May 29, 1945. E. J. DE COSTA ET AL 2,377,133

AUTOMATIC SERVICE EQUIPMENT

Filed Feb. 19, 1942 2 Sheets-Sheet 1

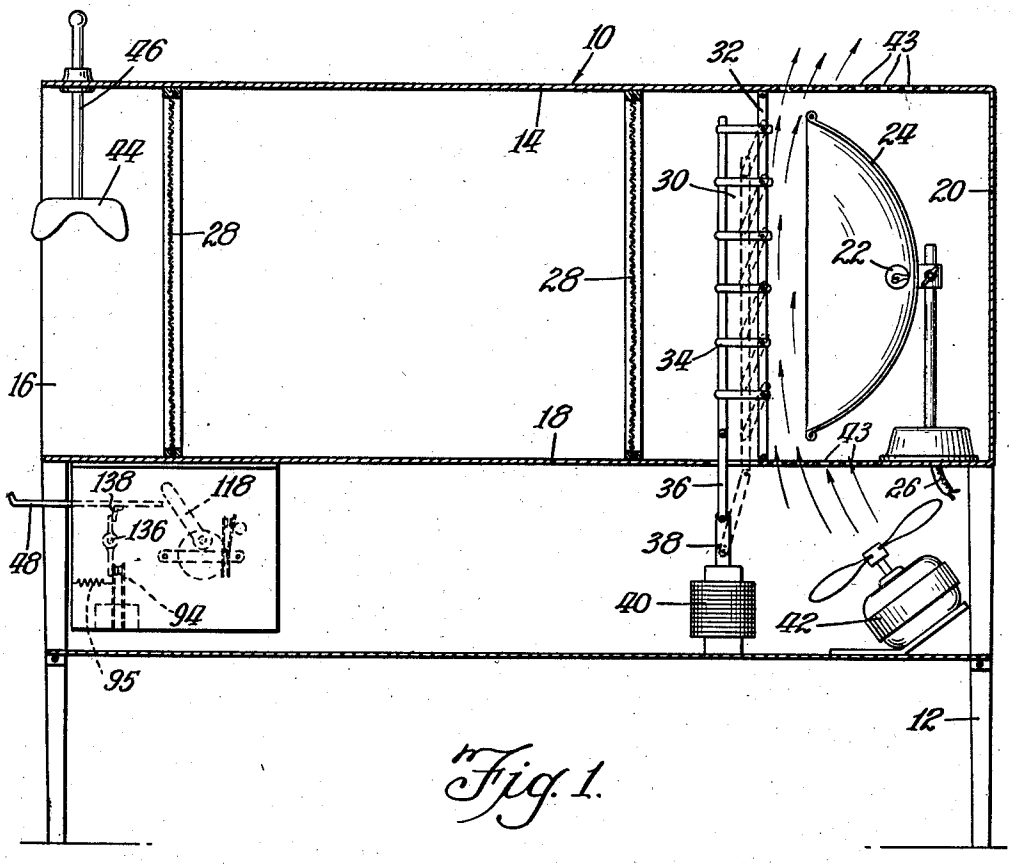
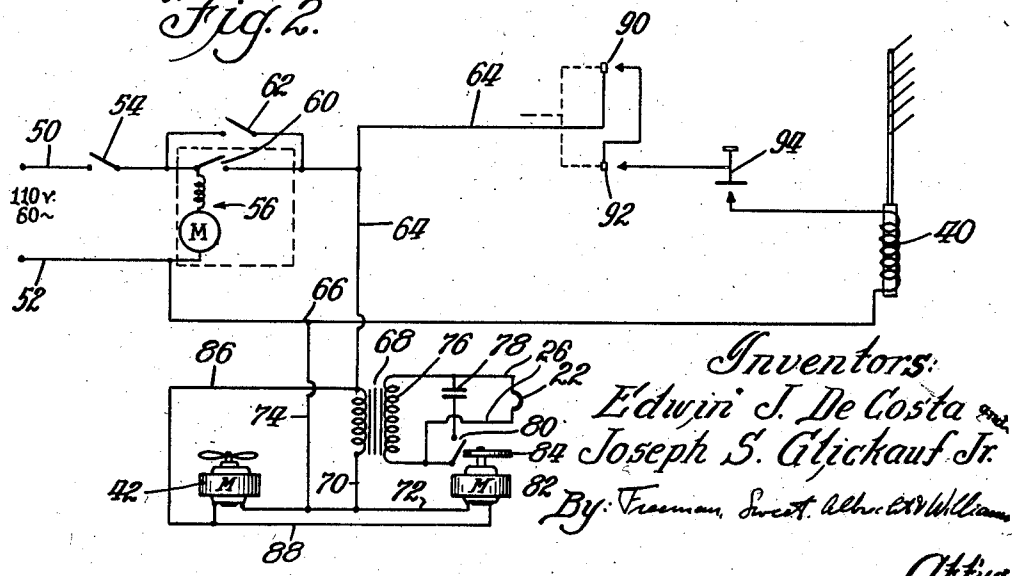


Fig. 1.

Fig. 2.



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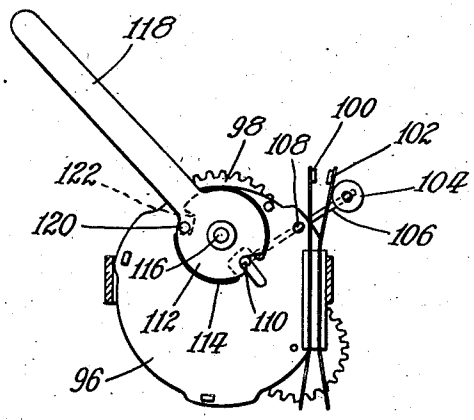


Fig. 3.

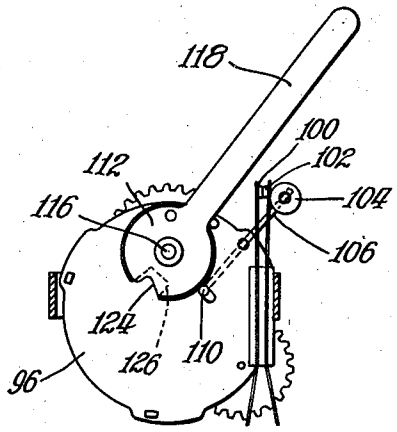


Fig. 4.

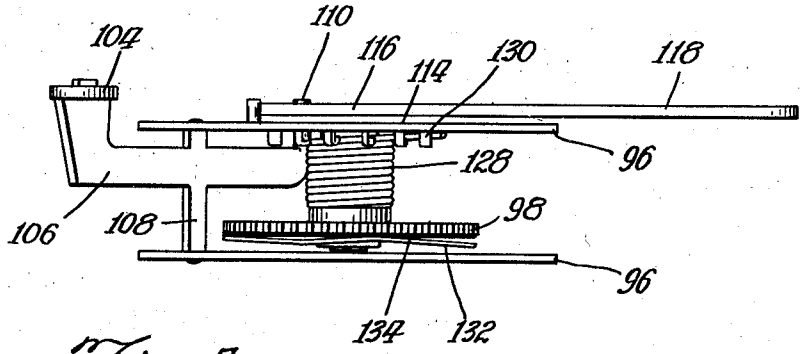


Fig. 5.

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UNITED STATES PATENT OFFICE

2,377,133

AUTOMATIC SERVICE EQUIPMENT

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Chicago, Ill.

Application February 19, 1942, Serial No. 431,510

11 Claims. (Cl. 250—50)

This invention relates to automatic service equipment and includes among its objects and advantages increased promptness in operation and increased safety for the user. These advantages are achieved by the apparatus disclosed to such an extent that services and treatment can be given which could not otherwise be automatically dispensed without undue delay or risk of injury to the recipient such, for instance, as ultra violet ray treatments.

In the accompanying drawings:

Figure 1 is a partially diagrammatic longitudinal section of a treatment cabinet according to the invention;

Figure 2 is a wiring diagram;

Figure 3 is a side elevation of an automatic timing device in one condition of adjustment;

Figure 4 is a similar view of the same device in a different condition of adjustment; and

Figure 5 is an enlarged detail view of the actuating lever for the timing device and parts directly associated therewith.

In the embodiment of the invention selected for illustration, 10 is a conventional cabinet or housing supported on legs 12 and including a top wall 14, two side walls 16, a bottom wall 18, and a rear end wall 20, leaving the end at the left in Figure 1 open to the user. At the right end there is indicated at 22 a conventional ultra violet ray generator including a reflector 24, which generator may receive energy through electrical connections 26. The screens 28 are of an open mesh so that a negligible amount of radiant energy will be interrupted by them, which screens effectively prevent the user from injury by improper access to the source 22. Adjacent and closely in front of the source there is provided a set of pivoted shutters 30 which, in the full line position, permits substantially all the energy from the source to pass through. But in the dotted line position the screens overlap to such an extent as to completely interrupt all radiant energy from the source. The shutters are pivoted on a support 32 and actuated by a drag link 34 connected to a pitman 36 which is moved up and down by the plunger 38 of the solenoid 40. Suitable means in the nature of a fan at 42 and vent holes at 43 are provided for maintaining an air circulation through such portions of the cabinet as might otherwise become unduly heated during periods of operation. The eye shield 44 at the user's end is adjustably mounted as by means of a slidable standard 46 for convenient adjustment to various heights so that users of different stature may move it to a convenient position during periods of use. A conventional coin control slide is diagrammatically indicated at 48 for the operation of circuit closing means to be described hereinafter.

Referring now to the complete equipment diagrammed in Figure 2, 50 is one wire and 52 the other wire of a conventional source of electrical power indicated as the usual 110 volt 60 cycle circuit. The master switch 54 is placed in a position accessible to the owner or operator but inacessible to the user. The synchronous time clock 56 may be set by the operator or at the factory to close the line switch 60 during predetermined periods which will be repeated regularly every twenty-four hours. Thus, whenever the switch 54 is closed, the equipment will remain operative during that portion of each day determined by the setting of the clock. If the owner or operator prefers not to have the clock 56 control the operation, he can close the bypass switch 62 either with or without disconnecting the clock 56, and thereafter he will ordinarily open the switch 54 by hand at the close of each business day and close it again at the beginning of each business day.

During periods when energy is thus rendered available in the wires 64 and 66, the generator 22 remains in continuous operation. For this purpose the step-up transformer 68 is connected through wires 70, 72, and 74 so that the high voltage winding 76 of the transformer is always delivering energy to the wires 26. The condenser 78 is connected across between the opposite ends of the winding 76 subject to the control of the switch 80, and the synchronous alternating current motor 82 rotates the cam 84 so as to close the switch 80 for a brief period every minute or so. The closure creates a momentary surge in the circuit including the winding 76 and the generator 22, which surge will start the generator operating if it is not already in operation, but will have no appreciable effect on the operation of the generator if it is already in operation.

The fan motor 42 and the tickling motor 82 are both connected across the line in parallel with the transformer 68, receiving energy from one pole through the wires 66, 74, and 72, and from the other pole through the wires 64, 86, and 88.

The automatic timing devices controlled by the user are indicated in Figure 2 diagrammatically at 90 and 92, and are connected in series so that power from the wire 64 has to come to the timing device 90, and if that contact is closed, it passes to the timing device 92, and if that contact is closed, it passes through the additional control contact 94 controlled by the coin slide 48, and the solenoid 40 is actuated and lifts the shutters to the full line position of Figure 1. This condition will continue until one or the other of the timing devices 90 and 92 opens the circuit and the shutters close, so that the user no longer receives treatment.

The purpose of having two timing switches 90 and 92 in series is to increase the factor of safety with respect to interruption of the circuit, to an extreme value. If the circuit were to remain closed for a much longer time than intended, the user might be seriously injured. Assuming, which is believed to be substantially correct, that such a switch as 90 and 92 can be made sufficiently reliable so that a switch which has passed inspection and test will not thereafter stick, or fail to open, oftener than once in 5,000 operations, the use of two switches in series reduces the risk or hazard of having both switches stick at the same time to one in 25,000,000, which is a degree of safety in keeping with the fact that serious personal injury might result from faulty operation in this respect.

Referring now to Figures 3, 4, and 5, each of the conventional timing devices indicated at 90 and 92 in Figure 2 comprises a frame 96 housing a conventional escapement timing device including the drive gear 98. The contact 100 mounted on the frame is stationary, and the contact 102 may be pressed against it by a roller 104 on the end of lever arm 106 pivoted on the frame at 108. The opposite end of the lever arm carries a pin 110 projecting past the edge of the cams 112 and 114 pivoted at 116. Cam 112 is integral with the actuating lever 118 which, as clearly indicated in Figure 1, lies in front of the coin slide 48 to be pushed by the coin slide from the position of Figure 3 to the position of Figure 4. Cam 114 is a disc underlying cam 112 having slight friction against the disc 112 but otherwise free to turn on the pivot 116. A pin 120 on cam 112 projects down into the notch 122 in cam 114, thus establishing a lost motion connection between the two cams. The receiving notch 124 in the cam 112 has a sloping side so that during movement from the position of Figure 3 to that of Figure 4, the pin 110 will ride up it, and the lever 106 will be shifted to the position of Figure 4. During this movement, the additional notch 126 in the cam 114 will occupy the position shown in dotted lines in Figure 4. But as the spring 128 (see Figure 5) turns the lever 118 slowly back to the position of Figure 3, the lost motion connection between the cams will permit the cam 114 to lag behind in a clockwise direction with respect to the counterclockwise movement of cam 112 so that the corner of the square slot 126 will be moved over into the middle of the notch 124 in the cam 112. Thus, at the end of the return movement to the position of Figure 3, the pin 110 will be held in the position of Figure 4 until the sharp corner of the notch 126 passes out from under it, and then it will snap back quickly to the position of Figure 3, thus providing a quick opening of the circuit. The spring 128 has one end anchored at 130 to the frame 96, and has its other end anchored to the lever 118 through the pintle 116. The pintle 116 also carries a driving disc 132 at its outer end, which driving disc is a resilient plate frictionally connected to the main gear 98 of the escapement timing means through a friction washer 134. The strength of the spring 128 is less than the friction force of the washer 134, but the friction force is materially less than the force the user can readily exert through the coin slide 48. Thus during movement from the position of Figure 3 to the position of Figure 4, the washer 134 slips, but after the coin slide 48 has been withdrawn again, the washer 134 holds the force of spring 128 and the escapement lets the spring unwind slowly in moving the lever 118 back to the position of Figure 3. The user finds himself compelled to draw the slide 48 back to its initial position because no service is received until he does so, by reason of the switch 94. Conventional means for closing the switch 94 on return movement of the slide 48 is indicated in Figure 1 in the nature of a pivoted lever 136, and a downward projection 138 on the slide, by means of which switch 94 is closed when the slide is in the position of Figure 1. Switch 94 is provided to prevent the user from blocking the return of lever 118, thereby keeping the shutter open longer than the predetermined interval. Spring 95 keeps contact 94 open until lever 48 is returned to its original position.

Without further elaboration, the foregoing will so fully explain the invention that others may, by applying knowledge current at the time of application, readily adapt the same for use under various conditions of service.

What is claimed is:

1. In a device of the class described, in combination: a source of radiant energy for the delivery of a flow of energy to a user, which source of energy requires a variable time interval to become effective; means other than said source and immediately operative and subject to the user's control for delivering or interrupting the delivery of energy from said source; automatic timing means limiting the time of operation of said delivering or interrupting means to deliver for a predetermined set time; and means for maintaining said energy source at all times in action and ready for immediate delivery of energy to the user, whereby delay in the delivering of energy to the user is eliminated, and the amount of energy delivered during each timed period is kept constant.

2. In a device of the class described, in combination: a cabinet; an ultra violet ray generator at one end of said cabinet; said cabinet being open to a user at the opposite end; guard means between the user's end and said generator to prevent a user from injurious access to said generator; a multiple shutter between said generator and the user's end; an adjustable eye shield at the user's end movable into various positions to cover the eyes of the user; coin-operated user's control means adjacent the user's end; automatic timing means connected to said control means to be rendered operative by an actuation of said user's control means; connections including a solenoid and a solenoid-actuating circuit adapted to be closed by said timing means, for opening said shutter for a predetermined length of time beginning with each actuation of said control means; and a master control inaccessible to the user but accessible to an operator, for rendering said generator continuously operative; said master control including automatic timing means for interrupting the operativeness of said generator repeatedly during predetermined portions of successive periods of twenty four hours each.

3. In a device of the class described, in combination: a cabinet; an ultra violet ray generator at one end of said cabinet; said cabinet being open to a user at the opposite end; a barrier between said generator and the user's end; an adjustable eye shield at the user's end movable into various positions to cover the eyes of the user; user's control means adjacent the user's end; automatic timing means connected to said control means to be rendered operative by an actuation of said user's control means; connections between said timing means and said barrier for opening

said barrier for a predetermined length of time beginning with each actuation of said control means; and a master control inaccessible to the user but accessible to an operator, for rendering said generator continuously operative.

4. In a device of the class described, in combination: a cabinet; a radiant energy generator at one end of said cabinet; said generator requiring a specific preconditioning before it is of desirable efficiency; said cabinet being open to a user at the opposite end; a barrier between said generator and the user's end; coin-operated user's control means adjacent the user's end; automatic timing means connected to said control means to be rendered operative by an actuation of said user's control means; connections between said timing means and said barrier for opening said barrier for a predetermined length of time beginning with each actuation of said control means; and a master control inaccessible to the user but accessible to an operator, for keeping said generator continuously preconditioned; said master control including automatic timing means for interrupting the operativeness of said generator repeatedly during predetermined portions of successive periods of twenty four hours each.

5. In a device of the class described, in combination: a cabinet; a radiant energy generator at one end of said cabinet; said generator requiring a specific preconditioning before it is of desirable efficiency; said cabinet being open to a user at the opposite end; a barrier between said generator and the user's end; user's control means adjacent the user's end; automatic timing means connected to said control means to be rendered operative by an actuation of said user's control means; connections between said timing means and said barrier for opening said barrier for a predetermined length of time beginning with each actuation of said control means; and a master control inaccessible to the user but accessible to an operator, for rendering said generator continuously operative.

6. In a device of the class described, in combination: a cabinet; a radiant energy generator at one end of said cabinet; said generator requiring a specific preconditioning before it is of desirable efficiency; said cabinet being open to a user at the opposite end; user's control means adjacent the user's end; automatic timing means connected to said control means to be rendered operative by an actuation of said user's control means; means in the nature of a barrier controlled as to its operativeness by said timing means for delivering or preventing delivery of radiation from said generator to said user; whereby the timing means determines the length of time, beginning with each actuation of said control means, during which the user is subjected to radiation; and a master control inaccessible to the user but accessible to an operator, for rendering said generator continuously operative.

7. In a device of the class described, in combination: a cabinet; a radiant energy generator at one end of said cabinet; said generator requiring a specific preconditioning before it is of desirable efficiency; said cabinet being open to a user at the opposite end; user's control means adjacent the user's end; automatic timing means connected to said control means to be rendered operative by an actuation of said user's control means; means controlled as to its operativeness by said timing means, for delivering or preventing delivery of radiation from said generator to said user without interrupting the operation of said source; whereby the timing means determines the length of time, beginning with each actuation of said control means, during which the user is subjected to radiation.

8. In a device of the class described, in combination: a cabinet; a source of radiant energy in said cabinet; said source of energy requiring a specific preconditioning before it is of desirable efficiency; said cabinet being open to a user; user's control means; automatic timing means connected to said control means to be rendered operative by an actuation of said user's control means; means controlled as to its operativeness by said timing means for delivering or preventing delivery of radiation from said generator to said user without interrupting the operation of said source; whereby the timing means determines the length of time, beginning with each actuation of said control means, during which the user is subjected to radiation.

9. In a device of the class described, in combination: a cabinet; a source of radiant energy in said cabinet; said source of energy requiring a specific preconditioning before it is of desirable efficiency; said cabinet being open for the delivery of energy; control means; automatic timing means connected to said control means to be rendered operative by an actuation of said control means; means controlled as to its operativeness by said timing means for delivering or preventing delivery of energy without interrupting the operation of said source whereby the timing means determines the length of time, beginning with each actuation of said control means, during which energy is delivered.

10. In a device of the class described, in combination: a source of radiant energy actuated by electric power and having a pair of main terminals, said source requiring an abnormal energy supply to said main terminals to initiate operation when it is not in operation; and continuously operating means connected to and actuated by the normal energy supply to said lamp for intermittently creating the required abnormality in the power supply; whereby, after any interruption of the power supply, restoration of power will cause said source of radiant energy to resume operation automatically after a relatively short time interval.

11. In a device for administering timed therapeutic treatments of such a nature that injury would result from an overdose: an electric circuit; means for administering treatment actuated by a current flow in said circuit; two devices for automatically opening a circuit after a predetermined time; said devices being adapted to operate after substantially the same time interval; means for initiating the operation of both devices substantially at the same time; and connections including both said devices in series in said first mentioned circuit; whereby the probability of an overdose due to failure of said devices is substantially the square of the probability that either device will fail to function.

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