Dec. 6, 1966 FLASHER SWITCH EMPLOYING A PERMANENT MAGNET AND A SWITCH BLADE COMPOSED OF A CURIE POINT MATERIAL Filed May 11, 1964 2 Sheets-Sheet 1





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3,290,630 FLASHER SWITCH EMPLOYING A PERMANENT MAGNET AND A SWITCH BLADE COMPOSED OF A CURIE POINT MATERIAL

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10 This invention relates to a switch for use in flasher systems and more particularly to a thermomagnetic switch which utilizes the Curie Point effect along with critically aligned and coacting magnetic fields to provide higher contact pressure and cleaner contact opening and clos- 15 ing. The invention also relates to a switch wherein an elongate magnet acts upon an elongate contact blade member which is critically positioned with respect thereto so that an optimum number of flux lines pass through the blade member, thus achieving a maximum contact 20 pressure. The invention further relates to a switch having long contact life and stable non-erratic operation.

While many devices of the prior art have utilized the Curie Point effect to provide switches and circuit breakers of various types, none have provided a blade-type 25 switch which not only operates under the Curie Point effect to open and close a circuit, but which utilizes critically aligned magnetic lines of flux to provide more effective magnetic holding pressure while current initially flows through the blade. In addition, the instant in- 30 vention utilizes the Curie Point effect in conjunction with such critically aligned magnetic lines of flux to provide a cleaner contact opening which greatly enhances the life of the contacts by the virtual elimination of undesirable arcing. The invention further pro- 35 vides a switch having a blade element positioned within a critically aligned magnetic field so that maximum magnetic attraction is attained between the blade element and the permanent magnet acting thereon.

The Curie Point characteristic of certain magnetic 40 materials is well known in the art and is the temperature at which such magnetic materials become non-magnetic and lose their magnetic attractability.

In the devices of the prior art which rely solely on the Curie Point effect for the opening and closing of a cir- 45 cuit, a low holding contact force is encountered which contributes to short contact life due to arcing. In addition, erratic operation tends to result due to the fact that the holding force acting on the blade member tends to deteriorate as the blade element becomes non-magnetic. 50 Hence, the blade element pulls away from the permanent holding magnet in a less positive manner, thereby promoting undesirable arcing. The instant invention also utilizes coacting magnetic fields to provide a "magnetic wash" 55 about the contacts so as to further decrease the occurrence of arcing, thus enhancing longer contact life.

A need has therefore existed for a thermomagnetic switch which utilizes the Curie Point effect to provide a flasher action by opening and closing a circuit and 60 which utilizes an elongate permanent magnet that is critically positioned with respect to an elongate blade contact member so that an optimum number of magnetic lines of flux are utilized to enhance the basic operation 65 of the switch.

A need has further existed for a theromagnetic switch in which the operation of the switch is enhanced by interaction of the magnetic field created by the passage of current through the blade member and the permanent 70 magnet magnetic field in which the blade member is critically aligned.

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A need has also existed for a thermomagnetic switch having a blade member which is selectively and repetitively movable so as to alternately close a circuit and to actuate a sounder membrane element.

Accordingly, an object of this invention is to provide a unique thermomagnetic switch in which the critically aligned flux lines of a permanent magnet coact with the magnetic field created by passage of a current through an elongate blade member so as to achieve more effective switch operation.

Another object of this invention is to provide a thermomagnetic switch having a biased blade member which loses its magnetic attractibility upon passage of a current therethrough so as to selectively open the switch circuit and act upon a sounder membrane.

Still another object of this invention is to provide a thermomagnetic switch having an elongate blade element and a permanent magnet parallel to and spaced apart therefrom and substantially coextensive therewith so as to exert maximum magnetic attraction thereon.

Yet another object of this invention is to provide a thermomagnetic switch having an elongate blade contact member which is positioned so that the longitudinal axis thereof is 90° to the magnetic flux lines of the permanent magnet acting upon the blade contact member.

A still further object of this invention is to provide a thermomagnetic switch having a blade element which is configured to quickly reach its Curie Point temperature upon passage of a current therethrough and yet which is configured so as to be acted upon by the maximum number of flux lines of force from the magnetic field in which the blade element is positioned.

Another object of this invention is to provide a thermomagnetic switch which has quicker contact opening characteristics so as to virtually eliminate arcing which heretofore has resulted in shorter contact life.

Yet another object of this invention is to provide a flasher switch in which coacting mangetic fields provide a "magnetic wash" about the contacts so as to eliminate undesirable arcing.

A still further object of this invention is to provide a flasher switch in which the permanent magnet acts upon the blade element but does not come into direct contact therewith.

Still another object of this invention is to provide a thermomagnetic switch having long life characteristics which is simple and economical to fabricate and which is easy to install and maintain.

Other objects and advantages found in the construction of this invention will be apparent from a consideration of the following specification in connection with the appended claims and the accompanying drawings.

In the drawings:

FIGURE 1 is a top breakway view of the thermomagnetic switch and showing the elongate blade elements in parallel relationship to the magnetic pole pieces.

FIGURE 2 is a full cross section elevation view taken on line II-II of FIGURE 1 and shows in detail the sounder membrane, the pair of pole pieces spaced apart therefrom, the blade element positioned intermediate the pair of pole pieces and the sounder membrane, and the magnet upon which the pole pieces are mounted.

FIGURE 3 is a full cross section side view taken on line III-III and shows in detail the housing, the positive terminal with blade element extending horizontally therefrom, and the negative terminal having a fixed negative contact in register with the positive contact provided on the blade element.

FIGURE 4 is a schematic circuit diagram showing the switch in its operative use environment.

FIGURE 5 is a schematic view of the instant invention showing the blade element being retained in its normally closed position under the influence of the permanent magnet and further showing by dotted line the normal rest position of the blade element when not under the influence of the magnet.

FIGURE 6 is a schematic view of the invention showing the end of the blade element and its relationship to the magnetic flux lines emanating from the pole pieces provided on the permanent magnet.

FIGURE 7 is a schematic perspective view of the invention showing the elongate blade element in parallel spaced apart relation to the pair of pole pieces and being substantially coextensive therewith and further illustrating the direction of the magnetic lines of flux 15 created by the permanent magnet.

FIGURE 8 is a schematic side view of the invention showing the relative positioning of the elongate blade element, and the pole pieces and illustrating the direction of current flow through the blade element.

FIGURE 9 consists of one top and two end schematic views showing the interaction of the magnetic field created by the magnet and the electromagnetic field created by the current through the blade.

FIGURE 10 is an enlarged schematic view showing the 25 "magnetic wash" about the contact point between the contact element provided on the blade member and the fixed contact element in register therewith.

FIGURE 11 is a schematic end view showing an embodiment of the blade member which has a curved trans- 30 verse cross-sectional configuration so as to match the curvature of magnetic lines of flux passing therethrough.

FIGURE 12 is a top view of the blade element shown in FIGURE 11 which shows in dotted lines the well defined bend line that is due to the transverse curvature of 35 the blade element.

In general, the present invention comprises a thermomagnetic switch for use as a flasher switch. The present embodiment of the switch is utilized to impart flashing action to the lights of an automobile turn signal system. 40 In addition to controlling the flashing of the turn signal system, the switch is adapted to emit an audible signal so that the operator receives a positive indication that the turn signal system is flashing in response to the action of the thermomagnetic switch embodying the instant 45 invention.

As shown generally in the drawings, a casing is provided which is adapted to receive positive and negative terminal elements therein. The positive terminal element is provided with a spring biased elongate blade element extend-50ing outwardly therefrom. The blade element, thus fulcrumed, is provided with a positive contact at the free end thereof. The positive contact is in spaced-apart register with a negative contact provided on the negative terminal element. An elongate permanent magnet having 55 north and south pole pieces is positioned beneath the elongate blade element. The permanent magnet and the pole pieces are substantially coextensive with and in parallel spaced-apart relationship to the elongate blade ele-The blade element, thus positioned, has its 60 ment. longitudinal axis perpendicular to the magnetic field or magnetic flux lines moving from one pole piece to another. The blade element thus presents its longitudinal or maximum cross sectional area perpendicular to the magnetic field so as to receive the optimum number of flux lines are 65 emanating from the permanent magnet and passing from one pole piece to the other.

The blade element is comprised of a magnetic material, such as Invar, which becomes non-magnetic when the temperature thereof is raised to a certain critical point 70 known as the Curie Point. In this switch, the temperature of the blade element is raised to the Curie Point by passage of a current therethrough.

Thus, as shown in the drawings, the blade element is result of distortion. These stresses have components peracted upon by the magnetic field emanating from the per- 75 pendicular to the general trend of the lines. Since, on the

manent magnet. Hence, the positive contact of the blade element is held down against the negative contact in a normally closed position. The normally straight blade is bent down due to the magnetic attraction of the permanent magnet, thus making contact against the negative or fixed contact. When an appropriate switch is closed, a current flows through the blade element to the turn signal lamps. The passage of the current through the blade element heats up the blade and raises it to its Curie Point temperature. When the Curie Point temperature is 10 reached, the blade element loses its magnetic attractability, thus removing itself from the influence of the permanent magnet. The blade element then springs to its normal rest position, thus breaking the contact. This interrupts the current flow and as a result the blade element cools down. As the blade element cools below its Curie Point, the blade element gradually regains its magnetic attractability. When the blade element has regained its magnetic attractability, it again comes under the attractive influence of the magnetic field of the permanent magnet and is caused to bend downwardly to once again make contact, thus closing the circuit. Current begins to flow and the cycle repeats itself, thus bringing about the flasher operation described herein.

The unique switch structure described herein provides a switch which has a high contact force, thus leading to a long contact life and non-erratic operation due to virtual elimination of arcing. The presence of a high contact force permits the use of a blade element which has a stronger spring bias incorporated therein. This enables the spring blade element to make a cleaner and more positive contact break when it loses its magnetic attractability. In addition, the design factors in this unique switch which bring about the high contact force, also bring about a more positive contact closing when the blade element regains its magnetic attractability and comes under the influence of the magnet.

As shown in FIGURE 9, the magnetic field created by passage of current through the blade element coacts with the magnetic lines of flux emanating from the pole pieces so as to produce a resultant downward force which further increases the contact pressure of the switch. The resultant downward force is easily explained by reference to several well-known physical laws and rules concerning them. The "right-hand" rule can be utilized to determine the direction of the magnetic field which is created around a wire carrying a current. The blade element of the instant invention can be compared to such a wire.

FIGURE 9(a) illustrates the blade element critically positioned so that the longitudinal axis thereof is 90° to the magnetic lines of flux moving from the north pole piece to the south pole piece. As shown in the top schematic view of FIGURE 9(a), the pole pieces are substantially coextensive with and parallel to the blade element. As a result of this critical relative positioning, the flux lines of both magnetic fields are substantially parallel.

As shown in FIGURE 9(b) which schematically depicts a view looking at the free end of the blade element, it is seen that on the upper side of the blade element, the flux lines of the field about the blade element are in the same direction as the flux lines of the field of the magnet, thus supplementing each other. On the lower side of the blade element, the lines of each field are in an opposing sense, thus tending to counteract each other.

FIGURE 9(c) illustrates the resultant force field created by the two superposed fields which supplement each other above the blade element and counteract each other below the blade element. As shown, it is seen that the lines of force on the upper side of the blade element are crowded together. On the lower side, the lines of force are opposite in sense and hence give a weaker resultant field. The lines of force, as imagined by Faraday, act like stretched elastic rubber bands which exert stresses as a result of distortion. These stresses have components perpendicular to the general trend of the lines. Since, on the

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upper side of blade element, the number of lines compressed together is greater than on the lower side, the resultant force on the blade element would be such as to move the blade element downward relative to the magnet.

In order to achieve the advantage of such coacting mag-5 netic fields a unique switch structure had to be invented wherein an elongate blade contact member was critically positioned with respect to an elongate magnet member which was substantially coextensive therewith.

Thus, the passage of current through the elongate blade 10 member creates a magnetic field about the blade member which coacts with the magnetic field of the magnet in the manner described above.

Further, it is obvious that the blade element has to be thin to offer enough electrical resistance and quickly reach 15 (about one second at room temperature) the Curie Temperature. But a thin blade, particularly one made of NiFe alloy, will saturate at relatively low flux densities. This means the attracting force from the permanent magnet on such a blade will be very small. This results in 20 a low contact force which leads to short contact life and erratic operation.

Thus, a switch is necessary which apparently must satisfy two apparently incompatible requirements: (a) the blade must be thin and narrow (i.e., have a small 25 cross-sectional area) so as to warm up and cool off quickly in order to flash the turn signal lamps at the rate of 60 to 120 cycles per minute, even when the load is only 4 amperes under 12 volts; (b) the blade must be thick and wide (i.e., have a large cross-sectional area) 30 in order to be able to carry the maximum lines of force which lead to strong attraction from the permanent magnet. This would give a good contact pressure which is of a paramount importance for a low voltage drop, for reducing arcing due to vibration or shock or acceleration, 35 and for long contact life.

The invention embodied in the switch described herein solves these apparent incompatibilities by mounting the permanent magnet in such a way that the magnetic flux therefrom crosses the blade in a direction perpendicular 40 to the current direction.

The foregoing advantages are obtained by mounting the elongate blade element so that it is spaced apart from and substantially parallel to a pair of pole pieces positioned therebelow. In this position the longitudinal axis 45 of the narrow blade element lies perpendicular to the magnetic flux lines emanating from the pole pieces and the permanent magnet upon which they are mounted. The elongate blade element, thus positioned, presents its longitudinal (maximum) cross-sectional area in the path 50 of the magnetic field between the pole pieces. The permanent magnet and the pole pieces extending therefrom are substantially coextensive with the elongate blade element, thereby insuring that an optimum magnetic flux from the permanent magnet acts upon the blade element. 55This insures that a maximum hold-down force is brought to bear upon the blade element.

The larger available hold-down force permits the use of larger spring bias force to be designed into the blade element. When the blade element loses its magnetic at-60 tractability, the larger spring bias force acts to more positively and cleanly break the contact and thus further decrease the chance for undesirable arcing.

It is thus seen that the provision of a narrow elongate blade element, coupled with the critical positioning of the 65 pole pieces in relation to the blade element, creates a unique switch. The electric current flows through a body having a small cross-sectional area while the magnetic flux from the permanent magnet flows through the same body, but is provided with a large cross-sectional area 70 through which to flow.

Another important advantage occurs at the contact point due to the presence of the coacting magnetic fields as described herein. As shown schematically in FIG-

dotted line) coact with the magnetic lines of flux emanating from the pole pieces (lower dotted line) so as to provide a "magnetic wash" across the contact point. This "magnetic wash" acts to decrease undesirable arcing. It has been shown experimentally that when the current flow is reversed (and hence the direction of the field around the blade element is also reversed), more arcing occurs. The same thing happens if the magnet is reversed while the direction of current remains the same.

SPECIFIC DESCRIPTION

As shown generally in the drawings, a unique switch 20 is provided for use as a flasher switch in connection with a turn signal system. A switch case 21 is provided to receive the switch assembly therein. The case 21 may be formed from metal or resin material as desired. A positive terminal element 22 is mounted by staking through the case body 21. An elongate blade element 23 is fulcrumed on said positive terminal 22 and extends outwardly therefrom in a normally straight rest position. The blade element 23 has a spring bias built thereinto which causes the blade element to spring back to and beyond its normal straight position after it has been moved from its normal rest position and then released. This relative movement is shown in FIGURE 5 wherein the dotted line represents the normal rest position of the blade element 23. The blade element 23 is comprised from a material which loses its magnetic attractability or permeability when heated to a certain temperature known as the Curie Point temperature. In the preferred embodiment of this invention, the blade element 23 con-sists of a nickel-iron alloy (35% Ni, 64% Fe) known as Invar. This alloy has a relatively low Curie Point (280° C.) combined with a relatively high resistivity (82 microohm-cm.) and a fair magnetic permeability. Other materials exhibiting similar characteristics and well known in the art may also be used as desired for specific applications.

A permanent magnet 24 having an elongate narrow configuration is positioned substantially parallel to the blade element 23 and is spaced apart therefrom and directly below theerof. A barium ferrite magnet is utilized in the preferred embodiment of this invention, however, any type of permanent magnet may be utilized. In fact, an electromagnet can be utilized provided that the magnetic field thereof is critically positioned in the manner described herein. The elongate permanent magnet 24 is substantially coextensive with the blade element 23 and is provided with a pair of elongate pole pieces, 25 and 26, respectively. However, the elongate magnet 24 can be utilized without such pole pieces if desired.

The elongate pole pieces 25 and 26 are also substantially coextensive with the blade element and are positioned therebelow in a parallel spaced-apart relation therefrom. In use, the elongate blade member is slightly longer than the magnet 24 and pole pieces 25 and 26 positioned therebelow. For this reason, the term "substantially coextensively with" should be interpreted to mean the magnet and pole pieces are designed to act over a major portion of the length of the blade member but that they are not necessarily of the same identical length as the blade member. It should be pointed out that the magnet (or pole pieces) should preferably not come into contact with the blade element, even when the contact is closed as in FIGURES 5 and 8. It is desirable that the blade element should not touch the magnet (or pole pieces) for the following reasons: (a) to avoid loss of heat from the blade by conduction; (b) to avoid sticking effect; and (c) to assure full contact pressure.

The elongate blade element 23 is provided with a positive electrical contact element 27 at the free end thereof. As shown in FIGURES 1, 3 and 12, the contact element 27 extends through the blade element 23 so as to form a sounder membrane contact extension therebeyond. It URE 10 the lines of flux around the blade element (upper 75 is within the scope of the invention to provide a separate sounder membrane contact element on the side of said blade element 23 opposite said electrical contact 27. The positive electrical contact element 27 is formed from silver, but any other suitable material can be used.

A negative terminal 28 having a negative contact 29 ⁵ is positioned below and substantially perpendicular to the blade element 23 so the negative contact 29 is spaced apart from and in substantial register with the positive contact 27. When the blade element 23 is not under the magnetic influence of the permanent magnet 24, the blade element 23 maintains a normally horizontal or straight position so that the positive contact 27 is positioned above and spaced apart from the negative contact 29. It is within the scope of the invention to build into the spring blade a reversely curved normal rest 15 position.

When under the magnetic influence of the permanent magnet 24, the blade element 23 is bent downwardly so that the positive contact 27 positively engages the negative contact 29, thus closing the circuit between the positive and negative terminals. This is shown schematically in FIGURES 5 and 8.

When an appropriate switch 30 (see FIGURE 5) is closed, current begins to flow through the blade element 23. As previously described herein, the passage of the 25 current through the blade element 23 raises the temperature of the blade element 23 to its Curie Point temperature thereby causing the blade to lose its magnetic attractability. When the blade element 23 loses its magnetic attractability, it is no longer acted upon by the permanent magnet 24 and therefore the blade element springs back to its normal rest position, thus reaking the contact between the positive contact 27 and the negative contact 29. The current flow is thereby interrupted. The blade then cools to below its Curie Point tempera- 35 ture, thus regaining its magnetic attractability. The magnet acts to close the circuit and the cycle is repeated so as to achieve the desired flasher operation.

It should be pointed out that the use of a higher magnet strength permits a larger contact opening which re-40 sults in better switch operation. The use of a stronger spring bias in the blade element is thus also made possible and this in turn results in better contact opening and closing.

A sounder membrane 31 is provided on the case 21 in 45 a parallel spaced-apart position above the blade element 23. The sounder member is made of a resin material such as Delrin, which is the same material that is used in molding one embodiment of the case. However, any suitable material can be utilized. When the blade ele-50 ment 23 loses its magnetic attractability, it springs back to and beyond its normal rest position. The upper part of the positive contact 27 which is provided on the blade element 23 thus strikes the sounder membrane 31. As the operative cycle of the switch repeats itself 55 as described herein, the sounder membrane 31 emits an audible signal as the upper portion of the positive contact 27 repetitively strikes the sounder membrane 31.

The overall performance of the switch can be further improved if the blade member 23 is punched out 60 across the rolling direction of the sheet stock from which it is formed. Thus, the rolling direction of the sheet stock from which the blade member 23 is formed would coincide with the magnetic lines of flux as shown in FIG-URE 7. The resulting improved performance is due to the fact that magnetic permeability is higher along the rolling direction of the stock. Further, the flatness of the stock is better, and the spring characteristics are better. These factors also contribute to the improved performance of the applicants' invention.

Another embodiment of this invention utilizes a blade element having a transverse curvature provided therein. As shown in FIGURE 11, this curvature coincides with the curvature of the magnetic lines of flux so that the 75

magnet exerts a maximum force of attraction upon the blade element.

Further, as shown in FIGURE 12, the transverse curvature establishes a definite bend line when the blade member is acted upon by the magnet.

In summary, the unique structure of applicants provides a flasher switch which utilizes a narrow elongate blade member and an elongate magnet (and pole pieces) which coact to achieve a highly effective and efficient flasher switch action. As shown in the end view of FIGURE 6, the blade element 23 has a narrow transverse cross section ABCD which heats rapidly with the passage of current therethrough and thus quickly reaches its Curie Point temperature. This results in a faster cycle.

Further, as shown in the side view of FIGURE 8, the elongate configuration of the blade element provides a large area BCDF that accommodates an optimum number of magnetic lines of flux therethrough. A maximum hold-down force is thus exerted upon the blade member by the elongate magnet.

The simplicity of the instant switch and the resultant ease of fabrication results in a switch that is capable of high production and economical maintenance.

Various modifications of the invention may be made without departing from the principle thereof. Each of these modifications is to be considered as included in the hereinafter appended claims unless these claims by their language expressly provide otherwise.

Having thus set forth the nature of our invention, we 30 claim the following:

- 1. In a flasher switch, the combination comprising:
- (a) an elongate resilient switch blade element having a portion thereof of reduced cross-sectional configuration, said switch blade element rigidly mounted at one end thereof, said switch blade element composed entirely of material which loses its magnetic permeability upon heating due to the passage of a current therethrough;
- (b) a fixed contact element in spaced apart register with the free end of said elongate switch blade element; and
- (c) a magnet in a fixed spaced apart relationship to said switch blade element and said fixed contact, said magnet adapted to cause said switch blade element to bend into contact with said contact element while said switch blade retains its magnetic permeability.

2. In a flasher switch assembly, the combination comprising:

- (a) an elongate magnet element, said elongate magnet having magnetic lines of flux which are substantially perpendicular to the longitudinal axis of said elongate magnet; and
- (b) an elongate switch blade element fulcrumed at one end thereof and being substantially coextensive with said magnet element, said switch blade element being parallel to and spaced apart from said elongate magnet element so as to be positioned perpendicular to said magnetic lines of flux, said blade element composed of material which loses its magnetic permeability upon heating due to the passage of a current therethrough.
- 3. In a flasher switch, the combination comprising:
- (a) a pair of elongate magnet pole pieces in spaced apart parallel relation one to the other; and
- (b) an elongate switch blade element fulcrumed at one end and having an electrical contact element at the other end thereof, said switch blade element extending parallel to said pole pieces and above and between said pole pieces whereby magnetic flux lines between said pole pieces are distributed through said blade over substantially the entire length of said blade and are substantially perpendicular to the longitudinal axis of said blade, said blade element composed of material which loses its magnetic per-

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meability upon heating due to the passage of a current therethrough.

- 4. In a flasher switch, the combination comprising:
- (a) a case;
- (b) an elongate switch blade element fulcrumed at 5 one end in said case, said blade element composed of material which loses its magnetic permeability upon heating due to the passage of current therethrough;
- (c) a contact element in spaced apart register with 10 the free end of said fulcrumed blade element;
- (d) an elongate magnet provided in said case and being substantially coextensive with said blade element, said elongate magnet positioned substantially parallel to said blade element and spaced apart therefrom so as to magnetically attract said blade element into contact with said contact element as long as said blade element retains its magnetic permeability; and
- (e) a pair of elongate magnet pole pieces provided on said magnet in spaced apart parallel relation one 20 to the other, said elongate pole pieces parallel to and spaced apart from said blade element, said pole pieces substantially coextensive in length with said blade element and so oriented therewith whereby magnetic flux lines between said pole pieces are distributed through said blade over substantially the entire length of said blade and are substantially perpendicular to the longitudinal axis of said blade.
- 5. In a flasher switch, the combination comprising:
- (a) a case;
- (b) a sounder membrane provided on said case;
- (c) a fixed contact element provided in said case, said fixed contact element being spaced apart from said sounder membrane;
- (d) a spring biased switch blade element fulcrumed 35 at one end thereof within said case in a substantially parallel spaced apart relation to said sounder membrane and having a contactor element provided through the free end thereof in spaced apart register with said fixed contact element, said contactor element having a normal rest position intermediate and spaced apart from said sounder membrane and said fixed contact element, said blade element composed of material which loses its magnetic permeability upon heating due to the passage of a current there-through; and
- (e) an elongate magnet substantially coextensive with said switch blade and positioned in said case so as to bracket said blade between said magnet and said sounder membrane, said elongate magnet substantially parallel to said switch blade and spaced apart therefrom so as to selectively urge said switch blade from its normal rest position to cause said contactor element to make selective and repetitive contact with

- said sounder membrane and said fixed contact element.
- 6. In a flasher switch, the combination comprising:
- (a) a case;
- (b) a sounder membrane provided on said case;
- (c) a fixed contact element provided in said case, said fixed contact element being spaced apart from said sounder membrane;
- (d) an elongate spring biased switch blade fulcrumed at one end thereof within said case in a substantially parallel spaced apart relation to said sounder membrane, said switch blade having the free end thereof positioned intermediate said sounder membrane and said fixed contact element so as to make selective repetitive contact therewith, said blade element composed of material which loses its magnetic permeability upon heating due to the passage of current therethrough;
- (e) an elongate magnet provided in said case and being substantially coextensive with said blade element and positioned in said case so as to bracket said blade between said magnet and said sounder membrane, said elongate magnet positioned substantially parallel to said blade element and spaced apart therefrom so as to magnetically attract said blade element into contact with said fixed contact element when said blade element retains its magnetic permeability and to release said blade element into contact with said sounder membrane when said blade element loses its magnetic permeability; and
- (f) a pair of elongate magnet pole pieces provided on said magnet in spaced apart parallel relation one to the other, said elongate pole pieces parallel to and spaced apart from said blade element, said pole pieces substantially coextensive in length with said blade element and so oriented therewith whereby magnetic flux lines between said pole pieces are distributed through said blade over substantially the entire length of said blade and are substantially perpendicular to the longitudinal axis of said blade.

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