

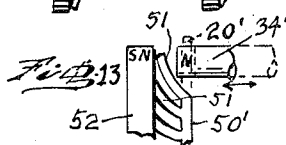
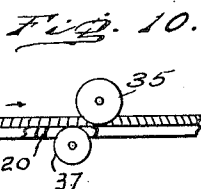
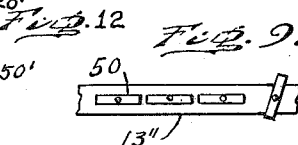
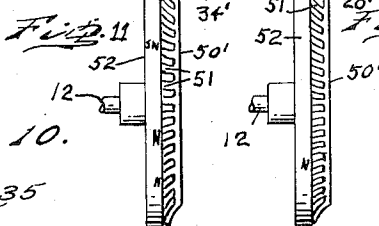
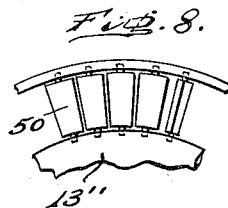
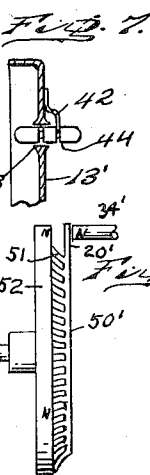
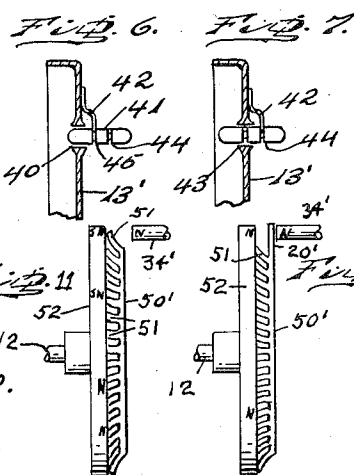
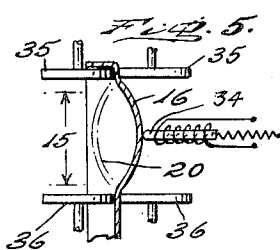
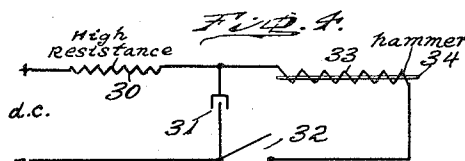
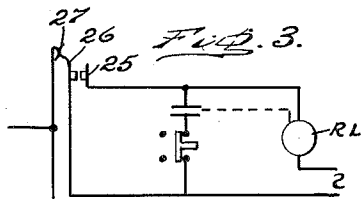
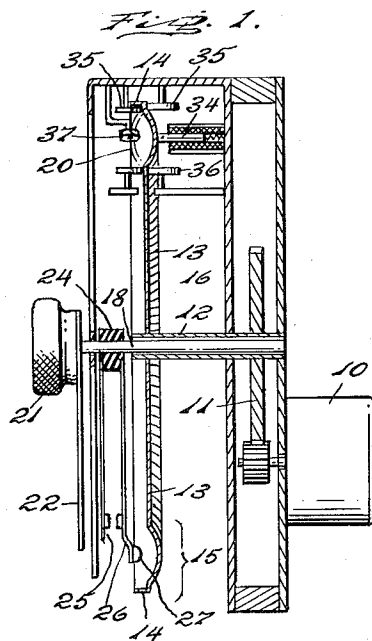
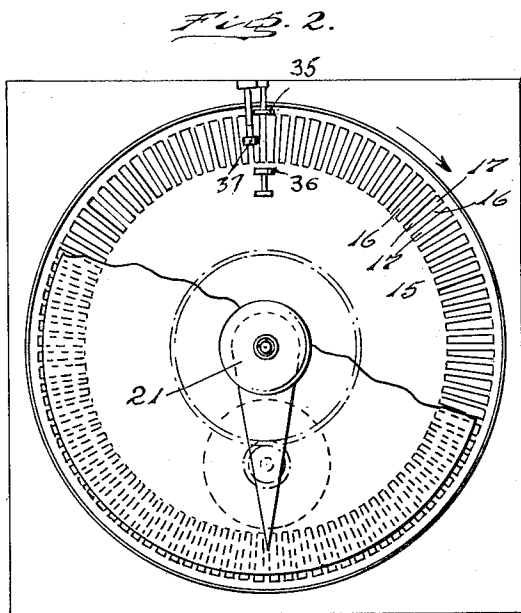
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2,690,800

AUTOMATIC RESET TIMER

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## UNITED STATES PATENT OFFICE

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## AUTOMATIC RESET TIMER

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3 Claims. (Cl. 161—1)

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This invention relates to automatic reset timers of the mechanical type.

It is among the objects of the invention to improve the art of timers; to provide a timer of wide variance of time cycle; to provide a rotatable element with physically distortable or movable means for controlling a timed circuit with erasing means for returning the distortable or movable means to neutral position; to provide a rotatable element with a plurality of normally inert or neutral elements incapable of contacting a circuit controller, with means for selectively displacing a selected element out of its neutral position into a positive contact actuating position; and to provide other objects and advantages as will become more apparent as the description proceeds.

In carrying out the invention in an illustrative basic form, a rotatable element is driven at a known peripheral speed and is provided with portions or elements susceptible to displacement from a normal neutral position into a contact-controlling active attitude.

In the accompanying drawings forming part of this description:

Fig. 1 represents a schematic vertical section through an illustrative form of the invention.

Fig. 2 represents a fragmentary front elevation of the same partially broken away.

Figs. 3 and 4 represent wiring diagrams for the operation of the device.

Figs. 5 to 13 represent fragmentary details of the device and modifications thereof.

In the preferred but illustrative form of the invention a synchronous motor 10 through gears 11 drives a shaft 12 on which is mounted a timing disc 13. In one illustrative form of disc 13, the peripheral edge is turned in a stiffening flange 14 and in a peripheral annular area 15 adjacent to the edge, a plurality of arched resilient anchored fingers 16 are formed by substantially radial slots 17 on each side of each finger, and by distorting each metal finger 16 between its ends into the arched resilient deformation out of the plane of the disc 13. The fingers and slots are as reasonably narrow as possible in order to increase the accuracy of the timer by sub-dividing the finger area 15 in its greatest number of components. It will be understood that the normal attitude of the arch of the fingers is with the arches all lying in a peripheral path on one face of the disc lying in a plane parallel thereto in what may be termed the neutral or passive attitude. It will be understood, however, that in response to suitable impact or thrust in a line parallel to the axis of the shaft in the substantial center of a finger 16, any

finger so impinged can flex resiliently through the space between slots 17 defining the finger to spring outwardly of the disc in the opposite direction as indicated at 20.

It will be understood that with the circuits properly arranged and with a common starting point at all times, say, at the center of the top of the disc, at the zero or datum point, the finger of the operator can depress or actuate a suitable element which will simultaneously force the top finger of the disc into reversed active position indicated at 20, will close or open the timing circuit to initiate the timing cycle and, if desired, will also close the circuit to the synchronous motor 10 to start the disc rotating in a timing cycle. It will be understood that repeat action without time loss can also be accomplished, by causing the active element signal, closing (or opening) of switch 25, 26, to simultaneously energize the hammer 34 to initiate a repeat cycle. This can be repeated continuously without the delay necessary in re-setting conventional devices. For this purpose, as well as generally, it is preferred to have the disc continuously rotated at a known timed rate so that the motor control is usually separate.

In order to determine and control a variable time cycle, a knob 21 carrying a pointer 22 is mounted in front of the disc, oscillatable on the axis of the shaft 12, by a concentric shaft 13, and positionable angularly of the axis of the shaft 12 and disc 13 through approximately 330°. Shaft 18 carries an insulating block 24 mounting two contact fingers respectively 25 and 26, usually biased apart, and finger 25 carries a cam extension 27 extending toward the area 15 in position to be engaged and moved by the distorted finger 20 in the cyclic progression of the disc 13. It will be understood, of course, that, if desired, the contact fingers 25 and 26 can be biased together to be opened or separated when the advancing in-bent finger 20 engages the cam end 27 of the finger 26. In the usual course, however, it is preferred that the contact of the cam 27 with the advancing finger 20 will close the contacts. It will be understood that these fingers are in a circuit containing a load relay as shown in Fig. 3, actuated at the end of the timed interval. The beginning of the timed interval being established by the closing of the switch of pulse timing circuit shown in Fig. 4.

This circuit is from a source of d. c. through the high resistance coil 30 and across condenser 31. With the switch 32 open, the condenser charges. When the switch 32 is closed momen-

tarily, the condenser discharges through the solenoid coil 33 in a pulse which moves the hammer element 34 smartly against the finger 16 to which it is juxtaposed. This impact snaps the impacted finger 16 from its peripheral registration with the remainder of the series thereof in the area 15, into the reversed active position indicated at 20, and starts the timing interval. After the timed motor running has continued to a point proper to bring the active finger 23 into contact with the cam 27 of the finger 25, the timed interval is concluded. As the timing interval usually does not stop the running of the motor upon its conclusion, it is necessary to erase the signal by returning the bent active finger into the inactive series thereof. This is easily accomplished by providing radially spaced anvil rollers 35 and 36 bearing slightly against one surface of the disc 30 straddling the finger area 15, and an erasing roller 37 spaced between them on the opposite side of the disc in position to be engaged by the advancing finger 20 to snap same back into its inactive position. If desired, the anvil rollers may be disposed in complementary pairs on both sides of the disc. This furnishes a backing-up anvil effect to hold the disc against the distortion when the hammer blow is struck against the finger 16.

It will be seen that the disc 13 can be a stamping and can be produced very cheaply and efficiently, and that although the start of the timing interval is located by the fixed position of the hammer 34, the end of the timed cycle is variable, depending upon the angular positioning of the contact fingers 25 and 26 determined by the angular setting of the knob 21 and pointer 22. The simplicity and efficiency of the invention will be appreciated.

It will be understood, however, that within the broad purview of the invention, other mechanical devices may be used, movable between passive and active position on a support. Thus, in Figs. 6 and 7 the disc 13' is provided with a peripheral series of apertures 40 within which are mounted notched plungers 41 guided for axial motion in the apertures, and having spring elements 42 disposed to engage in one or the other of the notches or grooves 43 and 44 of the plunger. It will be seen that the hammer impact against the end of a given plunger in the inactive position thereof shown in Fig. 6, snaps the plunger inwardly to the active position thereof shown in Fig. 7. The roller or other erasing element 37 forces it outwardly again in the cyclic rotation of the disc 13'.

In the form of the invention shown in Figs. 8 and 9, the disc 13'' mounts a series of pivoted shutters 50, the axes of which are radial of the rotational axis of the disc 13'' and in the inactive or passive position of the parts are in general alignment in the periphery of the disc. They may be held in this position by spring elements or friction as seems most expedient. The conversion of a given shutter from the passive position to the active circuit-controlling position is by having the hammer impact on one side of the shutter beside its axis, to twist the shutter on its axis to the active position shown by the right hand shutter in Figs. 8 and 9. The erasure of the active signal is by returning the given shutter to its aligned position.

Fig. 10 is a fragmentary plan partially in section illustrating the relationship of two of the rollers to the fingers of the disc of Fig. 1.

A further modified form is shown in Figs. 11, 12, and 13, in which the disc 50' has spring fingers

51, the normal resilience of which urges them into coextension with the planar portion of the disc 50'. The disc 50' is juxtaposed to a magnetized disc 52, one face of which, adjacent the fingers 51, has one given polarity, illustratively north. The other face of the disc 52 constitutes the south pole, but this is unimportant. In the rotation of the disc 50' with disc 52 the rollers, as shown in the other figures and for clarity are omitted in Figs. 11 to 13 inclusive, force the spring fingers out of their normal planar relation and into contact with the north face of the disc 52, in which position they are maintained as shown in Fig. 11 by the magnetic attraction between the spring fingers 51 and the polarized disc 52. The relatively narrow permanent magnet hammer 34' has a limited stroke, preferably avoiding actual contact with the fingers 51, and the advancing end thereof is polarized with the same polarity as the finger-engaging and latching face of the disc 52. In the illustrative example, the advancing end of the hammer 34' is polarized north. Actuation of the switch 32 moves the hammer 34' toward a given finger 51, to such adjacency thereof as to neutralize the magnetic flux retaining the said finger 51 against the disc 52, permitting the particular selected finger with which the hammer is aligned to snap into its normal aligned relation with the disc, as shown in Fig. 12. It is preferred that both the hammer end and the respective fingers 51 be relatively narrow and that the space between fingers be minimal, to the end that usually but a single finger is unlatched to respond to its bias toward alignment with the disc. In the event that the hammer moves so close to two of the fingers as to simultaneously release both from latched engagement with the disc, it is the forward finger of the two which becomes the actuated finger 29'. This possibility of releasing either one or a plurality of fingers introduces a potential error, by the width of the space between fingers plus the width of one finger. In a rapid rotation and small time interval this is inconsequential, whereas in a slow moving device of long time cycle, it becomes material and undesirable. It is to be noted, however, that when, if ever, more than one finger is unlatched simultaneously, it is the advancing finger which controls some such switch arrangement as is shown in Fig. 1, and the others have no effect thereon. At the conclusion of its cycle the actuated finger, or lead finger of two or more thereof, actuate a switch, as 25, 26 and 27 of Fig. 1, to end the timed cycle. When the single finger is released to form the actuated finger, the immediate reset delay following conclusion of the timed cycle is always at least for the width of the space between fingers, but in general follows the immediate reset available with the other forms of the invention.

At the conclusion of the timed cycle suitable rollers, as shown in the other figures, again engage the extended or actuated finger 29' and push it back into magnetically latched engagement with the disc 52, as will be clear.

Fig. 13 is a slightly enlarged fragmentary view showing the successive positions of the hammer and the given finger 51 in the respective movements of both in respective full and dotted lines.

The foregoing are illustrative of some of the ramifications and modifications available with the invention, and many others will occur to those skilled in the art, and all such are to be construed as within the scope and spirit of this invention.

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Having thus described my invention, I claim:

1. In apparatus of the class described, a rotatable disc having an axis of rotation, means for rotating the disc on its axis at a time-controlled rate, said disc comprising an inner portion mounting an integral outer portion comprising a multiplicity of individual fingers generally radial of said axis in a peripherally continuous series with contiguous fingers in spaced relation, each of said fingers being bendable between a first and a second attitude relative to the inner portion of the disc, manually adjustable means mounted for oscillation on an axis coextensive with the axis of said disc, circuit-controlling means mounted on said adjustable means adjacent to said peripherally continuous row of fingers incapable of actuation by any of said fingers in its first position but intersecting the rotative path of any finger in its said second position for actuation by such finger to control a circuit independent of said disc, means at a fixed point adjacent to the outer portion of said disc for moving the instantaneously juxtaposed finger of the series from its first to its second position to initiate a timing cycle completed when the thus actuated finger abuts the angularly positioned circuit controller, and means between the circuit controller and said fixed point in the direction of rotation of the disc for moving said moved finger from its second position to its first position.

2. Apparatus as recited in claim 1, in which the respective fingers are anchored to the disc at both ends and are distorted relative to the

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remainder of the disc so as to move between a generally bowed attitude at the first position to an oppositely bowed attitude at the second position.

3. Apparatus as recited in claim 1 in which the disc and fingers are of resilient magnetic material and in which the fingers have an inherent resilient urge to move into their respective second positions, a magnet is provided juxtaposed to the respective fingers for magnetically holding them in their respective first positions against said urge, said means at said fixed point comprising a permanent magnet of the same polarity as said first mentioned magnet and arranged upon movement toward said disc to neutralize the magnetic pull of said first mentioned magnet to permit the selected finger to respond to its said urge and to move into its said second position.

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