Jan. 21, 1930. J. D. BURKHOLDER 1,744,029

SWITCH

Filed Feb. 6, 1928 2 Sheets-Sheet 1

Fig. 1.

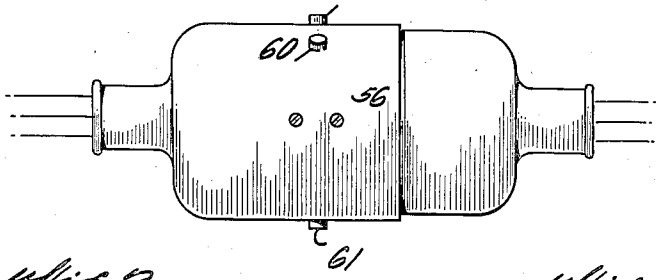


Fig. 2.

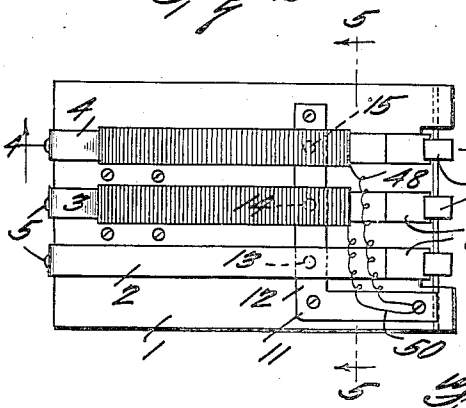


Fig. 3.

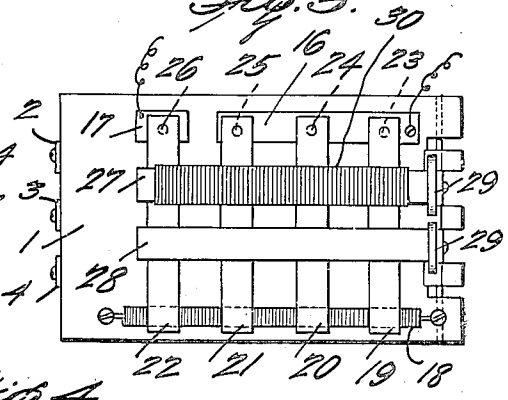


Fig. 4.

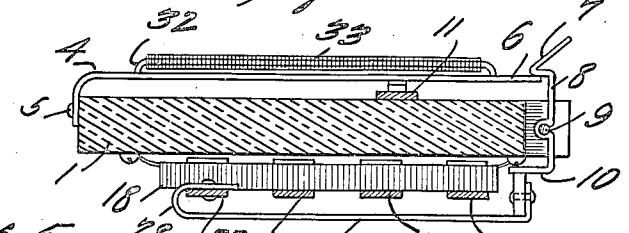


Fig. 5.

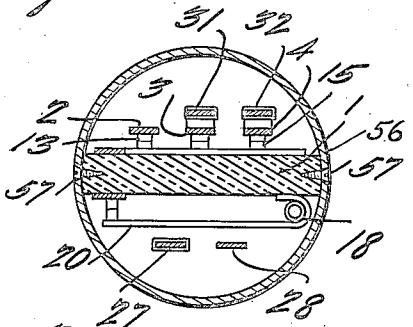
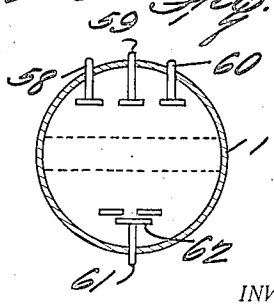


Fig. 7.

Fig. 6.

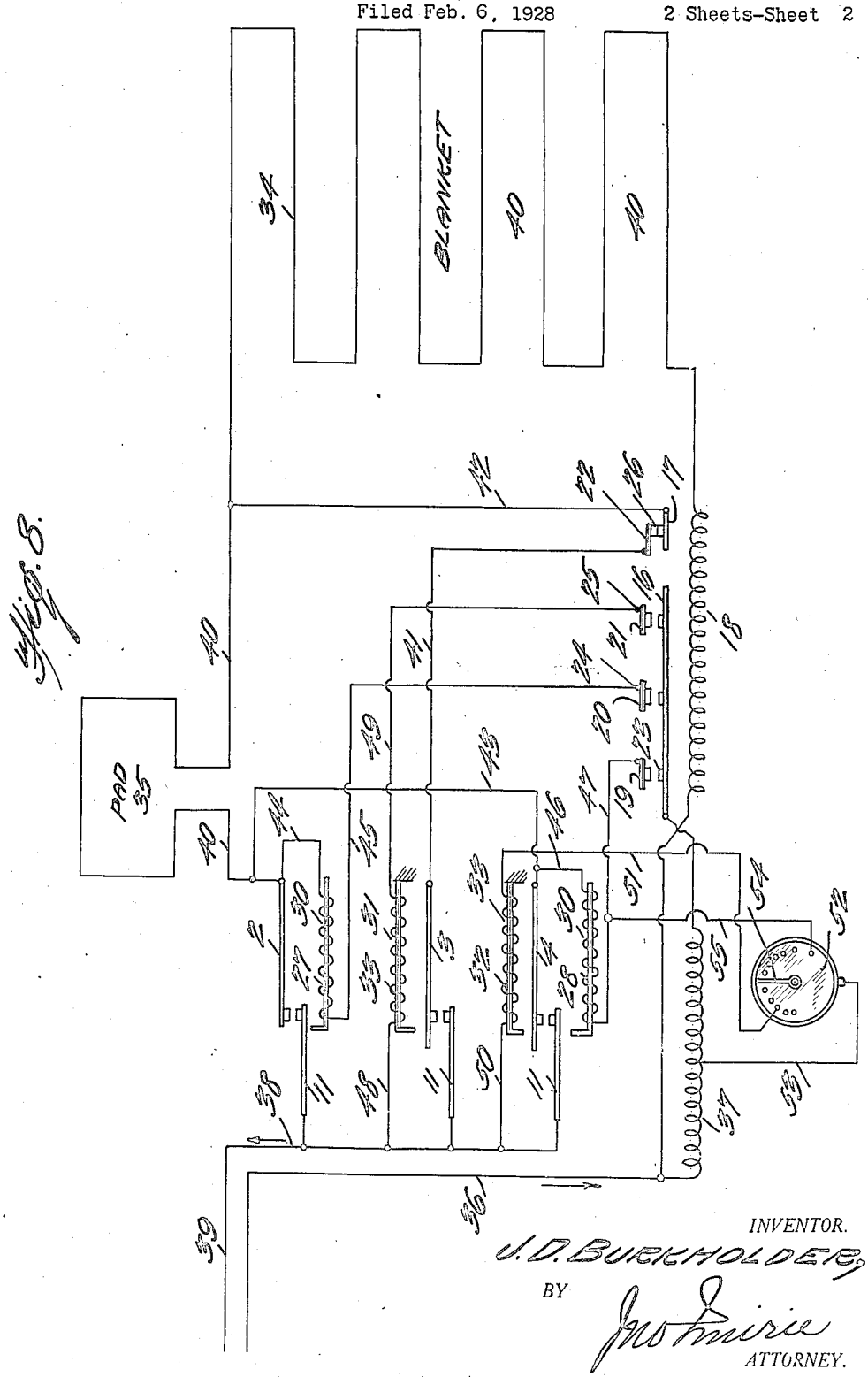


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SWITCH.

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UNITED STATES PATENT OFFICE

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SWITCH

Application filed February 6, 1928. Serial No. 252,312.

This invention relates to a switch for controlling the energization of a therapeutic appliance, in the use of which provision is made for the automatic intermittent control of the energization; for the control of the energization by the room temperature; and for the control of the energization for certain defined time periods.

In the use of a therapeutic appliance, such for example as a blanket or pad or both, constructed to afford certain remedial effects through the energization of such elements by the electric current, it is highly desirable that certain different controls of such energization be provided in order that the treatment resulting from the therapeutic appliance may be regulated in accordance with the requirements of the particular case being treated. For example, it may be desirable to provide an uninterrupted but intermittent energization throughout a considerable period; or it may be desirable to automatically cut the blanket energization on or off in accordance with the temperature of the room; or again, it may be desirable to set the energization for a predetermined period or periods, in order that through these various controls the requirements of any particular treatment may be readily provided for.

The improved switch of the present construction is particularly designed to provide in a single unit the means for governing the various energizations of the therapeutic appliance merely through the manual setting of the switch in a selective manner and in a single operation; the switch of course also contemplating the manual control of the energization at will.

The invention also provides for the periodic energization and deenergization of the therapeutic appliance through an appropriate clock control which operates through the switch.

The invention is illustrated in the accompanying drawings, in which:

Figure 1 is a view in elevation showing the switch in external form as arranged in the cord connected to the therapeutic appliance and adapted for the usual plug connection with the service outlet.

Figure 2 is a top plan view of the switch proper, the casing of course being omitted.

Figure 3 is a bottom plan view of the same.

Figure 4 is a section on line 4—4 of Figure 2.

Figure 5 is a section on line 5—5 of Figure 2.

Figure 6 is a section through the switch casing showing the manual control elements for the switch.

Figure 7 is a transverse section through one of the therapeutic elements.

Figure 8 is a diagrammatic view of the switch and circuits.

The switch proper comprises an insulating base 1, overlying the upper surface of which are arranged three independent spring strips 2, 3 and 4. These strips, which will be hereinafter termed contact strips, are secured at their ends at 5 at one end of the base, rising from such fixed point and overlying and extending longitudinally of the base, the free end 6 of each strip being adapted, when the strip has been depressed into contact position, to engage the hook terminal 7 of a latch 8 pivotally supported at 9 on one end of the base and having a tail portion 10 through which the latch may be operated to release the strip in a manner to be later described.

It is to be understood that the contact strips are of such inherent resiliency that when free of the latches, the ends 6 of the strips are arranged some distance above the base, and that when manually operated as will presently appear, the free ends of the strips or the selected strip is depressed into contact position and held in such position by cooperation with the latch, as clearly shown in Figure 4.

Underlying the contact strips and secured upon the upper surface of the base is an L-shaped contact plate 11, one arm 12 of which extends transversely of the base, underlying the strips. The contact strips and transverse arm 12 of the plate 11 are provided with contact points indicated for the respective strips at 13, 14 and 15, so that when the particular strip is depressed and within

the holding influence of its latch, such strip will be in electrical contact with the plate 11.

Secured on the lower surface of the base 1 and extending longitudinally of the base adjacent one side edge thereof is a plate 16, hereinafter termed the control contact, an auxiliary control contact in the form of a plate 17 of materially less length than the plate 16 being arranged in longitudinal alignment with but in spaced relation to the plate 16.

A heating coil 18 is arranged longitudinally of the bottom surface of the base at the edge opposite the control contacts, and contact bars 19, 20 and 21 are arranged for control by the heating element and for cooperation with the control contact, a similar contact bar 22 being arranged for control by the heating coil and for cooperation with the auxiliary contact 17. The contact bars are terminally secured to the base beneath the heating coil 18 and are curved partially around and spaced from the coil and extended across the same to and above the contact controls.

The bars 19, 20, 21 and 22 are of bi-metallic formation in order to movably respond to different heat conditions, the respective metals of the bars being of different coefficients of contraction and expansion as well understood. Thus, the contact bars, as will later more specifically appear, will occupy one position relative to the contact controls when the bars are in non-heated condition and the opposite position relative to such controls when the bars are in heated condition resultant from the energization of the heating coil 18.

The bars 19, 20 and 21, which engage with the contact control 16, are provided at their free ends with contact points 23, 24 and 25, while the contact bar 22, which cooperates with the auxiliary contact control 17, is provided at its free end with a contact point 26. These respective contact points cooperate, as is well understood, with the contact points on the respective controls, so that, when the particular contact bar is in operative position, the bar and control are in electrical engagement.

As the contact strips 2, 3 and 4 constitute the control elements for the circuits and as these circuits under certain conditions are to be automatically broken, means are provided for releasing the strips 2, 3 and 4 from contact position, that is to say, for tripping the latches 8 to permit the contact strips through their inherent resiliency to move to open circuiting positions. This release means includes thermostatic bars 27 and 28 secured at one end on the under side of the base and extending across and below the contact bars 19, 20, 21 and 22 and formed at their free ends with cross strips 29 adapted to cooperate with the tail portions 10 of adjacent pairs of latches. There are two thermostatic bars and the operation of either will actuate two latches, the intermediate or central latch being operated by either thermostatic bar. The thermostatic bars are of the usual bi-metallic character heated by a coil 30, the circuiting of which will later appear.

In connection with the automatic intermittent control of the energization of the therapeutic appliance, it is of course necessary that the circuit or certain of the circuits be automatically closed following their automatic interruption in order to provide the intermittent automatic operation. For this purpose, certain of the contact strips, for example contact strips 3 and 4, are provided with automatic operating or setting means. Such setting means includes thermostatic bars 31 and 32 arranged above the respective strips 4 and 5, such thermostatic bars being of the usual bi-metallic character heated by encircling coils 33. The free ends of the bars overlie the contact strips 3 and 4 near their free ends and the respective metals of the bimetallic thermostatic bar are so arranged that when the bar is heated, the free end will move downwardly and thereby move the free end of the particular contact strip into cooperation with its latch or into circuiting position.

The therapeutic appliance is here illustrated as a blanket 34 and a pad or pads 35, and the circuits for the various switch parts in their control of the energization of this therapeutic appliance are diagrammatically illustrated in Figure 8. In this connection, as will be plain from Figure 8, it will be understood that in the normal condition of the switch, the contact bar 22 is normally in electrical engagement with the auxiliary contact 17; the contact bar 21 is normally free or spaced from the cooperating contact of the contact control plate 16; while the contact bars 20 and 19 are normally free of electrical engagement with the contact control 16. The respective bars 19, 20, 21 and 22 are, as stated, thermostatic bars in their bimetallic formation and are to be operated under heat conditions. That is to say, bar 22 is normally closed at room temperature and opens under a predetermined degree of heat; contact bar 21 is normally open and is designed to close when the room temperature falls to a predetermined degree; contact bars 20 and 19 are time control bars and are so formed as to respond to a predetermined degree of heat at different periods of time, for example, bar 20 closes under a predetermined degree of heat in ten minutes while bar 19 closes under a predetermined degree of heat in fifteen minutes.

The incoming conductor 36, which as stated forms part of the cord leading from the usual plug to be inserted in the box of the main service terminals, leads directly to

the contact control 16, so that this contact control plate is a live plate when the current is flowing. The heating coil 18 is directly energized from the incoming conductor 36 but in order to take care of the current amperage without utilizing a portion of the wiring of the therapeutic appliance, there is provided in this incoming conductor an additional conductor 37 branching from the conductor 36 and leading directly to the heating coil. This conductor 37, which is in the form of a resistance conductor, is of sufficient length to take care of the current and by arranging the same in the cord, provision is made for taking care of the current demands without utilizing any portion of the switch or blanket wiring for the purpose.

The contact strips 2, 3 and 4 are, as stated, when in circuiting position, in electrical contact with the plate 11 and this plate is terminally connected through conductor 38 with the outgoing conductor 39 of the cord. The fixed end of contact strip 2 is connected through conductor 40 with the therapeutic appliance direct, leading through the pad 35 and blanket 34 in series, the conductor 40, which leads through the blanket, being connected at its opposite end to the heating coil 18. The contact strip 3 is connected by conductor 41 to the contact bar 22, the auxiliary contact control 17 being connected by conductor 42 with the blanket energizing conductor 40 beyond the pad, thus shunting the pad when the energizing circuit is through the bar 22 and auxiliary contact control 17.

The contact strip 4 is connected through conductor 43 with conductor 40 beyond the contact strip 2, serving on depression of the contact strip 4 to energize both the pad and blanket. The release thermostat 27, which controls the release of contact strips 2 and 3, has its coil 30 in circuit with the contact strip 2 through conductor 44 at one end and through conductor 45 leading to contact bar 20 at the opposite end. The thermostatic release 28, which serves contact strips 3 and 4, has its coil 30 connected at one end by conductor 46 to the contact strip 4, the opposite end of the coil being connected by conductor 47 to the contact bar 19.

The setting thermostat 31, which is adapted to set or move into circuiting position the contact strip 3, has its coil 33 connected at one end by conductor 48 with the plate 11 and at the opposite end through conductor 49 with the contact bar 21. The thermostatic setting bar 32, which is adapted to set the contact strip 4 into circuiting position, has its coil 33 connected at one end of a conductor 50 with the plate 11, its opposite end being connected by a conductor 51 with and forming part of a circuit for a clock control.

In the use of therapeutic appliances of this character, it is frequently desirable that the energization be controlled through the medium of a clock designed for the purpose in which, by the setting of contacts, a periodic energization will take place every hour. Such a clock is conventionally illustrated at 52, the circuiting features of which include a fixed circuit wire 53 branching from the resistance 37 of the incoming wire. The variable contact points of the clock to be engaged by the hand 54 include a conductor 55 which leads to and is in electrical connection with the conductor 47 of the coil 30 of the thermostatic release 28, the remaining variable contact of the clock being part of the conductor 51 hereinbefore referred to.

The switch is enclosed in a cylindrical two-part casing 56, in one part of which the base 1 is removably fixed by screws 57. Push-buttons 58, 59 and 60 are mounted in the shell of the casing overlying the contact strips 2, 3 and 4 respectively to permit manual operation of these strips when desired. A release push-button 61 is mounted in the casing and provided with a head 62 which overlies both of the release thermostats 27 and 28, so that on depression of this button 61, any or all of the latches set may be manually released.

In operation, if it is desired to provide an automatic intermittent energization of a therapeutic element, the contact strip 3 is moved in closed position by operation of the push-button 59. The current now flows through the lead-in wire 36, blanket conductor 40, conductor 42, auxiliary contact control 17, contact points 26, contact bar 22, conductor 41, spring strip 3, plate 11, conductor 38, and outgoing wire 39. The contact points 26 are normally closed and as the contact bar 22 is heated by the coil 18, the points 26 separate. The current is broken at this point and the blanket is deenergized. As the temperature falls in the room, the contacts 26 again close and the blanket is again energized. This intermittent energization and deenergization is maintained automatically and without attention on the part of the operator.

If it is desired that the blanket become deenergized at a particular room temperature for which the thermostatic bar 21 may be set, it will be apparent that when this room temperature is reached, contacts 25 will close and the current then flows through incoming resistor conductor 37, contact control 16, contacts 25, conductor 49, setting thermostat 31, conductor 48, conductor 38, and outgoing conductor 39. The spring strip 3 is then moved into circuiting position by the setting thermostat 31 and the current is then controlled by the intermitent thermostat contact bar 22 in the manner previously described.

If a constant heat for a predetermined period, say ten minutes, is desired, push-button 58 is operated to move contact 2 to circuiting position. The current then flows through the

blanket conductor, through contact strip 2, plate 11, and conductors 38 and 39. As the coil 18 is heated, the thermostat contact bar 20 responds in the predetermined time, that is ten minutes, to close the contacts 24. Current is then sent from the contact control 16, through contacts 24, arm 20, conductor 45, release thermostat coil 30 and to the outgoing conductor. The thermostat 27 then operates to release the latch holding the contact strip 2 and the latter opens, breaking the blanket circuit.

If a longer period of energization is desired, push-button 60 is operated to set contact strip 4. The current then flows through the blanket as previously described until coil 18 causes contact 23 to engage by operating thermostat contact bar 19. The coil 30 of release thermostat 28 is then operated and spring strip 4 released from its latch to break the circuit.

In the clock control, when the hand 54 contacts with the terminal of conductor 51, setting thermostat 32 is operated to close spring strip 4, providing the circuit previously described for the energization of the blanket. When the hand contacts with the terminal of conductor 55, the release thermostat 28 is operated to release the latch holding spring strip 4 in circuiting relation. The circuit is broken by the release of this spring strip. Thus the contact terminals of the clock may be adjusted to close and open the circuit at selected intervals.

What I claim to be new is:

1. In a switch for controlling the energization of a therapeutic appliance, current controlling strips, means for manually operating the strips to circuiting positions, means for automatically releasing the strips from circuiting positions under predetermined heat conditions, and means for automatically moving certain of the strips to circuiting positions under certain predetermined heat conditions.

2. In a switch for controlling the energization of a therapeutic appliance, a plurality of contact strips, means for moving the strips to circuiting positions, locking means for holding the strips in circuiting positions, thermostatic elements for releasing the locking means to permit the strips to move to non-circuiting positions, and other thermostats operative to compel movement of the strips to circuiting positions.

3. In a switch for controlling the energization of a therapeutic appliance, a plurality of contact strips, means for moving the strips to circuiting positions, locking means for holding the strips in circuiting positions, thermostatic elements for releasing the locking means to permit the strips to move to non-circuiting positions, other thermostats operative to compel movement of the strips to circuiting positions, a heating coil carried by the switch, and thermostat controlling contacts operated by the heating coil.

4. In a switch for controlling the energization of a therapeutic appliance, a plurality of contact strips, means for moving the strips to circuiting positions, locking means for holding the strips in circuiting positions, thermostatic elements for releasing the locking means to permit the strips to move to non-circuiting positions, other thermostats operative to compel movement of the strips to circuiting positions, a heating coil carried by the switch, and thermostat controlling contacts operated by the heating coil, said contacts being arranged to respond to varying heat periods.

5. In a switch for controlling the energization of a therapeutic appliance, manually operable spring strips for controlling circuits leading to the therapeutic appliance, means for locking the spring strips in circuiting positions, a thermostat for releasing the locking means under predetermined heat conditions, thermostats for automatically operating the spring strips to circuiting positions and within the influence of the locking means, thermostatic contacts for controlling the locking means releasing thermostats and the spring strip operating thermostats, and a heating element for controlling the thermostatic contacts.

6. In a switch for controlling the energization of a therapeutic appliance, manually operable spring strips for controlling circuits leading to the therapeutic appliance, means for locking the spring strips in circuiting positions, a thermostat for releasing the locking means under predetermined heat conditions, thermostats for automatically operating the spring strips to circuiting positions and within the influence of the locking means, thermostatic contacts for controlling the locking means releasing thermostats and the spring strip operating thermostats, and a heating element for controlling the thermostatic contacts, said thermostatic contacts being set to respond to different heat periods.

In testimony whereof I affix my signature.

JOHN D. BURKHOLDER.