March 30, 1965 H. J. WILLIAMS, JR 3,176,194

ELECTRIC HEATING CONTROL PANEL

Filed Jan. 17, 1962 3 Sheets-Sheet 1

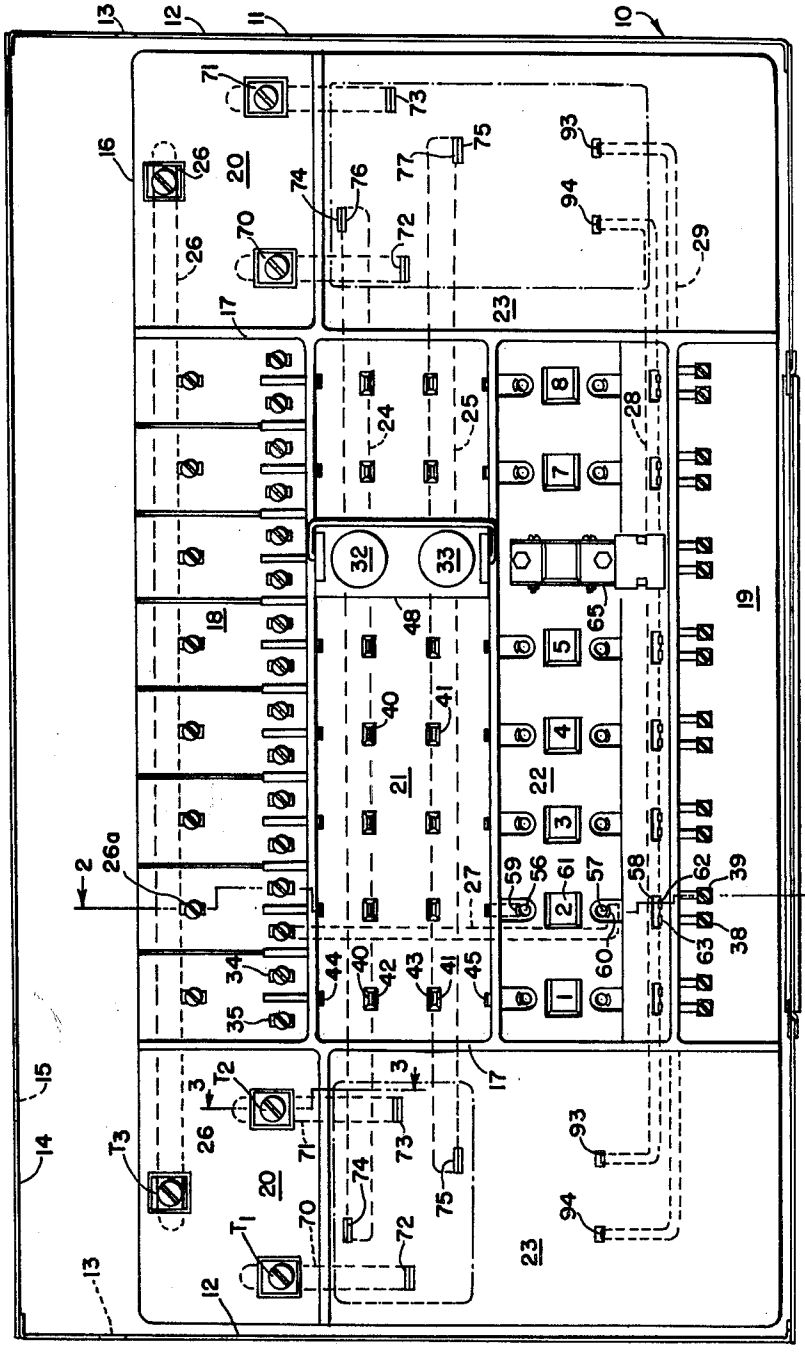


FIG. 1

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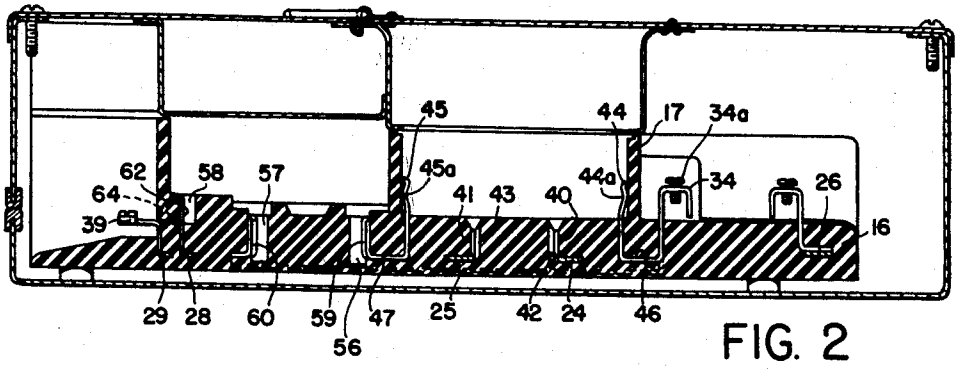


FIG. 2

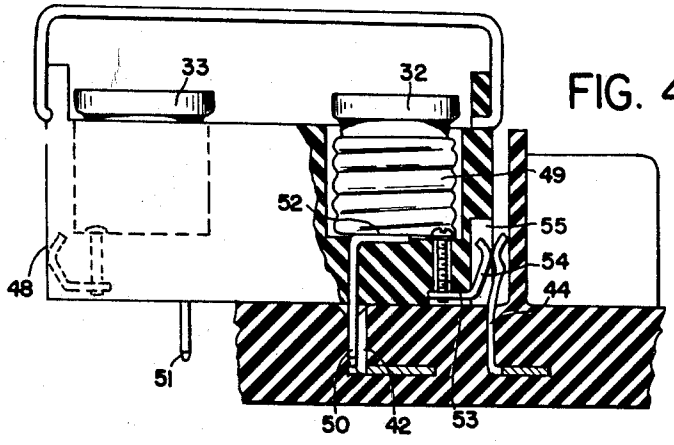


FIG. 4

FIG. 5

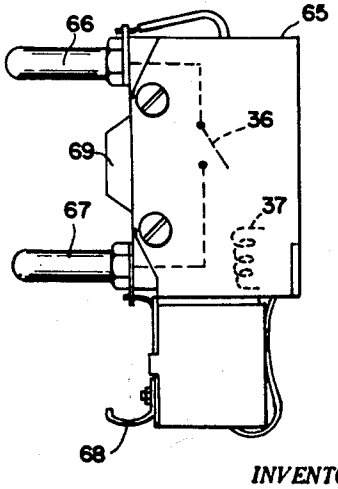
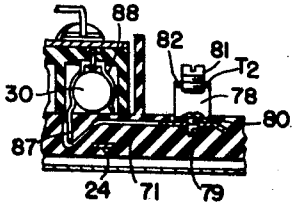


FIG. 3



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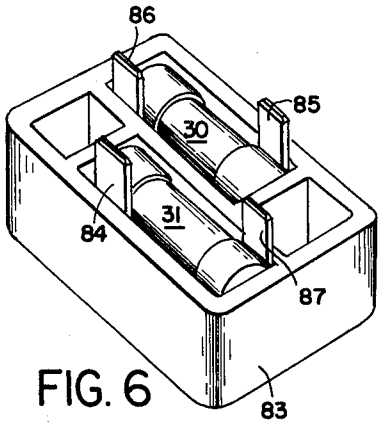


FIG. 6

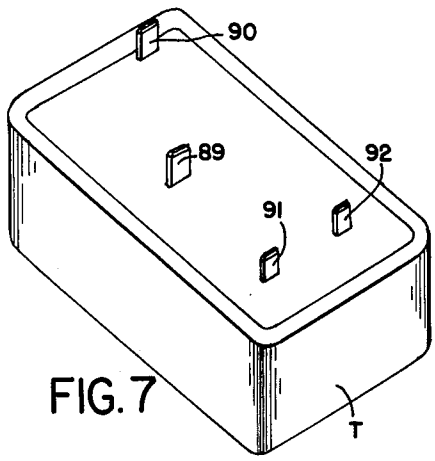


FIG. 7

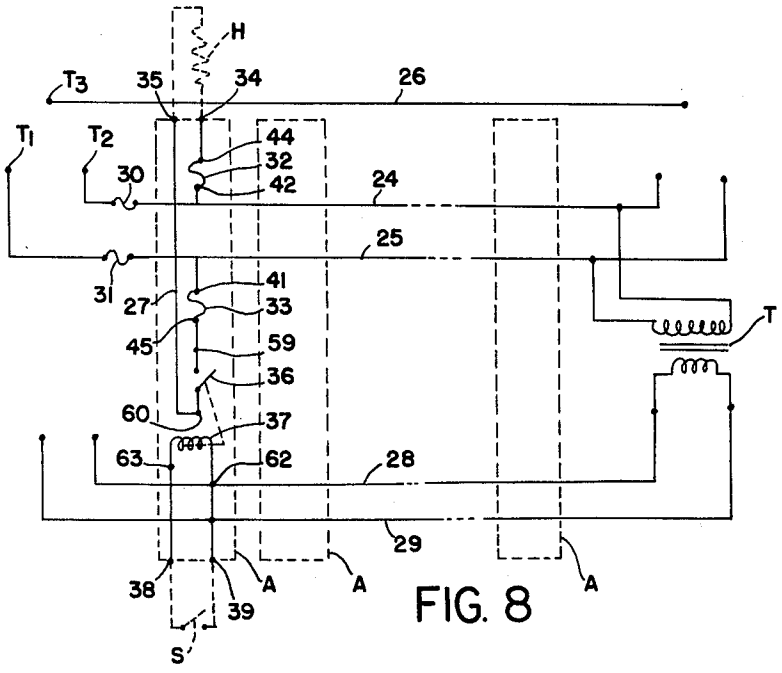


FIG. 8

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United States Patent Office 3,176,194 Patented Mar. 30, 1965

3,176,194

ELECTRIC HEATING CONTROL PANEL

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Filed Jan. 17, 1962, Ser. No. 166,859
5 Claims. (Cl. 317—116)

This invention relates to a multi-circuit control panel for use with electric heating installations for homes and the like.

Although electric heating for homes has been and is being used extensively in recent years, no adequate provision has been made for conveniently supplying power to the heaters and for controlling the heaters. As a result, the installations of electric heating have been in a rather haphazard manner, making use of equipment adapted primarily for other purposes.

An object of my invention is to provide a new and improved fuse and control panel of simple and inexpensive construction and operation for use with electric heating systems for homes and the like.

Another object of my invention is to provide a novel multi-circuit central control panel employing interchangeable and removable components for activating and controlling any of a plurality of electric heating units.

A further object of my invention is to provide an improved and novel control panel facilitating ready and easy connection to the main power supply lines and also facilitating transforming of the power to a low voltage for control purposes.

These and other objects and advantages of my invention will more fully appear from the following description made in connection with the accompanying drawings wherein like reference characters refer to the same or similar parts throughout the several views and in which:

FIG. 1 is a front elevation view of the invention with the cover removed;

FIG. 2 is a section view taken approximately at 2—2 in FIG. 1;

FIG. 3 is a detail section view taken at 3—3 in FIG. 1;

FIG. 4 is a detail view partially in section and partially in elevation showing a portion of the invention;

FIG. 5 is a detail elevation view of a portion of the invention;

FIG. 6 is a bottom perspective view of one of the detachable components;

FIG. 7 is a bottom perspective view of another of the components; and

FIG. 8 is a schematic circuit diagram of the control panel.

One form of the invention is shown in the drawings and is described herein.

The electric heating control panel is indicated in general by numeral 10 and includes an elongate and rectangular shallow housing 11 constructed of rigid metal such as steel or the like and having opposite end walls 12 provided with knock-out blanks 13 adapted for connecting the housing to the proper fittings for the power supply conductors. The top and bottom walls 14 of the housing are provided with suitable means such as knock-out blanks 15 for attaching and bringing in conductors for attachment to the baseboard radiator units and thermostatic controls, respectively.

The housing contains a rigid molded sealed insulating panel 16 of integral one-piece construction having

a plurality of forwardly extending divider walls 17 on the front face thereof and intersecting with each other to define a plurality of compartments and to particularly define high and low voltage terminal spaces 18 and 19 respectively. The walls also define power supply terminal spaces 20 and control component mounting spaces 21 and 22 respectively. The upstanding walls 17 also define at opposite ends of the panel, spaces 23 for purposes hereinafter more fully defined.

The panel 16 has a pair of elongate high voltage bus bars or power buses 24 and 25 embedded and confined therein and extending beneath the spaces 21 and 23. Another bus bar 26 for the neutral of a single phase three-wire power connection is embedded in a panel 16 beneath the spaces 18 and 20. A plurality of conductors or bus bars 27 are embedded in the insulating panel 16 and extend transversely with respect to the bars 24 and 25 and in spaced relation therewith so as to be insulated therefrom.

The panel 16 also has a pair of elongate low voltage bus bars or conductors 28 and 29 extending longitudinally of the panel and generally beneath the spaces 22 and 23.

Before considering the details of the panel 16 and the attachments therefor, it will be noted in FIG. 8 the general schematic of the circuitry is shown. In the form shown, power is supplied for the bus bars 24, 25 and 26 at the terminals T_1, T_2 and T_3 respectively from a three-wire single phase source. From terminals T_1, T_2, power is supplied through removable fuses 30 and 31 to the bus bars 24 and 25 to any or all of the individual baseboard heater circuits which are encased within the several dotted line boxes indicated by letters A. The bus bars 24 and 25 also supply power to a step-down transformer T for supplying low voltage power at approximately 28 volts to the bus bars 28 and 29.

Each of the baseboard radiator control circuits A has current overload protective devices specifically comprising a pair of removable fuses 32 and 33 which are respectively connected to the bus bars 24 and 25. Power is supplied directly from fuse 32 to a power terminal 34. From fuse 33 power is supplied to the terminal 35 through the power switch contacts 36 which are controlled by relay coil 37. It will be seen that a load such as the resistance heater H of an electric baseboard radiator is connected across the power terminals 34 and 35. One side of relay coil 37 is supplied with power from the low voltage bus 28 and the other side of the relay coil 37 is connected with a terminal 38. The low voltage bus 29 is connected to another terminal 39. It will be seen that a low voltage control switch S, which is preferably thermostatically operated is connected between the terminals 38 and 39 for controlling operation of the relay coil 37. When the thermostatically operated switch is closed, the relay coil is energized to close the contacts 36 and cause power to be supplied to the resistance heater H; and conversely when the thermostatically operated switch S is opened the contacts 36 are open to remove power from the electric resistence heater H.

With further reference to the construction of the control panel 16, it will be seen that the panel has a plurality of prong-receiving socket holes 40 and 41 respectively disposed in rows along the intermediate portions of bus bars 24 and 25 respectively. Each of the holes 40 is disposed opposite a corresponding hole 41. The bus bars 24 and 25 have a plurality of panel terminal projections 42 and 43 extending transversely of the corre-

sponding bus bars at each of the socket holes 40 and 41 respectively and disposed within the socket holes 40 and 41. Adjacent each pair of socket holes 40 and 41 is a pair of exposed stationary slide contacts 44 and 45 projecting upwardly from the front face of the panel 16 and lying against the adjacent compartment-defining walls 17. It will be seen that the contact 44 is formed integrally of a conductor or bar 46 which is embedded in the panel 16 and is connected with the terminal 34. The terminal 34 will be seen to be provided with a suitable wire-clamping screw 34*a*.

The stationary slide contact 45 is formed integrally with a conductor portion 47 which is embedded in the panel 16.

Interfittable with the socket holes 40 and 41 are a plurality of fuse-carrying blocks 48 which carry the fuses 32 and 33 in conventionally threaded receptacles 49. The blocks 48 carry a pair of prongs 50 and 51 which are respectively received in the socket holes 40 and 41 and lie in engagement with the terminal projections 42 and 43 therein. The inner ends 52 of prongs 50 and 51 are arranged for engaging the central conductor of fuses 32 and 33. The mounting receptacles 49 are connected by a conductor screw 53 to a spring terminal contact 54 contained within a recess 55 of the block 48 and positioned for slidably engaging one of the stationary contacts 44 or 45. It will be seen that the stationary spring contacts 44 and 45 have detents 44*a* and 45*a* formed therein for retaining the spring terminal contacts 54 against sliding movement and thereby hold the fuse block 48 to maintain the prongs 50 and 51 in proper position in the socket holes 40 and 41.

It will be noted that the panel 16 has a plurality of prong-receiving socket holes 56 and 57 in the space or compartment 22 and also has socket holes 58 therein. It will be noted that the sockets 56, 57 and 58 are arranged in rows extending longitudinally of panel 16 and are each also arranged, together with corresponding socket holes 40 and 41 and terminals 34, 35, 38 and 39, and contacts 44 and 45 and the conductor bars associated therewith, in lines extending transversely of all of said rows. Each of the embedded conductor portions 47 of contacts 45 has a terminal projection 59 disposed in the corresponding socket hole 56', and the socket hole 57 has a terminal projection 60 exposed therein which extends transversely and is formed integrally with the bus bar 27. Between the prong-receiving socket holes 56 and 57 is an indexing recess 61 in the front face of the panel. The prong-receiving hole 58 has a pair of contacts or terminals 62 and 63 exposed therein. The contact 62 is formed integrally with the bus bar 28. The contact 63 has a conductor portion 64 embedded in the insulating panel 16 and connected to the exposed terminal 38. The terminal 39 is connected directly to the bus bar 29.

The prong-receiving socket holes 56, 57 and 58 mount plug-in relay blocks 65, each of which has a pair of conductor prongs 66 and 67 which are normally seated in the corresponding socket holes 56 and 57 in engagement with the exposed terminal projections 59 and 60. The relay blocks 65 has low voltage spring-type prongs 68 which extend into the socket hole 58 and respectively engage the contacts 62 and 63 therein for supplying low voltage to the coil 37 which is confined within the relay block 65 for operating relay contact 36. It will be understood that the relay coil and contacts 37 and 36 respectively are of substantially conventional construction confined within the block 65. The relay block 65 has an indexing projection 69 on its bottom surface for reception in the recess 61.

At opposite ends of the panel 16, power supply bus bars 70 and 71 are embedded in the panel 16 adjacent the terminals T_1 and T_2 for supplying high voltage power to the bus bars 24 and 25. The bars 70 and 71, although embedded adjacent the bus bars 24 and 25 are maintained in spaced relation therewith and terminate adjacent a first pair of prong-receiving socket holes 72 and 73 respectively wherein terminal projections formed integrally with the bars 70 and 71 are exposed. A second pair of prong-receiving socket holes 74 and 75 are exposed at the ends of bars 24 and 25 respective, and the bars 24 and 25 have terminal projections 76 and 77 respectively exposed in the socket holes 74 and 75. It will be noted that at opposite ends of the panel 16 the socket holes 72, 73, 74 and 75 are oriented in predetermined and identical relation with each other.

Each of the terminals T_1, T_2 and T_3 has a wire-receiving sleeve 78 which is removably secured by means of a screw 79 to the corresponding embedded bus bar. A shallow recess 80 is provided in the surface of the panel 16 to expose the corresponding bus bar. The upper side of the wire-receiving sleeve 78 is provided with a large set screw 81 for holding a conductor wire in the terminal sleeve 78. The set screw 81 is of sufficient size as to permit insertion of a screw driver through the set screw-receiving hole 82 in the sleeve 78 so that when the set screw is removed, a screw driver may be inserted through the hole for tightening or loosening the screw 79. It will be seen therefore that the terminals T_1, T_2 and T_3 may be mounted at either end of the panel 16 and secured to the appropriate bus bars 26, 70 and 71.

At the end whereon the terminals T_1, T_2 and T_3 are mounted, a fuse block 83 is mounted with the conductor prongs 84 and 85 seated in the socket holes 74 and 75 and the conductor prongs 86 and 87 are seated in the socket holes 72 and 73. The several prongs 85–87 of the fuse block 83 form portions of the spring-type fuse clamps 88 as seen in FIG. 3. It will be seen that because of the symmetrical arrangement of the socket holes and prongs, the fuse block 83 may be turned end for end and plugged in without changing the nature of the circuit. In any event, the power is supplied from the terminal T_1 to the bus bar 25 and from terminal T_2 to the bus bar 24.

At the end of the panel 16 opposite to the fuse block 83 the transformer T is mounted with the contact prongs 89 and 90 being seated in the socket holes 75 and 74 respectively so as to supply power from the bus bars to the primary winding of the transformer. The transformer also has prongs 91 and 92 which are seated in the socket holes 93 and 94 respectively wherein terminal projections of bus bars 29 and 28 are respectively exposed so as to supply the low voltage power to the bus bars 28 and 29 for energizing the relay coils 37.

In installing and connecting the control apparatus 10 with the baseboard heaters H and thermostatic switches S, the conductors from the three-wire single phase power source are brought into the housing 13 at whichever end is most convenient and the terminals T_1, T_2 and T_3 are secured to the corresponding end of the panel 16. The fuse block 83 is then plugged into the socket holes immediately adjacent the terminals T_1, T_2 and T_3 so as to supply power to the bus bars 24 and 25. The transformer T is plugged into the opposite ends of these bus bars so as to supply low voltage power to the bus bars 28 and 29. Each pair of terminals 34 and 35, and the corresponding neutral terminal 26*a* which is connected to the bus bar 26, are connected to the appropriate conductors for one of the baseboard resistent heaters H. The conductors for the corresponding thermostatic switch S are connected to the pair of terminals 38 and 39 which are vertically aligned with the power terminals 34 and 35. The fuse block 48 is then supplied with the proper fuses 32 and 33 and is plugged into sockets 40 and 41 and similarly the fuse block 65 is plugged into the socket holes 56, 57 and 58. The particular circuit is then completely wired for operation. It will be understood that up to eight different circuits may be accommodated in the panel 16 and be individually controlled. The entire fabrication of the control apparatus 10 is accomplished during manufacturing with the exception of attaching the appropriate power

load and control conductors to the terminals. The bus bars are all in fixed relation with each other and with the panel and the high voltage conductors are completely confined when the fuse blocks 48 are removed. In certain installations it may be desirable to bring the power supply conductors into the housing 11 at the right hand end and at other instances it may be desirable that the power conductors be brought in at the left hand end and in either case, the conductors are attached to the panel at the corresponding end. By interchanging the terminals T_1, T_2 and T_3 to the appropriate end of the panel 16 and by plugging in the fuse block 83 and the transformer T at the appropriate positions, the panel is immediately and conveniently set up for immediate operation with no wiring of the panel being necessary.

In the event that any of the relays should fail in operation, the faulty relay need merely be removed and replaced with a new one.

It will, of course, be understood that various changes may be made in the form, details, arrangement and proportions of the various parts without departing from the scope of my invention.

What I claim is:

1. Control apparatus for electric baseboard radiator units and the like, comprising a sealed insulated panel having a bottom surface and also having a top surface with a plurality of prong-receiving socket holes arranged in a plurality of lines and rows extending transversely thereof, a plurality of pairs of terminals arranged parallel to one of said rows, a plurality of conductor bars embedded in said panel and extending along said lines and rows at varying distances from said top and bottom surfaces, a plurality of terminal projections in said holes and each of the projections being connected to a respective conductor bar, a plurality of current overload protective device blocks and relay blocks arranged in respective rows and having prongs removably seated in said holes and engaging the terminal projections therein, each of said protective device blocks and a respective relay block being disposed in one of said lines, means on the panel supplying power to the bars along the row of protective device blocks, said protective device blocks having current overload protective devices, and said relay blocks having relay power contacts cooperating with said protective devices and bars along said lines for supplying power to said pairs of terminals.

2. Control apparatus for electric baseboard radiators and the like, comprising an elongate housing having means providing access for wiring at opposite ends thereof, an elongate sealed insulating terminal panel in the housing and having opposite ends, a pair of parallel and spaced conductor bars embedded in the panel and extending longitudinally thereof, and having opposite ends disposed adjacent the ends of the panel, the bars having intermediate portions with transversely extending terminal projections thereon, the panel having prong-receiving socket holes adjoining each of said projections, prong-carrying plug-in conductor apparatus removably mounted in said socket holes, a plurality of pairs of terminals on the panel for connection with an electric baseboard radiator, circuit means connected to and mounted on the panel for connecting said conductor, apparatus with said terminals and said circuit means including a relay with a low voltage coil, each end of the panel having a first pair of socket holes each disposed adjacent a respective conductor bar and also having a second pair of socket holes, a pair of electric buses embedded in the panel and having terminal projections exposed in said first pair of socket holes, means for supplying electric power to said buses, said conductor bars having terminal projections exposed in said second pair of socket holes, said first and second pairs of socket holes being identically arranged at each end of the panel, a fuse holder block at one end of the panel and having first and second pairs of conductor prongs respectively received in said first

and second pairs of socket holes and engaging the terminal projections therein, a pair of fuses each connecting one prong of each pair together, and a power transformer at the other end of said panel and having a first pair of conductor prongs received in the first socket holes at the corresponding end of the panel for supplying power to the primary windings of the transformer, means connecting the secondary winding of the transformer to the low voltage coil of the relay, said fuse block and transformer being interchangeable with respect to each other at opposite ends of the panel.

3. An electric control apparatus for electric baseboard radiators and the like, comprising a molded insulating panel with high voltage power-carrying buses embedded therein, said panel and buses cooperatively defining power take-off sockets, certain of said bus bars and sockets being oriented along rows and other of said bus bars oriented along lines extending transversely of the rows, plug-in apparatus connected to the panel sockets for cooperating with said buses in defining power supply circuits, each of said circuits including overload fuses and a control relay, additional plug-in apparatus interchangeably positionable on the panel, said additional plug-in apparatus including overload fusing means applying power to the bus bars and also including voltage transforming means connected to said control relays, and said panel also including interchangeable means at opposite ends of the panel for attaching power supply conductors thereto.

4. A control apparatus for electric baseboard radiators and the like, comprising an insulating molded panel of unitary one-piece construction having a front face with a plurality of upstanding divider walls projecting therefrom and formed integrally therewith, said divider walls defining on opposite sides thereof high and low voltage power supply portions of the panel, said panel having high and low voltage bus bars embedded therein and extending along rows parallel to said walls and along lines extending transversely of said rows, said panel and bus bars having socket means defining plug-in sockets, current overload protecting and switching control plug-in apparatus cooperating with said embedded buses defining individual power circuits, the buses extending along said rows being spaced from the front face differently than the buses extending along said lines, said walls defining high and low voltage terminal spaces adjacent opposite edges of the panel, and a plurality of pairs of high and low voltage terminals connected with respective circuits and disposed in said spaces to be maintained in segregated relation with each other.

5. Control apparatus for electrical space heaters controlled by thermostats, comprising an upright panel having line voltage buses thereon and control voltage buses thereon and also having means supplying power from said line voltage buses at reduced voltage to said control voltage buses, a plurality of line voltage fusing devices disposed in a first row on the panel, a plurality of line voltage switching relays disposed in a second row on the panel and in juxtaposed relation with said first row, said relays having low voltage operating means, said panel and said fusing devices and said switching relays having cooperatively interfitting plug and socket connector parts removably mounting each of the fusing devices and a corresponding relay on the panel in alignment with each other and transversely of said rows, line voltage output wire terminal means and control voltage wire terminal means on the panel and respectively disposed on opposite sides of and in line with each of said aligned fusing devices and relays, means extending transversely of said rows and connecting said connector parts on the panel with said corresponding line and control voltage buses and with said wire terminal means and effecting fusing and switching of the power supplied from the line voltage buses to the line voltage wire terminal means.

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7

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8

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JOHN F. BURNS, *Primary Examiner.*

E. JAMES SAX, *Examiner.*