June 8, 1954 M. G. DOYLE 2,680,813

OZONE CLOCK

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Fig. 1.

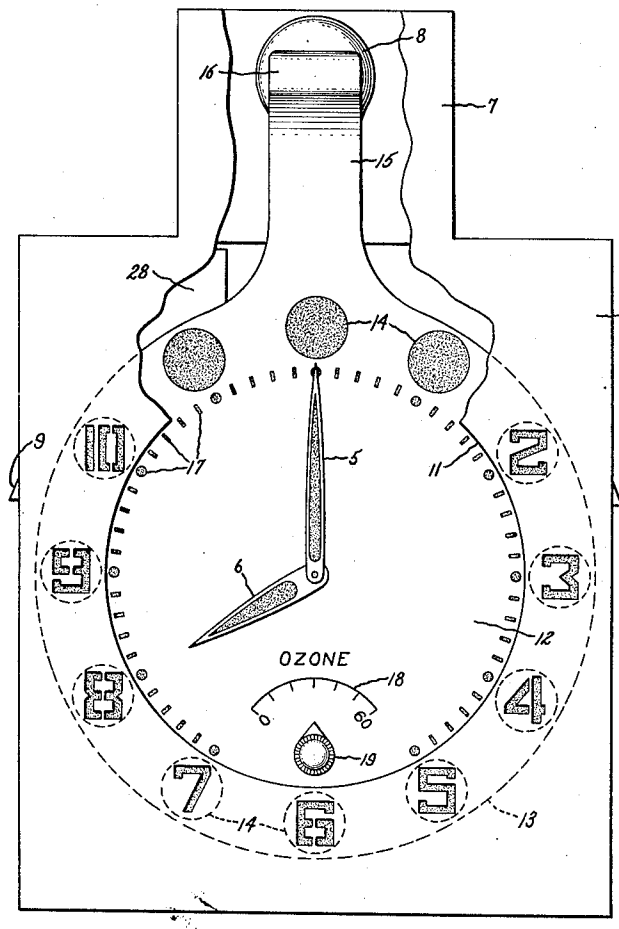


Fig. 2.

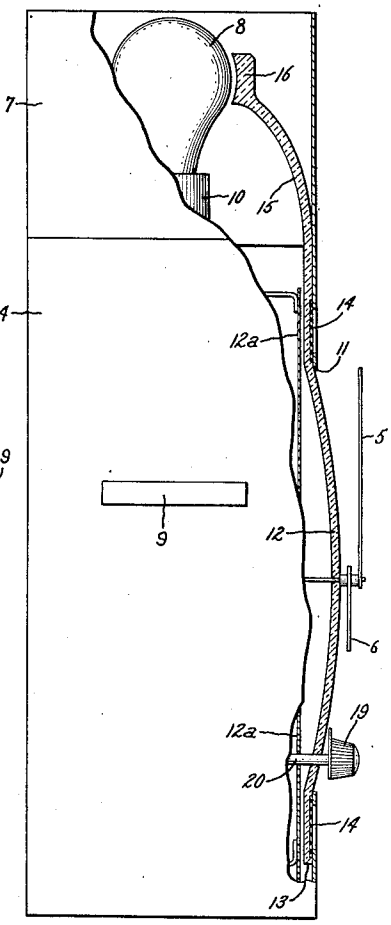
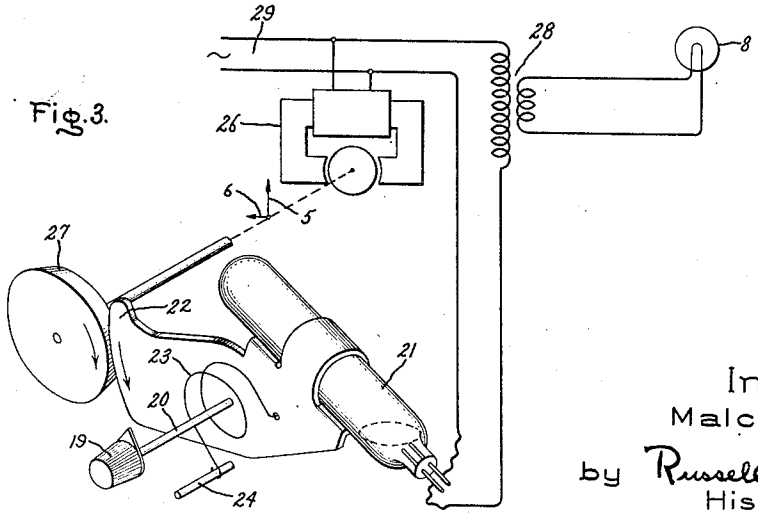


Fig. 3.



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OZONE CLOCK

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3 Claims. (Cl. 250—43)

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My invention relates to clock-controlled ozone and germicidal lamps, and its object is to provide an ozone or germicidal lamp control which is simple, safe and convenient for use in homes and hospitals without requiring the users to have any particular skill or knowledge of the subject. For this purpose I have provided a control where the lamp is turned on manually but is always turned off automatically after a relatively short adjustable period of time.

Means are provided generally to protect the eyes of users from the direct rays of the lamp. The clock used for control purposes is preferably provided with the usual clock dial and hands and serves the purpose of an ordinary clock, and its dial may be and preferably is arranged to be illuminated by the lamp and used as a signal to indicate when the lamp is on, and at such times may be used as a night light. For this purpose the clock dial and hands are so made as to glow by the use of fluorescent or radium paint, or the like, when exposed to the ultraviolet rays from the lamp used.

The apparatus is preferably self-contained, the clock casing housing all of the necessary components such as a ballast or transformer for the lamp, the lamp itself, the control therefor, and the necessary clock works such that the apparatus appears little different from an ordinary household clock and may be used as such in addition to performing its functions as a deodorizer or sterilizer as and when needed.

The features of my invention which are believed to be novel and patentable will be pointed out in the claims appended hereto. For a better understanding of my invention reference is made in the following description to the accompanying drawing in which Fig. 1 represents a face view of the ozone clock with portions of the casing structure broken away more clearly to illustrate illumination features to be described. Fig. 2 represents a side view of the apparatus of Fig. 1 with portions of the casing wall broken away for the same purpose as Fig. 1, and Fig. 3 is a somewhat schematic illustration of the control and of the lamp and clock motor wiring diagram.

Referring now to Figs. 1 and 2, the apparatus is housed in a casing 4 which, except for features to be mentioned, may be a conventional clock case having an exposed clock dial at its front and with time-telling minute and hour hands 5 and 6 indicating on such dial. At the central top of the case there is a chimney-like upward extension 7 which serves as a screen to protect the eyes of users from the direct rays of the ozone or germicidal lamp 8 contained within such chimney. This may have an open back and have any suitable configuration to conform to decorative features of the clock case used. This chimney or screen section will be made of a material

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which is partially or wholly opaque to ultraviolet rays generated by the lamp 8 when it is in operation. The top of the chimney is open and the bottom may open into the casing proper, and the casing may have one or more louver openings such as represented at 9 in Fig. 2 to permit the circulation of air through the chimney, the heat of the lamp when in operation providing an upward draft to promote such free circulation of air, and hence an efficient distribution of the beneficial effects produced by the lamp in the room in which it is used.

The lamp 8 is supported and electrically connected in circuit by a suitable socket indicated at 10 in Fig. 2, the socket being supported by any suitable casing or clock frame structure, not indicated.

As represented in Figs. 1 and 2, the front of the casing has a circular dial opening 11, which opening is closed by a transparent sheet bezel 12 which may be made of Lucite glass, polystyrene or any other transparent ultraviolet ray conducting material. This Lucite bezel part preferably has a diameter somewhat larger than the dial opening 11 in the casing and is inside and against the inner front wall of the casing. The outer edge of the Lucite bezel is indicated at 13 such that there is a circular annular band between the inner edge of opening 11 and the outer periphery of the Lucite bezel where the two overlap. And in this circular band the ordinary clock hour numerals are cut through the front wall of the casing as indicated by the large numerals 2 to 10, inclusive, in Fig. 1. This then exposes the Lucite material directly to the rear of such cutout numeral openings. The Lucite bezel material back of such numeral openings is painted with a fluorescent paint as indicated at 14 of a character which will glow when excited or exposed to ultraviolet rays, and a reduced width section 15 of the Lucite bezel material is extended upward into the chimney 7 where it is bent towards the lamp 8 and shaped at 16 efficiently to receive into its interior ultraviolet rays from the lamp when the latter is energized, and to conduct such rays through the Lucite by internal reflection to the various portions of the Lucite which have been painted with the fluorescent paint. The paint causes refraction of such rays outwardly of the Lucite and hence the fluorescent paint is caused to glow and be readily visible in the cutout numeral.

Similarly, there may be small marks 17 made with fluorescent paint forming clock dial minute graduations on the outer surface of the Lucite just inside the circular opening 11, which also glow when excited by the ultraviolet light transmitted through the Lucite from the lamp. The dial markings which are farthest from the lamp may have a progressively heavier deposit of the fluorescent material so that the dial lumines-

cence will be uniform. The clock hands 5 and 6 are preferably made of a skeleton formation with a narrow opening along their central portions. These openings are filled with fluorescent paint, the openings being narrow enough and the paint of such consistency as to be retained therein when dry. There is sufficient ultraviolet light emitted from the various painted portions of the Lucite dial to cause the fluorescent material in the clock hands to glow and show their positions in the dark, and to distinguish the hour hand from the larger minute hand. The details of the ultraviolet light excited clock indications may be varied, and various different paints containing material which will glow when thus excited may be used. The clock hands may be inside instead of outside the bezel.

As shown in Fig. 2, there is a background sheet 12*a* to the rear of the bezel 12. This sheet may be paper, metal, opaque plastic, or the like, and may be painted or decorated in any desired color or colors and serves to hide the clock movement parts that would otherwise be visible through the transparent bezel. It should, however, preferably be spaced slightly away from the bezel as shown because if in direct contact with the bezel, it serves to release from the bezel, and thus waste, a portion of the ultraviolet rays.

Just above the clock numeral 6 is a small minute scale 18 graduated from 0 to 60, and in this case marked Ozone. These markings may be cut into the Lucite and filled with a fluorescent material so as to flow when excited by ultraviolet light from the lamp 3. Indicating with respect to dial 18 is a pointer knob 19 constituting the control knob for turning on lamp 3 and adjusting the time "on" period thereof from any time from zero up to 60 minutes.

One suitable arrangement for such control is shown in Fig. 3. The knob 19 is on a rotatable shaft 20, the shaft extending through the Lucite bezel with the knob accessible on the outside. The shaft 20 is mounted in bearings in the clock casing and has on it within the clock casing a mercury switch 21 and a friction or gear drive sector 22. A mercury or other enclosed switch is desirable from a safety standpoint. A spring 23 fastened between a stationary post 24 and the shaft assembly urges the shaft in a counterclockwise direction. The post 24 extends beneath the hub portion of the sector 22 and serves as a stop to restrict rotation of the assembly within desired limits.

At 26 is represented the motor for driving the clock and this will preferably be a self-starting synchronous motor, although it could be a spring motor. From a suitable speed shaft in the clock train (illustrated diagrammatically) a friction wheel or gear 27 is driven continuously in a clockwise direction and is positioned to engage sector 22 in driving relation when the sector is rotated thereagainst. From an "Off" position where the pointer on knob 19 points below or to the left of the zero end of scale 18, with the sector 22 below and out of engagement with the friction wheel and stopped by stop pin 24, the knob 19 may be turned in a clockwise direction to bring sector 22 into frictional driving engagement with friction drive wheel 27, and because this is a friction drive or a friction clutch is otherwise provided the sector may be slipped on wheel 27 to any desired driving position. When the knob is then released, the sector 22, the shaft 20 with the mercury switch mounted thereon, and knob 19 are driven by the clock in a counterclockwise direction at a speed such that the pointer on knob 19 would be driven over scale 18 at a rate corresponding to the minute graduations on such scale. When the pointer reaches and indicates on the zero end of the scale, the sector 22 disengages from wheel 27, and spring 23 rotates shaft 20 a small distance further in a counterclockwise direction to an "Off" position until stopped by stop 24. In moving to this "Off" position the mercury switch 21 is tilted to open circuit position positively and quickly and is tilted to closed circuit condition whenever sector 22 is in engagement with friction wheel 27. It is thus seen that this control constitutes a manually closed, adjustable time delay automatically opened switch.

The time "On" period may be readjusted at any time when the switch is closed. For instance, assume the operator has closed the switch and set the time "On" period for 30 minutes where the pointer on knob 19 points to the middle graduation of scale 18. If before the 30 minutes are up, it is decided that the time delay "On" period should be extended or decreased, this may be done by corresponding manual adjustments of knob 19. Likewise, the switch may be turned off manually at any time before it would be turned off automatically.

The contacts of the switch are in series relation with the primary of a step-down transformer 28 which is connected across alternating current source 29, assumed to be a 110-volt, 60-cycle source which supplies both the clock motor and transformer. The secondary of the transformer is connected to the lamp 3. The transformer ratio should be such as to supply the correct lamp voltage. For example, a common form of ozone lamp requires 12.5 volts and 356 milliamperes. In place of a transformer, a ballast resistance might be used, but I prefer to use a transformer as it may be made smaller, lighter, and consumes less power than the required ballast resistance. The transformer may be made small enough to be enclosed in the clock casing, and in Fig. 1 I have indicated the transformer as being within the clock casing at 28. The lamp used is one that produces or emits untraviolet rays and may be particularly designed to break down the atmosphere to liberate free oxygen or ozone, or it may be particularly designed to emit germ-killing ultraviolet rays, eliminate undesirable odors, or produce therapeutic results. The rays from such lamp, while beneficial for the purpose for which intended, are detrimental to the eyes if there is exposure for any appreciable time; hence, the use of a chimney or screen which is opaque to ultraviolet rays. To prevent possible distressing or harmful results by continuous or prolonged operation of the lamp, I have arranged the control so that the lamp is never turned on automatically, and when turned on will be turned off automatically within a relatively short period of time. In the example given, the time during which the lamp may be turned on without attention cannot exceed one hour. Hence, a person may turn the lamp on and forget it or go to sleep with the assurance that it will be turned off without further attention within an intended short time. This is desirable also because lamps of this character have a relatively short useful life.

There is a further safety feature in having the clock driven by a self staring electric motor energized in parallel with the lamp as described because in case of a power failure and a conse-

quent stopping of the clock with the switch closed, the lamp nevertheless goes off but comes on again when the power is restored and the motor is started so that the total time on period before and after the power failure will be that for which adjusted, whereas with a spring-driven clock the clock could stop with the switch on and the lamp would continue to burn indefinitely.

Ultraviolet lamps of the type contemplated do not give off any substantial amount of visible light, although in the dark the lamp would be visible without any fluorescent material being used and could, while lit, serve as a night light and as a night signal as to the "on" or "off" condition of the lamp. The fluorescent material on the clock dial materially increases the visibility in the dark and enables time to be read at night, and when the lamp is on serves as a signal for the lamp "on" or "off" condition even in the daytime. In the daytime the holes formed by the cutout clock hour numbers in the clock dial shade the bottom of these holes formed by the Lucite so if the lamp is not lit, these shaded openings appear dark but if the lamp is lit, they glow sufficiently even in the daylight to provide a lamp "on" or lamp "off" signal, whereas in the daytime with the lamp itself screened by the chimney it would not, by itself, be a satisfactory signal. The ventilation produced by the heat of the lamp is beneficial, both as tending to keep the transformer cool when energized and as tending to cause circulation of the air in the room where the device is used. Thus, in the case of an ozone lamp the ozone tends to be distributed about the room although there is no noticeable draft.

Thus, the apparatus in addition to its utility as an ordinary time-telling clock provides the health features described as and when needed or desired with safety, convenience, and with relatively small additional cost. The control and transformer being inside the clock case and with the lamp hidden from visibility by a screen that may be incorporated into the clock case design, the apparatus may have substantially the space requirements and appearance of an ordinary, attractive clock.

What I claim as new and desire to secure by Letters Patent in the United States is:

1. A clock, a casing therefor, said clock having a clock dial and time-telling pointers exposed to view at the front of said casing, an ultraviolet lamp supported by said casing, said lamp when energized producing ozone in the atmosphere surrounding said lamp and casing and circulation of such atmosphere, a screen opaque to ultraviolet rays hiding said lamp from the view of a person to the front of said casing, a sheetlike piece of transparent material capable of transmitting ultraviolet rays by internal reflection forming at least a portion of said clock dial and extending to the vicinity of said lamp so as to be exposed to and to receive rays from said lamp into its interior, and fluorescent material deposited on clock dial portions of said sheet material which are caused to glow by reason of the ultraviolet rays transmitted thereto from the lamp through the sheet material, a switch in said casing through which electric energy is supplied to said lamp, adjustable time delay means in said casing operated by said clock for opening said switch, and manual means accessible at the front of said clock for closing said switch and adjusting the time delay setting of said switch opening means.

2. A clock, a casing therefor, a dial and clock hands for the clock exposed to view from the front of said casing, an ultraviolet lamp supported at the top of said casing, a chimney-like screen opaque to ultra-violet rays for hiding said lamp from view from the front and sides of said casing, said clock dial including transparent sheet material capable of transmitting ultraviolet rays by internal reflection, which material extends to the vicinity of said lamp and receives ultraviolet rays therefrom into its interior, fluorescent clock dial markings deposited on the front surface of said sheet material and on said clock hands which are caused to glow when the lamp is energized by reason of ultraviolet rays transmitted through the sheet material from the lamp, said lamp when energized producing ozone in the adjacent atmosphere and the circulation of such atmosphere, voltage reducing means in said casing through which the lamp is supplied, a switch in said casing for energizing and de-energizing said lamp, adjustable time delay means in said casing operated by said clock for opening said switch when closed, manual means accessible at the front of said casing for closing said switch and setting the time delay adjustment of the switch opening means, and a time scale on said clock dial and a pointer on said manual means for indicating such time delay setting adjustment.

3. A combined clock and ultraviolet ray producing apparatus comprising a clock casing, a self-starting electric motor driven clock movement in said casing, a clock dial and hands for said clock at the front of said casing and having material thereon which will glow when excited by ultraviolet light, an ultraviolet lamp supported at the top of said casing, casing structure hiding said lamp from the view of a person at the front of said casing, internal ray reflecting material for transmitting ultraviolet rays from said lamp to the fluorescent material on the dial and hands, a voltage reducing transformer in said casing through which the lamp is supplied, connections for energizing the electric motor of the clock movement and the primary of said transformer in parallel from a common source of supply, a switch of the enclosed contact type in said casing connected between the primary of said transformer and the parallel connection to said source of supply, a rotary shaft in said casing and extending to the front thereof for opening and closing said switch, said shaft being biased in a switch opening direction, a pointer and a knob at the front end of said shaft for manually rotatatively adjusting the shaft, a time scale on the clock dial on which said last-mentioned pointer indicates the rotary adjustment position of said shaft, and a wheel in said clock movement and a wheel sector on said shaft rotatable into driving engagement for driving said shaft in a switch opening direction when engaged, said switch being closed only when said driving parts are in driving engagement.

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