Oct. 21, 1941. G. E. LUCE 2,259,758

TIMING DEVICE FOR ELECTRIC CIRCUIT OPERATION

Filed April 18, 1940

FIG. 1

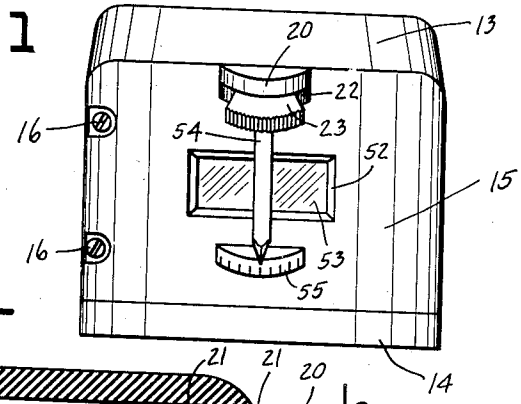


FIG. 2

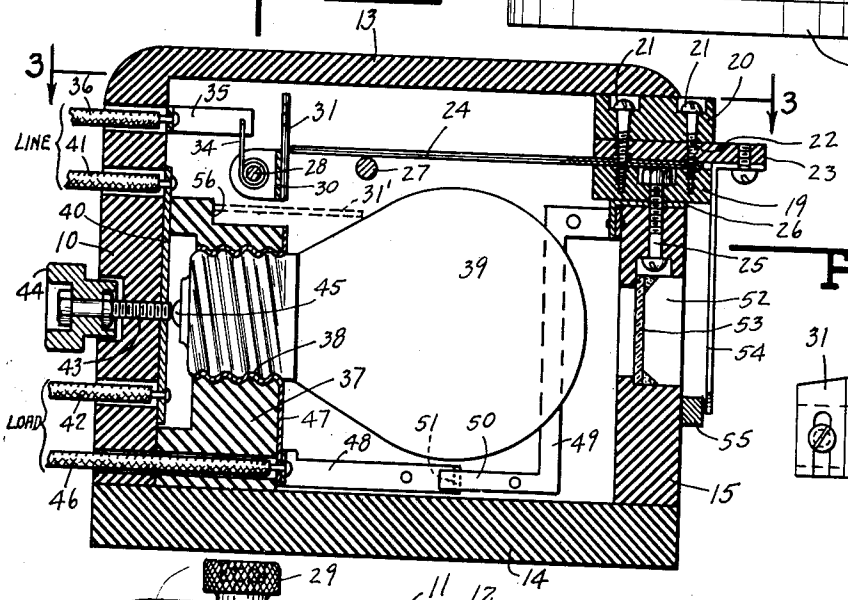


FIG. 4

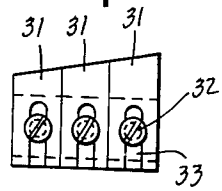
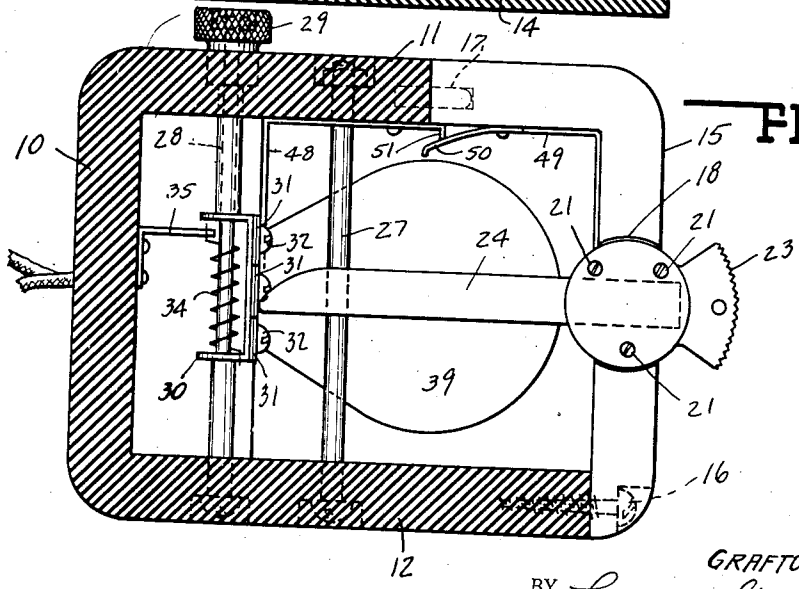


FIG. 3



INVENTOR.
GRAFTON E. LUCE.

BY Lockwood, Goldsmith & Galt,
ATTORNEYS.

Patented Oct. 21, 1941

2,259,758

UNITED STATES PATENT OFFICE

2,259,758

TIMING DEVICE FOR ELECTRIC CIRCUIT OPERATION

Grafton E. Luce, Brazil, Ind.

Application April 18, 1940, Serial No. 330,366

2 Claims. (Cl. 200—122)

This invention relates to a timing device for electric circuit operation.

One object of the invention is to provide a relatively simple and inexpensive timing device for the operation of electric circuits for many purposes. Timing devices now on the market generally include clock mechanisms of one kind or another which are relatively expensive to manufacture. The use of such devices is therefore limited to situations in which this expense is justified.

In the present invention, the timing of operation of an electric circuit is accomplished without the use of clock mechanism of any type. A reasonably accurate time control is obtained by the use of an electric switch operated by a thermally flexible element heated by an electrical heating unit adapted to generate a predetermined amount of heat in a predetermined time. Preferably the heating unit employed is an electric lamp which may also be arranged to provide light and which in any case gives a visible indication of the fact that the timing unit is in operation. In many cases the lamp which supplies the heat for operating the timing device is in itself the electrical unit controlled by the device. This fact extends the usefulness of the invention to the control of lamps which are often accidentally left burning or which are inconvenient to extinguish manually.

An example of such use is for a porch light. A person leaving his own home ordinarily has no assistance from his own porch light since he must leave it burning until he returns if he is to receive light from it as he goes from the porch to the street. By the use of the invention he may turn the light on and may leave it lighted under control of the timing unit. A few minutes after his need for the light has ceased, it is automatically extinguished. A similar use is found in automobiles where a light may be arranged to project a beam from the side windows of a car to assist the owner in going from the car to a darkened house. A few minutes later the heat of the lamp operates the timing device and turns off the light.

The invention also permits garage lights to be left lighted during the entire operation of taking a car out of the garage, without the necessity of the driver then getting out of the car turning out the light and getting back into the car.

In the control of closet lights, particularly in hotels, the use of the invention to turn the lights out after a predetermined period of use, may save considerable electric energy. The same is true in filling station toilet rooms which are infrequently used but in which lights are often left burning long after the necessity of their use has ceased.

One of the principal uses however, in which the economical construction of the device is important, is for the control of radio sets in the home. The use of the invention in this connection permits the use of the radio after the listeners have retired without the necessity of getting up and turning it off. It is automatically turned off by the timing device at a predetermined time after it is started. For this use particular means are provided for simple and convenient adjustment of the time period and for maintenance of the radio circuits independent of the timing device when the radio is to be used in the normal manner.

Numerous other uses of the invention and the full nature thereof will be apparent from the accompanying drawing and the following description and claims:

Fig. 1 is a perspective view of a timing unit designed particularly for radio operation. Fig. 2 is a central vertical sectional view thereof. Fig. 3 is a sectional plan view taken on the line 3—3 of Fig. 2. Fig. 4 is an elevational view of one of the contact members used in the construction.

In the form of the invention shown in the drawing by way of illustration, there is provided a housing having a rear wall 10, side walls 11 and 12 and top 13 which may be formed integrally with each other if desired. The housing is provided with a bottom 14 which may be formed integrally therewith or secured in any suitable manner. A closure 15 is provided for the front of the housing and may be secured in any suitable manner as by screws 16 engaging the side wall 12 and a dowel pin 17 maintaining the proper relation between the closure and the side wall 11. Preferably the entire housing and closure are formed of insulating material.

The closure 15 is provided with a recess 18 in which there is seated a pair of disc members 19 and 20 formed of insulating material and secured together by screws 21. Between the members 19 and 20 there is retained a strip 24 of thermally flexible material such as the bimetal commonly used in thermostats, and a member 22 having a forwardly extending segmental portion 23. The member 19 is pivotally mounted on a stud 25, the upper end of which makes electrical contact with the strip 24 and which is threadedly engaged by a metallic member 26 secured by

any suitable means to the closure 15. By means of this construction the strip 24 is secured to the discs 19 and 20 without the necessity of drilling holes therein since the screws 21 are arranged on opposite sides of said strip. A bolt 27 extending between the side walls 11 and 12 serves as a positioning means for the strip 24 on which said strip normally rests when cold.

A rotatable stem 28 is journaled in the side walls 11 and 12 and is provided with a knob 29 on its outer end. A bracket 30 is secured to the stem 28 and has mounted thereon a group of three contact members 31, the form of which is best seen in Fig. 4. Said contact members are adjustably secured to the bracket 30 by screws 32 engaging slotted openings 33 in said members. The height of the members 31 increases progressively from left to right and each of said members may be individually adjusted as to height. A torsion spring 34 surrounds a portion of the stem 28 and engages at one end the bracket 30 and at the other end an arm 35 secured to the back wall 10 and electrically connected to a line conductor 36. The spring 34 normally urges the bracket 30 and contact members 31 in the clockwise direction referring to Fig. 2 and presses the surface of one of said contact members against the tip of the bimetal strip 24.

Secured to the rear wall 10 of the housing there is a block 37 of insulating material on which there is mounted a metallic lamp socket 38. A lamp 39 is mounted in the socket immediately beneath the bimetal strip 24. The axis of the lamp is substantially parallel to the axis of the strip so that the strip receives heat from the lamp throughout substantially its entire length. A conductor 40 is secured to the back wall 10 and is electrically engaged with a line conductor 41 and a load conductor 42. A metallic stud 43 carrying a knob 44 is threadedly engaged with the conductor 40 and is adapted to engage the central contact member 45 of the lamp 39. A load conductor 46 is electrically connected to a downwardly extending portion 47 of the lamp socket 38 and to a conductor 48, the position of which is best seen in Figs. 2 and 3. A conductor 49 secured to the closure 15 has a resilient portion 50 adapted to engage an outwardly turned tip 51 of the conductor 48 when the closure is in place. The conductor 49 is electrically connected to the conducting member 26 which is in turn connected to the bimetal strip 24 through the pivot screw 25.

An opening 52 in the closure 15 is provided with a glass window 53 through which the light of the lamp 39 is visible. An index member 54 secured to the member 23 extends downwardly in front of the window 53 and registers with a scale 55 secured to the front of the closure 15.

In the operation of the invention the line conductors 36 and 41 are connected to any suitable source of electric current. The load conductors 42 and 46 are connected to an external electric circuit, the operation of which is to be controlled,—for example, to a lighting circuit or the main power circuit of a radio set. With the parts in the position shown in the drawing, the current for the lamp 39 is supplied from the line conductor 36 through the arm 35, spring 34, bracket 30, one of the contact members 31, the thermally flexible strip 24, pivot screw 25, conductors 26, 49 and 48, lamp socket 47, lamp 39, contact point 45, stud 43 and conductor 40 to the second line conductor 41. The lamp is thus lighted and serves to heat the thermal strip 24. At the same time the load conductor 46 is connected to the line conductor 36 through the same current path and the load conductor 42 is connected to the line conductor 41 through conductor 40 so that the load is also supplied with power. As the thermal strip 24 is heated it flexes upwardly and at the end of a predetermined time period reaches the top of the contact member 31 with which it is in contact. When this occurs the spring 34 rocks the contact members 31 into the position indicated by broken line 31' in Fig. 2, in which position the edges of said contact members engage a shoulder 56 on the insulation block 37. Contact is thus broken between the contact members 31 and 24, the lamp 39 is extinguished and the power supply to the load circuit is cut off.

The contact members 31 are preferably formed of thermally flexible material and are placed in position to bend away from the strip 24 as they are heated. These contact members receive heat directly from the lamp 39 and by conduction from the strip 24. As the heating progresses, said members bend backwardly but the action of spring 34 maintains the same in contact with the tip of the strip 24. As the angular position of the bracket 30 changes during this movement the point of contact between the contact members 31 and 24 is also changed, both by the flexing of the members 31 and by the flexing of the member 24. The flexing of the members 31 thus provides for additional relative movement between the contact members and serves to minimize any tendency for the tip of the strip 24 to stick in its movement over the surface of the contact members 31.

The variable height of the contact members 31 combined with the rotatable mounting of the strip 24 provides a ready means for adjusting the time period of operation. This is accomplished by manual manipulation of the segmental portion 23 of the member 22. When the member 22 is moved to bring the tip 24 into engagement with the shortest of the three contact members 31, the period of operation is shortest. When the member 22 is moved in the opposite direction to bring the tip of the strip 24 into engagement with the longest contact member 31, the time of operation is a maximum. The index member 54 moves over the scale 55 in the movement of the member 22 and the scale 55 may thus be calibrated in terms of operating time.

When the device has been operated at the end of a predetermined time period and the bimetal strip 24 has been allowed to cool, a new cycle of operation may be started by rotating the knob 29 to return the contact members 31 to their vertical position. If it is desired to operate the load circuit independent of time control the knob 44 is returned to withdraw the stud 43 from contact with the lamp and thus to break the lamp circuit. The light of the lamp seen through the window 53 indicates whether or not the circuit is operating on the time control. When the invention is to be used purely for illuminating purposes, the window 53 may be made considerably larger than shown herein and the lamp 39 is then used for illumination.

The invention has been described in one of its preferred forms, the details of which may be varied without departing from the scope of the invention as defined in the appended claims.

The invention claimed is:

1. In a timing device for electric circuit operation, a contact strip formed of thermally flexible material, a second contact member hav-

ing a surface substantially perpendicular to the axis of said strip and normally engaging a free end thereof, a pivotal mounting for said second contact member, spring means urging said second contact member about its pivotal mounting to press the surface thereof against said strip, and an electrical heating unit arranged to heat said strip and to flex the same in a predetermined time sufficiently far to clear the edge of said second contact member and to thereupon permit movement of said second contact member to a non-contacting position by said spring, said second contact member being formed of thermally flexible material and arranged to receive heat from said heating element and to flex away from said strip when heated, whereby said spring in maintaining contact between said contact members produces a slight movement of the second contact member about its pivotal mounting.

2. In a timing device for electric circuit operation, a contact strip formed of thermally flexible material, a second contact member having a surface substantially perpendicular to the axis of said strip and normally engaging a free end thereof, a pivotal mounting for said second contact member, spring means urging said second contact member about its pivotal mounting to press the surface thereof against said strip, an electrical heating unit arranged to heat said strip and to flex the same in a predetermined time sufficiently far to clear the edge of said second contact member and to thereupon permit movement of said second contact member to a non-contacting position by said spring, the distance of the edge of said second contact member from the normal plane of said contact strip varying progressively across the width of said contact member, and means for moving said strip laterally to vary the time of operation of said device.

GRAFTON E. LUCE.