

June 20, 1944.

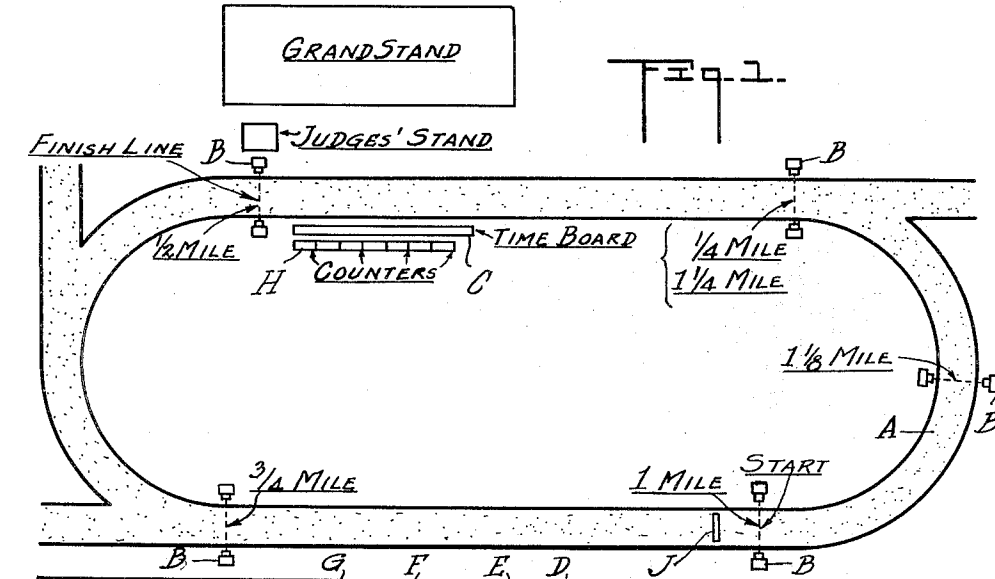
J. W. ROUPRICH

2,351,707

AUTOMATIC ELECTRIC SELF-POSTING TIMER

Filed April 12, 1940

3 Sheets-Sheet 1



	DISTANCES	TIME			
C	1/4 MILE				
H'	1/2 MILE				
H'	3/4 MILE				
H'	1 MILE				
H'	1-1/8 MILE				
H'	1-1/4 MILE				
H'	1-1/2 MILE				
		MINUTES	SEC. (TENS)	SEC. (UNITS)	SEC. (FRACTIONS)

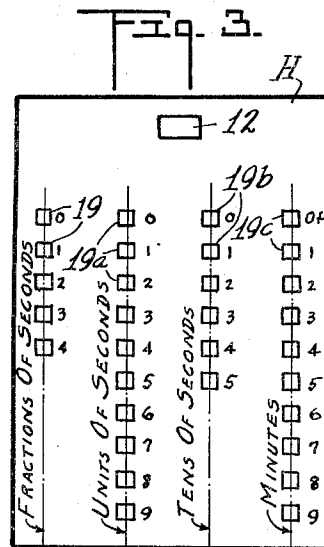


Fig. 2.
INVENTOR.
JAMES W. ROUPRICH.
BY *Munn, Anderson & Riddy*
ATTORNEYS.

June 20, 1944.

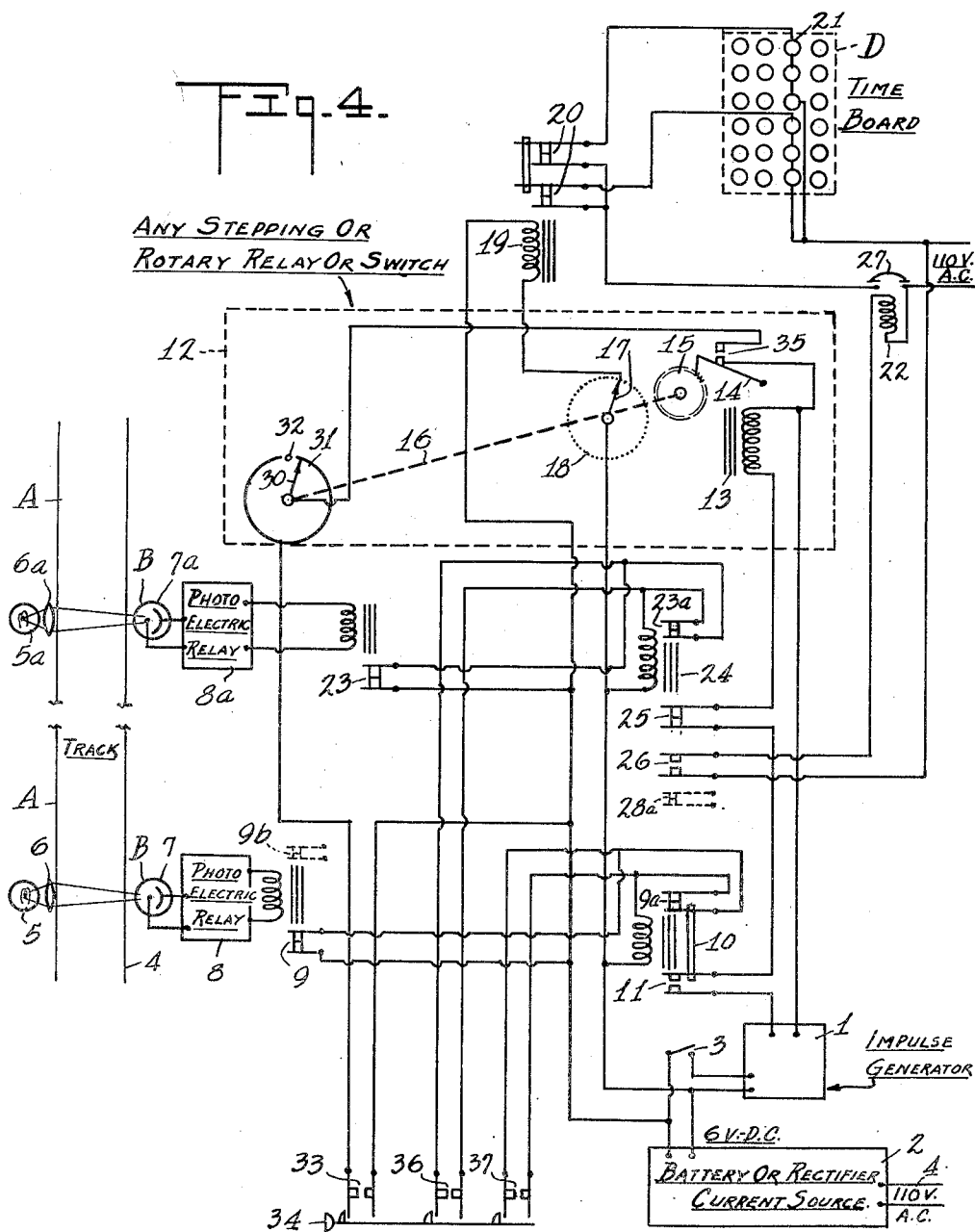
J. W. ROUPRICH

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AUTOMATIC ELECTRIC SELF-POSTING TIMER

Filed April 12, 1940

3 Sheets-Sheet 2



INVENTOR.

JAMES W. ROUPRICH.

BY *Munroe, Anderson & Riddy.*

ATTORNEYS.

June 20, 1944.

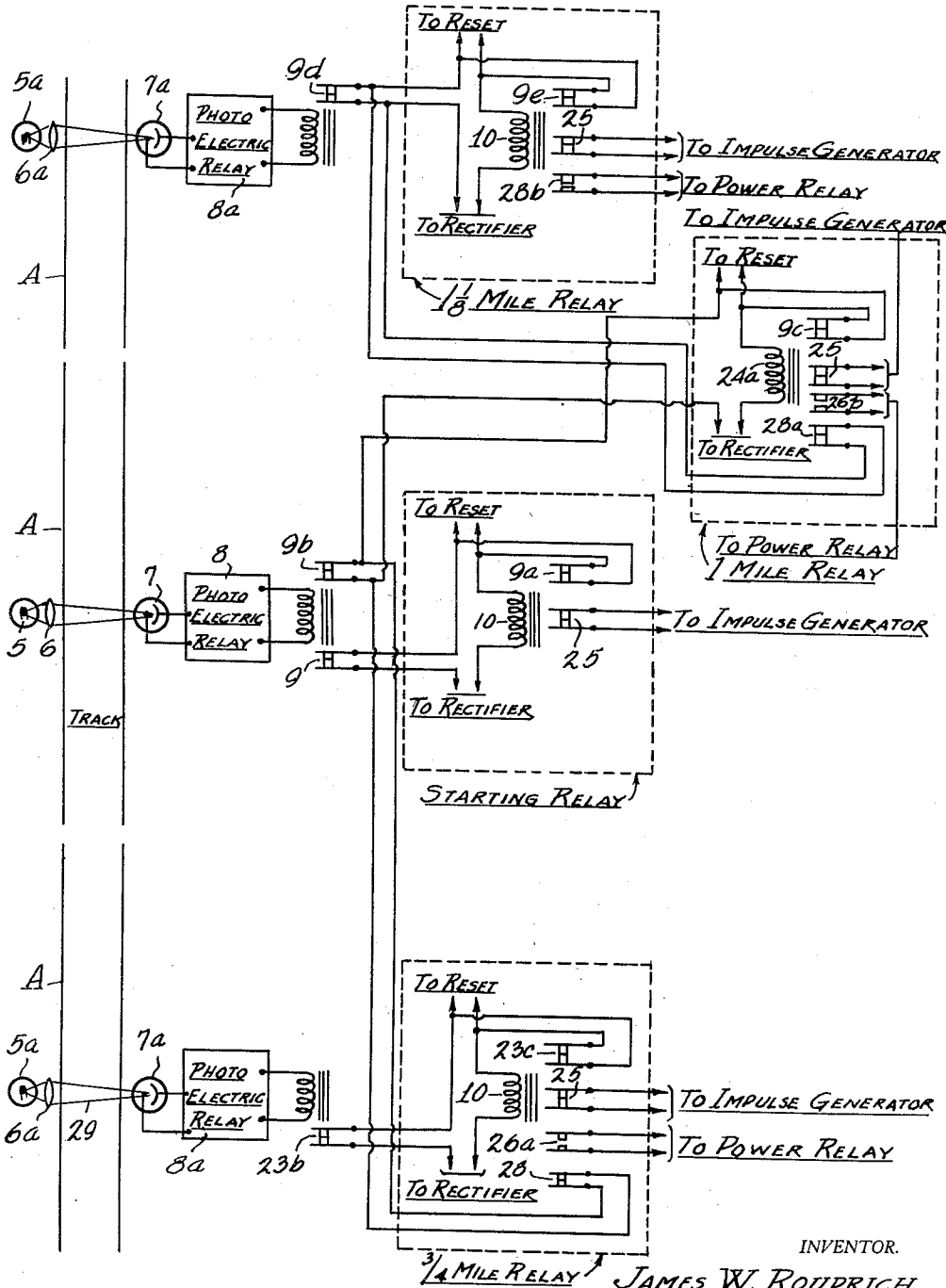
J. W. ROUPRICH

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AUTOMATIC ELECTRIC SELF-POSTING TIMER

Filed April 12, 1940

3 Sheets-Sheet 3



INVENTOR.

JAMES W. ROUPRICH.

BY *Munn, Anderson & Riddy.*

ATTORNEYS.

Fig. 5.

UNITED STATES PATENT OFFICE

2,351,707

AUTOMATIC ELECTRIC SELF-POSTING
TIMER

James W. Rouprich, San Francisco, Calif.

Application April 12, 1940, Serial No. 329,286

2 Claims. (Cl. 161-18)

The present invention relates to improvements in automatic electric self-posting timers, and it consists of the combinations, constructions and arrangements hereinafter described and claimed.

An object of my invention is to provide an automatic electric self-posting timer that may be used in any case where time or numbers are required to be registered. It is possible to post counts at intervals, these counts to remain posted with the final count until the entire device is reset.

The device lends itself admirably to the timing of horse races, where it is desired to instantly post the time for different portions of the race. The posting is done automatically and will instantly flash the time on a time board as the leading horse passes a given point in the race. The device will accurately give the time within a fraction of a second and does away with the necessity of using a stop watch or relying on an operator to post the time on the board.

In the drawings attached hereto, I have shown a mile and one-half race as an example, and the board will not only post the time for the complete race, but will also give the time for intermediate distances. A separate electric counter is used for each of the intermediate distances and also for the complete race. All of the counters are electrically connected to a master electric impulse generator and, therefore, no errors can creep into the system as the different intermediate distances are posted because all of the counters are simultaneously set in motion at the start of the race. The time is instantly, automatically and electrically posted as each distance pole in the race is passed. In the event that one of the counters should get out of order for any reason, it will not affect the other counters.

The device makes use of electric eyes, or any other devices of standard practise, such as switches, relays, etc., to start the operation of the counters and to post the various times on the board. The device will post automatically and electrically in lighted numbers the time required to cover any distance to be measured. The device may be quickly reset for timing another race.

Other objects and advantages will appear in the following specification, and the novel features will be particularly pointed out in the appended claims.

My invention is illustrated in the accompanying drawings, forming part of this application, in which:

Figure 1 is a plan view of a race track, show-

ing my device diagrammatically and properly arranged around the track;

Figure 2 a front elevation of the time board on which the numbers for the different racing distances are flashed;

Figure 3 a diagrammatic view of one of the counting networks illustrating the various banks of rack relays;

Figure 4 a wiring diagram showing the electric circuits; and

Figure 5 a wiring diagram showing the transfer circuits between the electric counters.

While I have shown only the preferred form of my invention, it should be understood that various changes or modifications may be made within the scope of the claims hereto annexed without departing from the spirit of the invention.

In carrying out my invention, I make use of a horse racing track indicated generally at A. Around this track I have placed electric eyes designated generally at B. As many electric eyes as desired may be used, and I have shown a sufficient number in a mile and one-half race to give the times for one-fourth mile, one-half mile, three-fourths of a mile, one mile, one and one-eighth miles, one and one-fourth miles, and the mile and one-half or the finish of the race.

In addition to these electric eyes, there is one used to start the device functioning at the start of the race. In the present device, the mile and one-half race is run on a mile track and therefore the starting electric eye for the race will also be used to give the time for the mile distance.

A time board C is shown in Figure 2, and this has four banks of lights D, E, F and G for each distance indicated on the board. At the bottom of Figure 2, I have indicated what each bank of lights represents. The bank D gives the time in fractions of seconds; the bank E in seconds (units); the bank F in seconds (tens); and the bank G in minutes. There are seven distances listed on the board and there will be a separate electrical counter for each distance. I have indicated the seven counters diagrammatically at H in Figure 1, and the distances at H' on the board C, shown in Figure 2.

In Figure 3, I diagrammatically show one of the electrical counters H, and this counter carries banks of relays for flashing the numbers on the board in the manner illustrated in the wiring diagram shown in Figure 4 and which will be described.

Description of electrical circuits

An impulse generator indicated generally at 1 in Figure 4 is electrically connected to a battery or rectifier current source indicated generally at 2 when a switch 3 is closed. The switch 3 may be closed when the starting gate J is opened to permit the horses to start running, or when the horses pass the starting electric eye for the race. The impulse generator 1 can be timed to give impulses for any desired time interval. In the present application an impulse will be given every one-fifth of a second. The rectifier 2 is connected to a source of 110 v. A. C. current shown at 4.

The horse racing track indicated diagrammatically at A has the electric eyes B disposed at desired points along the track. In the wiring diagram of Figure 4, I have shown the starting electric eye for the race and one other electric eye, which may be placed at the finish of the race, or for any intermediate point. The time board C shown in Figure 2 has the seven distances H' listed thereon and a separate electric eye B must be placed along the track at each of these distances. It is necessary to show only one of the electric eyes in the wiring diagram to show the operation and it is not necessary to show all seven. Since the mile and one-half race is run on a mile track as shown in Figure 1, certain of the electric eyes will be used for indicating two different time periods and this will be described hereinafter.

The timing circuit is closed by breaking a light beam directed against a photo-electric cell. The source of light for the cell consists of a lighted lamp 5, see Figure 4, that will project light rays through a lens 6 and onto a photo-electric cell 7. When the light beam is broken by the horses racing thereby, a photo-electric relay indicated diagrammatically at 8 is energized and will momentarily open a normally-closed switch 9. The switch 9 will open a circuit to a relay 10, which in turn will permit a normally-closed switch 9a in series with the relay coil to open and to mechanically close a switch 11 that will electrically connect a stepping or rotary relay or switch indicated generally at 12 with the impulse generator 1. A stepping switch 12 and associate mechanism will be provided for each electrical counter. The wiring diagram indicates the impulse generator connected to a magnet 13, forming part of the stepping relay 12 and the magnet will attract an armature 14 each time the generator 1 sends out an impulse. The armature will rotate a ratchet 15 step by step that may have any desired number of teeth thereon. In the present case, the ratchet is designed to make a complete revolution every ten seconds and since the armature will be actuated each fifth of a second, the ratchet will have fifty teeth formed thereon.

The ratchet 15 will intermittently rotate a shaft indicated generally at 16 by broken lines, and this shaft will move a switch arm 17 step by step over a series of terminals or contacts 18. There will be more than one switch arm 17 used in the device in actual practise. For example, in the time board C shown in Figure 2, there are four number-indicating banks of lights D to G, inclusive, for each of the seven distances H' indicated on the board. There will be a separate switch arm 17 for each one of these groups of lights, four in all, for each of the seven distances H' from one-fourth of a mile to a mile and one-half.

Since there will be fifty notches on the ratchet 15 there will also be fifty terminals 18 circumferentially arranged around the shaft 16. The arm 17 will pass from one contact or terminal to the next one every fifth of a second and therefore will indicate time in fifths of a second. Five relays will be connected to the fifty terminals for also indicating fifths of a second. Only one relay 19 is shown in the wiring diagram for purposes of clarity, although five are diagrammatically shown in Figure 3. The relay 19 is connected to the number one terminal in the circle of fifty terminals 18. Since there are fifty terminals, every fifth one will be electrically connected to the same relay 19. In like manner the "zero," "two," "three" and "four" terminals 18 will be electrically connected to their respective relays, shown diagrammatically in Figure 3, and all similar to the relay 19.

In the same way, an electric switch arm (not shown) will successively contact terminals (not shown) and circumferentially arranged for indicating seconds of time so that a new terminal will be contacted by the arm for each second of elapsed time. These second-representing terminals will be in electrical connection with the ten rack relays 19a shown diagrammatically in Figure 3. Another switch arm (not shown) will contact with another circle of six terminals (not shown) for indicating every ten seconds of elapsed time, this arm passing from one terminal to another every tensseconds. These six ten-second-indicating terminals are electrically connected to the six rack relays 19b shown in Figure 3 diagrammatically. Finally there is still another switch arm (not shown) movable over a circumferential row of terminals (not shown), each terminal representing a minute of elapsed time.

It should be noted that when the arm 17 moves over five contacts, it will close a circuit that will cause the second-indicating arm to advance one contact and when the latter moves through ten contacts, it will close a circuit to advance the ten-second-indicating arm to advance one contact. The minute-indicating arm will advance one contact when the ten-second arm passes six contacts.

For the purpose of a horse race only nine minutes need be indicated on the time board, because most races are run in a little over two minutes or less, this depending upon the distance run and the speed of the horses. This last row of ten terminals are electrically connected to the rack relays 19c shown diagrammatically in Figure 3. If desired, the arms indicating seconds, tens of seconds and minutes may be mounted on one or more separate shafts that will rotate at a slower speed than the shaft 16. It will be seen that I have provided relays 19, 19a, 19b and 19c that will indicate time in minutes, seconds and fractions of seconds for any time interval from one-fifth of a second up to nine minutes, fifty-nine seconds and four-fifths of a second.

I will now describe how the elapsed time is automatically posted and instantly flashed onto the board C the moment the horses pass one of the electric eyes disposed along the track. The relay 19 that is in electrical connection with the switch arm 17 is energized and will close one or more switches 20, that in turn electrically connect number-forming lights 21 with a source of current when a power relay 22 is closed. In other words, the relays 19 in all of the four banks of relays shown in Figure 3 will close in proper

sequence, but the lights 21 will not flash the time until the power relay 22 is closed. Each relay in each bank of relays 19, 19a, 19b and 19c is wired to its associate series of lights 21 to flash the number of the relay instantly on the board the moment the power relay 22 is closed. The wiring diagram illustrates the switches 20 connecting certain of the lights 21 to flash the number "1" as soon as the power relay 22 is energized and connects these lights 21 to a source of current indicated as 110 v. in the drawings.

Assume that the race has started and that the horses just break the light beam normally projected by the lamp 5a onto an electric eye placed along the track at a certain distance, the beam usually passing through the lens 6a and striking the photo-electric cell 7a. The photo-electric relay 8a will momentarily open a normally-closed switch 23 that in turn will cause a second relay 24 to permit a normally-closed switch 23a to open and to mechanically open switch 25 and close switch 26. The closing of the switch 26 will cause the power relay 22 to close its switch 27 and connect certain of the lights 21 with the 110 v. current and immediately light or post a number corresponding to the number of the relay 19 closed for that particular instant of time. The opening of the switch 25 will instantly stop the stepping relay 12 from further functioning and the relays 19, 19a, 19b and 19c that are in electrical connection with their arms 17 will remain closed so that their switches 20 will cause the desired numbers to be instantly flashed or posted on the board C when the switches 26 and 27 close.

As already stated, there is a separate electrical counter H, including the wiring diagram shown (except for the starting electric eye and the impulse generator), for each of the seven distances H' to be timed in the race. The first counter will flash its time on the banks of lights disposed opposite the one-fourth mile distance on the board. The second counter will be set in operation when the horses pass the starting electric eye and it will flash the elapsed time when the horses pass the electric eye associated with the one-half mile distance.

In a like manner, all of the counters will concurrently function and successively post their times on the board C, and the instant the race is over seven distinct elapsed times will be visible from the board. The electric eyes may be increased or decreased in number, this depending upon the results desired.

It is best now to describe how the same electric eyes can be used for posting the time for two different distances on the track and how one of the electric eyes will not post the time the first time the horses pass it, but only will post for the second passing. For example, in the mile track illustrated, the start of the mile and one-half race will take place at the electric eye beam marked "Start" in Figure 1, and this same eye will give the time when the horses have completed one mile of the race. The electric eye marked "1 1/2 mile" will not function to post the time when the horses first pass this eye, but will function only for the second passing. In a like manner, the one-quarter mile light beam will also function for the timing of the mile and one-quarter, and the one-half mile electric eye will also give the time for the finish of the race.

Transfer circuits

The wiring diagram is shown in Figure 5 for 75

accomplishing the above result, and consists of transfer circuits which will prevent certain counters from posting their time until the electric eye immediately prior in sequence has been tripped. The electric eyes B for the start of the race, the three-quarter mile post and the one and one-eighth mile post are shown in this view. Parts of the wiring circuits in Figure 5 that are similar to the parts in Figure 4 will be given like reference numerals.

The electric eye assembly shown at 5, 6, 7 and 8 in Figure 5 is the one used to start the race. The relay 8 not only opens switch 9 when the race starts, but also opens switch 9b. The switch 9 is in electrical connection with the starting relay 10, while the switch 9b is in electrical connection with a switch 9c of the one mile relay 24a. Although the switch 9b will be momentarily opened when the beam from the lamp 5 is tripped at the start of the race, the three-quarter mile relay will prevent the switch 9c from opening and this will preclude the one mile relay from posting the time at the start of the race.

It will be noted that a locking switch 28 in the three-quarter mile relay is normally closed and is in parallel with the switch 9b. Therefore, when the switch 9b is temporarily opened by the tripping of the light beam, the circuit through the switch 9c still remains closed because the switch 28 is closed. This will prevent the one mile relay from functioning at the start of the race and posting the time on the board C.

When the horses first move past the electric eye associated with the one and one-eighth mile distance, the momentary tripping of the light beam will have no effect to cause the one and one-eighth mile relay to post the time on the board. The horses must make one complete lap of the track and again pass the one and one-eighth mile electric eye before the time for this distance will be posted.

The means for preventing the mile and one-eighth relay from functioning when the horses have run only one-eighth of a mile comprises a locking switch 28a in the one mile relay. The one mile relay 24a keeps the locking switch 28a closed and since this is in parallel with a switch 9d in the one and one-eighth mile relay, the switch 9e will remain closed and prevent the time from being posted.

The one-quarter and one-half mile light beams will post the times for these two distances in the manner already described and the counters for the mile and one-quarter and the finish of the race will be prevented from posting in the same manner as the mile relay was held from posting at the start of the race.

We now come to the three-quarter mile post in the race. The electric eye beam 29 will be tripped and this will open the relay switches 23b and 23c. The switch 26a will close a circuit to the power relay 22 to flash the time and the switch 28 will open. When now the horses trip the one mile light beam (which is also the starting light beam), the switch 28 is open and therefore the momentary opening of the switch 9b will cause the one mile relay to post the time by closing the switch 26b to the power relay.

The locking switch 28a in the one mile relay will open and therefore when the horses pass the mile and one-eighth post and trip the electric eye beam of this post for the second time, the switch 9d will open and since the switch 28a is already open, the switch 9e will also open and actuate the one and one-eighth mile relay. The

switch 28b will close a circuit to the power relay 22 to flash the time on the board.

It is not necessary to show the transfer circuits for the mile and one-fourth and the finish of the race because the light beams at these two distances, when tripped for the second time, will close circuits for giving the time for the mile and one-quarter distance and also for the finish of the race. The circuits will be similar to that already described for the mile and mile and one-eighth relays.

Resetting circuits

After the race has been run, it is possible to reset the entire mechanism for the running of another race. I use a homing circuit for this purpose and show it in Figure 4. This circuit will quickly bring the arms 17 in all of the electric counters H back to starting position. An arm 30 is connected to the shaft 16 and rides over an arcuate conductor strip 31 in all positions, excepting starting position, where it contacts a dead terminal 32. When it is desired to reset the arm 17, a reset switch 33 is manually closed by a plunger 34, or any other means, and this will close a circuit through the arm 30 and a switch 35, the latter being carried by the armature 14. The movement of the armature 14 will open and close the switch 35.

The plunger 34 also closes reset switches 36 and 37 which bridge switches 9a and 23a respectively and thus establishes continuity of the starting and stopping circuits, which will cause the arm 30 to stepwise advance around the strip 31 until it comes to the dead terminal 32 and the arm 30 through the shaft 16 will return the arm 17 back to starting position. In this way all of the arms 17 for all of the electric counters H will be returned to starting position. Each time the switch 35 closes in the homing circuit, the magnet 13 is energized and attracts the armature 14, advancing the ratchet 15 one tooth. The opening of the switch 35 de-energizes the magnet 13 and permits a spring to return the armature for again closing the switch 35. This operation is repeated until the arms 17 and 30 are returned to starting position.

I claim:

1. In an automatic electric self-posting timer for races, a plurality of cooperating light beams and electric eyes disposed at intervals around an endless race track, a timed electric impulse generator, electric counters for each electric eye,

certain electric eyes having more than one counter associated therewith, means actuated by one of the electric eyes when obscured at the start of the race for electrically connecting all of the counters with the impulse generator, time-posting means for each counter, means associated with each counter and its electric eye for disconnecting the counter from the impulse generator the instant that the light beam of the electric eye is obscured and for connecting its counter with the associated time-posting means for indicating the total time between the obscuring of the starting light beam and the obscuring of the beam associated with the counter, and transfer circuits interconnecting certain counters for making the associated light beams non-effective for those counters until these beams have once been obscured, whereupon the second obscuring of the beams will disconnect the associated counters from the impulse generator and immediately connect them to the associated time-posting means.

2. In an automatic electric self-posting timer for races, a plurality of cooperating light beams and electric eyes disposed at intervals around an endless race track, a timed electric impulse generator, electric counters for each electric eye, certain electric eyes having more than one counter associated therewith, means actuated by one of the electric eyes when obscured at the start of the race for electrically connecting all of the counters with the impulse generator, time-posting means for each counter, means associated with each counter and its electric eye for disconnecting the counter from the impulse generator the instant that the light beam of the electric eye is obscured and for connecting its counter with the associated time-posting means for indicating the total time between the obscuring of the starting light beam and the obscuring of the beam associated with the counter, transfer circuits interconnecting certain counters for making the associated light beams non-effective for those counters until these beams have once been obscured, whereupon the second obscuring of the beams will disconnect the associated counters from the impulse generator and immediately connect them to the associated time-posting means, and means for resetting the counters back to starting position.

JAMES W. ROUPRICH.