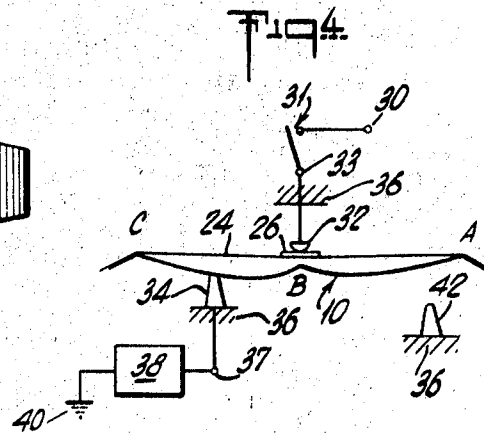
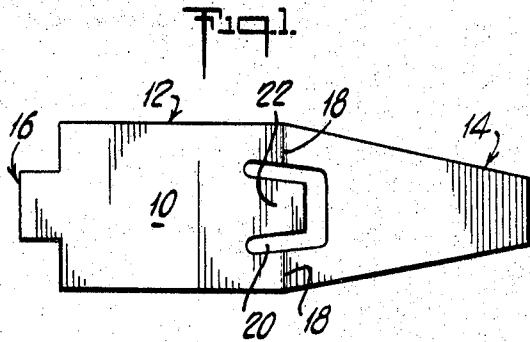
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H. G. SIIBERG

3,470,515

SNAP ACTION BLADE FLASHER

Filed May 16, 1967



INVENTOR
HEMMING & SIIBERG
BY
Eyre, Mann & Lucas
ATTORNEYS

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3,470,515

SNAP ACTION BLADE FLASHER

Hemming G. Siiberg, Union, N.J., assignor to Wagner Electric Corporation, a corporation of Delaware
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U.S. Cl. 337-138

6 Claims

ABSTRACT OF THE DISCLOSURE

A snap action flasher is constructed by connecting a pull ribbon, having a centrally located contact, between the ends of a blade which has a deformation transverse to its longitudinal axis. A portion of this deformation is cut out to leave a space large enough to accommodate the width of the pull ribbon within the deformation beyond the crest thereof. The pull ribbon is attached to the blade in such manner as to cause the two portions of the blade on either side of the deformation to be bowed reversely to the direction of bend of the deformation, thereby resulting in a substantial storage of mechanical energy. When mounted in a frame and associated with a stationary electrical contact opposite the contact on the pull ribbon and a mechanical stop for the free end of the blade, the flasher will operate to alternately open and close said contacts with the pull ribbon preferably moving into and out of the space provided by the cut out portion of the deformation and with the conformation of the deformation and bowed portions of the blade remaining essentially the same. This results in minimum change in the internal stresses created in the blade by the deformation and bowing thereof.

This invention relates to a snap action blade flasher.

Snap action flashers have in the past employed buckling members to provide the mechanical motion to open and close contacts, and a pull ribbon to control the timing of the opening and closing of the contacts. The buckling member is ordinarily prestressed with a crease or similar deformation which is mechanically biased by the tension of the pull ribbon into another configuration opposite in curvature and 90° rotated to the original deformation. When the pull ribbon expands due to the heat generated by current flowing through it, the buckling member "unbuckles" to allow the member to snap back towards its original deformation and thus provides the motion necessary to break the contacts. This unbuckled condition remains until the tension of the pull ribbon during cooling becomes sufficient to cause the blade to buckle once again. This type of mechanism has the serious disadvantage of creating extremely high stress levels within the buckling member itself which, especially in a high temperature environment, will result in undesired permanent changes in the magnitude of stresses in the buckling member. This, in turn, causes a maladjustment of the unit.

The present invention employs a blade-like deflecting member for providing the necessary mechanical displacement of contacts, which blade has relatively low internal stresses, thereby making it far less prone to maladjustment as a result of operating in a high temperature environment. Furthermore, there is essentially no change in the direction of the internal stresses in the blade, as is the case with prior art buckling members. Consequently, there is very little change in the internal stresses of the blade during operation, thereby resulting in very stable flasher performance, even at elevated temperatures.

Further details of the invention will be readily understood by reference to the accompanying drawings of which:

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FIG. 1 is a top plan view of the preferred embodiment of the blade employed in the present invention.

FIG. 2 is a side view of the blade shown in FIG. 1.

FIG. 3 shows the configuration of the blade with the pull ribbon attached to assemble the two parts together.

FIG. 4 shows the pull ribbon-blade assembly of FIG. 3 diagrammatically associated with other cooperative parts, with the assembly in the cold position.

FIG. 5 shows the pull ribbon-blade assembly in a functionally intermediate or equilibrium position encountered when the assembly snaps from cold to hot position.

FIG. 6 shows the pull ribbon-blade assembly in the hot position.

FIG. 7 shows the pull ribbon-blade assembly in a functionally intermediate or equilibrium position encountered when the assembly snaps from the hot to cold position.

It is to be understood from the outset that the preferred embodiment of the blade disclosed herein contains a number of refinements which are not required for an operational device. Blades having a variety of shapes, with or without the disclosed form of deformation, or with the deformation at a different location on the blade, or with a cutout having a different shape or different location with respect to the deformation all can produce an operative device. It is also to be noted that, although the disclosed invention provides mounting means attached to one specific portion of the blade, the mounting means may be attached to the other portion of the blade, or to the pull ribbon itself, the movable contact in the latter case being mounted on the blade. Also, while the disclosed embodiment utilizes passage of electric current through a high resistance pull ribbon to directly heat and expand the same, a separate electrical heater element may be used instead to indirectly heat and expand the ribbon.

Referring now to the preferred embodiment of the blade disclosed in FIGS. 1, 2 and 3, the blade 10 has a rectangular portion 12 and a tapered portion 14. The rectangular portion 12 has a tab 16 to facilitate the mounting of the pull ribbon. The narrow tip of the tapered portion 14 serves the same function.

A deformation 18 extends along an axis in the central region of the blade and is made after the formation of the cutout area 20 which produces the tongue 22. The blade is made of a conducting spring material such as steel, duranickel, or the like. A preferred range of the included angle formed by the rectangular and tapered portions after the deformation has been made is from approximately 160° to 170°, although angles outside of this range may also be used. The two portions of the blade 10 on either side of the deformation 18 are bowed reversely to the direction of bend of the deformation by attaching a pull ribbon 24 under tension to the blade as shown in FIG. 3. By tapering one portion of the blade 14, a more constant radius of curvature is produced in that portion when the blade is subjected to the tension of the pull ribbon and other functional advantages are achieved also. The function of the cutout 20 is to permit the pull ribbon 24 to pass just below the crest of the deformation in the blade 10.

Contact 26 is mounted on the pull ribbon 24 in proximity to the deformation 18 of the blade 10. The contact 26 is preferably centrally located on the pull ribbon 24 so as to provide the maximum rate of heating of the pull ribbon, which results in faster starting of the flasher. The pull ribbon 24 is preferably welded to the blade 10 at points 16 and 28, which form convenient tabs for mounting. Tab 28 is simply the tip of the tapered portion 14 of the blade 10.

FIG. 4 illustrates the pull ribbon-blade member assembly of FIG. 3 diagrammatically associated with other parts in an operative flasher mechanism which is in a cold position. The blade 10 is attached to a mount 34

which is electrically connected to terminal 37 and electrically insulated from a supporting frame 36. Terminal 37 is in turn connected to a lamp load 38 which is grounded at 40. The movable contact 26 is engaged with a stationary contact 32 which is electrically connected to terminal 33 and electrically insulated from frame 36. Terminal 33 is in turn connected through an on-off switch 31 to a source of electric current 30, such as an automobile battery. The stop 42 for the free end of the blade 10 is mounted on the frame 36 and the function of the stop will be explained in greater detail below.

In the FIG. 4 cold position of the flasher mechanism, the mechanical energy stored in the blade 10 under the tension of the pull ribbon 24 urges the pull ribbon upward to generate the pressure necessary to maintain the contacts 26 and 32 firmly engaged and to prevent arcing between these contacts upon disengagement thereof. When the switch 31 is closed, an electrical circuit is established whereby current flows from source 30 through switch 31, terminal 33, contacts 32 and 26, pull ribbon 24, blade 10, mount 34, terminal 37 and load 38 to ground 40. Current flow through the ribbon 24 generates heat which causes the ribbon to expand in length whereby the distance between points A and C increases. As this expansion occurs, the previously-stored energy of the blade 10 causes the crest of the deformation 18 (point B) to move towards the ribbon 24. When the ribbon 24 is substantially coincident with the crest of deformation 18, a functional intermediate or equilibrium position is reached (FIG. 5) and thereafter, when the ribbon moves just past the equilibrium position, a sudden release of energy occurs to produce a snap action movement which disengages contacts 32 and 26 and moves the pull ribbon-blade assembly into the hot position shown in FIG. 6.

In this position, the pull ribbon 24 is prevented from going too far below the crest of deformation 18 (point B) by the cutout portion 20 and the tongue 22 therein (FIGS. 1 and 2) and by mechanical stop 42. If the pull ribbon 24 were allowed to pass too far below point B, the forces exerted by the pull ribbon upon cooling would tend to pull points A and C down further below point B, rather than upward. Mechanical stop 42 is adjustable, so as to provide a control over the amount of potential energy in blade 10 which is to be released. This adjustment will control the rate at which the flasher operates.

With the flasher mechanism in the hot position shown in FIG. 6, the electric circuit for energizing the load 38 and heating the pull ribbon 24 is broken, so that the load is extinguished and the ribbon begins to cool and contract. This forces the crest (point B) to again move toward the ribbon 24, this time in an opposite direction as compared to the sequence of FIGS. 4 and 5, until a functional intermediate or equilibrium position is again reached, as shown in FIG. 7, with the ribbon being substantially coincident with the crest. When the ribbon 24 moves just beyond the equilibrium position, there is again a sudden release of energy which causes the pull ribbon and blade 10 to return to the cold position shown in FIG. 4 to re-engage the contacts 26 and 32.

The cycle described in connection with FIGS. 4 through 7 repeats as long as switch 31 is maintained closed.

From the foregoing description, it will be evident that the invention utilizes a pull ribbon-blade member assembly which, in between stable cold and hot positions, passes through functionally intermediate or equilibrium positions which are usually reached when the ribbon is substantially coincident with the crest of the deformation in the blade and, as soon as the ribbon just passes the equilibrium position, a sudden release of energy occurs to produce snap action movements that open and close cooperative make-and-break contacts in response to the successive traverses of the equilibrium position by the ribbon in reciprocating opposite directions. It will also be noted that these snap action movements are produced without substantial change in the directions of bend of the deformation and reversely bowed portions of the blade. Hence,

very little change in the direction of stresses is encountered and the flasher gives stable performance over wide variations in ambient temperature.

It will be understood that it is intended to cover all changes and modifications of the preferred embodiment of the invention, herein chosen for the purpose of illustration, which do not depart from the spirit and scope of the invention.

What is claimed is:

1. A snap action flasher comprising:

- (1) a deflecting member having a deformation extending along an axis thereof,
- (2) an expansible pull member attached under tension to said deflecting member to hold portions of said deflecting member bowed on opposite sides of said deformation reversely to the direction of bend of said deformation, said pull member being disposed along the concave sides of said bowed portions,
- (3) a movable contact mounted on the deflecting member-pull member assembly,
- (4) a stationary contact positioned for cooperative make-and-break electrical connection with said movable contact,
- (5) mounting means for supporting said deflecting member-pull member assembly and for electrically connecting said deflecting member-pull member assembly to an associated circuit, and
- (6) mounting means for supporting said stationary contact and for electrically connecting said stationary contact to an associated circuit,

whereby when said pull member is heated intermittently in order to alternately expand and contract said pull member, said pull member moves reciprocally in opposite directions and at least to an equilibrium position located substantially at the crest of said deformation to produce snap actions which correspondingly cause said make-and-break electrical connection between said contacts without substantial change in the directions of bend of said deformation and bowed portions of said deflecting member.

2. A snap action flasher according to claim 1, wherein said deflecting member comprises a blade having a longitudinal axis oriented transversely to said deformation axis, and said pull member extends above and across the crest of said deformation when unheated.

3. A snap action flasher according to claim 2, wherein said blade has a cutout portion in the region of said deformation, said cutout portion being large enough to accommodate the width of said pull member.

4. A snap action flasher according to claim 2, wherein said blade has a tapered portion.

5. A snap action flasher according to claim 2, including mechanical means for adjusting the flashing rate.

6. A snap action flasher according to claim 3, wherein:

- (1) said blade includes integral tabs to which said pull member is attached,
- (2) said deformation is a linear crease,
- (3) said cutout portion forms a tongue which partially coincides with said linear crease, and
- (4) said pull member moves alternately (a) into said cutout portion and against said tongue and (b) out of said cutout portion, as it moves reciprocally through said equilibrium portion.

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BERNARD A. GILHEANY, Primary Examiner

R. L. COHRS, Assistant Examiner

U.S. Cl. X.R.

337—391, 395

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,470,515 Dated September 30, 1969

Inventor(s) H. G. Siiberg

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Col. 4, Line 63 - Claim 6 - Last Line

"portion" should read --position--

SIGNED AND
SEALED
FEB 17 1970

(SEAL)

Attest:

Edward M. Fletcher, Jr.

Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents