

# United States Patent

[11] 3,591,765

[72] Inventor **Leonard C. Owers**  
**Southampton, England**  
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 [73] Assignee **Dreamland Electrical Appliances Limited**  
**Southampton, England**  
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 [31] **28761/68**

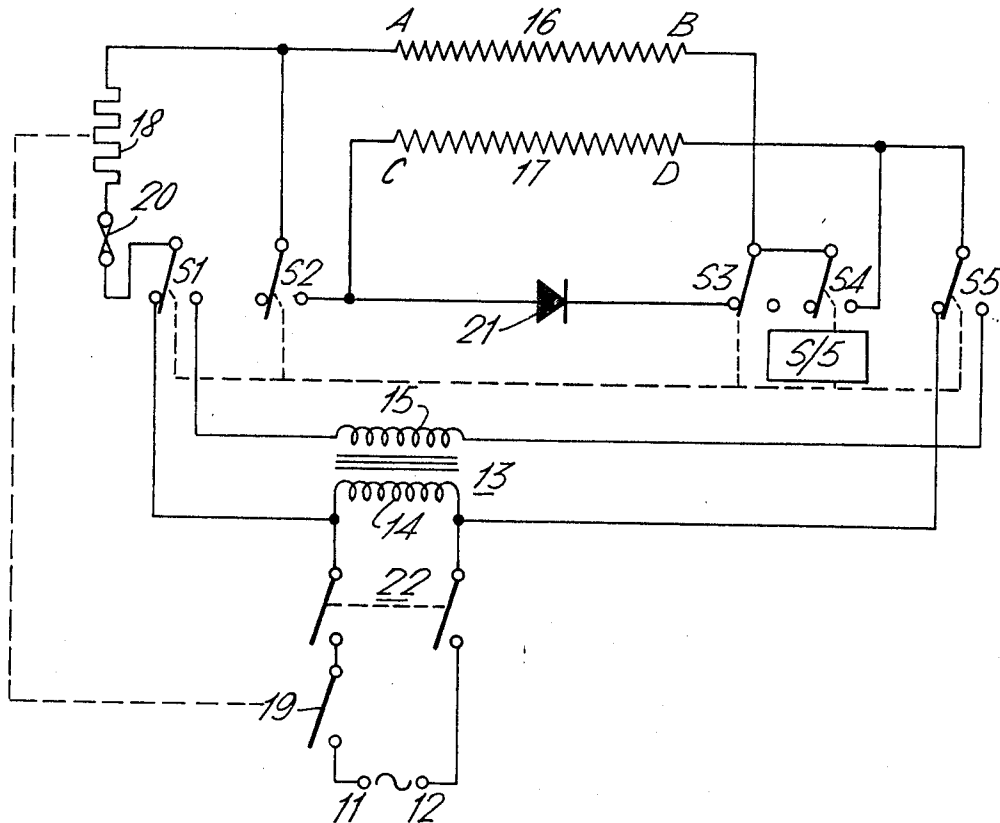
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Primary Examiner—J. V. Truhe  
 Assistant Examiner—C. L. Albritton  
 Attorney—Stevens, Davis, Miller & Mosher

[54] **ELECTRIC BLANKETS**  
**4 Claims, 4 Drawing Figs.**  
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 [51] Int. Cl. .... **H05b 1/00**  
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 488, 502, 529, 549, 482; 338/239, 539; 307/75;  
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**ABSTRACT:** A circuit for an electric blanket or an electrically heated pad has two heater elements. The circuit is such that these heater elements can either be connected directly to a source of supply, or indirectly by way of a transformer.



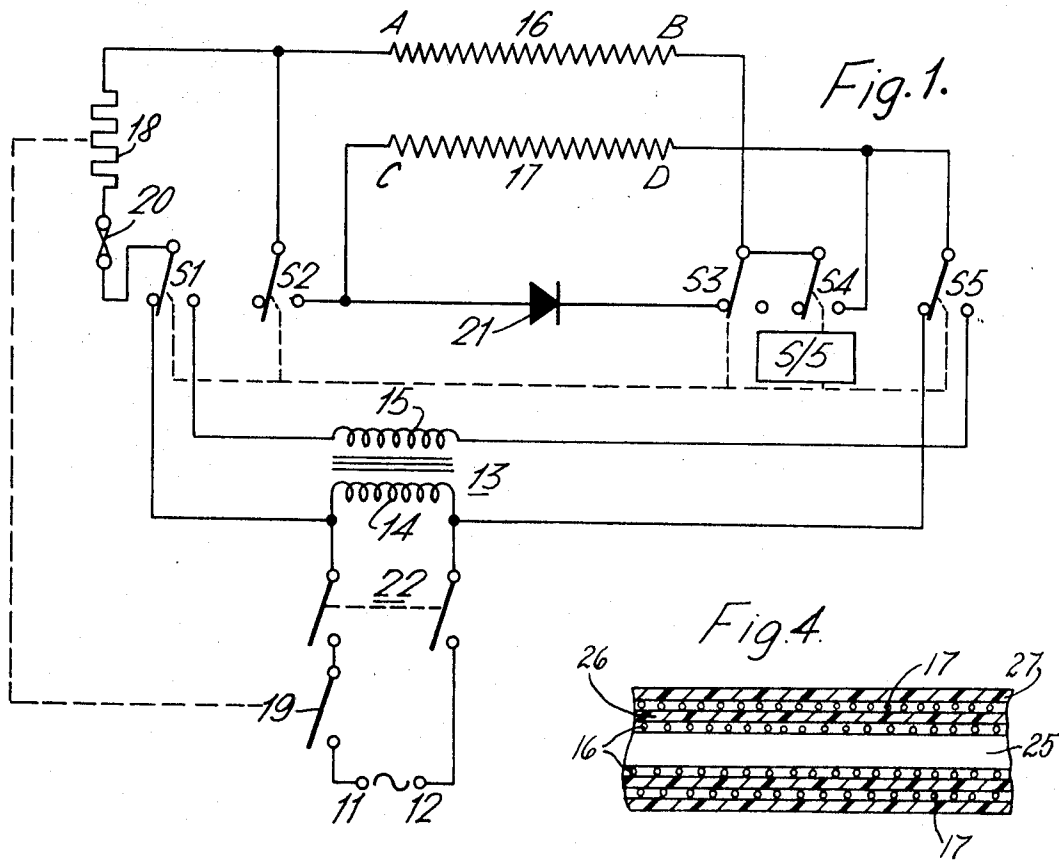


Fig. 1.

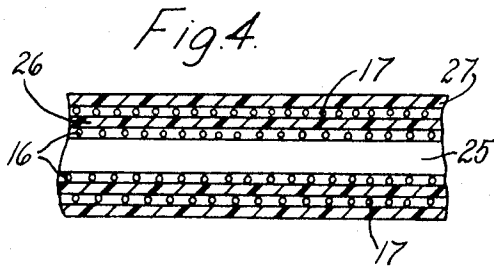


Fig. 4.

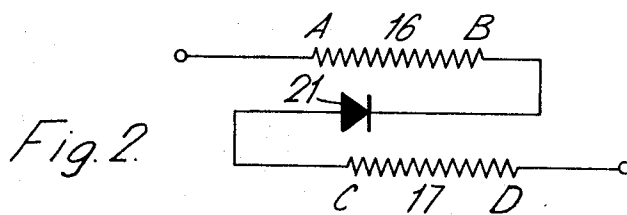


Fig. 2.

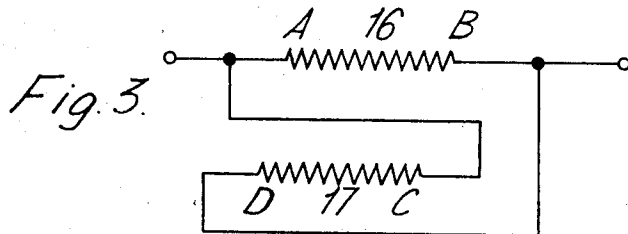


Fig. 3.

## ELECTRIC BLANKETS

## SUMMARY OF THE INVENTION

According to the present invention an electric blanket includes a circuit comprising two heater elements, a transformer having a primary winding and a secondary winding, a pair of terminal across which a source of electric power can be connected, and switch means having a first condition in which said elements are connected across said terminals and a second condition in which said elements are connected across the secondary winding of the transformer and the primary winding is connected across said terminals.

Preferably the two heater elements are connected in series with one another when the switch means is in the first condition and in parallel with one another when the switch means is in the second condition. The circuit may also include further switch means, for example a bimetallic switch, which acts as a safety cutout or as a temperature control. In this case it is desirable to arrange that the root mean square current in the further switch means is the same whether the first-mentioned switch means is in the first or the second condition.

It is also preferred that the two heater elements are wound together as a dual-concentric cable and a rectifier element is connected in series between the heater elements to form with a fuse a protective arrangement.

## BRIEF DESCRIPTION OF THE DRAWING

An electric blanket in accordance with the present invention will now be described by way of example with reference to the accompanying drawing, in which:

FIG. 1 shows the circuit of the blanket,

FIGS. 2 and 3 show parts of the circuit of FIG. 1 redrawn to illustrate the operation more clearly, and

FIG. 4 shows part of a dual-concentric cable in longitudinal section.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1, the blanket includes a circuit comprising a pair of input terminals 11 and 12 across which the mains supply is connected during operation, a transformer 13 having a primary winding 14 and a secondary winding 15, two similar heater elements 16 and 17, and a manually operated switch S/5 having five two-position contacts S1, S2, S3, S4 and S5. The circuit also includes a bimetallic switch including an element 18 and contacts 19, a fuse 20, a rectifier element 21 and a two-pole mains switch 22.

The terminal 11 is connected by way of the contacts 19 and one pole of the switch 22 to one end of the primary winding 14, whilst the terminal 12 is connected by way of the other pole of the switch 22 to the other end of the primary winding 14.

With the switch S/5 in one position, such that the contacts S1 to S5 are in the positions shown, a path extends from the first-mentioned end of the primary winding 14 by way of contacts S1, fuse 20, switch element 18, heater element 16, contacts S3, rectifier 21, heater element 17 and contacts S5 back to the other end of the primary winding 14. This corresponds to the 'high' setting of the switch S/5 in which the elements 16 and 17 are connected in series with one another (and with rectifier 21) across the mains as indicated diagrammatically in FIG. 2.

When the switch S/5 is reversed, a path extends from one end of the secondary winding 15 by way of contacts S1, fuse 20, switch element 18, contacts S2, heater elements 16 and 17 in parallel, contacts S4 and contacts S5 back to the other end of the secondary winding 15. This corresponds to the 'low' setting of the switch S/5, in which the elements 16 and 17 are connected in parallel with one another across the secondary winding 15 as indicated diagrammatically in FIG. 3.

When the circuit is first switched on the switch S/5 will normally be at the 'high' setting and the contacts 19 will be

closed. This results in rapid heating by the application of the mains supply of say 240 volts to the heater elements 16 and 17 in series. Subsequently, when the switch S/5 is set to the 'low' position, the heater elements 16 and 17 are connected in parallel and are energized by way of the transformer 13, which may for example supply an output voltage of ?volts or less.

This circuit is primarily intended for use in an underblanket or electrically heated pad, and for a single bed the heat output may be 80 watts on 'high' and 20 watts on 'low,' this lower wattage being sufficient to maintain a required temperature when the bed is occupied. Having switch S/5 at 'low' when the bed is occupied also provides additional safety to the user because of the isolated low voltage.

The heater elements 16 and 17 are wound as a dual-concentric cable as indicated in FIG. 4, that is to say they are helically wound one over the other on a common insulating core 25 with insulation 26 interposed between them and with an outer insulating sheath 27. The insulating material used may be polyvinyl chloride. With the switch S/5 on the 'high' setting the current in the heater elements 16 and 17 (and hence in the fuse 20) is half-wave rectified by the rectifier 21. If, however, an undesired high temperature develops in the heater cable sufficient to cause a short circuit between the elements 16 and 17, then the rectifier 21 is shorted out and there is a large increase in the current in the fuse 20 to ensure that it rapidly goes open circuit.

The bimetallic switch (18, 19) acts as an overriding control such that when the blanket temperature exceeds a predetermined value the contacts 19 are opened to disconnect the mains supply. For this to occur independently of the setting of the switch S/5, it is necessary for the root means square current in the switch element 18 to be the same for either position of the switch S/5. In one embodiment of the circuit this current was 0.47 amps with a mains voltage of 240, the secondary winding 15 supplying 42 volts and each heater element 16 and 17 having a resistance of 180 ohms. The predetermined temperature may be fixed, so that the switch 18 operates as a safety cutout to prevent overheating, or may be adjustable so that the switch 18 acts as a temperature control.

Various modifications may be made to the circuit without departing from the invention as defined in the appended claims. For example more than two heater elements may be incorporated in the circuit.

I claim:

1. An electric blanket including a circuit comprising two heater elements, a transformer having a primary winding and a secondary winding, a pair of terminal across which a source of electric power can be connected, first switch means having a first condition in which said elements are connected across said terminals and a second condition in which said elements are connected across the secondary winding of the transformer and the primary winding is connected across said terminals, and second switch means which acts as a temperature control, the circuit being such that the root mean square current in the second switch means is the same whether the first switch means is in the first or the second condition.

2. A blanket according to claim 1 wherein the two heater elements are wound together as a dual-concentric cable.

3. A blanket according to claim 2 wherein a rectifier element is connected in series between the heater elements to form with a fuse a protective arrangement such that if a short circuit occurs between the heater elements in the cable the rectifier element is shorted out of the circuit and there is a large increase in the current in the fuse.

4. An electric blanket including a circuit comprising two heater elements wound together as a dual-concentric cable, a transformer having a primary winding and a secondary winding, a pair of terminals across which a source of electric power can be connected, switch means having a first condition in which said elements are connected across said terminals and a second condition in which said elements are connected across the secondary winding of the transformer and the primary winding is connected across said terminals, a rectifier element

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connected in series between the heater elements, and a fuse which forms with the rectifier element a protective arrangement such that if a short circuit occurs between the heater elements in the cable, the rectifier element is shorted out of the

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circuit and there is an increase in the current through the fuse sufficient to open circuit the fuse and to terminate the delivery of current to the heater elements.

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