Jan. 3, 1956 I. M. MALOTT 2,729,288

STARTING MECHANISM FOR TIMER

Filed Oct. 3, 1952

2 Sheets-Sheet 1

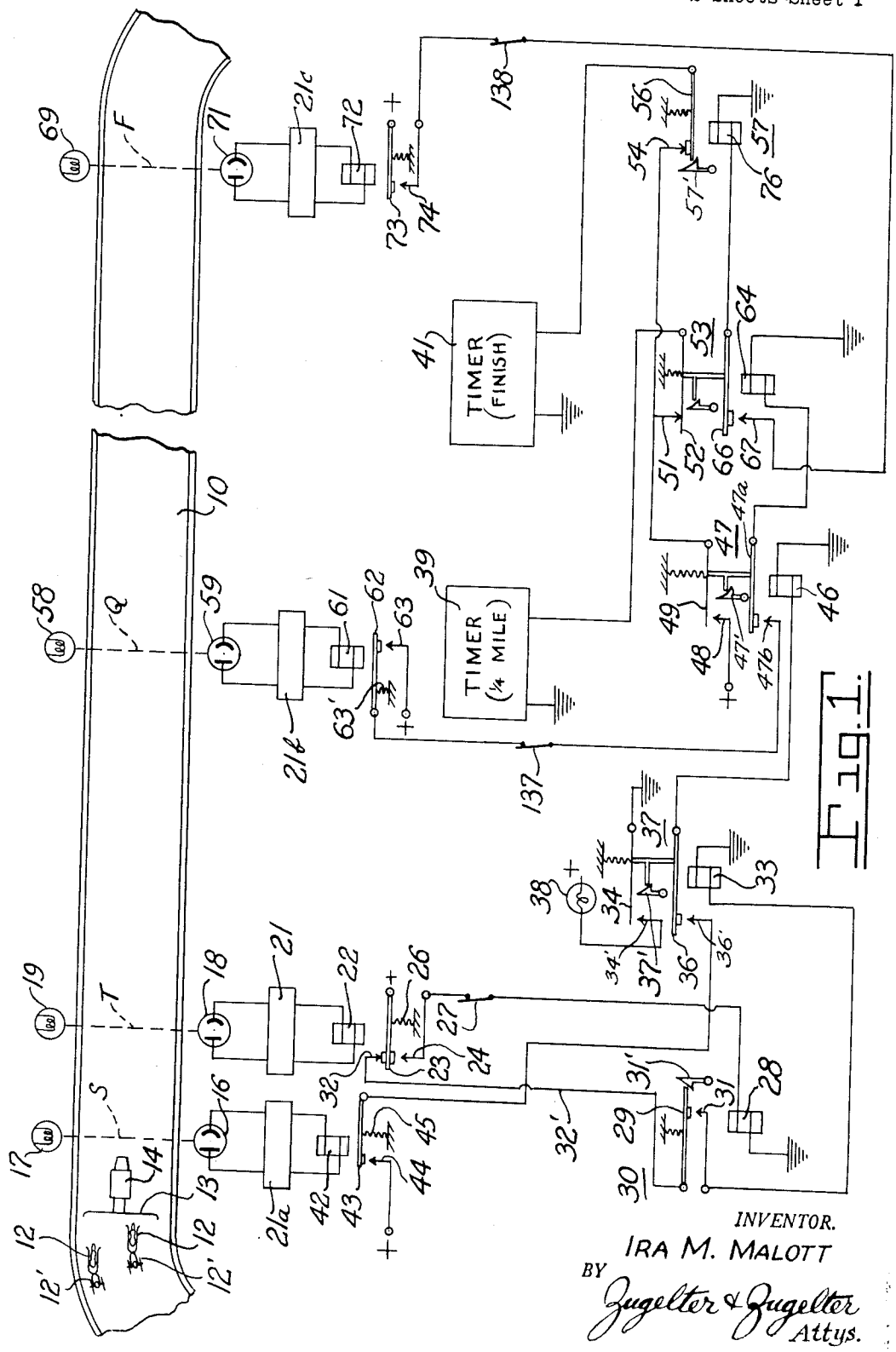


Fig. 1.

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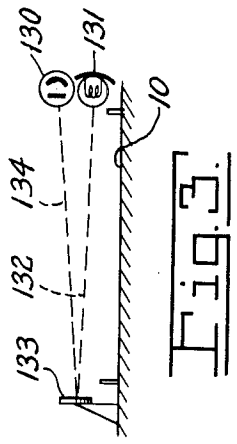


Fig. 3.

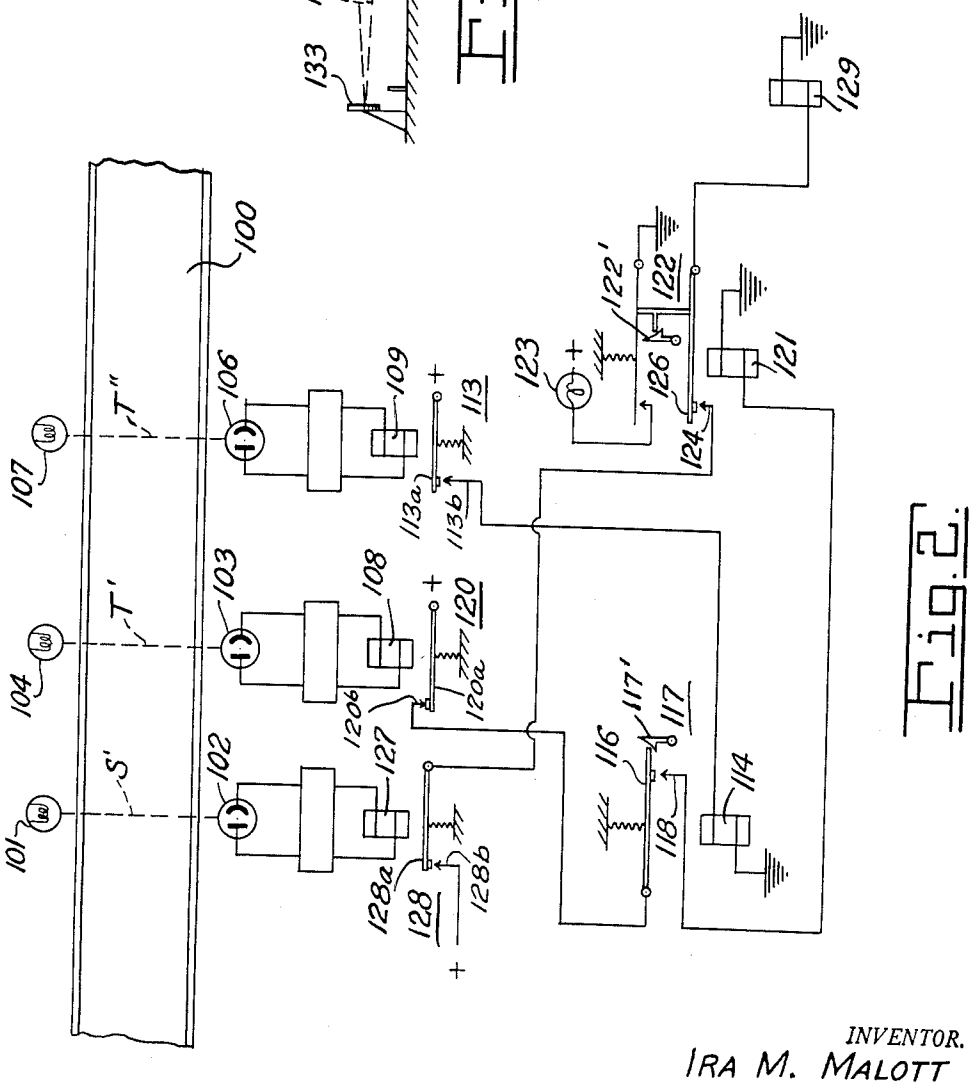


Fig. 2.

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STARTING MECHANISM FOR TIMER

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4 Claims. (Cl. 161—18)

This invention relates to a timing mechanism, and more particularly to a device for timing the start of a race in which contestants are preceded by a starting gate.

An object of this invention is to provide a device which automatically starts a timer in response to a contestant passing the starting line after the starting gate has crossed the line ahead of contestants.

A further object of this invention is to provide a device for starting a timer which device is ineffective until after the starting gate has crossed the starting line.

The above and other features of the invention will in part be apparent and will in part be obvious from the following detailed description and the drawings, in which:

Figure 1 is a schematic view of circuits and apparatus embodied in a timing mechanism constructed in accordance with an embodiment of this invention;

Fig. 2 is a schematic view showing a timing mechanism constructed in accordance with another embodiment of this invention; and

Fig. 3 is a schematic view showing an arrangement of photo-electric cell and a lamp for directing a light beam to the cell.

In the following detailed description, and the drawings, like reference characters indicate like parts.

In the drawings, a ground is shown by a conventional sign and a source of electrical potential is shown by a plus (+) sign. A circuit is complete if it has a plus sign at one end and a ground at the other.

The timer illustrated herein is adapted for use in timing so-called harness races, on either half-mile, mile or longer tracks. The particular features of the timer relate to the mechanism that functions at the start of the race.

In Fig. 1 of the drawings, the starting line is indicated at S, the ¼ mile at Q and the finish line at F. At each of these points is a light source on one side of the track and a photo-electric cell at the opposite side. The light beam is so placed as to shine on the photo-cell and they are so positioned with respect to ground or track level that the light beam is interrupted when a horse passes by. Each photo-cell controls an amplifier the output of which is connected to the solenoid of a relay, the relay being energized when the photocell receives light and is de-energized when the light beam is interrupted.

In Fig. 1, photocells are shown at the starting section of the track, at the ¼ mile and the finish line, other fractional stations along the track being omitted.

In Figure 1, a race track is indicated at **10**. The track may be a continuous track on which harness races are run as indicated by horses **12** and sulkies **12'**. At the start of a race the horses and sulkies are preceded on the track by a starting gate **13** which may be carried by a truck **14** or the like. The starting gate **13** crosses a starting line S ahead of the sulkies and horses. The start of the race occurs when the first horse crosses the starting line S after the starting gate has crossed the line S.

At the starting line of the track there are two photo-cell and amplifier relay devices, one at the starting line

S and one at a line T a predetermined distance after the starting line.

The start of a race is recorded by a photo-electric cell **16** at starting line S. Cell **16** receives light from a lamp **17**. The light from lamp **17** is directed along the starting line S to cell **16** at a proper height to be interrupted by a horse. However, cell **16** is rendered inoperative with respect to the starting timing mechanism until the starting gate has crossed line T. Line T is disposed a short distance further along the track than the starting line S and is parallel thereto. At line T, a photo-electric cell **18** receives light from a lamp **19**. Lamp **19** and cell **18** are set at an appropriate height so that the beam therebetween can be interrupted by the starting gate. Cell **18** is provided with and controls appropriate amplifying apparatus **21**, not shown in detail, which is so arranged that when the beam of light to cell **18** is interrupted, a solenoid **22** is de-energized, whereupon a movable switch contact **23** is actuated against a stationary contact **24** by spring **26**, thereby completing a circuit through a normally closed switch **27**, that energizes a solenoid **28**. Solenoid **28**, in turn, actuates the movable contact **29** of a switch **30** into engagement with stationary contact **31** thereof. Switch **30** is provided with a latch **31'** which holds the contacts thereof closed when actuated to closed position.

When the starting gate completes its passage across line T, cell **18** again receives light from lamp **19**, and solenoid **22** again is energized, thereby actuating movable contact **23** against a stationary contact **32** whereby a solenoid **33** is energized through a circuit including contacts **23** and **32**, a wire **32'** and contacts **29** and **31**. When solenoid **33** is energized, movable contacts **34** and **36** of a switch **37** are closed on stationary contacts **34'** and **36'**, respectively. Contact members **34** and **36** are provided with a latch **37'** which holds them closed when actuated to that position. When the contacts of switch **37** close, a lamp **38** is lighted and a circuit is established that functions in response to the next interruption of the light beam at starting line S, to start timers **39** and **41**.

When, after the starting gate has crossed line T, the first horse crosses starting line S, the beam of light to cell **16** is interrupted to cause de-energization of solenoid **42** at the start of the race. When solenoid **42** is de-energized, movable switch contact **43** is actuated into engagement with stationary contact **44** by a spring **45**. When contacts **43** and **44** are in engagement, a solenoid **46** is energized. When solenoid **46** is energized, the movable contacts **47*a*** and **49** engage contacts **47*b*** and **48** of a latch-type switch **47** and are latched in that position by a latch **47'**. When the contacts of switch **47** close, the timers **39** and **41** are started. Each of the timers, not shown in detail, may be an electrically driven self-starting clock.

The circuit for starting each of the timers is completed through stationary contact **48** and movable contact **49** of switch **47**. The circuit to timer **39** also includes a stationary contact **51** and a movable contact **52** of a switch **53**, while the circuit to timer **41** includes a stationary contact **54** and a movable contact **56** of a switch **57**. The aforementioned contacts of switches **53** and **57** are normally closed but are opened when the timers associated therewith are to be stopped.

Timer **39** is the quarter mile timer and is stopped when the first horse passes line Q, which is located a quarter of a mile from the start of a race. When the first horse passes the quarter mile line Q, a light beam from a lamp **58** to a photo-electric cell **59** is interrupted to cause de-energization of a solenoid **61**. When solenoid **61** is de-energized, a movable switch plate **62** is released and actuated by a spring **63'** into engagement with a stationary contact **63** to complete a circuit for energizing solenoid **64**. When solenoid **64** is energized, the contacts **51** and **52** of latch-

type switch 53 are opened to stop the timer and contacts 66 and 67 of switch 53 are closed.

Timer 41 is stopped when the first horse reaches a finish line F and records the time for the entire race. When the first horse crosses the finish line F, a beam of light from a lamp 69 to a cell 71 is broken to cause de-energization of a solenoid 72. When solenoid 72 is de-energized, a movable switch contact 73 is released to engage a stationary contact 74 to cause energization of a solenoid 76 of latch type switch 57. When solenoid 76 is energized, movable contact 56 is disengaged from stationary contact 54 and held open by a latch 57', whereby timer 41 is de-energized and stopped.

Each of the photo-cells is provided with appropriate amplifying circuits 21, 21*a*, 21*b*, and 21*c* of appropriate type to permit energization of a solenoid thereby. The amplifying circuits are not shown in detail.

The starting line S and the gate beam T may be closely spaced along the track. However, the gate beam T is placed at an appropriate level to be interrupted by the gate while the starting beam S is disposed at an appropriate height to be interrupted by a horse. The starting beam may cross the track at an appropriate height to be interrupted by the chest of a horse, and the gate beam T may cross the track about 5 inches further along the track but at a height to be interrupted by the starting gate.

In Fig. 2 is shown an alternate form of device for use on a track 100. In the device illustrated in Fig. 2, a starting line S' is disposed on the line connecting a lamp 101 with a cell 102. A short distance farther along the track are disposed a first gate line T' and a second gate line T''. At line T' are disposed a photocell 103 and lamp 104. At second gate line T'' are disposed a photo cell 106 and a lamp 107. As the starting gate passes along the track 100, the gate interrupts the gate beams at lines T' and T'' causing de-energization of solenoids 108 and 109. When solenoid 109 is de-energized, the contacts 113*a* and 113*b* of a switch 113 are closed. The closing of the contacts of switch 113 energizes a solenoid 114 to draw the movable contact 116 of a latch type switch 117 against a stationary contact 118 as the starting gate starts to interrupt the beam at line T''. These contacts are held closed by a latch 117'. The lines T' and T'' are separated by a distance less than the length of the starting gate so that when the beam at line T'' is interrupted, the gate also is in position to interrupt the beam at line T'. When the gate finishes crossing line T', the beam of light from lamp 104 strikes cell 103 causing energization of solenoid 108 and the closing of the contacts 120*a* and 120*b* of a switch 120. When the contacts of switch 120 close, a solenoid 121 is energized. The energization of solenoid 121 causes the contacts 124 and 126 of a latch type switch 122 to close and light a signal lamp 123. Contacts 124 and 126 are held closed by a latch 122'. Thereafter, when the first horse crosses the starting line S' after the gate has cleared the first gate line T', the beam of light from lamp 101 to photo-electric cell 102 is interrupted and a solenoid 127 is de-energized. When solenoid 127 is de-energized, the contacts 128*a* and 128*b* of a switch 128 close. Closing of the contacts of switch 128 energizes a solenoid 129. Solenoid 129 is a timer starting solenoid. The solenoid 129 may operate a switch similar to the switch 47 shown in Figure 1, and is equivalent to solenoid 46 of Figure 1. Solenoid 129 acts to start timing mechanism similar to that shown in Figure 1, and the remainder of the device of Fig. 2 (not shown). Operation of the device shown in Fig. 2, may be similar to the operation of the device illustrated in Fig. 1.

In Figs. 1 and 2, each photo-electric cell and its associated lamp have been shown on opposite sides of the track. However, as shown in Fig. 3, a photo-electric cell 130 and a lamp 131 for projecting a light beam thereinto can be located on the same side of the track. Lamp 131 projects a light beam 132 to a mirror 133 on the opposite side of the track from the cell and lamp. The mirror 133 reflects a light beam 134 to photo-electric cell 130.

The switch 27 (Fig. 1) is closed during normal operation of the mechanism. Switch 27 may be kept open until just before time for a race to start, to prevent inadvertent operation of the timing mechanism. When it is time for a race to start, switch 27 is closed to permit operation of the device as described above.

Inadvertent stopping of timer 39 before a horse reaches the quarter mile line Q may be prevented by opening a switch 137. Switch 137 is closed when the horses approach the line Q so that when the first horse passes line Q the timer 39 is stopped. Similarly, inadvertent stopping of timer 41 before a horse reaches the finish line F may be prevented by opening of a switch 138.

The timing mechanism described above and illustrated in the drawings is subject to structural modification without departing from the spirit and scope of the appended claims.

Having described my invention, what I claim as new and desire to protect by Letters Patent is:

1. Apparatus for starting and stopping a timer for timing a horse race in which the contestants are preceded across the starting line of the track by a starting gate propelled by a vehicle, said apparatus comprising a first light source and photo cell so located that the light source projects a beam across the track at the starting line onto said cell, an amplifier controlled by said photo cell and a relay controlled thereby having normally closed contact members which are held in open position when the light beam impinges on the photo cell; a second light source and photo cell so located that the light source projects a beam of light across the track on a line slightly in advance of the starting line onto said second photo cell, said second light beam being at an elevation to be interrupted by the starting gate, an amplifier controlled by said second photo cell and a relay controlled by said second amplifier and having normally open and normally closed contact members, the normally open contact members being closed when the light beam energizes said second photo cell; a first latch relay provided with a coil and normally open contact members and a latch for latching the same in closed position when said coil is energized, said first latch relay coil being in circuit with the normally closed contact members of the relay controlled by the second photo cell, the normally open contact members of said first latch relay being in circuit with the normally open contact members of the second photo cell relay; a second latch relay having a coil in circuit with the contact members of the first latch relay and the normally open contact members of the second photo cell relay, normally open contact members of the second latch relay in circuit with the normally closed contact members of the first photo cell relay, and a latch for holding said normally open contact members closed when its coil has been energized; a third latch relay having normally open contact members, a coil in circuit with the contact members of the first photo cell and the second latch relays respectively whereby the coil of the third latch relay is energized when the light beam impinging on the first photo cell is interrupted by the leading contestant, thereby closing the contact members of the third latch relay, a latch for holding said contact members closed; a timer in circuit with the normally open contact members of said third latch relay for timing the race from the starting line to the finish line, said timer starting when the first light beam is interrupted by the leading contestant; a timer stopping relay having normally closed contact members in series with the starting circuit of the timer; a finish line light source and photo cell so located that the beam crosses the track at the finish line and impinges on said photo cell, an amplifier controlled by said finish line photo cell, a relay controlled by said finish line photo cell and having normally closed contact members in circuit with the timer stopping relay coil, the contact

members of the finish line relay closing when the light beam at the finish line is broken by the leading contestant, whereby the coil of the timer stopping relay is energized and the timer stopped, and means for latching the timer stopping relay in energized position.

2. Apparatus for starting and stopping a timer for timing the total time of a horse race in which race the contestants are preceded across the starting line of the track by a starting gate propelled by a vehicle, said apparatus comprising a first light source and photo cell so located that the light source projects a beam of light across the track at the starting line and onto said cell, an amplifier controlled by said photo cell and a relay controlled thereby having normally closed contact members which are held in open position while the light beam impinges on the photo cell; a second light source and photo cell so located that said light source projects a light beam across the track on a line slightly in advance of the starting line onto said second photo cell, said second beam being at an elevation to be interrupted by the starting gate, an amplifier controlled by said second photo cell and a relay controlled by said second amplifier having normally open and normally closed contact members, the normally open contact members being closed while the light beam impinges on said second photo cell; a first latch relay provided with a coil and normally open contact members and a latch for latching the same in closed position when said coil is energized, said first latch relay coil being in circuit with the normally closed contact members of the second photo cell relay, the normally open contact members of said first latch relay being in circuit with the normally open contact members of the second photo cell relay; a second latch relay having a coil in circuit with the contact members of the first latch relay and the normally open contact members of the second photo cell relay, said second latch relay having normally open contact members in circuit with the normally closed contact members of the first photo cell relay, and a latch for holding said normally open contact members closed when its coil has been energized; a third latch relay having normally open contact members, a coil in circuit with the contact members of the first photo cell relay and the second latch relay for energizing the coil of the third latch relay when the light beam impinging on the first photo cell is interrupted by the leading contestant, thereby closing the contact members of the third latch relay, a latch for holding said contact members closed; a timer for timing the total time of the race from the starting line to the finish line; said timer being in circuit with the normally open contact members of the third latch relay and started when those contact members close; a finish line light source and photo cell so located that the light source projects a light beam across the track at the finish line onto said finish line photo cell, an amplifier controlled by said finish line photo cell, and relay means controlled by the amplifier at the finish line for interrupting the starting circuit of the timer and stopping the same when the leading contestant interrupts the light beam at the finish line.

3. Apparatus for starting and stopping timers for timing a fractional part of the distance of a race and the total time of the race in which the contestants are preceded across the starting line of the track by a starting gate propelled by a vehicle, said apparatus comprising a first light source and photo cell so located that the light source projects a light beam across the track at the starting line onto that cell, an amplifier controlled by said photo cell and a relay controlled by the amplifier and

having normally closed contact members which are held in open position while the light source impinges on the photo cell; a second light source and photo cell so located that the light source projects a light beam across the track on a line slightly in advance of the starting line onto said second photo cell, said second light beam being at an elevation to be interrupted by the starting gate, an amplifier controlled by said second photo cell and a relay controlled by said second amplifier and having normally open and normally closed contact members, the normally open contact members being closed when the light beam energizes said second photo cell; a first latch relay provided with a coil and normally open contact members and a latch for latching the same in closed position when said coil is energized, said latch relay coil being in circuit with the normally closed contact members of the second photo cell relay, the normally open contact members of said latch relay being in circuit with the normally open contact members of the second photo cell relay; a second latch relay having a coil, normally open contact members in circuit with the normally closed contact members of the first photo cell relay, and a latch for holding said normally open contact members closed when its coil has been energized; a third latch relay having normally open contact members, a coil in circuit with the contact members of the second latch relay and the first photo cell relay and a latch for holding said contact members closed, said coil being energized when the first light beam is interrupted by the leading contestant; a timer for recording the time of said fractional part of the total race distance; a timer for timing the race from the starting line to the finish line; said timers being in circuit with the normally open contact members of the third latch relay whereby said timers are started simultaneously; a third light source and photo cell so located that the light source projects a beam of light across the track onto said photo cell, at a point corresponding to said fractional part of the race distance, an amplifier controlled by said photo cell, and relay means controlled by the amplifier for interrupting the circuit of the fractional timer when the third light source beam is interrupted by a leading contestant whereby that timer is stopped to record the time for said fractional part of the race distance; a total timer stopping relay means having normally closed contact members in circuit with the total timer, and a coil for opening said contact members; a finish line light source and a photo cell so located that the beam crosses the track at the finish line and impinges on said photo cell, an amplifier controlled by said finish line photo cell, a relay controlled by said finish line photo cell and having normally closed contact members in circuit with the coil of said total timer stopping relay, the contact members of said finish line relay closing when the finish line light beam is interrupted by the leading contestant, whereby the total timer is stopped, and means for latching the timer stopping relay in energized position.

4. Apparatus as in claim 3 that includes a fourth latch relay means controlled by the stopping relay for the fractional distance timer and a fifth latch relay means controlled by the fourth latch relay means and by said finish line amplifier relay for interrupting the total timer circuit and stopping the same when the light beam at the finish line is interrupted by the leading contestant.

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