

Dec. 30, 1941.

R. SIMMON

2,268,268

TIMING APPARATUS

Filed July 14, 1938

3 Sheets-Sheet 1

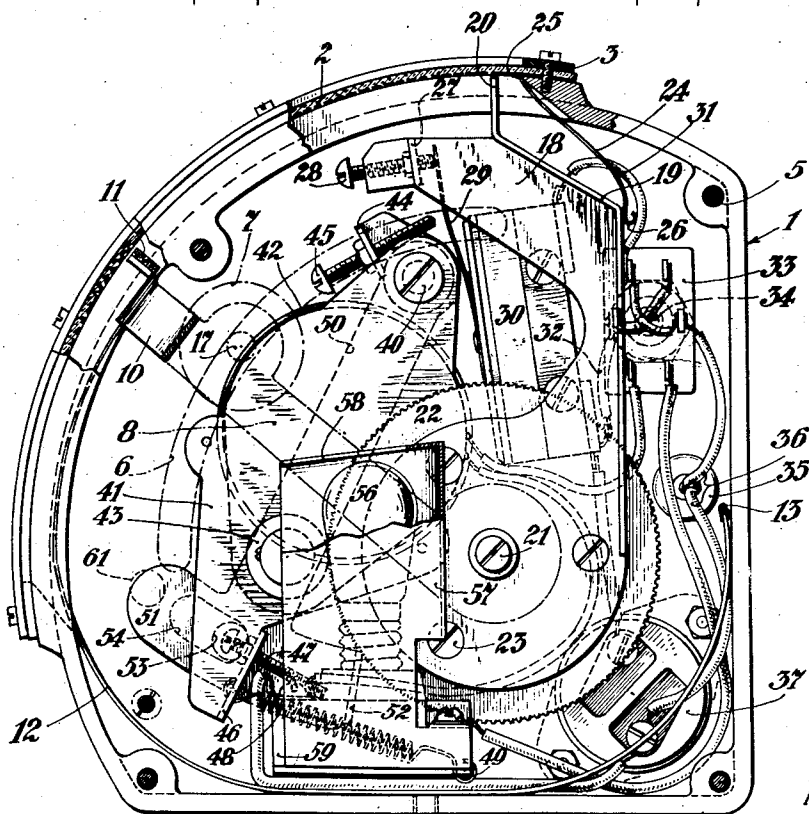
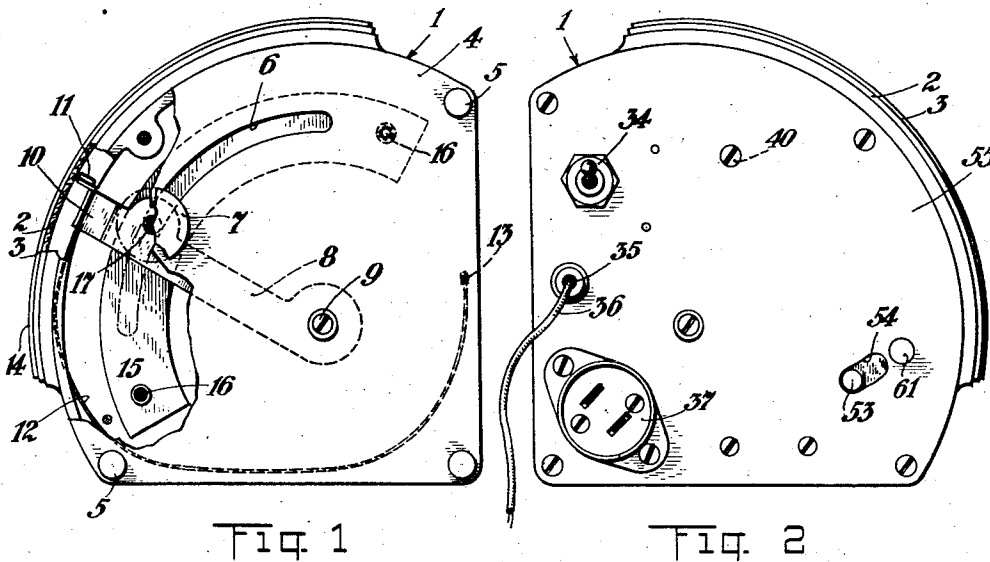


Fig. 3

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## TIMING APPARATUS

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3 Sheets-Sheet 2

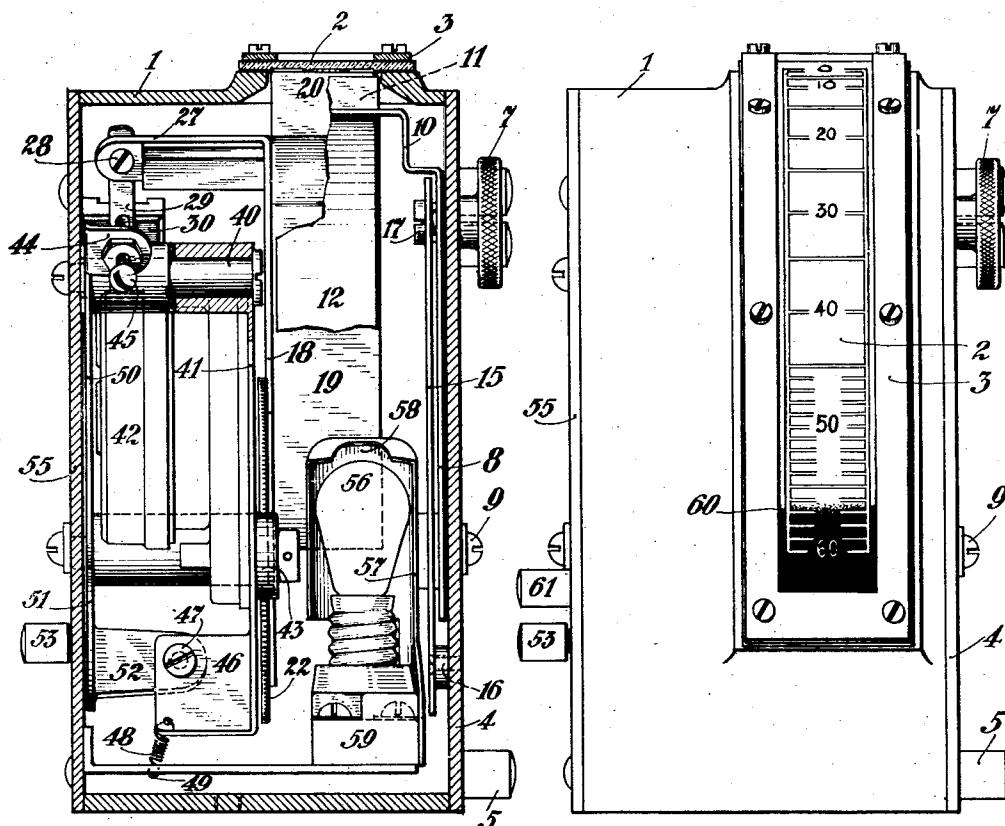
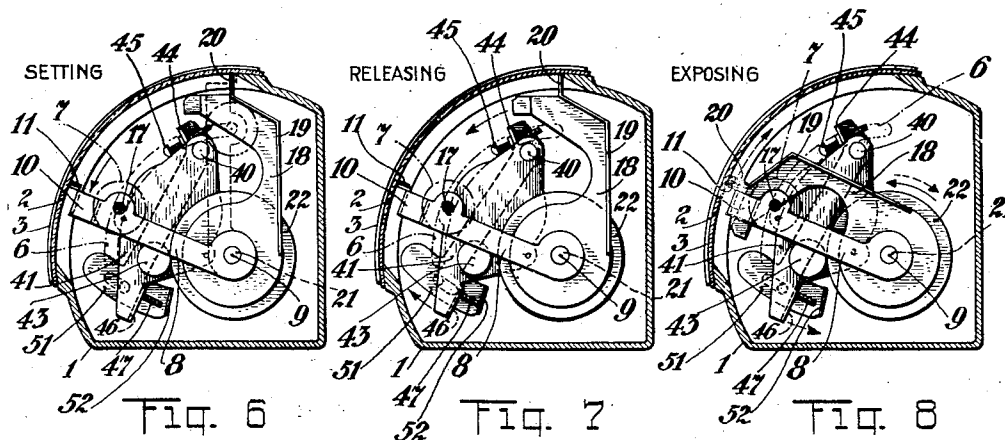
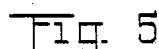


Fig. 4



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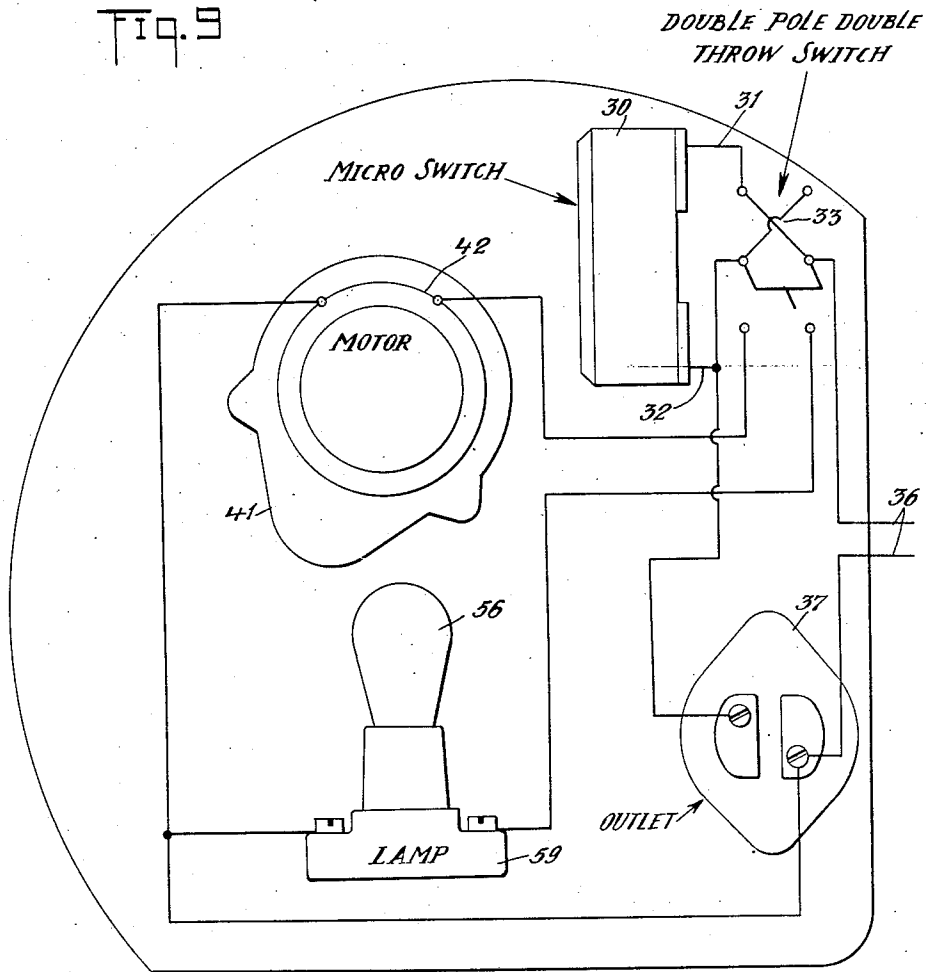
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TIMING APPARATUS

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3 Sheets-Sheet 3

Fig. 9



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## UNITED STATES PATENT OFFICE

2,268,268

## TIMING APPARATUS

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Application July 14, 1938, Serial No. 219,135

19 Claims. (Cl. 161—1)

The present invention is directed to timing devices, more particularly to mechanism for controlling an electric circuit to hold the same open or closed for a predetermined and variable length of time. Devices of this kind are adapted for various uses, as for example, for closing a circuit in a photographic enlarging apparatus to cause exposure of film for exact measurable lengths of time.

It is among the objects of the present invention to provide a device which is electrically operated and which during the operation visually informs the operator of the exact period of time which has elapsed.

It is a further object of the present invention to provide a mechanism which is positive in its action, accurate in its timing and which is readily constructed with a minimum number of moving parts.

In practicing the present invention, I provide a timer having a dial to denote time intervals, said dial being illuminated from within the timer. Means are provided for adjusting the time interval whereby a portion of the dial is blacked out and that portion which denotes time is illuminated. Upon the operation of the device, the remainder of the dial is blacked out and as the time elapses, the dial is progressively illuminated to directly indicate the elapsed time at any moment.

The mechanism of the device consists essentially of a pivoted timing lever which is held in inoperative position by the weight of a pivoted synchronous motor. In order to begin the operation, the motor is moved out of contact with the timing lever, allowing the same to drop to the starting position. Then, upon the release of said motor, the circuit thereof is closed, the circuit of the enlarging apparatus or the like is also closed, and the timing operation begins. At the end thereof, the circuits are automatically broken and the device is in position for another cycle.

In the accompanying drawings, constituting a part hereof, and in which like reference characters indicate like parts:

Fig. 1 is a side elevational view of one form of apparatus made in accordance with the present invention;

Fig. 2 is a view similar to Fig. 1 taken from the opposite side of said apparatus;

Fig. 3 is a view similar to Fig. 1 somewhat enlarged, with the cover removed to display the internal mechanism thereof;

Fig. 4 is a front view of the apparatus with the front cover broken away for clearness;

Fig. 5 is a front view of the apparatus showing particularly the timing dial;

Fig. 6 is a view similar to Fig. 3, showing the first stage of the operation wherein the time of operation is set;

Fig. 7 is a similar view showing the releasing of the mechanism just prior to the closing of the motor circuit;

Fig. 8 is a similar view showing the apparatus at the moment the timing has started; and Fig. 9 is a wiring diagram showing the lamp and motor circuits.

There is provided a casing 1 having a dial 2, as shown in Fig. 1, divided into seconds for a total period of one minute. The dial is mounted upon a plate 3 which in turn is secured to the casing 1. A plate 4 is held to one side of said casing by screws 5. An arcuate slot 6 is provided in plate 4. A hand operated finger piece or knob 7 on the outside of plate 4 is secured to time adjusting lever 8, which is pivoted at 9 to plate 4. An extension 10 on lever 8 terminates in a time adjusting stop member 11 in close proximity to the under surface of dial 2. The member 10 carries a flat spring 12 which, as more particularly shown in Fig. 1, lies within the casing and terminates at point 13. This spring prevents illumination from within the casing impinging upon the dial at certain points, as for example, point 14. A guard plate 15 within the casing is secured to plate 4 by screws 16 preventing illumination from within the casing passing out of the same through slot 6. The finger piece 7 is secured to the time adjusting lever 8 by being threaded on pin 17 integral with lever 8. By loosening finger piece 7, lever 8 is released and may be set at any position, and by the tightening thereof, the lever is held in such adjusted position during the operation of the apparatus.

A timing lever 18 has a rib or fin 19 extending along one edge thereof, as more particularly shown in Fig. 3, the extreme end 20 thereof being in proximity to the inner face of dial 2. The lower end of said timing lever is pivoted to the casing at 21. A knurled wheel 22 is secured to timing lever 18 by screws 23. A spring 24 secured to the casing at 25 has its free end 26 bearing against fin 19, normally tending to urge the lever to the left of Fig. 3. A bracket 27 at the upper end of the timing lever 18 is provided with an adjustable screw 28 making contact with operating lever 29 of a micro-

switch 30 secured in the casing. Said switch is connected by wiring 31 and 32 to a hand switch 33 operable from outside the casing by button 34. Through an opening 35, leads 36 are connected to a source of power. A socket 37 is provided for connection to the device to be operated, as for example, the lamp circuit of a photographic enlarging camera.

On a pivot 40 there is mounted a frame 41, carrying synchronous motor 42 having suitable gearing therein and having a friction wheel 43 on the outside of frame 41, contacting with the knurled gear 22. Pivot 40 is so located with respect to the rim of gear 22 that the action of gravity normally causes wheel 43 to operatively engage said rim so that the timing lever 18 is firmly held in both operative and inoperative positions thereby. At the upper end of frame 41 is a bracket 44 having an adjustable screw 45 adapted at certain points in the operation to make contact with member 29 of switch 30. At the lower end of said frame is a bracket 46 having an adjustable screw 47 therein for cooperation with an operating bar 50. A spring 48 secured at one end to bracket 46 and at its other end 49 to the casing, assists in holding the motor in the desired position.

On the pivot 40 is mounted an operating bar 50, the lower end 51 of which is T-shaped and has an extension 52 thereon adapted to contact with screw 47. An operating knob 53 on the end of operating bar 50 passes through a slot 54 in plate 55, constituting one of the covers of the casing 1.

In order to illuminate the apparatus, there is provided a lamp 56 having a cover 57 around the same, said cover being provided with an opening 58 in the upper end thereof so as to illuminate only the dial 2 and to prevent undue illumination of other parts of the apparatus. The lamp and cover are mounted on base 59, secured within the casing, and said lamp has suitable electric connections to the circuits as shown in Fig. 3.

The operation of the device is as follows: The various elements of the apparatus at the start of an operation are in the position shown in Figs. 3 and 6. A source of current is plugged into leads 36, socket 37 is connected with the enlarging camera lamp circuit, and switch 34 thrown upwardly in the upper contacts of switch 33 (Fig. 9) in a position connecting said camera lamp circuit but not connecting the motor 42 and lamp 56. The current flows through lower lead 36 (Fig. 9) into socket 37, through enlarging camera lamp (not shown), back to socket 37, through lead 32 to middle left contact of switch 33, through upper left contact thereof and upper lead 36. The camera is properly focussed on the film and switch 34 is thrown in the opposite position to connect the motor 42 and lamp 56 is lighted. The current flows through lower lead 36, lamp 56, lower right contact of switch 33 and upper lead 36.

The time lever 8 is adjusted by turning finger piece 7 and is moved to the proper position, as 60 on the dial, and finger piece 7 tightened to hold the same in said position, as shown in Fig. 6. Stop member 28 on timing lever 18 presses against member 29 and holds the switch 30 in open position.

The knob 53 and stop member 61 are grasped between the thumb and forefinger and knob 53 caused to move to the end of slot 54, causing bracket 52 to engage screw 47 and pull the mo-

tor housing 41 so as to release gear 22 from wheel 43. Simultaneously with the release of gear 22, stop member 45 on motor housing 41 contacts with member 29 and independently of stop 28 holds the switch 30 in open position.

Upon the release of gear 22, the action of spring 24 upon the timing lever 18 causes the same to pivot around 21 and move downwardly until the part 20 comes in contact with member 11, as more particularly shown in Fig. 8.

Thereupon, knob 53 is released and by the action of spring 48 and gravity, motor 42 is caused to move about pivot 40 to the right to again cause engagement of wheel 43 and gear 22. Simultaneously therewith, stop 45 moves to the left, releasing contact member 29 and closing switch 30. This causes the closing of the camera lamp circuit, and the circuit of the motor. The current flows through lower lead 36, socket 37, through enlarging camera lamp, back into socket 37, through switch 30 and lead 31 to upper left contact of switch 33 and through upper lead 36. The current also flows from lower lead 36 to socket 37 and directly through motor 42, through lead 32 and switch 30, through lead 31 and through upper lead 36. Illumination from the lamp 56 cannot be visible on the dial, as the portion thereof below member 11 is shaded by spring 12 and the portion above the same is shaded by fin 19 on timing lever 18.

The rotation of the motor causes a slow rotation of gear 22 and a gradual lifting of lever 18 until end 20 has reached the zero point of the scale of dial 2. As said lever moves, illumination from lamp 56 falls on the dial between points 11 and 20, thus directly indicating to the operator the time which has elapsed. When lever 18 has reached the uppermost or zero position, stop 28 presses against member 29 and opens the switch, thus breaking the camera lamp and motor circuits.

The apparatus is then ready for another operation, except that the operator may wish to change the time by resetting stop member 11 as described above.

Although I have described my invention setting forth a single specific embodiment thereof, it is quite apparent that numerous changes in the details of construction may be made within the spirit of the invention. For instance, the switches and other elements may be located in various positions, and various materials of construction such as are well known may be used. It is not necessary to have a knurled gear 22 operating with a friction wheel 43, as various other cooperating elements, such as toothed gears or smooth friction wheels, or other devices, may be substituted for the same. The various stop members may be of different construction than shown herein, and the shapes of the cooperating bar, timing lever and the like may be made quite differently than shown. The shading of the lamp need not be by means of a cover thereon, but other means may be employed. Also, the arrangements may be such that instead of illuminating that portion of the dial which indicates the time as it progresses, the reverse may be provided, namely, that the shadow is caused to fall progressively upon the dial to indicate the elapsed time. The lever 18 need not be biased by spring 24 but may be urged into operative position by the force of gravity. These and other changes of various character will be apparent to those skilled in the art, and my invention is not to be limited to the details described, but is to be broadly con-

strued in accordance with the claims appended hereto.

What I claim is:

1. In an automatic time switch mechanism the improvement which comprises a casing, a dial on said casing adapted to transmit light emanating from within said casing, a timing lever in said casing, a motor for moving said lever, one end of said lever being adapted to move in proximity to said dial, said end underlying and across the width of said dial, whereby the shadow of said lever moves over said dial during the timing operation, a time adjusting stop member within said casing, said member carrying a dial cover, said cover adapted to progressively underlie said dial by the movement of said member, and means for moving said member to black out a portion of said dial.

2. In an automatic time switch mechanism the improvement which comprises a casing, a dial on said casing adapted to transmit light emanating from within said casing, a timing lever in said casing, a motor for moving said lever, one end of said lever being adapted to move in proximity to said dial, said end underlying and across the width of said dial to black out at least a portion thereof, whereby the shadow of said lever moves over said dial during the timing operation, a time adjusting stop member within said casing, said member carrying a dial cover, said cover adapted to progressively underlie said dial by the movement of said member, and means for moving said member to black out a portion of said dial.

3. In an automatic time switch mechanism the improvement which comprises a casing, a dial on said casing adapted to transmit light emanating from within said casing, a timing lever in said casing, a motor for moving said lever, one end of said lever being adapted to move in proximity to said dial, said end underlying and across the width of said dial, whereby the shadow of said lever moves over said dial during the timing operation, a time adjusting stop member within said casing, said member carrying a dial cover, said cover adapted to progressively underlie said dial by the movement of said member, and means for moving said member to black out a portion of said dial including a slot in said casing and a finger piece extending out through said slot, and a light guard within said casing adjacent said slot.

4. An automatic time switch mechanism comprising a casing, a dial on said casing, a time adjusting stop member in said casing, a timing lever pivoted in said casing, the free end of said lever being in proximity to said dial, a gear secured to said lever at its pivot point, a motor, a frame, said motor held in said frame, the upper part thereof being pivotally mounted in said casing at a point above and to one side of the pivot of said lever, a wheel driven thereby, the action of gravity on said motor making operative contact between said wheel and gear, means for biasing said lever into operative position, means for disengaging said wheel and gear to cause said lever to move into initial starting position, a switch adapted to be closed by said movement of said lever, and means for causing said wheel and gear to mesh.

5. An automatic time switch mechanism comprising a casing, a dial on said casing, a time adjusting stop member in said casing, a timing lever pivoted in said casing, the free end of said lever being in proximity to said dial, a gear se-

cured to said lever at its pivot point, a motor, a frame, said motor held in said frame, the upper part thereof being pivotally mounted in said casing at a point above and to one side of the pivot of said lever, a wheel driven thereby, the action of gravity on said motor making operative contact between said wheel and gear, means for biasing said lever into operative position, means for disengaging said wheel and gear to cause said lever to move into initial starting position, a switch adapted to be closed by said movement of said lever, and means for causing said wheel and gear to mesh, said switch being in series with a circuit to be timed, said circuit being closed simultaneously with the meshing of said wheel and gear by means associated with said motor frame.

6. An automatic time switch mechanism comprising a casing, a dial on said casing, a time adjusting stop member in said casing, a timing lever pivoted in said casing, the free end of said lever being in proximity to said dial, a gear secured to said lever at its pivot point, a motor, a frame, said motor held in said frame, the upper part thereof being pivotally mounted in said casing at a point above and to one side of the pivot of said lever, a wheel driven thereby, the action of gravity on said motor making operative contact between said wheel and gear, means for biasing said lever into operative position, means for disengaging said wheel and gear to cause said lever to move into initial starting position, a switch adapted to be closed by said movement of said lever, and means for causing said wheel and gear to mesh, said switch being in series with a circuit to be timed, said circuit being closed simultaneously with the meshing of said wheel and gear by means associated with said motor frame, a switch operating member on said lever adapted to open said switch to break its circuit when said lever reaches the end of its path.

7. An automatic time switch mechanism comprising a casing, a dial on said casing, a time adjusting stop member in said casing and pivoted thereto, the free end of said member being in proximity to said dial, a timing lever pivoted in said casing, the free end of said lever being in proximity to said dial, a gear secured to said lever at its pivot point, a motor, a frame, said motor held in said frame, the upper part thereof being pivotally mounted in said casing at a point above and to one side of the pivot of said lever, a wheel driven thereby, the action of gravity on said motor making operative contact between said wheel and gear, means for biasing said lever into operative position, means for disengaging said wheel and gear to cause said lever to move into initial starting position, a switch adapted to be closed by said movement of said lever, and means for causing said wheel and gear to mesh.

8. An automatic time switch mechanism comprising a casing, a dial on said casing, a time adjusting stop member in said casing, a timing lever pivoted in said casing, the free end of said lever being in proximity to said dial, a stop on said end cooperating with said member, a gear secured to said lever at its pivot point, a motor, a frame, said motor held in said frame, the upper part thereof being pivotally mounted in said casing at a point above and to one side of the pivot of said lever, a wheel driven thereby, the action of gravity on said motor making operative contact between said wheel and gear, means for biasing said lever into operative position, means

for disengaging said wheel and gear to cause said lever to move into initial starting position, a switch adapted to be closed by said movement of said lever, and means for causing said wheel and gear to mesh.

9. An automatic time switch mechanism comprising a casing, a dial on said casing, a time adjusting stop member in said casing, a timing lever pivoted in said casing, the free end of said lever being in proximity to said dial, a gear secured to said lever at its pivot point, a motor, a frame, said motor held in said frame, the upper part thereof being pivotally mounted in said casing at a point above and to one side of the pivot of said lever, a wheel driven thereby, the action of gravity on said motor making operative contact between said wheel and gear, means for biasing said lever into operative position, means for disengaging said wheel and gear, means operative on said lever upon said release to cause said lever to move into initial starting position, a switch adapted to be closed by said movement of said lever, and means for causing said wheel and gear to mesh.

10. An automatic time switch mechanism comprising a casing, a dial on said casing, a time adjusting stop member in said casing, a timing lever pivoted in said casing, the free end of said lever being in proximity to said dial, a gear secured to said lever at its pivot point, a motor, a frame, said motor held in said frame, the upper part thereof being pivotally mounted in said casing at a point above and to one side of the pivot of said lever, a wheel driven thereby, the action of gravity on said motor making operative contact between said wheel and gear, means for biasing said lever into operative position, means for disengaging said wheel and gear to cause said lever to move into initial starting position, a switch adapted to be closed by said movement of said lever, and means for causing said wheel and gear to mesh including an operating bar in said casing, an operating knob projecting outside of said casing and a projection on said bar adapted to contact with the housing of said motor to lift the same.

11. An automatic time switch mechanism comprising a casing, a dial on said casing, a time adjusting stop member in said casing, a timing lever pivoted in said casing, the free end of said lever being in proximity to said dial, a gear secured to said lever at its pivot point, a motor, a frame, said motor held in said frame, the upper part thereof being pivotally mounted in said casing at a point above and to one side of the pivot of said lever, a wheel driven thereby, the action of gravity on said motor making operative contact between said wheel and gear, means for biasing said lever into operative position, means for disengaging said wheel and gear to cause said lever to move into initial starting position, a switch adapted to be closed by said movement of said lever, and means for causing said wheel and gear to mesh including an operating bar in said casing, an operating knob projecting outside of said casing, a member carried by the motor housing, a projection on said bar adapted to contact with said member on said housing of said motor to lift the same, and a switch operating member on said bar adapted to hold said switch open when said motor is lifted.

12. An automatic time switch mechanism comprising a casing, a dial on said casing, a time adjusting stop member in said casing, a timing lever pivoted in said casing, the free end of said

lever being in proximity to said dial, a gear secured to said lever at its pivot point, a motor, a frame, said motor held in said frame, the upper part thereof being pivotally mounted in said casing at a point above and to one side of the pivot of said lever, a wheel driven thereby, the action of gravity on said motor making operative contact between said wheel and gear, means for biasing said lever into operative position, means for disengaging said wheel and gear to cause said lever to move into initial starting position, a switch adapted to be closed by said movement of said lever, and means for causing said wheel and gear to mesh including an operating bar in said casing, an operating knob projecting outside of said casing, a member carried by the motor housing, a projection on said bar adapted to contact with said member on said housing of said motor to lift the same, and a switch operating member on said bar adapted to hold said switch open when said motor is lifted, the raising of said bar causing release of said lever, the lowering thereof starting said motor and meshing of said wheel and gear.

13. An automatic time switch mechanism comprising a casing, a dial on said casing, a time adjusting stop member in said casing, a timing lever pivoted in said casing, the free end of said lever being in proximity to said dial, a gear secured to said lever at its pivot point, a motor, a frame, said motor held in said frame, the upper part thereof being pivotally mounted in said casing at a point above and to one side of the pivot of said lever, a wheel driven thereby, the action of gravity on said motor making operative contact between said wheel and gear, means for biasing said lever into operative position, means for disengaging said wheel and gear to cause said lever to move into initial starting position, a switch adapted to be closed by said movement of said lever, and means for causing said wheel and gear to mesh, including an operating bar pivoted in the upper part of said casing, an operating knob at the lower free end thereof projecting outside of said casing, means at said free end for lifting said motor, a switch operating member at the upper end of said bar adapted to open and close said switch.

14. An automatic time switch mechanism comprising a casing, a dial on said casing, a time adjusting stop member in said casing, a timing lever pivoted in said casing, the free end of said lever being in proximity to said dial, a gear secured to said lever at its pivot point, a motor, a frame, said motor held in said frame, the upper part thereof being pivotally mounted in said casing at a point above and to one side of the pivot of said lever, a wheel driven thereby, the action of gravity on said motor making operative contact between said wheel and gear, means for biasing said lever into operative position, means for disengaging said wheel and gear to cause said lever to move into initial starting position, a switch adapted to be closed by said movement of said lever, and means for causing said wheel and gear to mesh, including an operating bar pivoted in the upper part of said casing, an operating knob at the lower free end thereof projecting outside of said casing, means at said free end for lifting said motor, a switch operating member at the upper end of said bar, said switch being in series with a circuit to be timed, said circuit being closed simultaneously with the meshing of said wheel and gear by means associated with said motor frame, a switch oper-

ating member on said lever adapted to open said switch to break its circuit when said lever reaches the end of its path, both of said switch operating members cooperating to hold said switch in open condition except when said motor is running.

15. An automatic time switch mechanism comprising a casing, a dial on said casing adapted to transmit light, a time adjusting stop member in said casing, a timing lever pivoted in said casing, the free end of said lever being in proximity to said dial, a gear secured to said lever at its pivot point, a motor, a frame, said motor held in said frame, the upper part thereof being pivotally mounted in said casing at a point above and to one side of the pivot of said lever, a lamp for illuminating said dial within said casing, said free end being interposed between said lamp and dial, whereby the shadow of said lever moves over said dial during the timing operation, a wheel driven by said motor, the action of gravity on said motor making operative contact between said wheel and gear, means for biasing said lever into operative position, means for disengaging said wheel and gear to cause said lever to move into initial starting position, a switch adapted to be closed by said movement of said lever, and means for causing said wheel and gear to mesh.

16. In an automatic time switch mechanism the improvement which comprises a casing having a curved face, a dial on said face of said casing adapted to transmit light emanating from within said casing, a timing lever pivoted in said casing at the focal point of said curved face, said face being normal to said lever in its several positions, a motor for moving said lever, the free end of said lever being adapted to move about said pivot in proximity to said dial, said end underlying and across the width of said dial, means on said lever such that when in position for timing it prevents illumination of a portion of said dial and during the timing allows progressive illumination of said portion.

17. In an automatic time switch mechanism the improvement which comprises a casing having a curved face, a dial on said face of said casing adapted to transmit light emanating from within said casing, a timing lever pivoted in said casing, a motor for moving said lever, the free

end of said lever being adapted to move in proximity to said dial, said end underlying and across the width of said dial, the form of said lever being such that when in position for timing it prevents illumination of a portion of said dial and during the timing allows progressive illumination of said portion, and a stop member within said casing adjacent said dial and adapted to prevent illumination of the remainder of said dial during the timing operation.

18. In an automatic time switch mechanism the improvement which comprises a casing having a curved face, said curvature being on the arc of a circle, a dial on said face of said casing adapted to transmit light emanating from within said casing, a timing lever pivoted at the center of said arc in said casing, a motor for moving said lever, the free end of said lever being adapted to move in proximity to said dial, said end underlying and across the width of said dial, the form of said lever being such that when in position for timing it prevents illumination of a portion of said dial and during the timing allows progressive illumination of said portion.

19. In an automatic time switch mechanism the improvement which comprises a casing, a dial on said casing adapted to transmit light emanating from within said casing, a timing lever in said casing, a motor for moving said lever, said lever having an extended portion adapted to be interposed between said dial and a source of light to exclude light from said dial, one end of said lever being adapted to move in proximity to said dial, said end underlying and across the width of said dial to black out at least a portion thereof, whereby the shadow of said lever moves over said dial during the timing operation, a time adjusting stop member within said casing, said member carrying a dial cover, said cover adapted to correspondingly underlie said dial by the adjustment of said member, and means for moving said lever to black out the remainder of said dial, said lever being so placed that at the beginning of a timing operation substantially the entire dial is blacked out and as the timing progresses said lever moves so that the illuminated portion of said dial increases continuously in extent with the lapse of time.

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