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INFRARED RAY TREATER

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Fig. 1

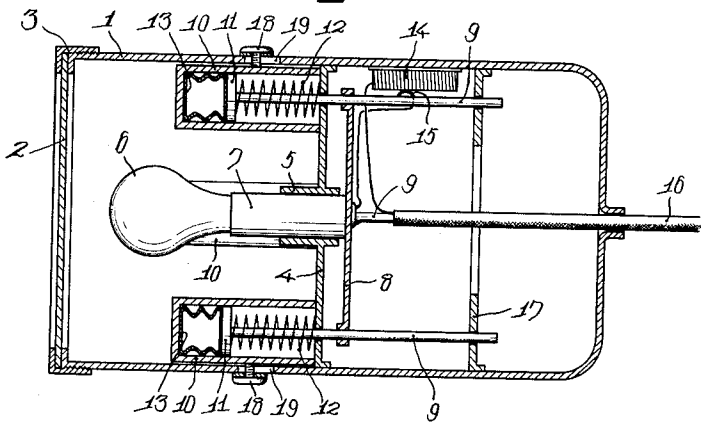


Fig. 2

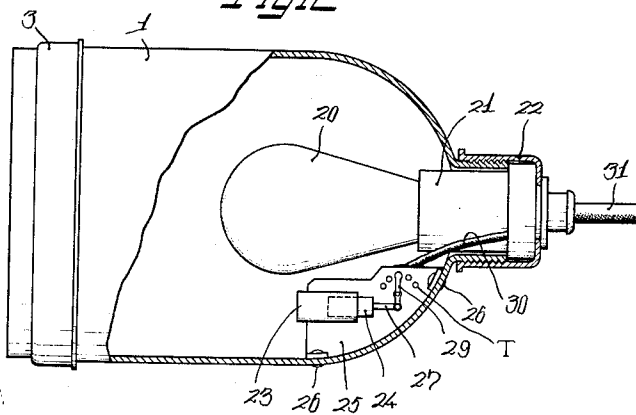
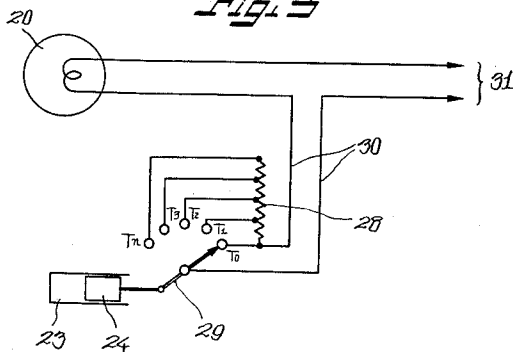


Fig. 3



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## INFRARED RAY TREATER

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The present invention relates to an infrared ray treater utilizing the infrared rays emitted from an electric bulb, and more particularly to such a treater wherein the infrared rays, emitted from an infrared emitting source, are projected against a mica plate mounted on the open end of an outer casing to heat an affective part of the human body to be treated by automatically adjusting either the distance between the mica plate and the infrared emitting source or the heat emitted from the source itself, to hold its temperature at a desired predetermined value of the heating effect of the source.

Heretofore, it has been well known that such treaters do not have any automatic adjusting means for the heat to be generated, so that it was required, in case of an excessive rise of the temperature for the treatment, to increase suitably the distance between the source and the affected part by manual operation, and accordingly proper observation must be provided during the treatment.

Particularly, in the infrared ray treater, designed in accordance with the present invention, a considerable amount of heat is generated by the infrared rays, and there is a danger of suffering an injury, such as a burn on the treated part of the patient or on the clothes of the patient while sleeping, due to the excessive heat emerging from the source.

It is, therefore, the main object of the present invention to provide an infrared ray heater which avoids the drawbacks of the known structures by providing an automatic adjustment of either the distance between the heater and the mica plate or the heat emission of the source itself, the heat emission being adjusted by regulating the voltage at the source terminals by means of a rheostat by the action of the heat emitted from the source.

With this and other objects in view which will become apparent in the following detailed description, the present invention will be clearly understood in connection with the accompanying drawings, in which:

FIGURE 1 is a longitudinal section of one embodiment of the present invention;

FIG. 2 is a side elevation, partly in section, of another embodiment of the present invention; and

FIG. 3 is an electric circuit diagram used in the embodiment disclosed in FIG. 2.

Referring now to the drawing, and particularly to FIG. 1, the treater comprises an outer casing 1 open at one end and which is provided with a mica plate 2 secured to the casing 1 at its open end by means of an annular member 3, the mica plate 2 being perforated by means of a plurality of small holes (not shown), in order to provide vents for the created heat. The outer casing 1 comprises a guide plate 4 securely fitted therein and spaced apart from the mica plate 2, a centrally mounted tube 5 receiving a socket 7 for the infrared emitting source 6 inserted in the socket and a mounting plate 8 for the socket 7 of the source 6. The mounting plate 8 is provided with a plurality of operating rods 9, carried by the mounting plate 8. The operating rods 9 are slidably inserted in holes formed in the guide plate 4 and project into tubular members 10. The latter are disposed at the side of the source 6 and remote from the guide plate 4. A piston 11 is secured to one end of each of the operating rods 9, and a coiled spring 12 is disposed in a compressed state between the piston 11 and the guide plate 4. Bellows type bodies 13 expandible by the heat emitted from the source 6 are in-

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serted in the tubular member 10 between one end of the latter and the piston 11. An electrical conduit 15 connects the socket 7 with a resistor 14. An electric cable 16 feeds current to the infrared emitting source 6. A supporting plate 17 disposed in the rear of the outer casing 1 functions as supporting means for the rear end of the operating rods 9. An adjusting screw 18 projects through an elongated slot 19 provided in the outer casing 1 and is screwed into the tubular member 10. The screw 18 serves the purpose to adjust the position of the guide plate 4 for the length of the slot 19 by moving the screw 18 along the slot 19 after being slightly loosened, while upon tightening the screw 18, the tube 10 and, thereby, the guide plate 4, is retained in its predetermined adjusted position.

In the embodiment disclosed in FIG. 2, the treater is provided with means for adjusting the reostat by means of a piston mechanism closely disposed to the infrared emitting source, which piston mechanism is operated automatically in response to the variation of the temperature of the source. In this embodiment, the construction of the outer casing 1 and of the mica plate 2, secured to the open end of the outer casing 1 by means of the annular member 3, is the same as that disclosed in connection with the embodiment of FIG. 1, except that a socket 21 supporting the source 20 is tightly secured to a threaded ring 22, and that a cylinder 23 and a piston 24 reciprocating in the cylinder 23 disposed closely to the source 20, are secured to a panel 25 by screws 26 in the outer casing 1. Further, a contact lever 29 turns selectively over terminals T of a rheostat 26 and is pivotally connected with a piston rod 27 of the piston 24. Accordingly, the contact lever 29 can promptly switch over the terminals T by means of the piston 24 when gas contained in the cylinder 23 expands by the heat emerging from the bulb 20. An electric cable 30 connects the rheostat 26 and the contact lever 29 with the socket 21 of the infrared emitting source and the rheostat 26 thus controls the feeding of electric current to the source 20. A cable 31 provides the feed of current to the source 20 from an electric source (not shown).

In accordance with the present invention, if the amount of heat emitted from the infrared emitting source becomes excessive for heating the mica plate 2, then in the case of the embodiment shown in FIG. 1, the bellows type bodies 13 expand, so as to exert pressure on the pistons 11 and urge their axial movement in rearward direction against the force of the springs 12, and, thereby, to withdraw the source 6 away from the mica plate 2, whereby a suitable reduced temperature is provided at the affected part of the human body to be treated.

In the case of FIG. 2, if the temperature due to the source 20 becomes excessive, gas present in the cylinder 23 expands, thereby moving the piston 24 outwardly, and rearwardly relative to the source 20, whereby the contact lever 29, pivotally connected with the piston rod 27, will turn along the terminals T in response to the rise of the temperature of the source 20, and will increase the resistance of the rheostat 26, whereupon the voltage applied to the source 20 is lowered, thereby, keeping the temperature of the source 20 at a lower level.

In the conventional apparatus of this kind, the temperature is likely to rise excessively during treatment, and it is required to increase the distance between the apparatus and the body to be treated. Such arrangement brings about inconvenience, since it is difficult to perform a satisfactory treatment for a given time. Whereas, in the present treater, a moderate temperature can be attained automatically at any time to provide a satisfactory treatment, so that the part of the human body may safely be subjected to the rays for any length of time, as may be required for the effectiveness of the treatment.

While I have disclosed two embodiments of the present invention, it is to be understood that these embodiments are given by example only and not in a limiting sense, the scope of the present invention being determined by the objects and the claims.

I claim:

1. An infrared ray treater comprising an outer casing having an open end, a mica plate mounted on said casing at the open end of the latter, an infrared emitting source disposed in said casing spaced apart from said mica plate, and a control means for varying automatically the distance between said source and said mica plate so that a predetermined value of heat may be substantially invariably impinged on said mica plate.

2. An infrared ray treater comprising an outer casing having an open end, a mica plate mounted on said casing at the open end of the latter, infrared emitting source disposed in said casing spaced apart from said mica plate, and a control means for varying the voltage of said source, so that a predetermined value of heat may be substantially invariably impinged on said mica plate.

3. An infrared ray treater comprising an outer casing having an open end, a mica plate mounted on said casing at the opening of the latter, an infrared emitting source disposed in said casing spaced apart from said mica plate, a control means for varying the distance between said source and said mica plate in response to the heat emitted from said infrared emitting source, said distance varying means comprising a bellows body disposed in the vicinity of said source, a guide plate adjustably disposed crosswise in said outer casing, a tubular member receiving said bellows body and secured to said guide plate, a piston reciprocating with said tubular member and engaging said bellows body, a piston rod projecting from said piston and guided in said guide plate, a mounting plate secured to said piston rod for joint-reciprocating movement with the latter and carrying said infrared emitting source, a coil spring disposed between said adjustable guide plate and

said piston, so that an expansion of said bellows body pushes said piston against the force of said coil spring in said tubular member and by means of said mounting plate secured to said piston rod withdraws simultaneously said infrared emitting source.

4. An infrared ray treater comprising an outer casing having an open end, a mica plate mounted on said casing at the open end of the latter, an infrared emitting source disposed in said casing spaced apart from said mica plate, a control means for varying the voltage of said source in response to the heat emitted from said infrared emitting source, said voltage varying means comprising a cylinder, a piston reciprocating in said cylinder and having a piston rod projecting therefrom, a rheostat having a plurality of terminals disposed in a circuit feeding electric current to said source, a contact lever pivotally mounted to engage selectively one of said terminals, and the rear end of said contact lever being pivotally connected to said piston rod, so that said piston is pushed out from said cylinder upon expansion of gas contained therein and simultaneously turning said contact lever to engage successively said terminals of said rheostat, all said elements of said voltage varying means being disposed in said outer casing.

5. An infrared heater comprising an outer casing having an open end, a mica plate mounted on said casing at the open end of the latter, an infrared emitting source disposed in said casing spaced apart from said mica plate, and a control means responsive to the heat emitted from said source for varying automatically the heat emitted from said source to said mica plate, so that a predetermined value of heat may be substantially invariably impinged on said mica plate.

#### References Cited in the file of this patent

#### UNITED STATES PATENTS

|           |         |                |
|-----------|---------|----------------|
| 2,215,635 | Collins | Sept. 24, 1940 |
| 2,441,284 | Parrish | May 11, 1948   |