Jan. 30, 1962 F. N. ANDERSON 3,019,319

THERMAL SNAP-ACTION SWITCH

Filed Aug. 3, 1959

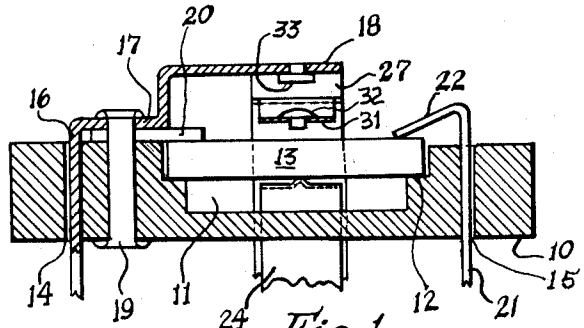


Fig. 1.

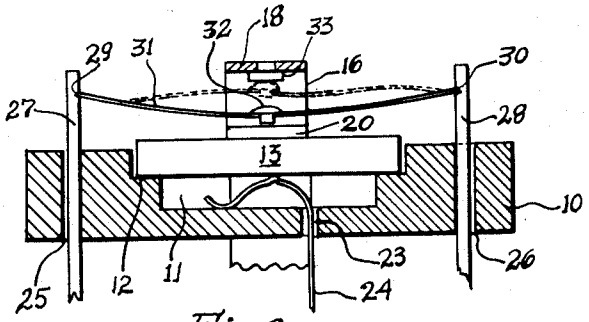


Fig. 2.

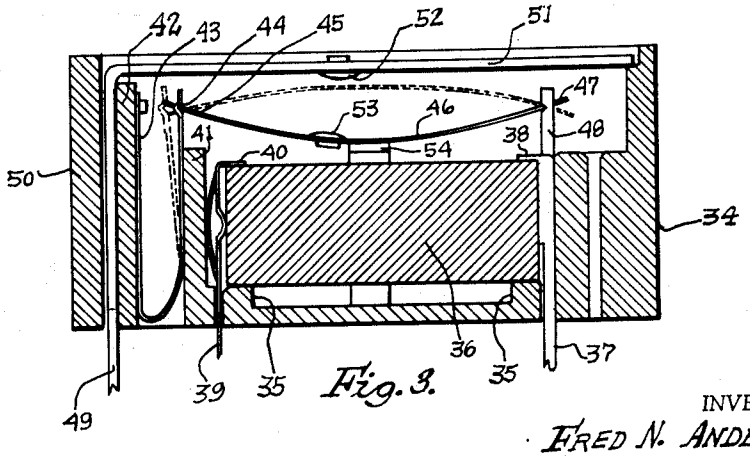


Fig. 3.

INVENTOR.
FRED N. ANDERSON
BY Dmoody & Dmoody
HIS ATTORNEYS.

United States Patent Office 3,019,319
Patented Jan. 30, 1962

3,019,319

THERMAL SNAP-ACTION SWITCH

Fred N. Anderson, Highland Park, Ill., assignor to Cherry Electrical Products Corp., Highland Park, Ill., a corporation of Illinois

Filed Aug. 3, 1959, Ser. No. 831,143
1 Claim. (Cl. 200—122)

This invention relates to a new and useful improvement in a thermal snap-action switch and more particularly to a heat responsive switch wherein the contact carrying member is moved with a snap-action.

Another object of my invention is the provision in a switch of this character in which the switch contact actuating member is a bi-metal contact arm and is moved in a snap-action in response to a heat expelling member.

A further object of this invention is in the provision in a switch of this character, of a thermistor for actuating a bi-metal contact arm.

Another object of this invention is in the provision in a switch of this character of an arrangement of parts which is simple and economical in manufacture.

Other objects will appear hereinafter.

The invention consists in the novel combination and arrangement of parts to be hereinafter described and claimed.

The invention will be best understood by reference to the accompanying drawings showing the preferred form of construction, and in which:

FIG. 1 is a side elevational sectional view of my improved thermal snap-action switch;

FIG. 2 is a front elevational sectional view of my improved thermal snap-action switch; and

FIG. 3 is a side elevational sectional view of a modified form of my improved thermal snap-action switch.

My improved thermal snap-action switch comprises a substantially flat rectangular shaped base **10**. The top surface of the base **10** is provided with a recess **11**. The side walls of the recess **11** are formed to provide a shoulder **12** as seen in FIGS. 1 and 2. A thermistor **13** is adapted to be placed in the recess **11** so that the marginal edges thereof sit upon the shoulder **12**.

The base **10** is provided with a plurality of slots **14** and **15**. In the slot **14** is frictionally seated a contact bracket **16**. This bracket **16** provides a medial portion **17** and a raised contact bearing end **18**. The contact bracket **16** is connected to the base **10** by a circular band clasp **19**, as shown, or by riveting directly to the base **10**. Disposed between the top face of the base **10** and the medial portion **17** of the contact bracket **16** is an insulation plate **20**. This insulation plate **20** provides a portion thereof that extends into the opening of the recess **11** and which is in facial abutment with one edge portion of the thermistor **13** as seen in FIG. 1.

In the slot **15** a terminal arm **21** is adapted to be firmly positioned. This terminal arm **21** provides a hook portion **22** which is bent so as to engage an opposite edge portion of the thermistor **13** with respect to the insulation plate **20** as seen in FIG. 1. By this arrangement it is clearly shown that I have provided a simplified retaining connection for the thermistor **13** with respect to the base **10**.

The recess **11** is provided with a slot **23** formed in the bottom wall thereof. In this slot **23** is positioned a spring loaded contact arm **24**. This contact arm **24** has a bearing connection with the bottom surface of the thermistor **13** when it is seated upon the shoulder **12**.

Extending parallel to the other opposite longitudinal edges of the base **10** are slots **25** and **26**. Positioned within the slots **25** and **26** are pivot brackets **27** and **28** respectively.

Each of the pivot brackets **27** and **28** adjacent the top

edge thereof and on their inner walls are provided with V-grooves **29** and **30** respectively. Positioned in the V-grooves **29** and **30** are the end portions of a bi-metal contact arm **31**. This bi-metal contact arm **31** is held in spaced relation with respect to the top edge of the thermistor **13** as viewed in FIGS. 1 and 2. The bi-metal contact arm **31** carries a contact member **32** which is adapted to be moved in a manner hereinafter described into an engagement with a contact **33** carried by the free end **18** of the contact bracket **16**.

As current is applied to the thermistor **13** such element will give off heat which will be picked-up by the restrained bi-metal contact arm **31** causing the bi-metal contact arm **31** to bend in the direction which it would normally were it not restrained. Since normal bending of the bi-metal contact arm **31** cannot occur by reason of the pivotal brackets **27** and **28**, it will deflect such pivotal brackets **27** and **28** in their respective slots **25** and **26** in a direction away from each other as the bi-metal contact arm **31** assumes its full longitudinal length in a horizontal plane. As the thermal activity continues, the bi-metal contact arm **31** will move away from the thermistor **13** beyond a horizontal plane and be snapped over so that the contact **32** thereof will engage the contact **33**. This snap-action of the bi-metal contact arm **31** is accomplished by the buckling forces imposed upon it by the returning of the deflected pivotal brackets **27** and **28** to their normal position as seen in FIG. 2. Since the contact bracket **16** also acts as a stop for the bi-metal contact arm **31**, it will allow contact pressure between contacts **32** and **33** to reach a maximum. When current is withdrawn from the thermistor **13** the reverse of the above procedure will occur thereby breaking the contact with the same positive snap-action.

In FIG. 3 I show a modified form of my thermal snap-action switch. In such modified form I provide a housing **34**. The base of the housing **34** provides a raised seat **35** for a thermistor **36**. One end of the thermistor is held in place by a contact bracket **37** which provides a lateral finger **38** in facial abutment with the top surface of the thermistor **36**. Adjacent the opposite end of the thermistor **36** is a contact bracket **39** which has a spring loaded arm **40** also engaging the upper surface of the thermistor **36** to hold it on the seat **15**. Within the housing **34** are two spaced apart upstandting members **41** and **42**. A U-shaped pivot bracket **43** is disposed between the upstanding members **41** and **42**. One free end of the U-shaped bracket **43** is V-notched as at **44** and receives therein one end **45** of a movable bi-metal contact member **46**. The opposite end **47** of such member **46** is connected to a portion **48** of the contact arm **37**. A terminal **49** is disposed in a slot **50** formed in the housing **34** and provides a longitudinally extending arm **51** extending above and in spaced relation to the thermistor **36**. This arm **51** carries a contact **52** which is adapted to be engaged by a contact **53** carried by the bi-metal contact **46**. The side walls of the housing **34** provide a rest **54** for the bi-metal contact member **46** when in normal unactuated position as seen in FIG. 3.

The operation of the modified thermal snap-action switch is the same as heretofore described with the exception that it is the free end of the U-shaped bracket **43** which is laterally disposed into the dotted line position as seen in FIG. 3 as the bi-metal contact member **46** is forced to attain its full longitudinal length in a horizontal plane extending between its connection to the bracket **43** and contact bracket **37**.

While I have illustrated and described the preferred form of construction for carrying my invention into effect, this is capable of variation and modification without

departing from the spirit of the invention. I therefore, do not wish to be limited to the precise details of construction set forth, but desire to avail myself of such variations and modifications as come within the scope of the appended claim.

Having thus described my invention, what I claim as new and desire to protect by Letters Patent is:

A thermal snap action switch comprising a substantially rectangularly shaped base provided with a plurality of slots extending transverse of its longitudinal length, with a slot adjacent each edge of said rectangularly shaped base, a heat emitting element carried by said base, a plurality of means carried in certain of the slots formed in said base for connecting said heat emitting element thereto, one of said means carried by certain of said slots providing an electrical conduit to one side of said heat emitting element, while the other of said means provides a fixed switch contact carried above and in spaced relation to said heat emitting element, a thermal responsive switch actuating member carried by said base above and in spaced relation to said heat emitting element, yieldable means carried in certain other of the slots formed in said base for pivotally engaging the opposite ends of said switch actuating member for supporting the same relative to said heat emitting element, with one of said yieldable means providing an electrical conduit for one side of said switch member, said switch actuating member having a longitudinal length greater than the distance between said yieldable means so that said switch actuating member will move with a snap-like action into and out of contact with the fixed contact when said switch actuating member is thermally responsively moved by the heat emitting from said heat emitting element.

References Cited in the file of this patent

UNITED STATES PATENTS

267,711	Peck et al.	Nov. 21, 1882
1,845,998	Gregory	Feb. 16, 1932
1,898,174	Dubilier	Feb. 21, 1933
2,016,244	Gregory	Oct. 1, 1935
2,239,541	Spencer	Aug. 22, 1941
2,825,785	Taylor	Mar. 4, 1958

FOREIGN PATENTS

318,960	Switzerland	Mar. 15, 1957