June 25, 1957 S. E. MACCHI ET AL 2,797,343

FLASHER

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FIG. 1

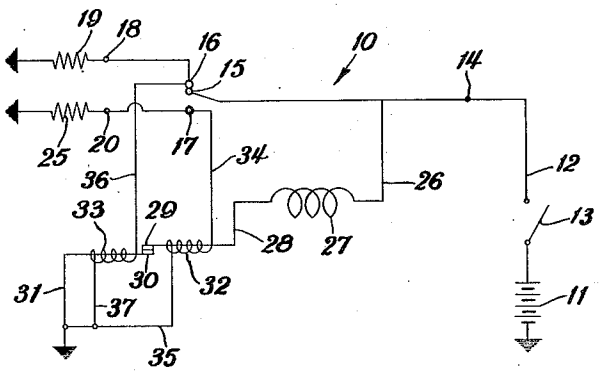


FIG. 2

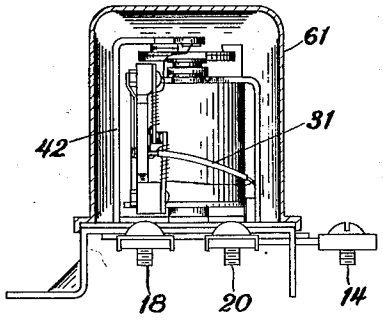


FIG. 3

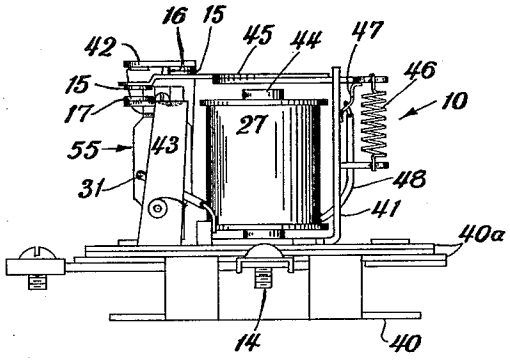


FIG. 4

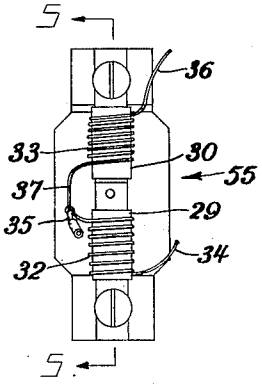
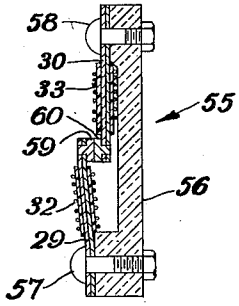


FIG. 5



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FLASHER

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7 Claims. (Cl. 307—132)

This invention relates to a flasher. More particularly it relates to a flasher device for flashing a light, causing intermittent sounding of a horn, or the like.

The invention is more particularly directed to electrical devices adapted to alternate the flow of electric current between two loads, such as two incandescent lamps, to cause a flashing, or to repeatedly interrupt the flow of electric current to a horn to operate the same intermittently; the flow of current being at a relatively high amperage, and the rate of operation being relatively fast.

Heretofore a relay type of flasher has been used for such purposes, comprising one or more fixed contact elements connected to the load or loads, a movable contact element, spring means for holding the movable element in a normal position and a relay coil and armature for urging the movable contact element to its other position. A flasher mechanism of this character is adapted to carry a relatively high current but has a slow rate of operation.

It is an object of the present invention to provide a flasher of the character and for the purpose described which is operable in circuits requiring a relatively high amperage and which operates at a rapid rate, of the order of 60 cycles or more per minute.

A further object of the invention is to provide a relay type of flasher in which the relay circuit is opened and closed by bimetal elements, such circuit involving means for accelerating the operation of the bimetal elements.

These and other objects of the present invention will be apparent from the ensuing description and the appended claims.

One form of the invention is illustrated by way of example in the accompanying drawings, in which

Figure 1 is a circuit drawing of the device.

Figure 2 is a view in end elevation of the device with the protective cap or housing shown in section and the internal components of the device shown in end elevation.

Figure 3 is a view in side elevation, as seen from the right of Figure 2 with the cap or housing removed.

Figure 4 is a view in front elevation, on a larger scale than that of Figures 2 and 3, of the bimetallic flasher element of the device.

Figure 5 is a section taken along the line 5—5 of Figure 4.

Referring now to the drawings and first to Figure 1, the device is generally designated by the reference numeral **10** and it is supplied with power from a suitable source shown at **11** which is connected by a wire **12** including a manual switch **13** to the power input contact **14** of the device. The power input contact **14** is connected to a movable contact element **15** which is engageable with either of two fixed contact elements **16** and **17**. As explained more in detail hereinafter with reference to the Figures 2 and 3, the movable contact element **15** is normally maintained in contact with the fixed contact element **16**. The fixed contact element **16** is connected to an output terminal **18** which in turn is connected to a

load element indicated as **19**, which, in turn, is grounded. The other fixed contact element **17** is connected to another output terminal **20** which, in turn, is connected to a load element **25** which, like the load **19**, is grounded.

The load elements **19** and **25** may be, for example, two incandescent lamps which are alternately energized by the flasher device **10** to cause a flashing. Alternatively a single load, such as a horn, may take the place of the two loads **19** and **25**, in which case the purpose of the device **10** is to supply a pulsating or intermittent current to the horn to operate the same intermittently as a warning signal. The circuit just described will be referred to as the "main circuit".

Also included in the device is a relay subcircuit comprising a wire **26** connecting the power input terminal **14** with a relay coil **27** which is connected by a lead **28** to a first bimetal element **29** which is normally in contact with another bimetal element **30** which is connected by a lead **31** to ground.

In the operation of the device as thus far described, when the switch **13** is closed, and assuming that two loads **19** and **25**, such as two incandescent lamps, are employed, current will pass from the source **11** through the lead **12** to the input terminal **14**, thence through the movable contact element **15** to the fixed contact element **16**, thence to the output terminal **18** and to the load element **19**. Simultaneously current will pass through the wire **26** to the relay coil **27**, thence through wire **28**, the normally closed bimetal elements **29** and **30** and wire **31** to ground. This subcircuit will energize the relay coil **27** and will cause the latter, through the means described hereinafter, to move the movable contact element **15** so as to break its contact with the fixed element **16** and to make contact with the other fixed element **17**. It will, therefore, be apparent that the supply of current to the load element **19** will be interrupted and current will be supplied to the load element **25**. The bimetal elements **29** and **30** may be arranged so that when either or both of them are heated, they will separate. For example, they may be arranged so that heat applied to the element **29** will cause it to flex upwardly and heat applied to the element **30** will cause it to flex downwardly. With this arrangement, when the relay subcircuit is energized in the manner described, current will pass through the bimetal elements and will heat them, thereby causing them to separate and to de-energize the relay coil **27**. When the latter is de-energized, the contact element **15** will separate from the contact **17** and will re-contact the contact element **16**, thereby de-energizing the load **25** and energizing the load **19**. When the bimetal elements **29** and **30** cool, they will recontact one another, thereby re-energizing the relay coil **27** and starting a new cycle. For this purpose the bimetal elements **29** and **30** are of the self-heating type.

It will, therefore, be apparent that the circuits thus described, including the relay subcircuit, will cause a flashing to occur. This circuit has the advantage that only a relatively small amount of current passes through the relay coil **27** and the bimetal elements **29** and **30**, yet a relatively high amperage current can be conducted to the load elements **19** and **25** without burning out the relay coil **27** and/or the bimetal elements **29** and **30**.

However, notwithstanding these advantages the said circuits are relatively slow in operation due to the time required to heat and cool the bimetal elements **29** and **30**. This slowness of operation is overcome by the means which will now be described.

The bimetal elements **29** and **30** are arranged so that both of them flex upwardly (i. e., in the same direction) when heated. Also the bimetal element **29** has a resistance winding **32** and the bimetal element **30** has a resistance winding **33**. The winding **32** is connected to

the contact element 17 by a wire 34 and to ground by a wire 35. The winding 33 is connected to the contact element 16 by a wire 36 and to ground by a wire 37.

When the manual control switch 13 is closed, the relay coil 27 is energized and the contact element 15 is caused to separate from contact 16 and to engage contact 17 in the manner described above. Current will then flow from contact 17 through the wire 34 and the resistance winding 32 to the wire 35, thence to ground, thereby heating the resistance winding 32 and its bimetal element 29. Meanwhile the bimetal element 30 will be heating at a very much slower rate by reason of the flow of current through the relay subcircuit. Hence the element 29 will flex upwardly at a much greater speed, and the contact between these elements will be broken very quickly. When the elements 29 and 30 separate the relay coil 27 is, of course, de-energized, the contact elements 15 and 17 will separate and the contact elements 15 and 16 will close again. Current will now pass through the resistance winding 33 and will consequently heat its bimetal element 30. The latter will flex upwardly at high speed while the element 29 cools and flexes downwardly. Recontacting of the bimetal elements and re-energizing of relay subcircuit is, therefore, accelerated. The energizing of the relay coil 27 will recontact the contact elements 15 and 17 and will complete a cycle of operation.

Referring now more particularly to Figures 2 and 3, the flasher there illustrated comprises a main mounting bracket and base 40 of metallic construction for mounting the device. To the base 40 is fixed insulators 40*a* and upright brackets 41, 42 and 43. The relay coil 27 is shown mounted on the base 40, such coil having an armature 44 which is disposed beneath an arm or lever 45 which is pivoted on the bracket 41 and to which movable contact elements 15 are fixed, one of which is in registry with the fixed contact element 16, the other being in registry with the other fixed contact element 17. A spring 46 is provided which normally holds the contact elements 15 and 16 in contact with one another and the contact elements 15 and 17 apart from one another.

Also shown in Figures 2 and 3 are the input terminal 14 and the output terminals 18 and 20. The input terminal 14 is connected electrically to the bracket 41, and a wire 47 connects the bracket 41 with the lever 45, thereby providing an electrical connection between the input terminal 14 and the movable contact elements 15. Another wire 48 is provided which serves to connect the input terminal 14 (through the bracket 41 and wire 47) to the relay coil 27, the other end of the relay coil 27 being connected through a lead 28 (which is shown only in Figure 1) to the bimetal element 29.

Referring now more particularly to Figures 4 and 5, a bimetal flasher element is provided which is generally designated by the reference numeral 55 and which comprises a ceramic base or bracket 56. The two bimetal elements 29 and 30 are there shown, which are fixed to the base 56 by means of screws 57 and 58 which also serve as terminals for the bimetal elements 29 and 30. The bimetal elements 29 and 30 are provided with contact buttons 59 and 60. The entire flasher assembly 55 is mounted on the device as illustrated in Figures 2 and 3 and connections are made in accordance with the circuit diagram of Figure 1 and in the manner which will be apparent from an inspection of Figures 1, 2, 3 and 4. Thus, the ground lead 31 is shown in Figures 2 and 3, the input leads 34 and 36 for the windings 32 and 33 are shown in Figure 4 and the ground leads 35 and 37 are also shown in Figure 4.

In order to protect the entire assembly from damage and from dust and moisture, an outer cap or housing 61 is also provided which is clamped to the base 40.

The device of the invention has been illustrated in Figure 1 and described hereinabove, as a flasher for alternately lighting two lamps. It may be used with equal advantage for supplying power intermittently to a single load such as a horn or a single lamp. Thus, referring to Figure 1, assume that the load element 19 is eliminated (i. e., the output terminal 18 is not connected to anything) and that the load element 25 is a warning horn which it is desired to sound intermittently. When the switch 13 is closed, the relay subcircuit wil operate exactly as described above; the contact 16 will serve to supply power (at a low current value) to the winding 33; and power will be supplied to the horn intermittently and at a high frequency.

It will, therefore, be apparent that a flasher has been provided which is highly effective for the purpose of alternately energizing two devices, such as two different lamps, to cause flashing, or for energizing a single device such as a horn intermittently. This device is simple in its construction and operation and it is effective to operate the intended load, such as lamps or a horn, at relatively high amperage. Meanwhile only a small current is caused to pass through the bimetal elements and relay coil, and the device operates at high frequency, e. g., 60 to 90 cycles per minute.

An important advantage of the bimetal contacts 29 and 30 arises from the following facts: It is customary in flasher construction to provide a fixed contact and a movable contact, the movable contact being of bimetal or other thermoresponsive construction to flex or move, when heated, from a normal position. The normal position may be one of engagement with the fixed contact (i. e., normally closed), or it may be a position spaced from the fixed contact (i. e., normally open). In our design two bimetal contact (or other thermoresponsive) elements are employed; they are preferably of identical construction and length; and they are arranged to flex in the same direction. In the specific embodiment illustrated these elements are normally closed, but they may be normally open, as will be apparent. Being of the same length and flexing in the same direction, any variation in temperature of the environment is automatically compensated. As a result our flasher can be used in an environment where extremes of temperature are encountered, e. g., minus 30° F., or lower, to 120° F., or higher.

We claim:

1. An electrical device of the character described comprising an input terminal, at least one output terminal, an automatic switch having a closed position to connect said terminals and an open position to disconnect the same, means normally holding said switch in one of said positions, electromagnetic means for moving said switch to the other of said positions, a first subcircuit for energizing said electromagnetic means, said first subcircuit comprising thermoresponsive elements normally in contact with one another to close such first subcircuit, and a second subcircuit including a resistance element for heating at least one of said thermoresponsive elements to accelerate opening and closing of such elements.

2. An electrical device of the character described comprising an input terminal, at least one output terminal, an automatic switch having a closed position to connect said terminals and an open position to disconnect the same, means normally holding said switch in one of said positions, relay means for moving said switch to the other of said positions, a relay subcircuit for energizing said electromagnetic means, said relay subcircuit comprising thermoresponsive elements normally in contact with one another to close such relay subcircuit and arranged so that, when heated, they will flex in the same direction and a subcircuit for each thermoresponsive element including a resistance element for heating the respective thermoresponsive element to accelerate separation and re-contact thereof.

3. A flasher device of the character described comprising a main circuit including an input terminal, an output terminal and a pair of contact elements having a closed position for closing and an open position for opening said main circuit; resilient means urging said contacts to one of

said positions; relay means for urging said contacts to the other of said positions; a pair of bi-metal elements normally closed but opened by heating thereof; a relay circuit energized when said main circuit is energized and including said bimetal elements; and heating circuits operated by said main circuit to accelerate opening and closing of the bimetal elements.

4. A flasher device of the character described comprising a main circuit including an input terminal, an output terminal and a pair of contact elements having a closed position for closing and an open position for opening said main circuit; resilient means urging said contacts to one of said positions; relay means for urging said contacts to the other of said positions; a pair of bimetal elements normally closed and arranged to flex, when heated, in the same direction; a relay circuit energized when said main circuit is energized and including said bimetal elements; and a heating circuit for each bimetal element, said heating circuits being arranged to heat first one of the bimetal elements and then the other in such manner as to accelerate both the opening and closing thereof.

5. A flasher of the character described comprising a main circuit having an input terminal, a pair of output terminals, a fixed contact for each output terminal and a movable contact connected to the input terminal, resilient means urging the movable contact into engagement with one of said fixed contacts; relay means operable, when energized, to move the movable contact into engagement with the other of said fixed contacts, and a relay circuit connected to said main circuit and to ground to be energized when the main circuit is energized, said relay circuit including a pair of bimetal elements normally in contact with one another and arranged to flex in the same direction when heated; a first heater circuit for one of said bimetal elements including a resistance winding for heating such bimetal element, said circuit being connected to one of said fixed contacts and to ground, and a second heater circuit including a resistance winding for heating the other of said bimetal elements and including a connection to ground and to the other of said fixed contacts; said heater circuits being so arranged as to accelerate both the opening and closing of the bimetal elements.

6. A flasher of the character described comprising a main circuit having an input terminal, first and second

output terminals, first and second fixed contacts for said first and second output terminals, respectively, and a movable contact connected to the input terminal; resilient means urging the movable contact into engagement with said first fixed contact, and relay means operable, when energized, to move the movable contact into engagement with the second fixed contact; a relay circuit connected to said main circuit and to ground to be energized when the main circuit is energized, said relay circuit including first and second bimetal elements normally in contact with one another and arranged to flex in the same direction, a first heater circuit for said first bimetal element including a resistance winding for heating such bimetal element, said circuit being connected to said first fixed contact and to ground, and a second heater circuit including a resistance winding for said second bimetal element and including a connection to ground and to said second fixed contact.

7. A make-and-brake device comprising a pair of electrically conductive, thermoresponsive elements each having a normal position but adapted to flex from such position in a given direction when heated and to return to said normal position upon cooling, such flexing and returning movements being relatively slow if caused by electrical self heating; said elements being arranged to be in electrical contact when both are in their normal positions and to flex in the same direction; said device including also an electrical heating element for each thermoresponsive element in thermal contact therewith to heat the thermoresponsive element indirectly; said device also including means for supplying electric current alternately to one and the other of said heating elements to heat one and then the other of said thermoresponsive elements in rapid sequence, whereby electrical contact between said thermoresponsive elements is made and broken in rapid sequence and at a substantially higher frequency than would be caused by direct heating of said thermoresponsive elements by the passage of current therethrough.

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