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ELECTRICAL INTERVAL TIMER

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Fig. 2

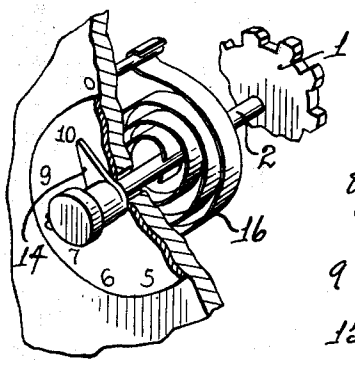
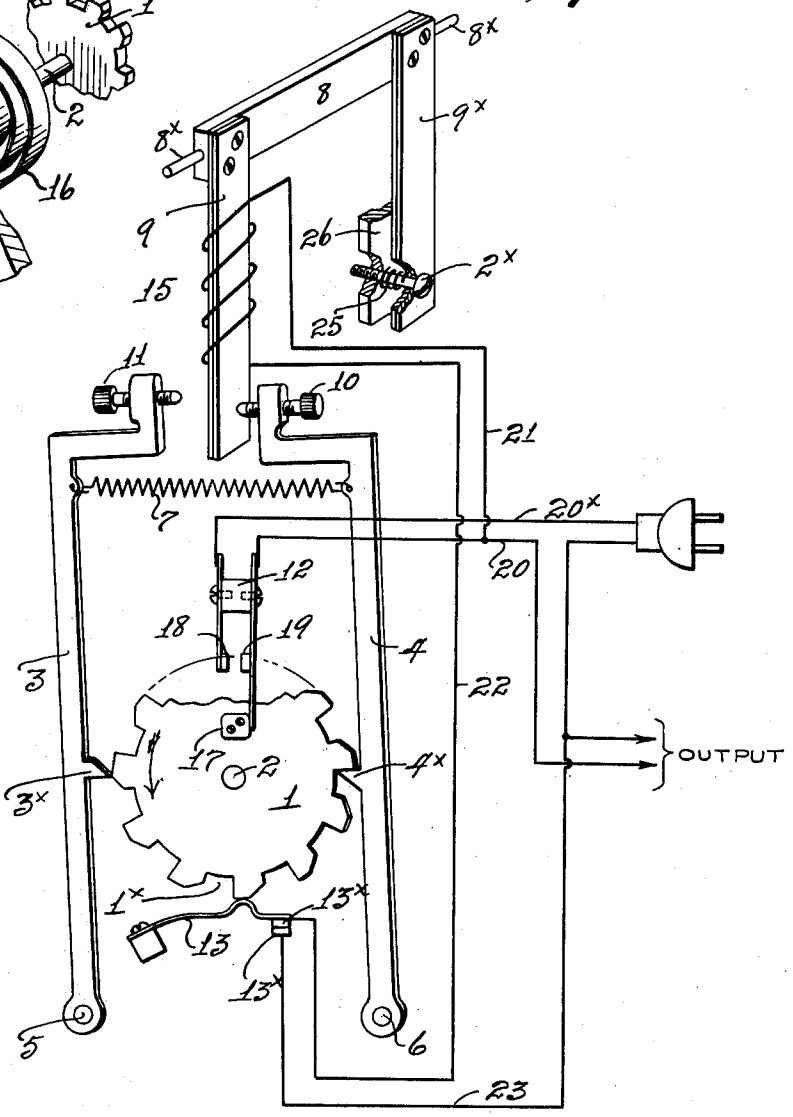



Fig. 1




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## ELECTRICAL INTERVAL TIMER

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4 Claims. (Cl. 161—1)

1

This invention relates to a timing device designed to provide an electrical switching circuit and maintain constancy of operation under variable external conditions.

The subject matter of this invention includes apparatus making use of the warping action of a bimetallic element, when said element is heated by electrical means, to operate a detent mechanism.

More particularly this invention makes use of the time required to heat a bimetallic element to a predetermined temperature plus the time required for said element to return to a predetermined lower temperature. This total time which we will term a "full pendulum cycle" remains relatively constant even though the electrical heating means or the surrounding ambient temperature may vary over a comparatively wide range.

This feature is accomplished in the following manner: The bi-metallic element is heated during a relatively short period of time which we will term "flash heating" whereas the cooling period takes a relatively longer time. For example, in a one minute cycle the heating period may require only five seconds, whereas the cooling period will require fifty-five seconds. Since the cooling curve is a relatively constant function, the variations which may occur in the heating period have very little effect on the total unit cycle. Variations in ambient temperature, as will be described later, are corrected by the bi-metallic structure suspension and are cancelled out.

One object of this invention is to provide an interval timing device of simple and inexpensive construction.

Another object of this invention is to provide an interval timer using a thermo-electrical detent mechanism which will operate on direct or alternating current supply.

Another object of this invention is to provide a device of the above stated character which will operate within small tolerance of error even though the electrical power supply may vary over a relatively wide range of voltage input, say 90 to 130 volts, for example.

A further object of this invention is to provide a device of the above stated character which will not be affected in its operation by variations in ambient temperature.

Further objects, advantages and capabilities possessed by this invention will appear in the following description and specifications:

2

The invention will be described with reference to the accompanying drawings, in which—

Figure 1 is a diametric view showing the various elements in conjunction with electrical circuits leading thereto;

Figure 2 is a fragmentary perspective view showing a casing wall, a coil spring rearwardly thereof and connected to a shaft which carries the tooth wheel element of the device, a dial being carried by the casing for registration with a fingerpiece on the shaft and having a pointer.

Referring to the accompanying drawings for a more complete understanding of the invention, a toothed wheel is designated by numeral 1, mounted on the shaft 2. Engaging alternately with the teeth of wheel 1 are shown arms 3 and 4, fulcrumed at points 5 and 6, said arms 3 and 4 being drawn toward the teeth of wheel 1 by spring 7. Each arm has a beveled spur at 3x and 4x, respectively. It will be noted that when the spur of one arm lies between the teeth of toothed wheel 1, the spur of the opposite arm rests on the top of the tooth, 180° away, wheel 1 having been constructed with an odd number of teeth.

Fastened to pivoted block 8 is a bi-metallic element 9 so disposed that when said element warps when heated, it will strike against adjusting screws 10 and 11 attached to arms 3 and 4. A resistance 15, shown diagrammatically, is wound around bi-metallic element 9. At ambient temperature element 9 engages screw 11 to hold arm 3 out of engagement with the teeth of wheel 1.

Generally designated as 12 is an electrical switch, hereinafter called the master switch, and designated as 13 is another electrical switch, hereinafter called the commutating switch.

The electrical circuit and other elements will be described in connection with the following:

In the operation of the device, a pointer 14 on shaft 2 is rotated in a clockwise direction against the force exerted by a spring 16 and brought to rest, say after five teeth of wheel 1 have been successively engaged by the spur of arm 4. Arm 3, of course, does not engage any teeth of wheel 1 as it is held away from said teeth by bimetallic element 9 now at ambient temperature.

The device is now ready for cycling: As soon as shaft 2 was rotated to set the device in operation block 17 fastened to wheel 1 released the contacts 18, 19 of switch 12, the latter closing to form an electrical circuit through contacts 18 and 19, via conductors 20, 20x, provid-

ing power at the point designated as output. Simultaneously, through conductors 21, 22, and through the contacts 13x of commutator switch 13 now closed, current is allowed to flow through resistance 15.

The heat produced by current flowing through resistor 15 causes bimetallic element 9 to deflect at its free end to the right and exert a pressure on screw 10, forcing arm 4 to disengage from toothed wheel 1. Wheel 1 under the action of spring 16 rotates counterclockwise, and arm 3 under the tension of spring 7 carries its spur into toothed wheel 1 to hold said wheel 1 in a new stationary position. Simultaneously, commutating switch 13 opens its contacts as its high point falls into groove 1x and breaks the electrical circuit furnishing current to resistor 15. At this point the heating portion of the cycle is terminated and bi-metal element 15 starts to cool and deflects in the opposite direction. In so doing said bimetallic element strikes against screw 11 and disengages arm 3 from the groove of toothed wheel 1, arm 4 latching wheel 1, completing one unit cycle. The output remains unaffected.

In the stated movement of the pointer 15, the same operation is repeated five times, after the completion of which block 17 opens master switch 12 and brings the device to a rest by disconnecting bimetallic element 15 and removing the electrical source of supply from the output leads.

Co-acting with element 9 is element 9x anchored to the same block-carrier 8, the latter being pivoted at 8x, and controlled by adjusting screw 24, spring 25, and stationary block 26. The high expansion sides of both bimetallic elements will thus act in opposite directions so that any variations in ambient temperature will have no effect on the free end bimetallic element 9, as is already known in the art.

While the toothed or abutment-carrying member is shown as a wheel, it will readily be understood that it can be a movable member of other forms and that the claims are to be interpreted accordingly.

Having thus described our invention, what we claim and desire to secure by Letters Patent, is as follows:

1. In electrical interval timers, a spring-engaged toothed wheel, means including a dial and pointer for setting the position of the wheel and thereby imparting tension to the spring, a pair of spring-engaged latch arms individually pivoted, one at each side of the wheel, an output circuit, including a switch, a master circuit breaker for said switch carried by the wheel, a second circuit including a commutator circuit-breaker actuated by said wheel, and a bi-metallic element having a resistance heater in said second circuit, said bi-metallic element being adapted at ambient temperature to hold one latch arm in neutral position, the second latch arm being spring impelled to wheel holding position, and said bi-metallic element at predetermined heated position acting to effect reverse movement of said latch arms with a dwell in action permitting a predetermined movement of the wheel sufficient for operation of the commutator circuit breaker.



2. An electrical interval timer constructed in accordance with claim 1, in combination with an adjustable member carried by each latch member for engagement by the bi-metallic element and adapted to vary timing.

3. In electrical interval timers, a spring-engaged toothed wheel, means including a dial and pointer for setting the position of the wheel and thereby imparting tension to the spring, a pair of spring-engaged latch arms individually pivoted, one at each side of the wheel, an output circuit, including a switch, a master circuit breaker for said switch carried by the wheel, a second circuit including a commutator circuit-breaker actuated by said wheel, and a first bi-metallic element having a resistance heater in said second circuit, said first bi-metallic element being adapted at ambient temperature to hold one latch arm in neutral position, the second latch arm being spring impelled to wheel holding position, said first bi-metallic element at predetermined heated position acting to effect reverse movement of said latch arms with a dwell in action permitting a predetermined movement of the wheel sufficient for operation of the commutator circuit breaker, and a second bi-metallic element adapted to compensate for temperatures above the ambient temperature.

4. An electric interval timer constructed in accordance with claim 3, in combination with an adjustable member carried by each latch member for engagement by the first bi-metallic element and adapted to vary timing, and a second bi-metallic element adapted to compensate for temperatures above the ambient temperature.

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