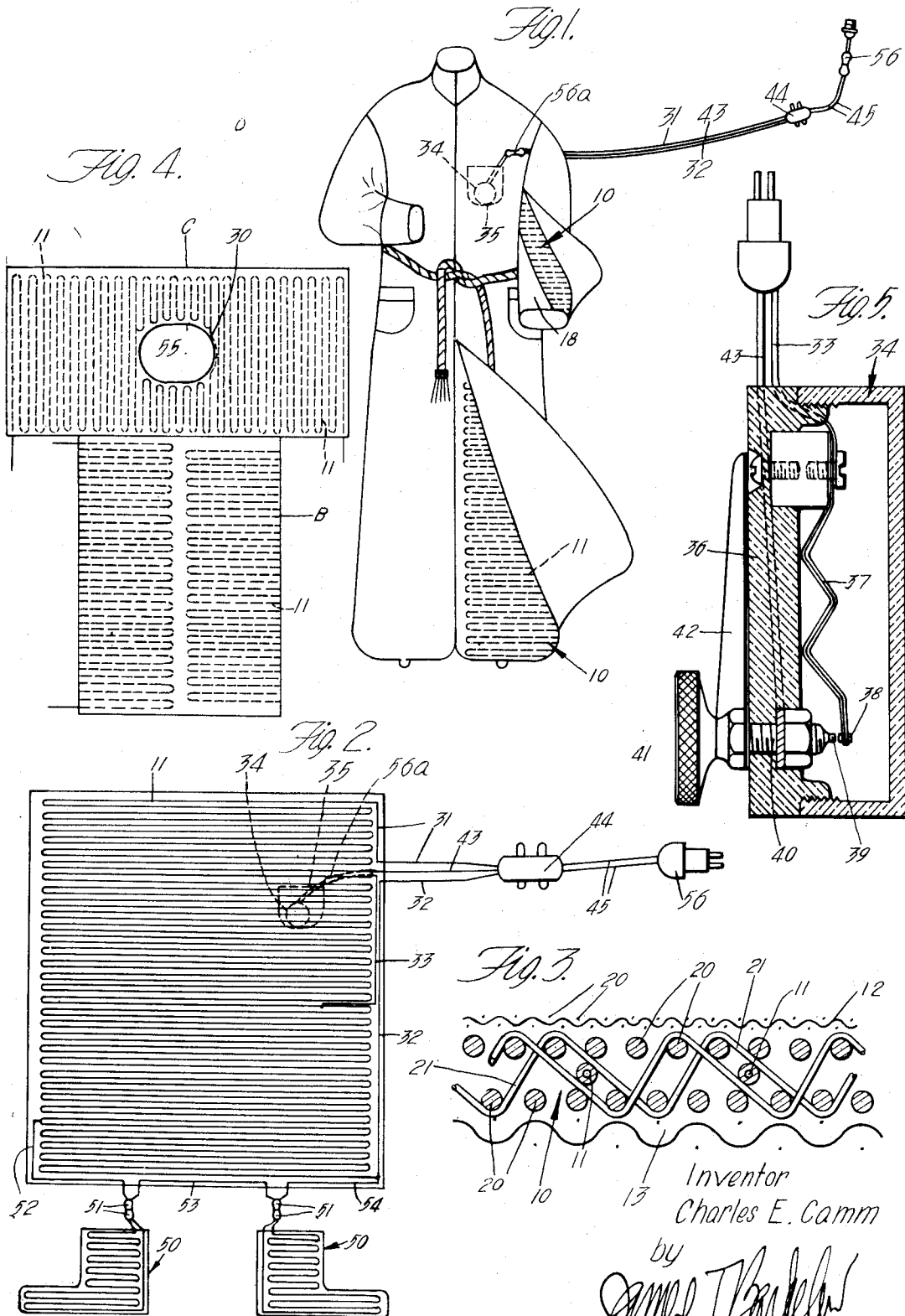


C. E. CAMM.
 ELECTRICALLY HEATED GARMENT.
 APPLICATION FILED MAR. 20, 1919.

1,312,830.

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Inventor
 Charles E. Camm

by
James T. Bunker
 his Attorney.

UNITED STATES PATENT OFFICE.

CHARLES E. CAMM, OF SALT LAKE CITY, UTAH, ASSIGNOR OF ONE-HALF TO WILLIAM H. TURVER, OF LOS ANGELES, CALIFORNIA.

ELECTRICALLY-HEATED GARMENT.

1,312,830.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, CHARLES E. CAMM, a citizen of the United States, residing at Salt Lake City, in the county of Salt Lake, State of Utah, have invented new and useful Improvements in Electrically-Heated Garments, of which the following is a specification.

This invention relates to electrically heated garments, blankets, pads and the like; and an object of the invention is to provide an efficient and convenient form of such device. There are many minor objects of the invention, all of which will be better understood from the detailed description following.

In my improved electrically heated device I provide an improved form of fabric with which the electric resistance wires are interwoven. This weave I call "electro-thermo weave." Furthermore I provide a means for controlling the temperature of the garment by means of a thermostat which is actuated and controlled by the temperature of the garment itself—not by the temperature raised by a resistance in the thermostat, but by the temperature raised by the resistance of the winding in the garment itself; so that the temperature of the garment is at all times accurately controlled. This thermostat is regulatable; and may preferably be of the kind and character described in my co-pending application entitled "Thermostat" filed on even date herewith, and which is shown in Fig. 5 of the present drawing.

These features of the invention, together with others, will be readily understood from the following detailed description of a preferred specific form of device embodying the invention, reference for this purpose being had to the accompanying drawings in which—

Figure 1 is a view showing a typical form of my electrically heated garment; Fig. 2 is a diagrammatic view illustrating the electrical connection of the garment; Fig. 3 is an enlarged section illustrating a form of weave which may be used in the garment; Fig. 4 is a diagram illustrating how the garment may be made up of two pieces of the electric woven fabric; and Fig. 5 is a section showing the construction of the thermostat.

In the drawings I illustrate a garment of typical form which is composed of my spe-

cial weave. Such a garment may of course be made in any form desired; it may either be in the form of a robe or of a blanket; or in the simpler adaptations of my device it may be merely a pad.

The whole garment, or blanket, or pad, is made up of a fabric structure which may comprise the special electric weave as shown at 10, carrying the electric wires 11; an outer surfacing fabric 12 to give finish in any desired color and pattern to the garment; and an inner surface fabric 13 of a suitable kind and texture to form the inner surface of the garment which contacts directly with the body. Such inner surfacing may be made of any suitable material—say of cotton with a fleecy surface. These three fabrics may be either secured together or they may be made entirely detachable from each other; in fact, a complete garment or blanket or pad may be made of each one of the fabrics and they may simply fit one over the other without any fastening means. Or any suitable releasable fastening means may be used. The inner and outer fabrics may thus be laundered at convenience. The weave which contains the electric winding may be of any suitable kind, the wires being woven into the fabric as a weft. Or such a special weave as is indicated in Fig. 3 may be made. Weft threads of any ordinary kind but preferably fairly coarse may be used as indicated at 20; and the warp 21 may be woven with the weft as shown in Fig. 3, the electric wires 11 being placed in spaced positions, parallel with the weft, and so held by the warp as to be entirely covered and protected by the fabric. By weaving the electric wires with a fairly heavy and pliable fabric the wires themselves are protected against injury and are also protected against being bent sharply and thus broken. The fairly heavy fabric, although it is flexible, will not bend sharply across the weft, which is preferably heavy and yet flexible.

The electric wires being a part of the weft, are carried back and forth in zigzag fashion across the fabric, the resistance wire in a piece of fabric being thus endless. This is indicated in Figs. 2 and 4. In Fig. 4 I illustrate how a garment may be made up of two pieces of such a fabric, the lower or body piece B having the weft running horizontally, the warp running vertically; while

the piece C which forms the neck, shoulders and sleeve of such a garment, has the warp running lengthwise of the sleeve and the weft running transversely thereon. The piece C may be cut at 30 and a neck hole cut out at 55.

Fig. 2 shows diagrammatically the electrical connection of such garment. For the purpose of the diagram I illustrate a simple form of blanket with its one continuous electric winding 11. A wire 31 leads from one end of this winding, and a wire 32 leads from the other end of the winding, while a wire 33 leads from a central point on the winding. The wire 33 leads to a thermostat 34 which may be placed in a pocket 35 in the garment, the pocket holding the thermostat close to the electric fabric. This pocket may be formed on the electric fabric 10 itself, inside the outer facing fabric 12, or it may be formed in the inner lining fabric. The thermostat is thus directly subjected to the heat of the garment; and it is the heat of this garment that causes it to operate to control the electric circuit. The thermostat itself is shown in Fig. 5 and it may preferably embody a thin, flat case 35 having a cover 36 on which the thermostatic apparatus is mounted. This thermostatic apparatus embodies a bi-metallic thermostat bar 37 rigidly mounted at one end on the case cover and carrying at its other end a contact 38 adapted to engage with an adjustable contact 39 mounted on the end of an adjusting screw 40 which is mounted in the cover 36. This adjusting screw 40 has a thumb nut or other adjusting means at 41 on its outer end and carries a pointer 42 adapted to travel over the outer face of the cover. Suitable indication marks may be made on the cover so as to locate the pointer for any particular adjustment of contact 39. By turning the adjusting screw the contact 39 may be adjusted so that the contact 38 will be raised off contact 39 at a low or medium or high or very high heat. Thus the thermostat controls the electrical circuit in accordance with the heat of the garment. The resistance of element 37 is low so that it is not heated by the electric current passing through it.

The wire 33 is led into the thermostat as hereinbefore stated, and another wire 43 leads out from the thermostat. All three wires 31, 32 and 43 lead to a three-way switch 44 which is connected by wires 45 with any suitable source of current. Three-way switch 44 may be of any ordinary kind, such switches being obtainable upon the market; and their function is to throw a current either to wires 31 and 32 (putting the whole resistance winding in one series circuit) or to wires 31 and 32 on one side of the circuit and wire 43 on the other side of the circuit (putting the two halves into

the resistance wire in parallel with each other) or to wires 31 and 43 or 32 and 43, (using only one half of the winding). In either of the two last stated electrical connections (which are the ones which give medium and high heat) the thermostat 34 is in circuit. It is the function of the thermostat to prevent the temperature going above a predetermined degree; to prevent the garment from becoming too hot. From the foregoing description it will be readily understood how the thermostat accomplishes this function.

With the garment I may also supply boots which are illustrated diagrammatically at 50 in Fig. 2. These boots may be made of the same electric weave as hereinbefore described, with the suitable lining and facing, as desired; and they may be detachably connected to the body of the garment through the medium of detachable electric connectors illustrated at 51. In order to supply current to the boots I may preferably run a wire 52 from a point on the winding of the body of the garment, which point is removed from the end of the winding by about the same length of resistance wire as is contained in the boots. This wire 52 runs to one of the electrical connectors 51 and then a wire 53 extends between the two electrical connectors and another wire 54 extends from the last mentioned connector to the wire 32. It will be seen that the boots are thus arranged in parallel with a section of the resistance wire of the body of the garment. The boots may be detached or attached without having to operate any switch to open or close a circuit; and the boots may or may not be used, just as is desired.

A garment of any character, constructed in accordance with this invention, has durability and strength. However, it is easily constructed, as the wire is woven into the fabric when the fabric is made, and no special means or arrangement is necessary for holding the wire in place. Either insulated or bare wire may be used because the wire may be woven into the fabric in such a manner as to embed it entirely in the woven fabric. The weaving of the wire into the fabric causes it to be thoroughly protected against kinking or stretching or breaking, and causes it to be permanently anchored into place without liability of displacement. All of these things cause even distribution of heat to cause long life and non-liability to burning out of the wire or injury of the garment.

The garment may be easily cleaned, as hereinbefore stated. In fact, the garment may be cleaned as a whole without injuring the electric wiring. Very many other advantages of this method of wiring are apparent to those using it and need not be specifically mentioned here.

Having described a preferred form of my invention, I claim:

1. In an electrically heated garment or the like, a resistance winding, circuit connections, one to each end of the winding and one to an intermediate point, a three way switch adapted to throw current through the whole winding in series or through either of its halves or through both halves in multiple; and a thermostat connected into the intermediate circuit connection and located adjacent the garment to be actuated by the heat thereof.

2. In an electrically heated garment or the like a garment body provided with a resistance winding, boots also provided with a resistance winding, circuit connections leading to the garment winding, and circuit connections for the boots connecting them in parallel with a lower part of the garment winding next to the boots.

3. In an electrically heated garment or the like a garment body provided with a resistance winding, boots also provided with a resistance winding, circuit connections leading to the garment winding, and circuit connections for the boots connecting them in series with each other and together

in parallel with a lower part of the garment winding next to the boots; the resistance in the boot circuit being substantially equal to the resistance in the parallel part of the garment circuit.

4. In an electrically heated garment or the like, a resistance winding circuit connections to each end of the winding and one to an intermediate point, a three way switch adapted to throw current through the whole winding in series or through its halves; a manually adjustable thermostat connected into the intermediate circuit, a pocket in the garment for holding the thermostat, said thermostat when placed in said pocket being actuated by the heat of the garment, and the thermostat being manually adjustable, so that the action of the thermostat may be manually controlled to control the temperature of the garment.

In witness that I claim the foregoing I have hereunto subscribed my name this 4th day of March, 1919.

CHARLES E. CAMM.

Witnesses:

Mrs. T. M. OLIVER,
L. E. CLUFF.