Feb. 22, 1966 J. W. WELSH 3,236,973

HEATER ELEMENT FOR VANE TYPE SNAP-ACTION DEVICES

Filed Feb. 28, 1964

Fig. 1.

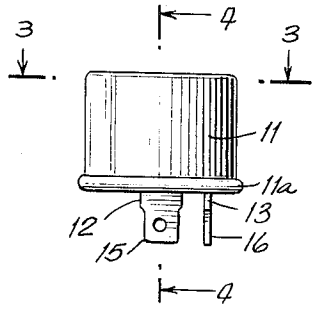


Fig. 3.

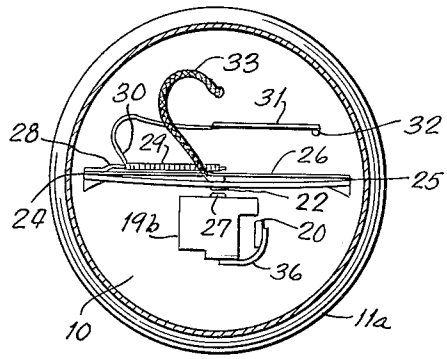


Fig. 2.

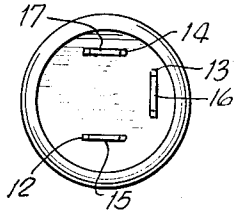


Fig. 4.

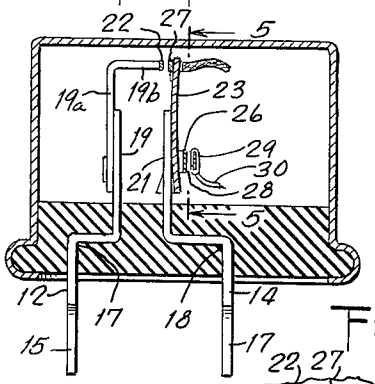


Fig. 5.

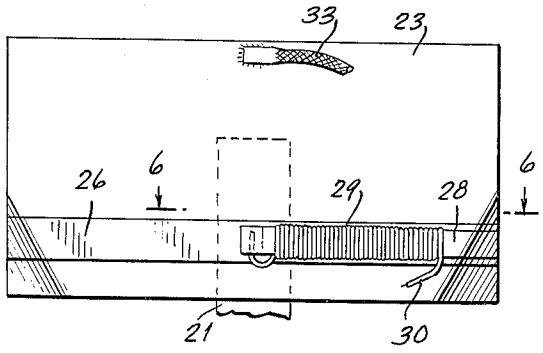


Fig. 7.

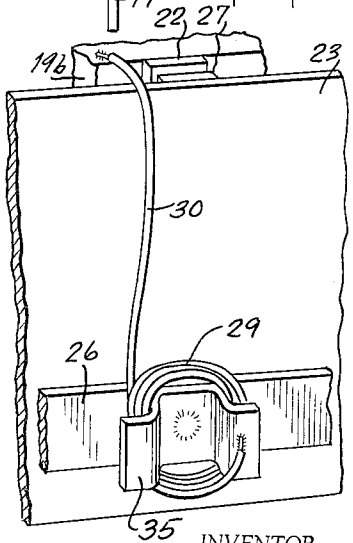
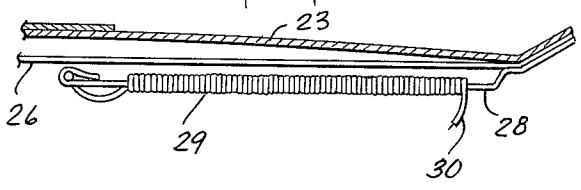


Fig. 6.



INVENTOR.
JAMES W. WELSH
BY
Kenyon & Kenyon
ATTORNEYS

United States Patent Office 3,236,973 Patented Feb. 22, 1966

3,236,973
HEATER ELEMENT FOR VANE TYPE SNAP-ACTION DEVICES

James William Welsh, Summit, N.J., assignor to Hudson Lamp Company, Kearney, N.J., a corporation of New Jersey

Filed Feb. 28, 1964, Ser. No. 348,117
3 Claims. (Cl. 200—122)

This invention relates to an improvement in vane type snap-action devices and more particularly to a new and improved means for heating the motive element ribbon of a vane type snap-action device.

Electrical snap-action devices are well known in the art for use in controlling electrical circuits such as automobile directional signal systems. Such a vane type snap-action device is described in U.S. Patent No. 3,088,012 issued April 30, 1963.

Vane type snap-action devices generally comprise a vane provided with a motive element ribbon which upon heating and expansion causes the vane to undergo a snapping-type action. As described in the above mentioned Patent No. 3,088,012, a vane curved about its longitudinal axis is provided with a high resistance metallic motive element ribbon welded across and held under tension by the vane, such as to stress the vane about its vertical axis. In a series type snap-action device, the ribbon is in series with two normally closed contacts, one of which is mounted on the ribbon. When current is passed through the high resistance ribbon, the ribbon heats up and expands, causing the vane to snap and to assume a curvature about the longitudinal axis. Expansion of the ribbon opens the contacts and allows the ribbon to cool and contract, which in turn causes the vane to snap and return to the position in which the contacts are normally closed.

In parallel type snap-action devices where the contacts of the snap-action device are normally open, a heating coil is mounted on the motive element ribbon to cause the ribbon to expand and contract, expansion and contraction of the ribbon in turn causing the snap-action device to go through a snap-action cycle.

Heating coils of the prior art have generally been wound around the motive element ribbon itself. It has been found that by providing the heating coil adjacent the motive element ribbon rather than wound around it, ease of assembly in manufacturing the snap-action device is introduced while providing superior heating action of the ribbon.

It is thus an object of this invention to provide a new and improved means for heating the motive element ribbon in vane type snap-action devices.

It is a further object of this invention to provide means for heating the motive element ribbon of snap-action devices that is easily assembled and that provides greater concentration of heat to the metallic ribbon.

Other and further objects of this invention will make themselves apparent from the following description and drawings wherein:

FIG. 1 is a side perspective view of a vane type snap-action device showing it in completed form suitable for installation,

FIG. 2 is a bottom perspective view of the snap-action device,

FIG. 3 is a top cross-sectional view taken along line 3—3 of FIG. 1,

FIG. 4 is a side cross-sectional view taken along line 4—4 of FIG. 1,

FIG. 5 is an elevational view of one embodiment of the present invention,

FIG. 6 is a top partially sectional view taken along line 6—6 of FIG. 5, and

FIG. 7 is an elevational partially sectional view of another embodiment of the present invention.

In general, the present invention contemplates the provision of a heating coil adjacent to the metallic motive element ribbon of a vane type snap-action device. The heating coil is comprised of an insulated wire wound around a metallic strip affixed adjacent to the motive element ribbon. One end of the wire is soldered to the metallic strip, while the other end is connected to one of the terminals of the snap-action device.

More particularly, referring to the figures, the snap-action device is provided with a base **10** of Bakelite or other non-conductive material. Base **10** is provided with a shell **11** having a peripheral flange **11***a* adapted to register over base **10**, flange **11***a* being rolled or crimped to secure shell **11** to base **10** as shown in FIGS. 1 and 2. Base member **10** is shown to have secured within its terminals **12**, **13** and **14**. Terminals **12**, **13**, and **14**, respectively, huve lugs **15**, **16**, and **17** which are adapted to be inserted into an electrical socket. As shown in FIG. 4, electriacl terminals **12** and **14** are angled as at **17** and **18** within base **10** such as to provide a secure mounting of terminals **12** and **14**.

As shown in FIGS. 3 and 4, terminals **12**, **13** and **14** have arms **19**, **20** and **21** extending through the top of base **10**. Terminal **12** also has an angled extension member **19***a* affixed to arm **19**. The angled portion **19***b* of extension member **19***a* is provided with a contact **22**. Arm **21** has mounted thereon stressed vane **23**. Vane **23** comprises a thin metallic piece of metal curved along its horizontal axis to provide a convex front face and a concave back face. The vane is constructed so that it is adapted to be bent inwardly against the curvature and tend to flatten out when a force is exerted at its side edges **24** and **25**.

Ribbon **26**, of very thin metal, is attached to vane **23** adjacent its side edges by electrical spot-welding or the like. Ribbon **26** is preferably made of a high-resistance metal such as a nickel-chromium alloy which has a different coefficient of expansion than the metallic vane. Ribbon **26** is affixed to vane **23** in such a way as to stress vane **23** out of its normal curvature about is horizontal axis such that the vane is deformed or curved about its vertical axis rather than about the horizontal axis.

The bottom corners of vane **23** are bent inwardly so that part of the ribbon adjacent edges **24** and **25** is bent inwardly. The increased friction caused by the bending at the corners of the vane assists in holding the ribbon and provides for maximum static pulling force at ambient temperature. Vane **23** is provided with an electrical contact **27** aligned with but horizontally spaced from contact **22** of the angled portion **19***b*.

According to one embodiment of the present invention, mounted adjacent to ribbon **26** is a thin metallic strip **28** which may be affixed to ribbon **26** at one end thereof. A heater coil **29** is mounted on strip **28**. Coil **29** comprises a wire **30**, a portion of which is wound around strip **28**. The insulation of wire **30** is striped from both ends thereof, one end being soldered to the free end of strip **28** and the other end being affixed as by soldering or the like to the free end of metallic arm **31**. Arm **31** is mounted on post **32**, post **32** being affixed to element **13** within base **10**.

Vane **23** is further provided with shunt wire **33**, wire **33** being affixed at one end thereof adjacent to contact **27** on vane **23** and being affixed at the other end thereot to terminal **13** within base **10**. Wire **33** is provided to permit the snap-action device to operate in a heavy load

circuit where the amount of load current would ordinarily burn out the vane of the snap-action device.

As shown in FIG. 7, a further embodiment of this invention contemplates coil **29** being wrapped around a U-shaped member **35**, member **35** being preferably affixed near the center of ribbon **26**.

As shown in FIG. 3, the snap-action device is provided with three terminals and thus arm **20** of terminal **13** is connected to arm **19** of terminal **12** by means of electrically conductive metallic strip **36**, terminals **13** and **14** thus being at the same electrical potential. It will be understood that in a two-terminal snap-action device, terminal **13** and arm **19** would be omitted and that therefore strip **36** would be unnecessary.

In operation, when an electrical potential is impressed across terminals **12** and **14**, as when a switch is thrown to introduce the snap-action device into an automobile directional signal circuit, current will pass through high-resistance coil **29** since contacts **22** and **27** are normally open. Since coil **29** is made up of a number of turns of high-resistance wire, heat will be produced by the passage of current through coil **29**. Since coil **29** is immediately adjacent to metallic ribbon **26**, ribbon **26** will be heated by coil **29**, the heating of ribbon **26** causing expansion thereof. When ribbon **26** has expanded such that the stresses in vane **23** overcome the lessening tension in ribbon **26**, vane **23** will undergo a snapping action. Contacts **22** and **27** are then closed, causing current to flow through the circuit of terminal **12**, arm **19**, extension **19***a*, angled portion **19***b*, contacts **22** and **27**, vane **23**, and terminal **14**. When contacts **22** and **27** are closed, heater coil **29** is short-circuited, thus cutting off current flow through coil **29**. This allows ribbon **26** to cool and contract, which is turn causes vane **23** to be snapped back into its stressed condition. Contact between contacts **22** and **27** is thus broken and the cycle is repeated as long as the snap-action device is kept in the signalling circuit.

Shunt wire **33** is provided for use of the snap-action device in a circuit having high current. Wire **33** shunts the larger portion of the current past vane **23**, thus preventing burnout of the snap-action device.

It will be understood that since mechanical equivalents will be readily apparent to those skilled in the art, that this invention is not to be limited to the description and drawings herein but rather by the appended claims.

What is claimed is:

1. A vane type snap-action device comprising a base, a pair of electrical terminals mounted on said base, said terminals having arm portions extending through the top of said base, a snap-action vane mounted on the arm of one of said terminals, a motive element ribbon fixed across and held under tension by said vane, a pair of normally open contacts respectively mounted on said vane and said other terminal adjacent to and opposite each other, a metallic strip mounted on said ribbon at one point only such that at least one end of said strip is free and a high resistance insulated heater wire wound around said strip.

2. The vane type snap-action device of claim **1** wherein said metallic strip extends substantially parallel to said motive element ribbon and is affixed at one end only to said ribbon, the other end thereof being free.

3. The vane type snap-action device of claim **1** wherein said strip is substantially arcuate and is affixed to said motive element ribbon at substantially the central portion of said strip, the two ends thereof being free.

References Cited by the Examiner

UNITED STATES PATENTS

1,966,444	7/1934	Guett	200—116
2,842,642	7/1958	Colombo et al.	200—122
3,174,012	3/1965	Siiberg	200—137 X

BERNARD A. GILHEANY, *Primary Examiner.*

L. A. WRIGHT, *Assistant Examiner.*