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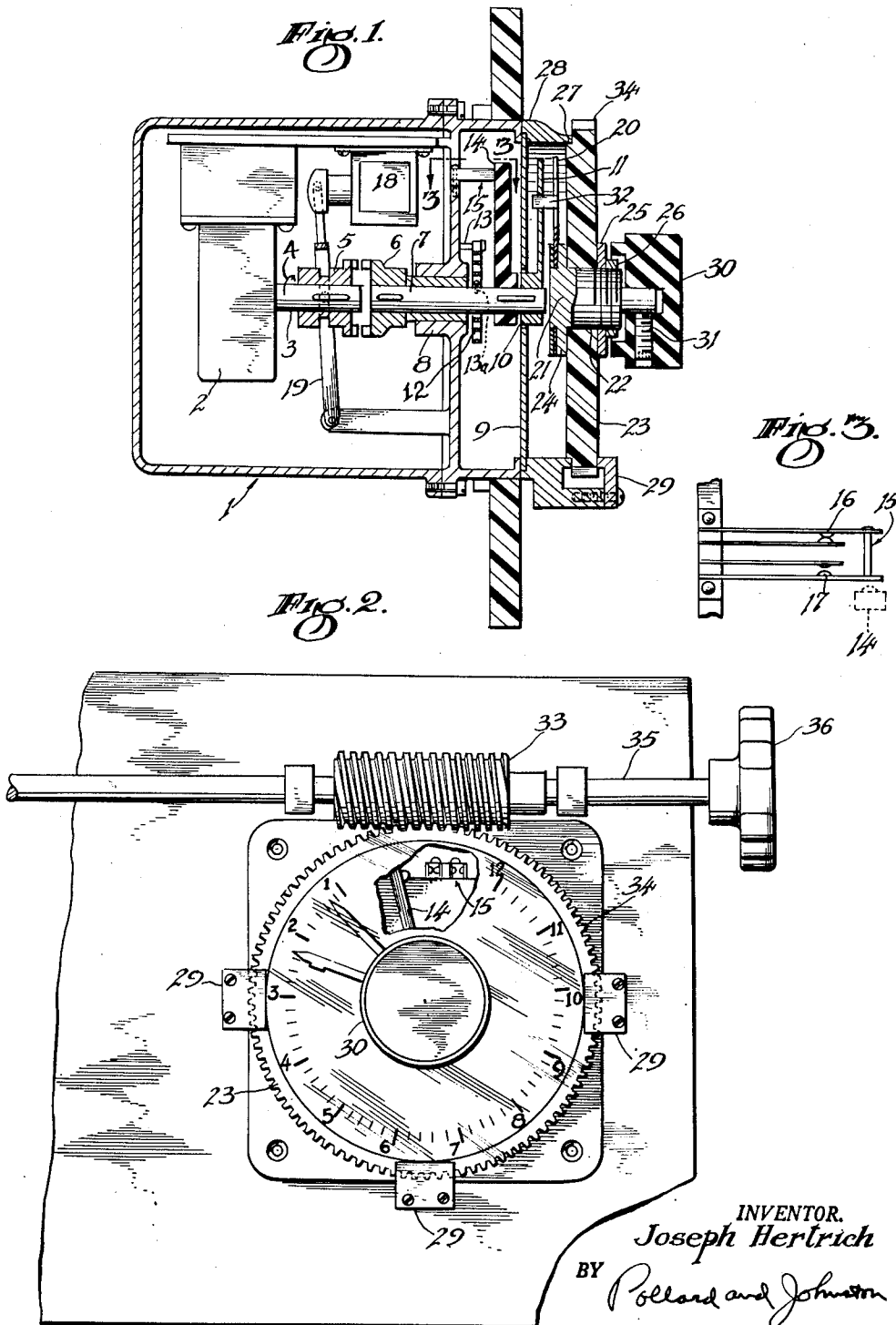
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2,644,518

GROUP CONTROLLED ELECTRIC TIMER

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FIG. 4.

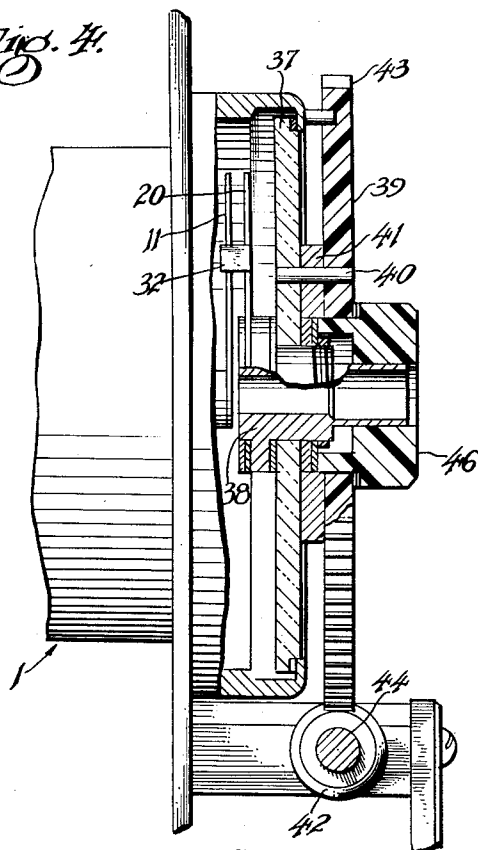
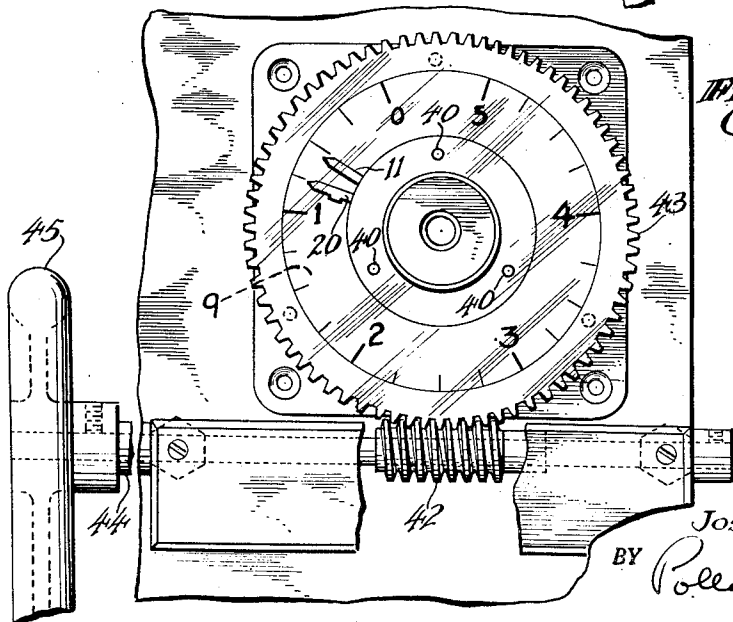


FIG. 5.



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GROUP CONTROLLED ELECTRIC TIMER

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14 Claims. (Cl. 161—1)

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This invention relates to mechanical group control apparatus for two or more electric timer units. More particularly, it relates to timer units which can be controlled individually or, alternatively, as a group.

The primary object of the present invention is to provide simple dual controls for adjusting the period of operation of an electric timer, one of said dual controls being part of a group control for unitary adjustment of a plurality of timers while the other of said controls is an individual adjustor. The present invention provides a mechanical system much more simple in design than any known device, for common adjustment of a group of timers. In the present invention, the individual adjustor common to known electric timers is unaffected, since this adjustor is operable independently of the group adjustor.

Another object of the invention is to provide a means of common adjustment of a group of timers, which can be used with standard electric timers inexpensively and with little alteration of the adjusting unit present in such timers.

A further object of this invention is to provide simple control apparatus for group adjustment of a plurality of timers which can be cheaply manufactured, has a minimum number of parts and is easily assembled.

It is frequently desirable, for example, in commercial sugar refining processes, to have a number of electric timers group controlled. Each timer of a group may be used to control one function in the operation of one of a group of machines performing similar functions in similar operating cycles. The uniform performance of each function by all machines of the group can be assured in such processes, and much time can be saved, if the group of timers controlling each function can be moved to identical settings by a single act of adjustment.

According to the present invention, each of a plurality of timer units is provided with dual controls for an adjusting arm of the timer which limits the period during which the timer operates. One of said controls, the individual adjustor, is fixed on a shaft carrying the adjusting arm and serves by rotating the shaft to position this arm at any desired setting in relation to a rotary timing arm and a dial over which that arm moves in the course of a timing operation. The second control is frictionally engaged with said shaft and rotatably mounted so as to be able to rotate the shaft and hence said adjusting arm; and group adjustment is obtained by grouping a plurality of the timer units side by side and placing a com-

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mon driving member in driving relation to the second control elements of all of the grouped timers. More particularly, the second control is most advantageously a transparent worm wheel which overlies the dial and the timing and adjusting arms of each timer unit, thus serving as a window for observation of the timer setting and timer operations, and the common driving member is a worm shaft having fixed thereon a number of worm gears, each in mesh with the frictionally mounted transparent worm wheel of each timer unit, whereby rotation of said worm shaft simultaneously effects the setting of the adjusting arms of all the grouped timer units.

Other objects, features and advantages of the invention will appear from the following description of preferred embodiments thereof, which makes reference to the accompanying drawings in which corresponding parts are indicated by the same reference numbers, and in which:

Figure 1 is an assembly view, partly in section and partly in side elevation, of one illustrative embodiment of the invention;

Figure 2 is a front elevation, partly broken away, of the embodiment of Figure 1;

Figure 3 is a plan view, taken along line 3—3 of Figure 1, of electrical contact elements of the timer;

Figure 4 is a fragmentary side elevation, partly in section, showing exposed parts of a timer assembled according to a second embodiment of the invention; and

Figure 5 is a front elevation view of the embodiment of Figure 4.

Referring to Figures 1-3 of the drawing, a timer housing generally indicated at 1 is shown supporting a timer motor 2 which rotates a shaft 3 in the direction of arrow 4 (shown in Figure 1). A clutch member 5 is slidably mounted on shaft 3 for rotation therewith and is also adapted to engage a second clutch member 6 fixedly mounted on one end of a timer shaft 7 which is supported in a bearing 8. A graduated face plate or dial 9 is fixed in the housing adjacent the other end of the timer shaft 7. The latter end of the timer shaft 7 extends through an aperture 10 in the dial 9 and has a timing arm 11 fixed thereto for rotation over the dial. Timer shaft 7 is continuously biased in a counterclockwise direction, as viewed facing the dial in Fig. 2, by a clock spring 12 one end of which is fixed to the housing as at 13 while the other end is secured to shaft 7 in any convenient manner, as at 13a. Also fixed on the timer shaft for rotation therewith is a trip arm 14 which is adapted to actuate a switch

15 having contacts 16 and 17 for controlling the flow of current to the elements to be controlled. A solenoid 18 actuates a shifter fork 19 which moves clutch member 5 into and out of engagement with clutch member 6.

For controlling the period of the timing operation an adjusting arm 20 is arranged adjacent the timing arm 11 and is secured to a shaft 21 for rotation over the dial 9. Shaft 21 is supported in a central opening 22 in a transparent disc 23, the shaft frictionally engaging the disc by means of a flange 24 on one end of the shaft, a collar 25 fitted over the other end of the shaft and an adjusting nut 26 clamping the disc between the flange 24 and the collar 25 with a friction sufficient to cause shaft 21 to move with disc 23 but allowing the shaft to be turned relative to the disc. The transparent disc overlies the dial 9, the timer arm 11 and the adjusting arm 20 so that these three elements can be observed through the disc. The disc 23 is also rotatably mounted in the housing by means of an axially extending portion 27 which is supported in a ring member 28 of the housing. Three circumferentially-spaced brackets 29 prevent axial movement of the disc along shaft 21. The shaft 21 can also be rotated by a manual adjusting knob 30 secured to the shaft by set screw 31.

The adjusting arm 20 which is spaced from the timing arm 11 along the axis of the housing, has a stop 32 axially extending a distance slightly exceeding the length of the spacing between the two arms whereby the stop lies in the path of rotation of the timer arm 11.

In operation, the timer is set or reset for a predetermined period of operation by turning the adjusting arm 20 to a desired setting on the dial. Under the biasing action of the spring 12 the timing arm 11 is rotated in a counter-clockwise direction with timer shaft 7 until it comes to rest against the stop 32. In this position, the switch 15 is in its normal position in which contacts 16 are closed and contacts 17 are open. When the solenoid 18 and the motor 2 are energized, the solenoid actuates the shifter 19 to force the clutch 5 into engagement with clutch member 6, and the timer shaft and timing arm are rotated in a clockwise direction. When the arm 11 reaches the zero position of the dial 9, the timer is timed out, and at that moment the trip arm 14 urges the switch member 15 from its normal position to its tripped position whereby the normally closed contacts 16 are opened and the normally open contacts 17 are closed. The timer is reset by deenergizing the solenoid which actuates the shifter 19 and disengages clutch members 5 and 6. When this happens, the timing arm 11 is again urged counter-clockwise by spring 12 into its starting position (rest position against stop 32).

While it is known to adjust timers individually by a central adjusting knob as at 31, applicant has provided a simple and convenient means for group adjustment of a plurality of such timers. By using a frictional connection between transparent disc 23 and adjustment shaft 21, the position of the adjusting arm 20 can be adjusted by rotation of the disc 23 as well as by knob 30. Rotation of the disc is controlled by a worm 33 which meshes with teeth 34 cut in the periphery of the disc 23. Worm 33 is fixed to a worm shaft 35 which is turned by a knob 36. By placing side by side all the timers controlling the same function on a number of machines and by having each timer equipped with a transparent disc in the form of a toothed wheel in mesh with a worm

fixed on a worm-shaft common to all the machines, the entire group can be adjusted simultaneously by the knob 36. The disc acts as a driving member for shaft 21 and as a window member for observing the dial, timing arm and adjusting arm. Thus, it is apparent that the timers can be adjusted as a group by knob 36 or individually by their respective knobs 30.

According to a second embodiment of the invention, use may be made of a standard timer, such as a "Cycle-Flex" timer manufactured by the Eagle Signal Corporation. Dual adjustment elements may be combined with such a timer, according to the invention, as shown in Figures 4 and 5; while the motivating and actuated elements of the timer may correspond to those shown to the left of timing arm 11 in Fig. 1.

A transparent disc 37 is rotatably mounted in the housing 1 in any convenient manner so as to form a closure plate for the housing and a window for observing the dial 9, the timing arm 11 and the adjusting arm 20. An adjusting shaft 38 on which the adjusting arm 20 is secured, is frictionally mounted in the disc 37 in a manner similar to the mounting of shaft 21 in disc 23 in the embodiment shown in Fig. 1 whereby the friction between the disc 37 and the shaft 38 is sufficient to cause the shaft to move with the disc but allowing the shaft to be turned relative to the disc. A second transparent disc 39 overlies the first disc and is secured thereto for rotation therewith by pins 40, which are fixed in metal washers 41. The second disc is driven by a worm 42 which meshes with teeth 43 cut in the periphery of the disc. The worm 42 is fixed on a worm shaft 44 which is turned by a knob 45. Thus the adjusting arms 20 of a plurality of timers can be simultaneously rotated to a desired setting on the dial 9 by turning the knob 45. For individual adjustment of each timer independently of the position of the disc 39, a knob 46 is secured to shaft 38 whereby the adjusting arm 20 can be turned to a desired setting by turning the knob 46.

While preferred examples have been described in detail, it will be understood that various changes and modifications may be made in the illustrated embodiments without departing from the spirit and scope of the invention, and it is intended therefore that the following claims covers all such changes and modifications.

I claim:

1. In an electric timer adapted for common adjustment with a plurality of similar timers and having timer means, a timing arm forming part of the timer means, and a dial over which said timing arm is rotated during a timing operation and over which an adjusting arm is turned to a desired setting thereon to limit the period of rotation of the timing arm; a control for the adjusting arm comprising a shaft on which the adjusting arm is secured, a transparent disc overlying the dial, the timing arm and the adjusting arm so that the latter three elements can be observed through said disc, said disc being drivingly connected to said shaft whereby the adjusting arm can be turned to a desired setting by rotation of said disc, and means for rotating said disc, said latter means being adapted to rotate a plurality of like discs, one in each of the similar timers for simultaneous adjustment of all the timers.

2. In an electric timer adapted for common adjustment with a plurality of similar timers and having a housing, timer means in the housing for actuating a switch member, a timing arm

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forming part of the timer means, and a dial over which said timing arm is rotated during a timing operation and over which an adjusting arm is turned to a desired setting thereon to limit the period of rotation of the timing arm; a control for the adjusting arm comprising a shaft on which the adjusting arm is secured, a rotatable transparent disc overlying the dial, the timing arm and the adjusting arm so that the latter three elements can be observed through said disc, means to manually turn said shaft, means to drivingly connect said shaft to said disc whereby the adjusting arm can be turned to a desired setting by rotation of said disc and means for rotating said disc, said latter means being adapted to rotate a plurality of like discs, one in each of the similar timers for simultaneous adjustment of all the timers.

3. In an electric timer adapted for common adjustment with a plurality of similar timers and having a housing, timer means in the housing, a timing arm forming part of the timer means, and a dial over which the timing arm is rotated during a timing operation and over which an adjusting arm is turned to a desired setting thereon to limit the period of rotation of the timing arm; a control for the adjusting arm comprising a transparent disc rotatably mounted in said housing and overlying the dial, the timing arm and the adjusting arm so that the latter three elements can be observed through said disc, a shaft frictionally engaging said disc and having the adjusting arm secured thereon whereby the adjusting arm can be turned to a desired setting by rotation of said disc or by manual rotation of said shaft, and a driving member for turning said disc, said driving member being adapted to drive a plurality of like discs, one in each of the similar timers for simultaneous adjustment of all the timers.

4. In an electric timer adapted for common adjustment with one or more similar timers and having a housing, timer means in the housing, a timing arm forming part of the timer means, and a dial over which the timing arm is rotated during a timing operation and over which an adjusting arm is turned to a desired setting thereon to limit the period of rotation of the timing arm; a control for the adjusting arm comprising a transparent gear wheel rotatably mounted in said housing and overlying the dial, the timing arm and the adjusting arm so that the latter three elements can be observed through said gear wheel, a shaft supported in and frictionally engaged with said gear wheel, said shaft having the adjusting arm secured thereon whereby the adjusting arm can be turned to a desired setting by rotation of said gear wheel, and a driving gear for turning said gear wheel, said driving gear being secured on a gear shaft which is adapted to drive a plurality of like driving gears, one in each of the similar timers for simultaneous adjusting of all the timers.

5. In an electric timer adapted for common adjustment with one or more similar timers and having a housing, timer means in the housing, a timing arm forming part of the timer means, and a dial over which the timing arm is rotated during a timing operation and over which an adjusting arm is turned to a desired setting thereon to limit the period of rotation of the timing arm; a control for the adjusting arm comprising a first transparent disc rotatably mounted in said housing and overlying the dial, the timing arm and the adjusting arm, a shaft supported in and

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frictionally engaged with said first disc, a second transparent disc drivingly connected to and overlying the first disc so that the dial, the timing arm and the adjusting arm can be observed through said discs, said shaft having the adjusting arm secured thereon whereby the adjusting arm can be turned to a desired setting by rotation of said second disc or by manual rotation of said shaft, and a driving member for turning said second disc, said driving member being adapted to drive a plurality of like discs, one in each of the similar timers for simultaneous adjustment of all the timers.

6. In an electric timer adapted for common adjusting with one or more similar timers and having a housing, timer means in the housing, a timing arm forming part of said timer means, and a dial over which the timing arm is rotated during a timing operation and over which an adjusting arm is turned to a desired setting thereon to limit the period of rotation of the timing arm; a control for the adjusting arm comprising a transparent cover plate rotatably mounted in said housing and overlying the dial, the timing arm and the adjusting arm, a shaft supported in and frictionally engaged with said cover plate, a transparent gear wheel drivingly connected to and overlying said cover plate so that the dial, the timing arm and the adjusting arm can be observed through said plate and gear wheel, said shaft having the adjusting arm secured thereon whereby the adjusting arm can be turned to a desired setting by rotation of said gear wheel, and a driving gear for turning said gear wheel, said driving gear being secured on a gear shaft which is adapted to drive a plurality of like driving gears, one in each of the similar timers for simultaneous adjusting of all the timers.

7. In an electric timer adapted for common adjusting with a plurality of similar timers and having a housing, timer means in the housing to actuate a switch member, a timing arm forming part of said timer means, and a dial over which the timing arm is rotated during a timing operation and over which an adjusting arm is turned to a desired setting thereon to limit the period of rotation of the timing arm; a control for the adjusting arm comprising a transparent worm wheel rotatably secured to the housing and overlying the dial, the timing arm and the adjusting arm so that the latter three elements can be observed through said worm wheel, a shaft mounted in said worm wheel, means for urging said worm wheel into frictional engagement with the shaft, a knob also fixed to said shaft, said shaft having the adjusting arm secured thereon whereby the adjusting arm can be turned to a desired setting by rotation of said worm wheel or by manual rotation of said knob, and a worm for turning said worm wheel, said worm being secured to a worm shaft which is adapted to drive a plurality of like worms, one in each of the similar timers for a simultaneous adjustment for all the timers.

8. In an electric timer adapted for common adjustment with a plurality of similar timers and having a housing, timer means in the housing to actuate a switch member, a timing arm forming part of said timer means, and a dial over which the timing arm is rotated during a timing operation and over which an adjusting arm is turned to a desired setting thereon to limit the period of rotation of the timing arm; a control for the adjusting arm comprising a transparent cover plate rotatably secured to the housing and over-

lying the dial, the timing arm and the adjusting arm, a shaft mounted in said cover plate, means for urging said cover plate into frictional engagement with the shaft, a knob also fixed to said shaft, a transparent worm wheel overlying and fixed to the cover plate for rotation therewith so that the dial and timing and adjusting arms can be observed through the worm wheel and cover plate, said shaft having the adjusting arm secured thereon whereby the adjusting arm can be turned to a desired setting by rotation of said worm wheel or by manual rotation of said knob, and a worm for turning said worm wheel, said worm being secured to a worm shaft which is adapted to drive a plurality of like worms, one in each of the similar timers for a simultaneous adjusting for all the timers.

9. In an electric timer unit adapted for common adjustment with a plurality of similar units and having a dial over which a timing arm is rotated from an adjustable limiting position during a timing operation, and a stop member settable relative to the dial for engaging the timing arm to fix the limiting position; a rotary disc covering the timing arm, the stop member and the dial, and through which the latter three elements may be observed from in front of the unit, cooperating means for engaging the disc and the stop member to move the latter upon rotation of the disc, and means for rotating said disc, said latter means being adapted to rotate a plurality of like discs, one in each of the similar units for simultaneous adjustment of all the units.

10. In an electric timer unit adapted for common adjustment with a plurality of similar units and having a dial over which a timing arm is rotated from an adjustable limiting position during a timing operation, and a stop member settable relative to the dial for engaging the timing arm to fix the limiting position; a rotary disc covering the timing arm, the stop member and the dial, and through which the latter three elements may be observed from in front of the unit, a manual setting means connected with the stop member and including an element at the front of the disc movable manually to adjust the position of the stop member, the disc being connected with the manual setting means so that rotation of the disc rotates the manual setting means to position the stop member, said manual setting means being movable relative to the disc to set the stop element independently of the disc, and means for rotating said disc, said latter means being adapted to rotate a plurality of like discs, one in each of the similar units for simultaneous adjustment of all the units.

11. In an electric timer unit adapted for common adjustment with a plurality of similar units and having a dial over which a timing arm is rotated from an adjustable limiting position during a timing operation, and a stop member settable relative to the dial for engaging the timing arm to fix the limiting position; a rotary worm wheel covering the timing arm, the stop member and the dial, and through which the latter three elements may be observed from in front of the unit, a manual setting means con-

nected with the stop member and including an element at the front of the disc movable manually to adjust the position of the stop member, the disc being frictionally connected with the manual setting means so that rotation of the disc rotates the manual setting means to position the stop member, and a worm for rotating said wheel, said worm being secured on a worm shaft which is adapted to rotate a plurality of like worms, one in each of the units for simultaneous adjustment of all the units.

12. In an electric timer having a dial over which a timing arm is rotated from an adjustable limiting position during a timing operation, and an adjusting arm settable relative to the dial for engaging the timing arm to fix the limiting position; a shaft on which the adjusting arm is secured, manual means for turning the shaft to position the adjusting arm, a disc which overlies the dial, the timing arm and the adjusting arm, and through which the latter three elements can be observed, said disc being connected to said shaft so that rotation of the disc rotates the shaft, said shaft being movable relative to the disc by said manual means to position the adjusting arm independently of the disc, and driving means engaging a peripheral part of the disc for rotating said disc to set said adjusting arm.

13. In an electric timer having a dial relative to which a timing element is rotated from an adjustable limiting position during a timing operation and an indexing element over the dial which is settable relative thereto to fix the limiting position; a shaft rotatable to change the relative position of the indexing element and the dial, a disc overlying the dial and the indexing element, said disc being transparent so that the dial and said indexing element can be observed through the disc, said disc being connected to said shaft so that rotation of the disc rotates the shaft, and driving means for engaging a peripheral part of the disc for rotating said disc to adjust said relative position.

14. In an electric timer having a dial relative to which a timing element is rotated from an adjustable limiting position during a timing operation and an indexing element over the dial which is settable relative thereto to fix the limiting position; a shaft rotatable to change the relative position of the indexing element and the dial, a disc overlying the dial and the indexing element, said disc being transparent so that the dial and said indexing element can be observed through the disc, said disc being connected to said shaft so that rotation of the disc rotates the shaft, said disc having peripheral teeth forming a worm wheel, and a worm gear engaging said teeth for rotating said disc to adjust said relative position.

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References Cited in the file of this patent
UNITED STATES PATENTS

Number	Name	Date
1,367,148	Kennedy	Feb. 1, 1921
2,113,274	Lux	Apr. 5, 1938