

Aug. 8, 1933.

J. D. BURKHOLDER

1,921,343

THERAPEUTIC APPLIANCE

Original Filed April 18, 1927 5 Sheets-Sheet 1

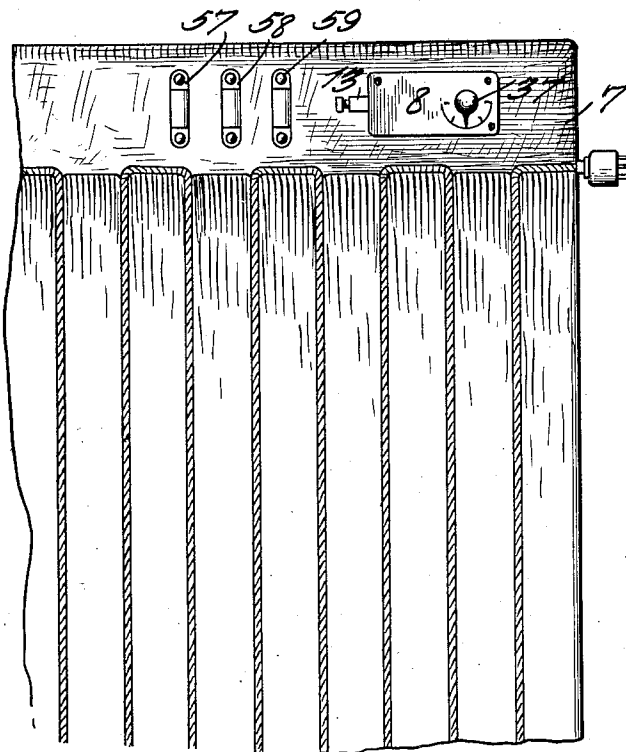


Fig. 1.

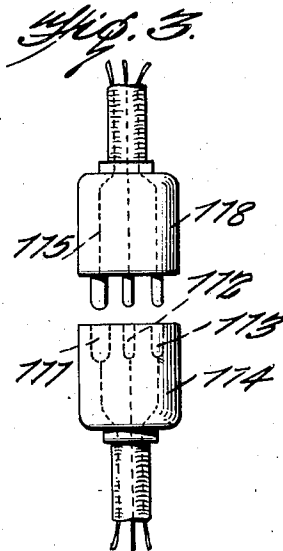


Fig. 3.

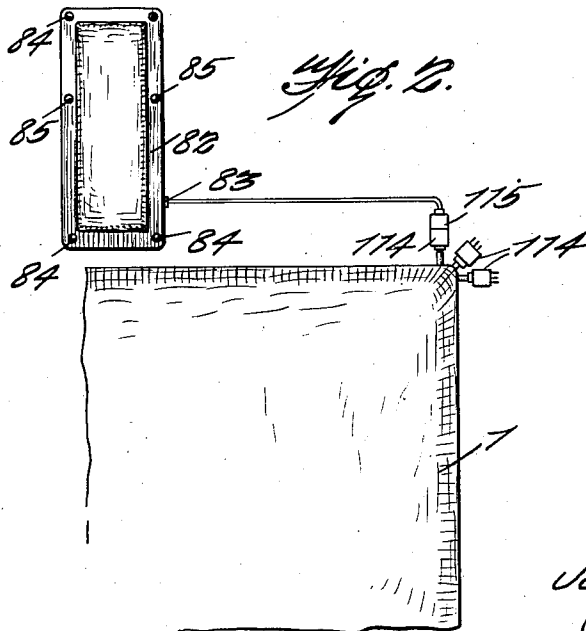
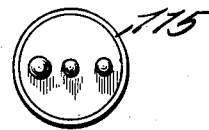


Fig. 2.

Fig. 4.



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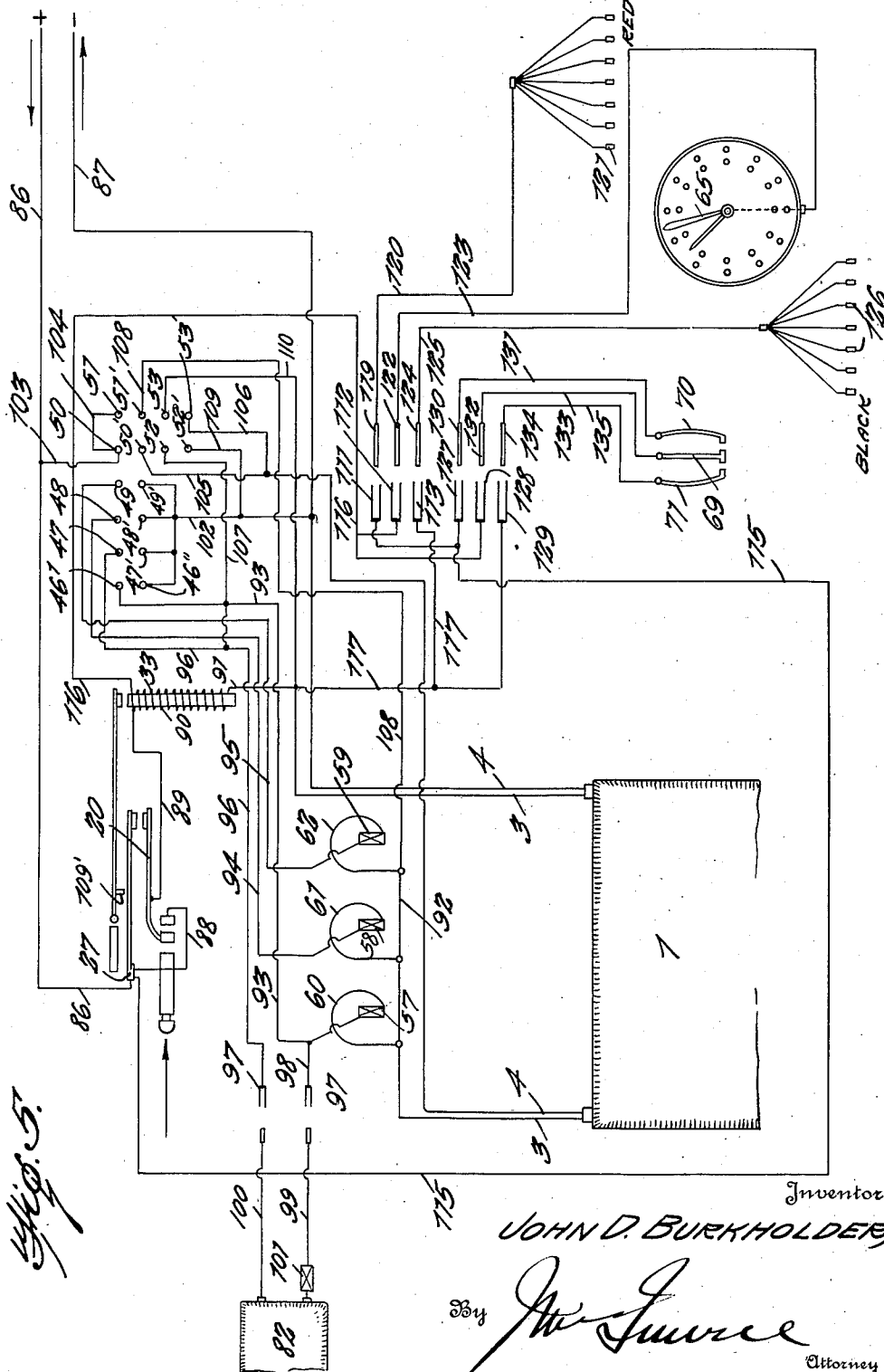
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THERAPEUTIC APPLIANCE

Original Filed April 18, 1927

5 Sheets-Sheet 2



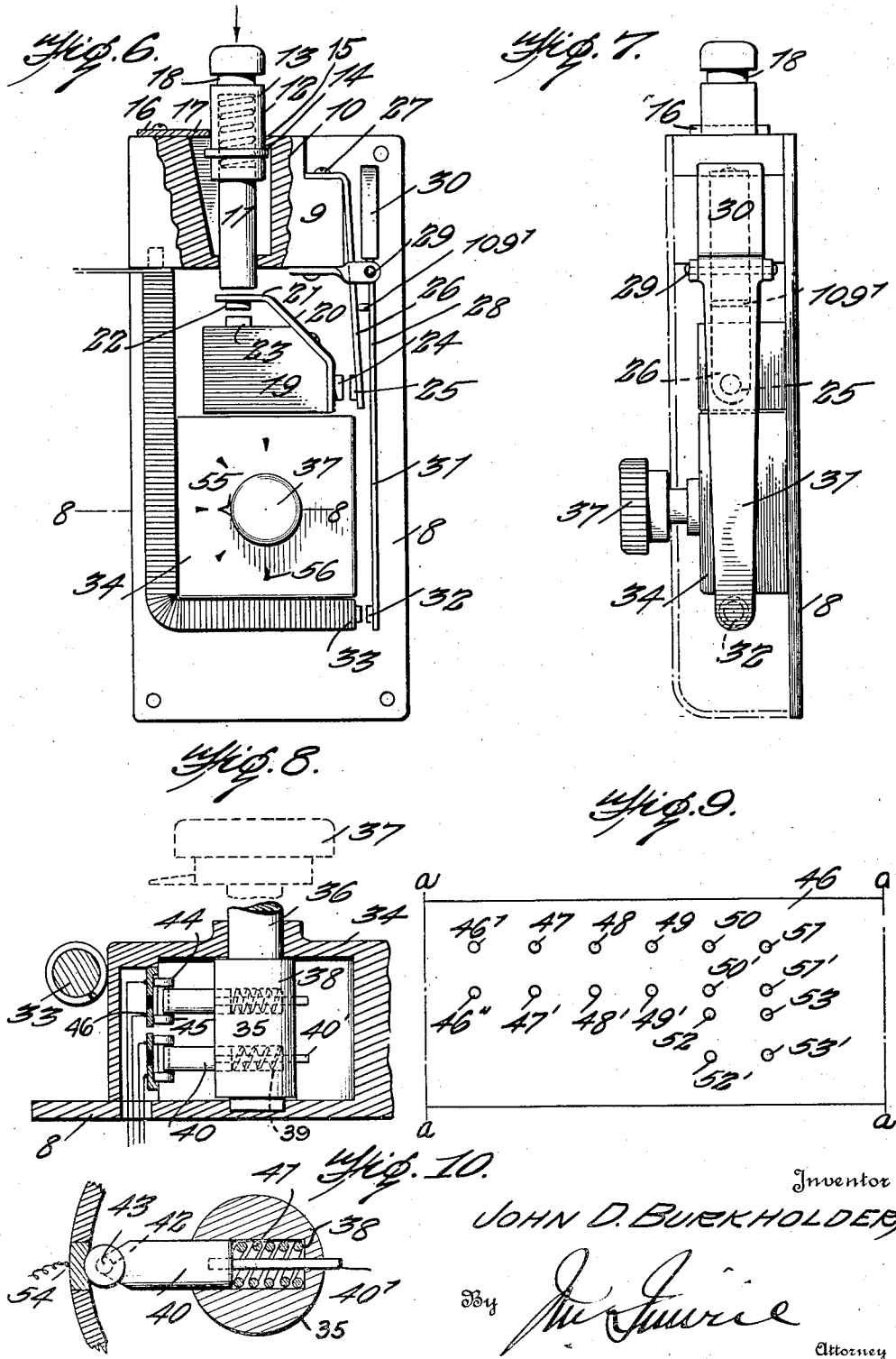
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Fig. 11.

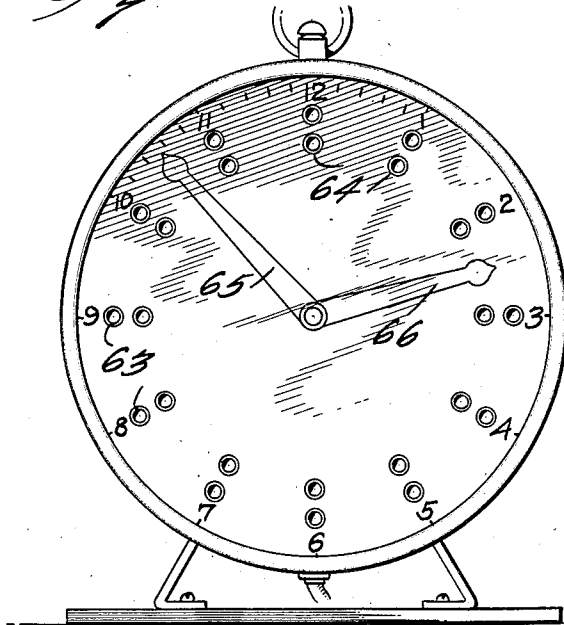


Fig. 12.

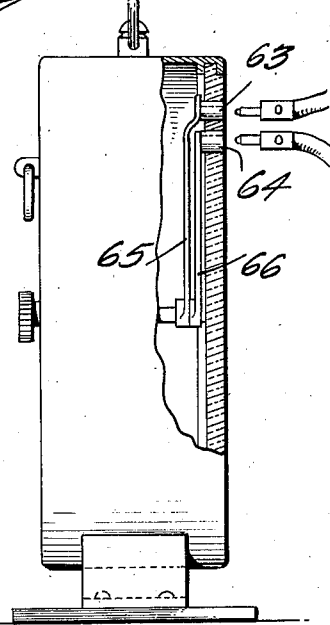


Fig. 13.

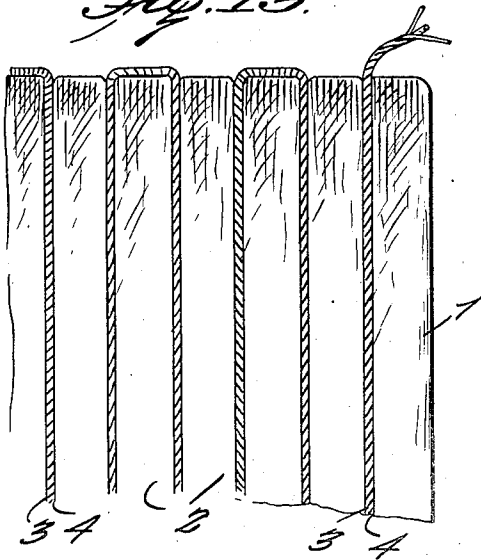


Fig. 14.

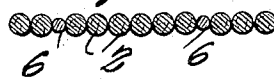
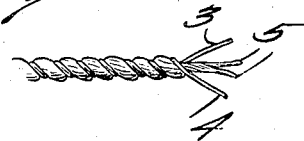


Fig. 15.



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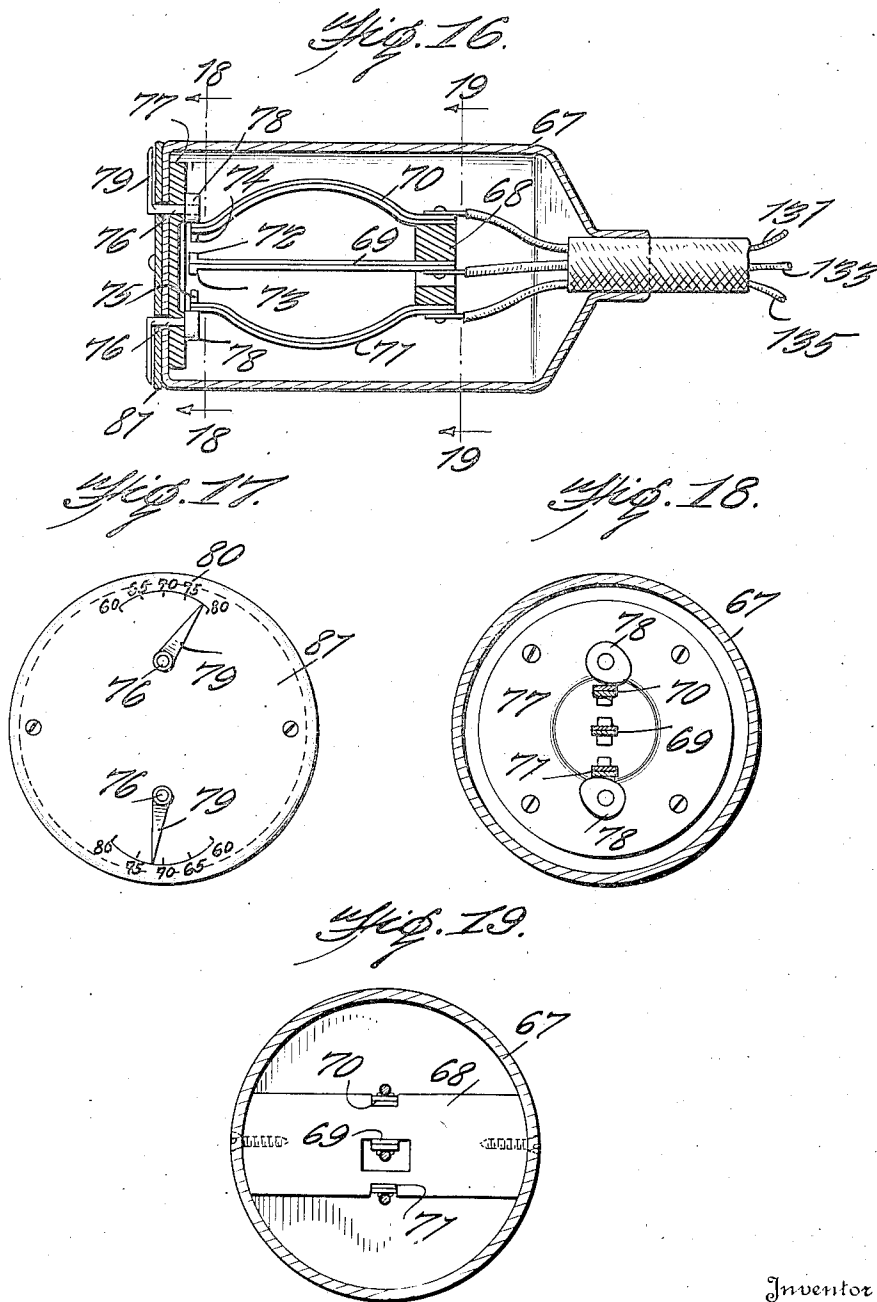
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THERAPEUTIC APPLIANCE

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UNITED STATES PATENT OFFICE

1,921,343

THERAPEUTIC APPLIANCE

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poration of New Jersey

Application April 18, 1927, Serial No. 184,697
Renewed October 12, 1932

4 Claims. (Cl. 219—46)

This invention relates to a therapeutic appli-
ance involving primarily the application of ex-
ternal heat to the patient as a remedial treat-
ment.

element in accordance with the control, such in-
terrupter, which is in the form of an electro-
magnetic switch, being, in the use of the hand
controls, manually set to energize the heating
element and, in the use of the clock control, auto-
matically set to energize the heating element.

5 In carrying out the present invention, the me-
dium of heat generation is the electric current
and the medium of the heat application is
through a blanket-like element particularly and
peculiarly woven to include the heat yielding
10 electric conductors with the blanket serving as a
covering or wrapping for the patient; there be-
ing associated with the blanket a pad or pads of
similar or selected construction for application
of the heat to certain specific parts of the body.

15 A further object of the invention is the pro-
vision of means for controlling the degree of heat
and the duration or time of such heating effect
in order that the appliance may be readily adapt-
ed to meet varying conditions of treatment as
20 may be required.

It has been found from experience that certain
essential characteristics are highly important in
a therapeutic appliance of this character in or-
der to provide for and take care of the widely
25 varying conditions of treatment in the field of
treatment of such appliance particularly in the
degree of heat to be generated, in the duration
of a particular treatment, and in the various con-
trols whereby these details of heat degree and
30 heat duration may be governed. It is highly im-
portant as a general and main characteristic of
the appliance that the duration of treatment be
capable of being definitely set for one of several
predetermined periods and that the heat genera-
35 tion be automatically terminated at the end of
the selected period. It is also of importance
that under certain conditions the inauguration
or starting of the heating period as well as its
interruption or cessation be wholly automatic,
40 thereby permitting the attendant physician or
nurse to set the device for certain treating
periods with definite separated intervals, and to
insure this particular character of treatment
wholly independent of any voluntary action on
45 the part of the patient.

Therefore, the invention has for its further
object the provision of a series of controls in the
use of which the heating effect may be governed
as to duration and as to intensity through a
50 hand-manipulated regulator; or a clockwork
control may be utilized to automatically energize
and deenergize the heat producing medium at
selected intervals; there being provided with
both such controls an automatic interrupter
55 which insures the deenergization of the heating

A further object of the invention is the pro-
vision of a thermostatic control which is directly
governed by the heat of the bed on which the
therapeutic appliance is used, this thermostatic
65 control operating through the electro-magnetic
switch to automatically energize and deenergize
the heating element of the blanket at the respec-
tive temperature limits for which the device may
be set.

The invention is illustrated in the accompany-
ing drawings in which:

Figure 1 is a broken view in elevation showing
the improved therapeutic appliance in the form
of a blanket, the manual control and electro-
magnetic switch being shown in position on the
75 edge of the blanket.

Figure 2 is a broken plan of the blanket show-
ing a treating pad associated therewith and the
provision of means whereby the clock control and
80 thermostatic control may be coupled to the
blanket at will when desired to use such controls.

Figure 3 is an elevation of a plug and socket
formed to insure a particular coupling of these
parts in order that an improper circuiting con-
85 nection is impossible.

Figure 4 is a face view of the plug showing the
different sized projections to compel a definite
relation of the plug and socket in connecting.

Figure 5 is a diagrammatic view of the circuits
90 of the various controls and electro-magnetic
switch.

Figure 6 is a plan view of the electro-mag-
netic switch, the casing being removed.

Figure 7 is an edge elevation of the same.

Figure 8 is a vertical sectional view through
the hand control element associated with the
electro-magnetic switch.

Figure 9 is a development of the fixed contacts
100 of such hand control.

Figure 10 is an enlarged sectional view show-
ing the means for making and breaking the con-
tacts in the hand control.

Figure 11 is a face view of the clock used in
105 the clock control.

Figure 12 is a side view, partly broken out, of
the same.

Figure 13 is a broken plan view of the blanket
110 showing particularly the means for introducing

the electrical conductors or heat providing elements in such blanket.

Figure 14 is a transverse section through the blanket showing the association of the wires 5 and contiguous weft threads of the blanket.

Figure 15 is an enlarged detail showing the means of associating the double wires of the blanket with a textile thread, with such wires and thread intertwined to provide a composite 10 thread used in weaving the improved blanket.

Figure 16 is a longitudinal sectional view of the thermostatic element in which the heating is controlled by the heat of the bed.

Figure 17 is an end view of the same.

15 Figure 18 is a section on line 18—18 of Figure 16.

Figure 19 is a section on line 19—19 of Figure 16.

20 The therapeutic appliance of the present invention involves a blanket-like element here indicated at 1 and shown more particularly in Figures 13, 14 and 15. As this blanket construction involves the inclusion of conducting wires which through their resistance generate the heat desired, it is important that the blanket be so woven 25 that these wires be protected against wearing or breakage of their insulation or against short-circuiting during the handling or doubling of the blanket. For this purpose, it is proposed that the blanket be woven of appropriate threads 2, as of chenille or the like, which while soft have a considerable diameter or cross sectional area and that the two service wires 3 and 4 embedded in 30 the blanket be relatively insulated or protected from each other by forming said wires into a composite thread through intertwisting the wires with, for example, two textile threads 5. The composite thread thus formed (indicated at 6 in Figure 14) is of less diameter than that of the 40 chenille threads 2.

In the weaving of the blanket, the composite thread is of course fed back and forth across the blanket to maintain the continuity of the circuiting wires and such composite thread will 45 be laid in following a predetermined number of chenille or similar threads, as clearly shown in the section (Figure 14). By this arrangement, it will be apparent that the composite thread carrying the conductors is well below the surface 50 formed by the chenille threads or, in other words, there is at predetermined intervals a trough or recess between adjacent chenille threads in which the composite thread is laid. As the composite 55 thread is thus of less diameter than the adjacent chenille or like threads, it will be apparent that any folding of the blanket or bending or turning of the same will avoid wear directly on the composite thread and will not permit adjacent composite threads to contact in such folding or 60 turning of the blanket. Thus, the composite thread with the conducting wires is effectively protected and this protection is provided for in the weaving of the blanket and without any particular other provision to secure the result.

65 The blanket is of any desired size, that is to say, the area covered by the conducting wires 3 and 4 may be any desired size. Ordinarily, however, the blanket will be of a size similar to an ordinary bed blanket or may, if desired, be 70 formed as a bath-robe, the particular form and size of the blanket being unimportant.

The blanket is preferably provided with a margin, indicated at 7 in Figure 1, which is free 75 of the conducting wires and on this margin is mounted the hand control. In this connection, it

is to be noted that the resistance wires 3 and 4, hereinafter termed the heating wires, are maintained separate throughout the length of the blanket; that is to say, these wires within the limits of the blanket are not in any way inter- 80 connected. This provision is made to permit a single one of these wires to be used as the heating element or the current to be passed through the wires in series to reduce the heat.

The hand control and electro-magnetic switch 85 are associated in a single element arranged on the margin 7 of the blanket and this element is illustrated particularly in Figures 6, 7, 8, 9 and 10. The element includes a base 8 to be secured directly to the blanket on which at one end is 90 mounted an insulating block 9 formed with an opening 10 to receive and guide a plunger 11. This plunger carries a movable cap 12 recessed to receive the plunger and between the bottom of the cap recess and the plunger is arranged a 95 spring 13, the cap being provided with a stop 14 to engage a projection 15 on the block to limit the outward movement of the cap. The cap 12, which is adapted to be manually operated at will, will obviously compel an inward move- 100 ment of the plunger when the cap is depressed and, for a purpose which will later appear, provision is made whereby the cap may be held at its inward limit of movement to maintain the plunger depressed. This means includes a plate 16 se- 105 cured to the block 9, such plate having a lip 17 adapted to be engaged in an annular channel 18 in the cap when the latter has been depressed to the desired extent, the cap being of course moved laterally to insure the engagement and moved 110 into the opposite direction when it is desired to release the engagement.

An insulating block 19 is mounted on the base 8 inwardly of and spaced from the block 9 and on this block is mounted a conducting strip 20 115 having a spring terminal portion 21 provided with a contact point 22 with the spring terminal directly underlying the plunger 11 and the contact point 22 overlying a contact point 23 on the block 19. The strip 20 extends lengthwise one side 120 of the block 19 and terminates in a contact point 24 which underlies a contact point 25 carried on a spring strip 26 terminally connected at 27 to the block 9. The inherent resiliency of the strip 26 is such as to maintain the contacts 24 and 25 125 separated. An operating lever 28 is pivotally supported at 29 on the block 9, this lever having an enlarged weighted short terminal 30 overlying the block 9 and a long arm 31 projecting beyond the block 19 and having a contact section 32 serv- 130 ing as an armature for an electro-magnet 33, here shown as of L-form, and extending transversely and longitudinally of the base 8.

Arranged in the angle of the electro-magnet is the hand control switch. This switch, shown 135 more particularly in Figures 8 to 10, comprises a casing 34 in which is rotatably supported a barrel 35 of insulating material, the upper end of the barrel being reduced to form a bearing spindle 36 and terminating in an operating knob or disk 140 37 whereby the barrel may be selectively rotated. This barrel is formed at appropriate points in its length, that is in the height above the base 8, with diametrically extending recesses 38 and 39, which recesses open through the sur- 145 face of the barrel at one end in full diameter and through the opposite surfaces in reduced diameter. In the recesses are mounted switch plungers 40 fitting the recesses with pins 40' 150 extending through the reduced diameter open-

ings. These plungers are normally held in projected relation by springs 41 arranged between the inner ends of the plungers and the bottoms of the recesses. The outer ends of the plungers 5 are of somewhat conical shape and formed with vertically extending depressions 42 in which are loosely held metallic rods 43 carrying at their upper and lower ends rollers 44 and 45. The rollers are arranged above and below the respective plungers and obviously if such rollers engage spaced contact points simultaneously, the circuit will be completed between such points.

Arranged inwardly of the casing 34 and concentric with the path of movement of the plungers is an insulating wall 46 formed with contacts arranged in pairs. There are six pairs of such contacts within the range of movement of the upper set of rollers 44 and 45 and two pairs of such contacts within the range of movement of the lower rollers 44 and 45. The upper pairs of contacts are indicated in pairs as 46', 46"; 47, 47'; 48, 48'; 49, 49'; 50, 50' and 51, 51', and the lower sets of contacts are indicated in pairs as 52, 52' and 53, 53'. These contacts are preferably slightly concaved, as at 54, in order that when the contact is made the rollers riding into such concavities or recesses will indicate through the sense of touch to the person operating the disk 37 that the contact is made. If desired and as preferred, the disk 37 may be provided with an indicator 55 in the upper surface of the casing 34 marked at various points 56 for association with the indicator, such points if desired bearing legends to indicate the character of control at the 35 particular point.

Associated with the hand control are independent thermostats 57, 58 and 59. These thermostats are governed by immediately adjacent coils 60, 61 and 62, which coils are in circuits to be later explained. As the coils 60, 61 and 62 are of different lengths, or if desired of different material, it is of course apparent that the respective thermostats will operate at different periods. The particular form of the thermostat is not indicated as it is of no importance, it being simply required that it be of a character to respond to the heat of the adjacent coil and to break the circuit in accordance with that heat.

A further or time period control is provided in the use of which an appliance may be set to be energized or deenergized at particular time periods wholly independent of either operator or patient control, with these time periods regulatable at will. The clock control is illustrated more particularly in Figures 11 and 12 wherein the face of the clock is provided with a series of metallic sockets 63 and 64 at certain time intervals, say five minute periods, and the hands 65 and 66, which are in circuit as will later appear, adapted to cooperate with the respective sockets as the hands reach the particular point. In the utilization of circuiting elements, which will later be described and which are to be associated with the respective sockets in selective positions, the current for energizing the heating element of the blanket may be cut on or off by the clock or time element in accordance with the socket selected.

The invention also contemplates a thermostatic control, that is, a control governed by the heat of the bed with which the blanket is used. This control, which is illustrated more particularly in Figures 16 to 19 inclusive, includes a casing 67 which is adapted to be placed in electrical connection with the blanket at will and is de-

signed to be placed in the bed with which the blanket is used so as to control the energization of the blanket from the heat of the bed. In this casing is arranged an insulating block 68 from which extends a central thermostatic member 69 80 and spaced oppositely arranged outer thermostatic members 70 and 71. These members are made up of metals of different coefficients of expansion and contraction as well understood, and the center member 69 has opposing terminal contacts 72 and 73 adapted at the limit movements of the member to engage with contacts 74 and 75 on the thermostatic elements 70 and 71. As will appear from the following description of the wiring connections, the central thermostatic element is the circuiting element moving in one direction as the heat of the bed is reduced and finally engaging one of the side thermostatic elements, as 70, to thereby close the circuit to energize the blanket. This central thermostatic element under the heat of the bed incident to the heating of the blanket of course moves in the opposite direction and finally engages the other side thermostatic element, as 71, with the result of interrupting the electrical circuit and de- 100 energizing the heating element of the blanket.

It is desirable in a thermostatic control of this character that it be adjustable in certain limits in order that the maximum and minimum temperatures may be controlled to insure that the heat 105 of the bed will be kept within predetermined limits. To secure this result, the side thermostatic elements are adjustable toward and from the center element, this adjustment being provided through the medium of a rod 76 mounted 110 adjacent each side element and extending through an insulating disk 77 secured in the end of the casing 67. On the inner ends of the rods 76 are mounted cams 78 which cams overlie the free ends of the side thermostatic elements 70 and 115 71, so that as the rods are turned the cams will compel the terminals of the side thermostatic elements to move toward each other or permit said elements to move from each other incident to their inherent resiliency. The outer ends of 120 the rods 76 are provided with lateral extensions 79 serving as handles for the operation of the cams and as pointers to cooperate with scales 80 inscribed on the disk 81 forming the end wall of the casing 67. This permits the side thermostatic elements to be set for different temperature limits as will be understood.

It is preferred to associate with the blanket 1 a pad element 82 in which a single heating wire 83 is arranged and which pad element is formed 130 with terminal fasteners 84 by which the element may be secured about the limb of a patient and with intermediate fasteners 85 which, when associated with either set of end fasteners, may form a bag-like receptacle to receive the feet of the 135 patient. This pad is designed to be associated at will with the blanket as will later appear, and when so associated is automatically controlled in its heating with the control of the blanket in certain control stages of blanket heating. 140

The circuit diagram is illustrated particularly in Figure 5 of the drawings, and as the electromagnetic switch and hand control are associated with and form a part of the blanket, the circuits for these will be first described, it being understood that both the time or clock control and thermostatic control are wholly independent from the blanket proper and form accessories therefor adapted to be connected at will to the blanket in order that these particular controls 150

may be brought into use when required in the particular instance.

The service conductors, here indicated at 86 and 87, will of course terminate in the usual plug (not shown) adapted for connection with any service socket. For the convenience of this illustration, it will be assumed that the current is entering over the conductor 86 and leaving over conductor 87. The service conductor 86 leads through the electro-magnetic switch, being connected to the switch arm 26 at point 27 and then through conductor 88 to contact point 23. The conducting strip 20 is through conductor 89 in circuit with one end of the coil 90 of the electro-magnet 33. The opposite end of the coil 90 is connected by a conductor 91 to the heating or resistance wire 3 of the blanket. This wire 3 of the blanket, after its passage through the blanket proper, is connected to each of the coils 60, 61 and 62 of the thermostats 57, 58 and 59 by a conductor 92 and such thermostats are connected by conductors 93, 94 and 95 to contacts 46', 48 and 49 respectively. A conductor 96 leads from contact 47 to a socket 97, the other lead 98 to which extends from the thermostat 57. The terminals 99 and 100 of the conductor included in the pad 82 terminate in a plug adapted for connection with the socket 97. If desired, the pad energizing conductor may include a thermostat 101 merely to prevent overheating of the pad.

The heating wire 4 of the blanket is connected at one end with the outgoing service wire 87, being also connected through a conductor 102 with contacts 46'', 47', 48' and 49'. Contact 50 is connected by conductor 103 directly to the incoming service conductor 86, a conductor 104 connecting contacts 50 and 51. Contact 50' is connected by a conductor 105 with the blanket heating wire 4 and such conductor 105 is also connected through conductor 106 with contact 53'. Contact 52 is connected by a conductor 107 with conductors 93 and 96, and contact 51' is connected by a conductor 108 with conductor 92. Contact 52' is connected by a conductor 109 to conductor 102. Contact 53 is connected by a conductor 110 with wire 3 of the blanket.

As previously stated, the hand control switch may be operated to one or the other of six operative positions, the first position bridging contacts 46', 46''; the second position bridging contacts 47, 47'; the third position bridging contacts 48, 48'; the fourth position bridging contacts 49, 49'; the fifth position bridging contacts 50, 50' as a unit and 52, 52' as a unit; and the sixth position bridging contacts 51, 51' as a unit and 53, 53' as a unit.

In the operation so far described, it will be apparent that no current is passing through the coil of electro-magnet 33 in the normal position of the parts and that upon depression of the cap 12, the plunger 11 causes contact points 22 and 23 to be brought into contact. This leads the current through these contacts, strip 20, conductor 89 to the electro-magnet coil, energizing the latter and attracting the operating lever 28 which by reason of a projection 109' depresses spring strip 26 to close contacts 24 and 25. Current now flows through spring strip 26, strip 20 and conductor 89 to maintain the energization of the electro-magnet, so that the release of the plunger operating means which is really a starter does not interrupt the current flow. As long as the electro-magnet remains energized, the current will continue to flow.

Assuming the hand control switch in the first position, where contacts 46' and 46'' are bridged. In this position of the hand control switch, assuming the electro-magnetic switch in operation, the current flowing beyond the coil of the electro-magnet passes into the blanket 1 through the wire 3 and by the resistance of the latter heats the blanket. The current passing out of the blanket through the wire 3 at the opposite side passes through the coil 60 of the thermostat 57, through the thermostat, conductor 93, contact 46', contact 46'', conductor 102 and outgoing service wire 87, completing the circuit and energizing the blanket. As the coil 60 is of a nature to heat the cooperating thermostat quickly, it is apparent that the heat, when reaching the prescribed limit, will open the thermostat, interrupt the continuity of the circuit, deenergizing the electro-magnet, restoring the parts to normal position and cutting off the current to the blanket and preventing further heating thereof. Thus, the blanket is set for what may be termed a short duration heat.

If it is desired that the pad 82 be also heated, the plug and socket connection is made at 97 and the hand control switch turned to the second position to bridge the contacts 47, 47'. With the electro-magnetic switch started, as previously described, the current flowing beyond the thermostat 57 cannot pass over the wire 83 as the first position of the hand control switch is open. Therefore, the current will flow through conductor 98, conductor 99, thermostat 101, pad 82, conductor 100, conductor 96, contact 47, contact 47' and the outgoing service wire 87. Therefore, the first position of the hand control switch will heat the blanket while the second position provides for simultaneous heating of the blanket and pad.

In the third position of the hand control switch, where contacts 48 and 48' are bridged, the circuiting conditions are exactly similar to those previously described except that coil 61 and thermostat 58 are now included in the circuit. This is obvious, for conductor 93 or 96, as the case may be, is broken at the hand control switch while conductor 94 is connected in circuit. Hence the current beyond the blanket flows through the coil 61, thermostat 58, conductor 94, contact 48, contact 48' and outgoing service wire 87. If the coil 61 is arranged to act upon the thermostat in a different time period, say a longer period than the coil 60 relative to thermostat 57, it is apparent that in the third position of the hand control switch, the heat of the blanket is maintained for a longer period than in either the first or second position.

In the fourth position of the hand control switch, where contacts 49 and 49' are bridged, the current flow to and beyond the blanket is identical with that previously described except that as conductors 93, 94 and 96 are open at the hand control switch, the current flows through conductor 95, beyond thermostat 59 and coil 62, to contact 49, thence to contact 49' to the outgoing service wire 87. Here, the coil 62 is arranged to maintain a close relation of the thermostat 59 for a greater length of time than the other thermostatic coils and hence in this fourth position of the hand control switch, the heat of the blanket is maintained for a longer period.

In the use of a therapeutic device of this character, it is frequently desirable that the patient receive a comparatively high degree of heat for a short period. This condition is taken care of in the fifth position of the hand control switch, as a result of which both heating wires 3 and

4 of the blanket are energized in parallel so that the blanket is heated by the independent resistance of each wire and thus to the maximum effect. As it is intended and designed that this maximum heat be carried for but a short period, it is incident to the circuit of the fifth position of the hand control switch that the short duration thermostat 57 be included in this circuit.

In the fifth position of the hand control switch, it is understood that contacts 50, 50' are bridged as a unit and contacts 52, 52' bridged as a unit. The current will enter through conductor 103, contact 50, contact 50', conductor 105, to and through wire 4 of the blanket, and out the wire 4 to the outgoing service wire 87. This energizes wire 4 of the blanket and utilizes its resistance to heat the blanket. In this position of the hand control switch, it is understood that the electro-magnetic switch has been started in the manner previously described. The current is flowing then through the electro-magnetic switch, conductor 91, blanket wire 3, through the blanket, out said wire 3, through coil 60, thermostat 57, conductor 93, conductor 107, contact 52, contact 52', conductor 109 to the outgoing service wire 87. Therefore, in this position of the switch, wires 3 and 4 are separately energized and the blanket given the maximum heat afforded by both wires. It is to be noted that wire 4 is energized solely and alone through the hand control switch while wire 3 being energized through the electro-magnetic switch is governed, so far as circuit continuity is concerned, by the thermostat 57. As this is the short duration thermostat, the energization of wire 3 will be maintained for a comparatively short period, hence this maximum heating effect will be a comparatively short one.

It is also desirable in a therapeutic appliance of this character that the blanket be capable of being heated to a minimum degree for an indefinite period and this is provided for in the sixth position of the hand control switch where the blanket wires 3 and 4 are energized independently of the electro-magnetic switch and in series to provide the minimum heat without other control than that of the hand control switch. In the sixth position of the switch, contacts 51, 51' are bridged as a unit and contacts 53, 53' are bridged as a unit. In such position, current enters over conductors 103 and 104 to contact 51, then contact 51', then through conductor 108, conductor 92, incoming wire 3 of the blanket, outgoing wire 3, contact 53, contact 53', wire 106, incoming blanket wire 4, outgoing blanket wire 4, to outgoing service conductor 87. Thus the blanket is heated by both the wires 3 and 4 in series producing a minimum heat controlled solely by the hand control switch.

In the automatic time control, which as understood is to be selectively used at will, the purpose is to permit the operator to set the times at which the blanket will be heated and cut off. The clock construction described is utilized for this purpose, and when used the connection between the clock and blanket may be made through the medium of a push plug connection. The blanket terminals or the socket portion of this push plug connection includes three sockets 111, 112 and 113. The socket portion 114 is formed to insure that the plug can cooperate therewith in but one position, as for example one of the sockets and the corresponding portion of the plug will differ in diameter from the remaining sockets and plug portions, thereby insuring that the plug and socket can be assembled only in

one position, as will be plain from Figure 3. The socket 111 forms the terminal of a conductor 115 which leads to the point 27 of the switch arm 26 of the electro-magnetic switch, which point 27 it will be remembered is in permanent circuiting conditions with the lead-in service wire 86. The socket 112 of the particular plug is connected by a conductor 116 with the lead-in end of the coil 90 of the electro-magnet 33 while the socket 113 of the plug is connected by a conductor 117 with the outlet end of the coil 90 of the electro-magnet 33. The plug 118 for cooperation with the socket has, of course, three projections to engage the sockets. The projection 119, which cooperates with socket 111, is connected by conductor 120 with a series of plugs 121 which, for example, may be colored red and which are adapted to electrically cooperate with the sockets 63 or 64 in the clock. The plug 122, which cooperates with the socket 112, is connected by conductor 123 with the hands of the clock while the plug 124, which cooperates with socket 113, is connected by a conductor 125 with a series of plugs 126 adapted to cooperate with clock sockets 63, 64 and which are preferably colored black.

Assuming that these socket connections have been made and it is desired to start the treatment at ten o'clock and stop it at ten minutes past ten, one of the red plugs 121 will be placed in the socket 63 in line with the numeral 10 on the clock, which socket, it will be remembered, is engaged by the hour hand. One of the plugs 126 will be placed in the socket 64 in line with the numeral 2 on the clock which is the ten minute period past the hour. As the socket 111, plug 119 and the red plugs 121 are in direct connection with incoming service wire 86, it is apparent that as soon as the hour hand reaches and contacts with the socket 63 in line with the numeral 10 on the clock, the circuit will be completed through conductor 115, socket 111, plug 119, conductor 120, plug 121, the hour hand of the clock, conductor 123, plug 122, socket 112, wire 116 and coil 90 of the electro-magnet 33. Lever 28 will be immediately attracted and the main line circuit directed through the blanket exactly as previously described in the manual operation of the electro-magnetic switch. When the minute hand reaches the socket 64 in line with the numeral 2 on the clock, black plug 126 being in this socket short-circuits the coil 90, deenergizing the electro-magnet 33 and breaking the current through the blanket. Obviously the plugs may be used in any position desired and it is apparent that the control of the clock is but a momentary control, as following such control the current is made or broken through the electro-magnetic switch without regard to the clock.

In the thermostatic control, which is also a plug and socket control similar to that described in connection with the clock, and therefore adapted to be used at will, the socket 127 is connected to wire 115 which is in close circuit relation with the incoming service wire 86. A socket 128 is connected to wire 116 leading to the incoming end of coil 90 while a socket 129 is connected to wire 117 leading to the outgoing end of coil 90. The plug projections cooperating with this socket include a plug 130 to engage socket 127 which is connected by a conductor 131 with the side thermostatic element 70 which may be termed the "cold side". A plug projection 132 is connected by a conductor 133 with the center thermostatic element 69 while plug 134 is connected

by a conductor 135 with the side thermostatic element 71 which may be termed the "hot side".

With this plug and socket connection made, the current passes through the thermostatic element 70 and as of course at this time the bed condition is comparatively cold, there having been no heat, the current returns through the center thermostatic element 69, plug 132, socket 128, wire 116, energizing the electro-magnet 33 and operating the electro-magnetic switch to energize the blanket. As the blanket heats, the thermostatic element 69 gradually moves away from the thermostatic element 70 and approaches the thermostatic element 71. The blanket is of course energized at this time through the electro-magnetic switch and there is no current whatever in the thermostatic element. As the thermostatic element 69 contacts with the thermostatic element 71, the current is led through the conductor 135, plug 134, socket 128 and conductor 117, short-circuiting the coil 90, deenergizing the electro-magnet 33 and cutting out the blanket. The temperature of the bed gradually falls until the thermostatic element 69 again engages the thermostatic element 70 when the electro-magnet is again energized and the blanket again heated. This operation will continue as long as desired, the range of temperatures being, as previously noted, adjustable so that the bed may, if desired, be held within a very few degrees of a constant temperature by the thermostatic control.

It is of course to be understood that any desired form of thermostat may be used which will accomplish the result but, as indicated in the drawings, it has been found that the thermostatic elements may be readily constructed of sheets of brass and iron connected together to prevent independent relative movement and that they may be arranged in position to secure effective results. For example, the adjacent surfaces of the center thermostatic element and the side thermostatic element 70 may be of similar materials as iron while the adjacent surfaces of the center thermostatic element and of the remaining side thermostatic element 71 may be of the remaining and similar materials.

The electro-magnetic switch herein described is obviously automatic in its connection following the starting operation incident to pressure upon the cap 12. It may be, however, that for some reason the electro-magnetic feature of this switch becomes inoperative. Under these circumstances, the heating of the blanket may be made a selective operation of indeterminate duration by locking the cap 12 in operative position; that is to say, the cap may be pressed in and moved laterally to cause the projection 17 to enter the recess 18 of the cap. This will maintain the electrical continuity of the circuit through the switch independently of the electro-magnetic feature and result in the energization of the blanket, the heating continuing until the cap is released.

The various controls herein described including that of the hand control switch are primarily

designed for use in connection with a therapeutic appliance of the type described. It is to be understood, however, that such controls are not limited to such use as it will be apparent that the electro-magnetic switch may be used to energize any desired electrical appliance, such for example as a stove, heater, refrigerator, or other device, the hand control or clock control correspondingly functioning in connection with the electro-magnetic switch for governing the duration of such energization. Therefore, these details are adapted for various other purposes than that described and such details within the scope of the appended claims are contemplated for use in such other relations and functions.

What I claim to be new is:

1. A therapeutic appliance including a woven element made up of fabric threads and a composite thread including current conducting wires, the fabric threads being of greater diameter than the composite thread to hold the latter inwardly of the respective surfaces of the element to prevent short-circuiting the wires in the folding of the element.

2. A therapeutic appliance in the form of a woven element including a composite thread made up of a plurality of independent circuiting wires, and textile threads woven with said composite thread and having a diameter materially greater than that of the composite thread to thereby insure that the composite thread will be inwardly of the surface presented by the textile threads at all points.

3. In a therapeutic appliance, an electrically heated element, an electro-magnetic switch for controlling the energization and deenergization of the element, a manually operable member for energizing the electro-magnetic switch, and means whereby said member may be secured in that position normally serving to energize the electro-magnetic switch, said member when so secured being utilized to energize the electrically heated element independently of the electro-magnetic switch.

4. In a therapeutic appliance, an electrically heated element, an electro-magnetic switch for controlling the energization and de-energization of the element, said switch including an electro-magnet, a strip movable to close the circuit to the electro-magnet, a circuiting member normally spaced from the strip, means operated by the electro-magnet when energized for moving the circuiting member into contact with the strip, a manually operable element for causing the strip to close the circuit through the electro-magnet, and means whereby the manually operable element may be temporarily secured in a position to maintain the strip operated to close the circuit through the electro-magnet, said latter position of the strip maintaining the circuit to the heating element independent of the operation of the electro-magnetic means.

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