Dec. 4, 1951 J. DOBSON 2,577,408

AUTOMATIC ELECTRIC TIMING SYSTEM

Filed Oct. 4, 1948 2 SHEETS—SHEET 1

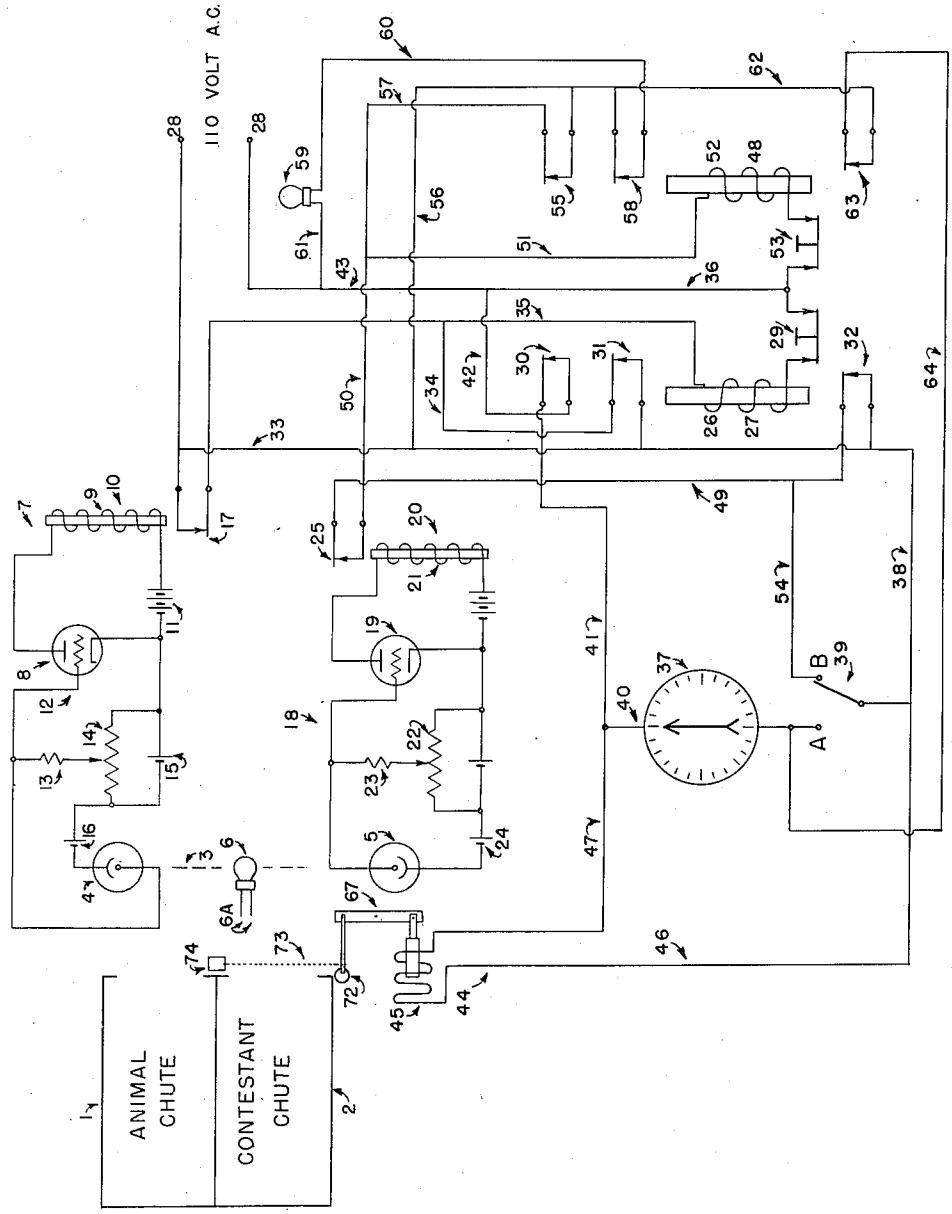


FIG. 1

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AUTOMATIC ELECTRIC TIMING SYSTEM

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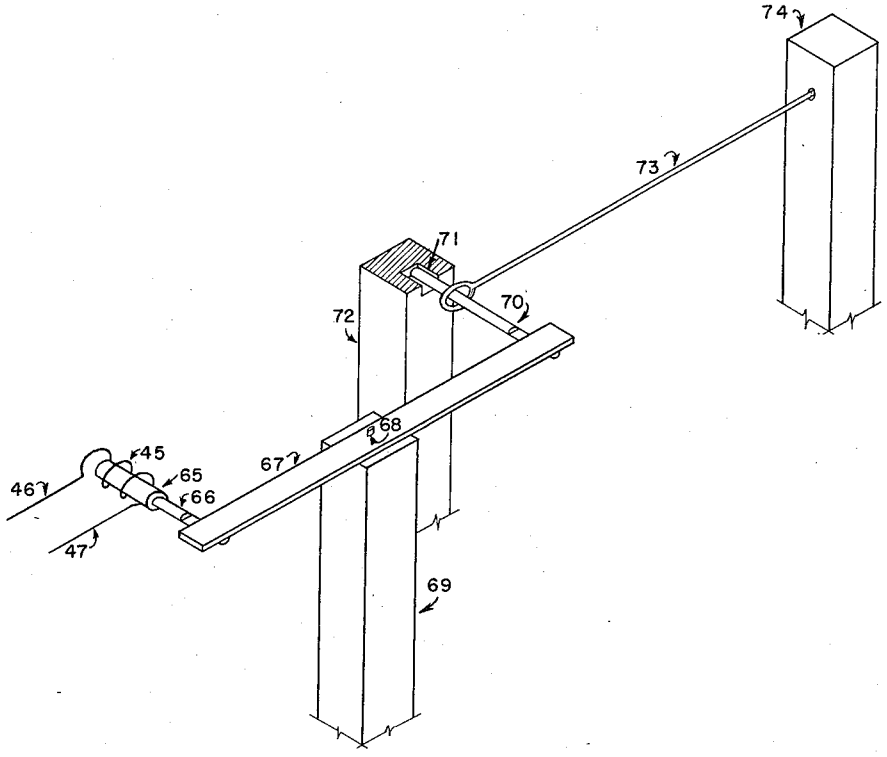


FIG. 2

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AUTOMATIC ELECTRIC TIMING SYSTEM

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3 Claims. (Cl. 161—18)

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This invention relates to timing devices and more particularly to apparatus including light beam receivers or photoelectric cells for timing racing events.

The present invention is particularly adaptable for use in timing rodeo events or contests such as, for example, calf and steer roping, flag race, and any other event for time.

In timing rodeo events it has been common practice to manually start a clock or other suitable timing means at the beginning of the contest and to stop the clock in a similar manner upon completion thereof. For example, in calf roping a calf is allowed to pass out of an animal chute, at which time the clock is started manually. As soon as the animal breaks, the contestant may leave the contestant chute in pursuit thereof. Upon completion of the contest the clock is stopped by manually operating a stopping switch. Since the contestant is given a certain penalty if he crosses the starting line prior to the animal, it has been necessary to maintain surveillance over the initial phase of the contest to determine whether the contestant has committed a foul. It is obvious that in many instances the animal and contestant will approach the starting line substantially at the same time, and under such circumstances it is difficult, if not impossible, to determine which of the two crosses the starting line first. Moreover, difficulty is experienced in manually starting the clock at the exact instant the animal breaks from the chute.

Accordingly one object of the invention is to provide apparatus which will obviate the foregoing difficulties.

Another object is to provide an apparatus for timing racing events, which apparatus includes a clock or other timing means and a pair of light beam receivers for automatically starting the clock upon interruption of a light beam impinging on one of the receivers.

Another object is to provide apparatus including a clock and a pair of light beam receivers for automatically starting the clock upon interruption of a light beam impinging on one of the receivers and for actuating an indicating means in the event that interruption of a light beam impinging on the other receiver occurs prior to the first mentioned interruption.

A further object is to provide apparatus including a clock and a pair of light beam receivers for automatically starting the clock upon interruption of a light beam impinging on one of the receivers and automatically stopping the

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clock at a subsequent time upon interruption of a light beam impinging on the other receiver.

Other objects and features of the invention will be apparent from the drawing and description which follow.

Figure 1 is a schematic view of apparatus constructed in accordance with the invention.

Figure 2 is a view showing in detail the releasable starting barrier.

In accordance with the present invention, a light beam source and a first and a second light beam receiver are positioned at a starting line. Associated with the first receiver is a first electric circuit which is responsive to interruption of a light beam between the source and the receiver for starting a suitable timing means and releasing a barrier provided adjacent to that portion of the starting line between the source and the first receiver. Suitable means are associated with the first circuit for manually selectively stopping the timing means. There is provided a second electric circuit associated with the second receiver and responsive to interruption of the light beam between the source and the second receiver for actuating a suitable indicating means when the last mentioned interruption occurs prior to interruption of the light beam between the source and first receiver. By means of the apparatus, the timing means or clock may be automatically started at the beginning of the race and a foul indicated in the event that a body crosses that portion of the starting line between the source and first receiver prior to the crossing of the starting line between the source and the first receiver by another body.

Another phase of the invention involves a modification of the above apparatus. In the modified apparatus, as before, the first electric circuit, associated with the first receiver and responsive to interruption of a light beam between the source and first receiver, is employed for starting the clock. In this case, however, an electric circuit is associated with the second receiver by means of which the clock is automatically stopped. It is thus seen that by means of modified apparatus the clock may be started as a body crosses the starting line and interrupts a light beam between the source and first receiver, and may be automatically stopped at a subsequent time upon interruption by a body of the light beam between the source and the second receiver.

Referring now to the drawings, numerals 1 and 2 denote respectively an animal and a contestant chute, each of which is provided at one

end thereof with an opening through which a body passes at the beginning of the event or contest. At either end of a starting line, generally denoted by numeral 3 and established adjacent to the open ends of the chutes, there are provided a pair of light beam receivers, or photoelectric cells, cells 4 and 5. Disposed along the starting line and between chutes 1 and 2 is light beam source, or incandescent lamp 6, so constructed and arranged as to emit light beams which impinge upon cells 4 and 5. Connected to cell 4 is a conventional reverse photoelectric cell circuit, generally denoted by the numeral 7. This circuit includes triode 8 connected as an amplifier and having coil 9 of our relay 10 provided in the plate circuit thereof. Plate voltage is supplied to triode 8 by means of battery 11. The grid 12 of triode 8 is connected through grid resistor 13 to the moving arm of potentiometer 14, which is connected across biasing battery 15 and provides means for adjusting the biasing voltage on the grid. One side of potentiometer 14 is connected to the cathode of triode 8. As shown, the cathode of cell 4 is connected through battery 16, which supplies operating voltage to the cell, to the negative side of battery 15, and the anode of cell 4 is directly connected to grid 12 of triode 8. Operating voltage may be supplied to lamp 6 through leads 6a from a suitable power supply not shown.

In operation with a light beam from lamp 6 impinging on cell 4, potentiometer 14 is adjusted in a manner such that the bias applied through resistor 13 to grid 12 will be sufficient to limit the current flow in the plate circuit and through coil 9 below that necessary to actuate contacts 17, which are normally open, of relay 10. When the animal leaves chute 1 and crosses starting line 3, thereby interrupting the beam of light between lamp 6 and cell 4, the resistance of the cell is increased, resulting in a decrease in the current flow through resistor 13, making the grid voltage less negative, whereby plate current flow through coil 9 will be increased an amount sufficient to actuate contacts 17.

Associated with photoelectric cell 5 is a reverse photoelectric cell circuit 18, substantially identical to circuit 7 and comprising corresponding triode 19, relay 20, including coil 21, potentiometer 22, and biasing resistor 23. As in the case of circuit 7, the cathode of cell 5 is connected through battery 24, as shown, to one side of potentiometer 22, and the anode is directly connected to the grid of triode 19. Normally, contacts 25 of relay 20 are open; however, upon interruption of the light beam between lamp 6 and cell 5 by a contestant crossing starting line 3, plate current flow through coil 21 will be increased, as described hereinbefore, an amount sufficient to cause contacts 25 to close.

Contacts 17 control the application of actuating potential to coil 26 of a multi-contact relay, generally denoted by numeral 27 and including normally open contacts 30 and 31, and normally closed contacts 32. A suitable source of operating potential, not shown, is applied to terminals 28. One of the terminals is connected, as shown, through contacts 17 and lead 35 to one side of coil 26. The other side of the coil is connected through a suitable push button 29 and lead 36 to the other terminal. It is thus seen that when contacts 17 are momentarily closed by interruption of the light beam between lamp 6 and cell 4, the source of potential will be applied across coil 26, thereby energizing relay 27 to actuate contacts 30, 31 and 32. Actuation of relay 27 closes contacts 31, thereby applying the source potential through lead 33, contacts 31, leads 34 and 35, to coil 26, and thence through push button 29 and lead 36 back to the potential source. It is thus seen that once relay 27 is actuated by momentary closing of contacts 17, actuating current will continue to flow through the relay until push button 29 is depressed.

The closing of contacts 17 will also result in the completing of an electric circuit from the potential source through a suitable timing means, or clock, 37. This circuit includes terminals 28, leads 33 and 38, switch 39, clock 37, conductors 40 and 41, contacts 30 of relay 27, and conductors 42 and 43.

Disposed across the open end of contestant chute 2 is a releasable barrier, generally denoted by numeral 44, which will be described more fully hereinafter. The barrier includes solenoid 45, which is connected in parallel with clock 37 by means of conductors 46 and 47. Accordingly, barrier 44 is released simultaneously with start of clock 37.

Contacts 25 of relay 20 control the initial actuation of multi-contact relay 48, which includes coil 52, normally open contacts 55 and 58, and normally closed contacts 63. One side of the potential source is connected through lead 33, contacts 32, lead 49, contacts 25 and conductors 50 and 51, to one side of coil 52 of relay 48, the other end of which is connected through push button 53 and lead 36 and conductor 43 to the other side of the potential source. When switch 39 is in position B, contacts 32 are by-passed and the circuit is completed through lead 38, switch 39, lead 54. It is thus seen that with contacts 32 closed, or with switch 39 in position B, upon interruption of the light beam between lamp 6 and cell 5 and the resulting closing of contacts 25, an actuating potential will be applied to coil 52, thereby actuating relay 48. Actuation of relay 48 causes contacts 55 to close, thereby completing a circuit from the source potential through coil 52. This circuit includes leads 33 and 56, contacts 55, conductors 57 and 51, coil 52, push button 53, lead 36 and conductor 43. As in the case of relay 27, after initial actuation relay 48 will continue to be energized until push button 53 is depressed, thereby opening the electric circuit through coil 52. Contacts 58 control the actuation of electric lamp 59, or other suitable indicating means. The closing of contacts 58 by actuation of coil 52 completes a circuit from the potential source through leads 33 and 56, contacts 58, conductor 60, lamp 59, and conductor 61.

It is readily seen that with switch 39 in position B and with relay 48 in a de-energized condition when relay 27 is actuated by interruption of the light beam between lamp 6 and cell 4, an operating potential will be applied to clock 37 through leads 33, 56 and 62, contacts 63, which are normally closed, conductor 64, and back to the potential source through conductors 40 and 41, contacts 30 and conductors 42 and 43. The clock will continue to run until interruption of the light beam between lamp 6 and cell 5, which results in actuation of relay 48 opening contacts 63 thereby stopping clock 37.

Referring more particularly to Figure 2, the releasable barrier 44 includes solenoid 45, which is connected as pointed out hereinbefore by

means of conductors 46 and 47 across clock 37. Plunger 65, formed of iron or other suitable magnetic material, is mounted for slidable reciprocating movement in solenoid 45. The plunger is connected by means of a suitable rod 66 to one end of an elongated bar 67 which is pivotally mounted as at 68 on support 69. To the other end of bar 67 is rigidly secured, by any suitable means such as by screws, stud 70 which extends substantially parallel to plunger 65, and the end of which is adapted to be received in a suitable aperture, 71, in upright post 72. Releasably attached to stud 70 is barrier rope or tape 73, which extends across the open end of contestant chute 2 and is secured at its other end to post 74. When solenoid 45 is energized, plunger 65 is caused to be moved into the solenoid moving stud 70 out of aperture 71, and permitting the barrier rope 73 to be released.

When the apparatus is to be employed for timing calf and steer roping events, or other events involving an animal and a contestant, after the apparatus has been assembled as shown in the drawings, switch 39 is placed in position A. Before start of the contest or event, relays 27 and 48 will be in their normal de-energized condition, and therefore clock 37 will be without operating potential. As the animal emerges from chute 1 and crosses the starting line 3, the light beam between lamp 6 and cell 4 will be interrupted, thereby causing contacts 17 to close, as described hereinbefore, thus completing a circuit from the potential source through relay 27. Energizing relay 27 causes contacts 30 and 31 to close and contacts 32 to open. The closing of contacts 31 completes a circuit from the power source through relay 27, thereby maintaining relay 27 in an actuated condition until push button 29 is operated. Simultaneously therewith, clock 37 is started and barrier 44 is released by the application of an operating potential thereto from the potential source through contacts 31 and switch 39. Clock 37 will continue to run until push button 29 is manually depressed at the end of the contest.

Interruption of the light beam between lamp 6 and cell 5 as the contestant passes from chute 2 and crosses starting line 3 will cause contacts 25 to close. Since contacts 32 previously had been opened by acutation of relay 27, the closing of contacts 25 will have no effect upon relay 48. If, however, the contestant crosses the starting line and interrupts the light beam between lamp 6 and cell 5 prior to interruption of the light beam between lamp 6 and cell 4, contacts 32 will be closed at the time contacts 25 are operated, whereby relay 48 will be actuated by the application thereto of an operating potential from the power source through contacts 32 and contacts 25. Actuation of relay 48 will cause contacts 55 and 58 to close, whereby lamp 59 is illuminated to indicate commission of a foul. As before, interruption of the light beam between lamp 6 and cell 4 by the animal as it crosses starting line 3 will result in the starting of clock 37 and the releasing of barrier 44. At the end of the contest, push buttons 29 and 53 respectively are depressed to stop the clock and extinguish the illumination of lamp 59.

When employing the apparatus for timing a flag race, or other event in which a contestant is required to cross a starting line, complete certain assigned duties and return to the original point, switch 39 is placed in position B. Interruption of the light beam between lamp 6 and cell 4 as the contestant crosses the starting line, causes contacts 17 to close, resulting in the starting of clock 37 by the application thereto of an operating potential from the potential source through leads 33, 56 and 62, contacts 63, conductor 64, and thence back to the source through conductors 40 and 41, contacts 30, and conductors 42 and 43. As the contestant crosses the line at the end of the race interrupting the light beam between lamp 6 and cell 5, relay 48 is actuated to open contacts 63, thereby breaking the circuit through clock 37 and stopping the operation thereof. When employing the apparatus for this purpose, the barrier may be eliminated.

I claim:

1. Apparatus for timing racing events which comprise a first and a second light beam receiver positioned at a starting line, light emitting means positioned so as to direct light on said light beam receivers, electric timing means, a first electric circuit connecting said first receiver with said timing means and responsive to interruption of the light beam between said first receiver and said light emitting means to cause said timing means to start, indicating means, and a second electric circuit connecting said second light beam receiver and said indicating means and responsive to interruption of the light beam between said second light beam receiver and said light emitting means to actuate said indicating means, said second circuit including a circuit opening element actuated by said first electric circuit upon interruption of the light beam between said first light beam receiver and said light emitting means to open said second circuit thereby preventing actuation of said indicating means by subsequent interruption of the light beam between said second receiver and said light emitting means.

2. Apparatus for timing racing events which comprises a first and a second light beam receiver positioned at a starting line, light emitting means positioned so as to direct light on said light beam receivers, electric timing means, a first electric circuit connecting said first receiver with said timing means and responsive to interruption of the light beam between said first receiver and said light emitting means to cause said timing means to start, circuit opening means provided in said first electric circuit for selectively opening said first electric circuit to stop said timing means, indicating means, and a second electric circuit connecting said second light beam receiver and said indicating means and responsive to interruption of the light beam between said second light beam receiver and said light emitting means to actuate said indicating means, said second circuit including a circuit opening element actuated by said first electric circuit upon interruption of the light beam between said first light beam receiver and said light emitting means to open said second circuit thereby preventing actuation of said indicating means by subsequent interruption of the light beam between said second receiver and said light emitting means.

3. Apparatus for timing racing events which compromises a first and a second light beam receiver positioned at a starting line, light emitting means positioned so as to direct light on said light beam receivers, electric timing means, a releasable starting barrier, a first electric circuit connecting said first receiver with said timing means and said barrier and responsive to interruption of the light beam between said first receiver and said light emitting means to cause said timing

means to start and said barrier to be released, circuit opening means provided in said first electric circuit for selectively opening said first electric circuit to stop said timing means, indicating means, and a second electric circuit connecting said second light beam receiver and said indicating means and responsive to interruption of the light beam between said second light beam receiver and said light emitting means to actuate said indicating means, said second circuit including a circuit opening element actuated by said first electric circuit upon interruption of the light beam between said first light beam receiver and said light emitting means to open said second circuit thereby preventing actuation of said indicating means by subsequent interruption of the light beam between said second receiver and said light emitting means.

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