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GAME TIMING DEVICE

Filed March 26, 1956

Fig. 1

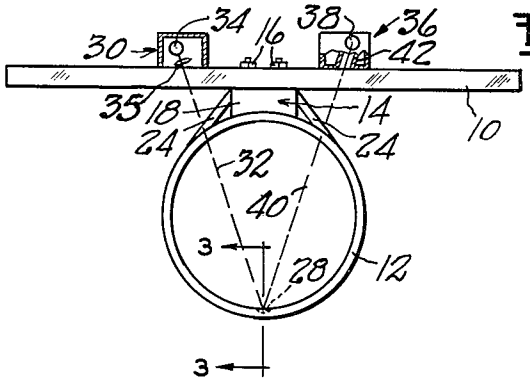


Fig. 2

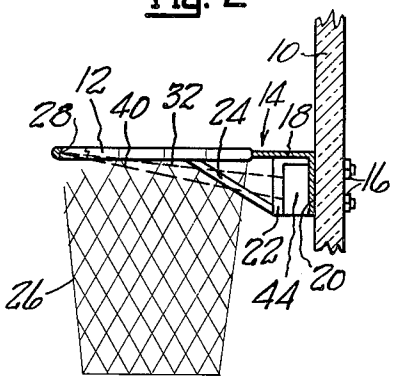


Fig. 3

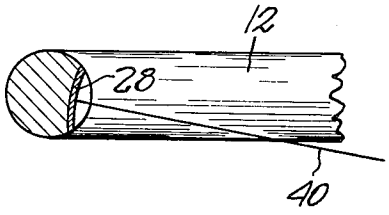
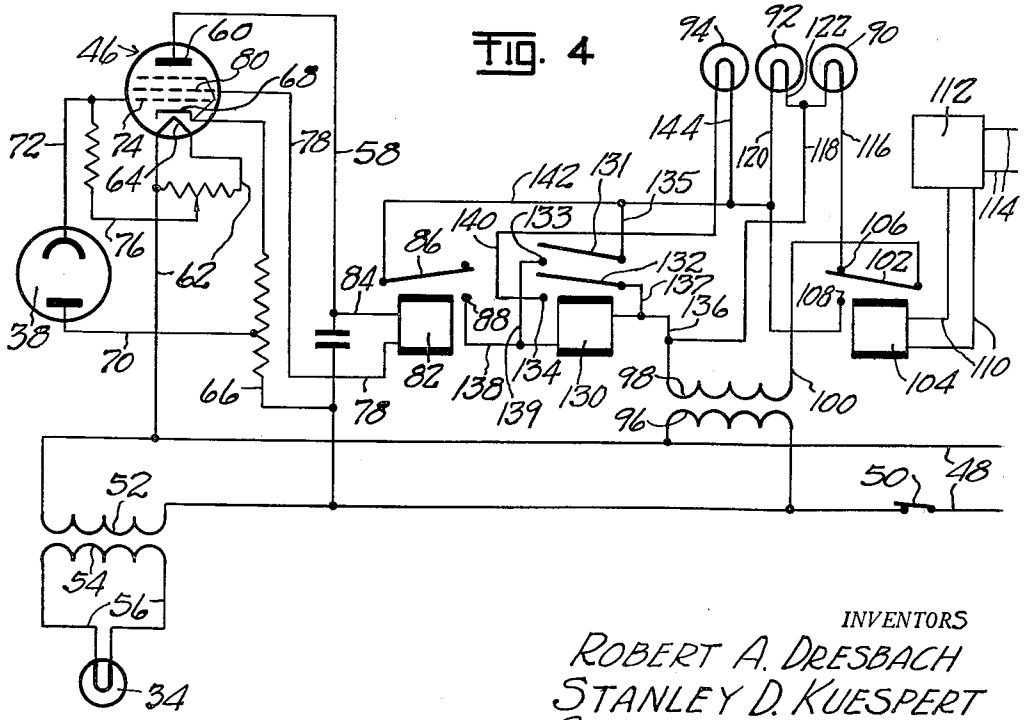


Fig. 4



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GAME TIMING DEVICE

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This invention relates to improvements in game timing devices. More particularly, it relates to a device for accurately timing a basketball game.

Various types of games, such as basketball games, extend for a predetermined period of time. Scoring in such games is frequent, and the outcome of a game may depend upon determination of whether or not a given scoring play occurred during the running period of the game or occurred after the end of playing time in the game.

In the game of basketball, the matter of determination of a score sometimes depends upon the official's interpretation of whether or not the scoring play or throw commenced before the game ended, or in other words, whether the ball had been thrown toward the basket before the game ended. Such determinations are frequently very close and therefore difficult to make, and there has been lack of satisfaction in many instances where a ruling has been made in a game on a play which has affected the score to the extent of determining who was the winner of the game.

The primary object of this invention is to provide a device which automatically determines whether or not a scoring play occurred during or after a play period.

A further object is to provide a device of this character operable under the control of game-timing means for automatically indicating all plays occurring outside of the allotted playing period to be illegal and not subject to count.

A further object is to provide a device of this character which is simple in construction, inexpensive, trouble-free in operation, and which does not interfere with the play of the game.

Other objects will be apparent from the following specification.

In the drawing:

FIG. 1 is a top plan view illustrating one embodiment of the invention;

FIG. 2 is a side view with parts shown in section, illustrating another embodiment of the invention;

FIG. 3 is an enlarged detail sectional view taken on line 3—3 of FIG. 1; and

FIG. 4 is a wiring diagram illustrating an electrical circuit usable with the device.

Referring to the drawing, the numeral 10 designates a vertical backboard or panel commonly employed for use in connection with a game of basketball, and usually supported in a vertical position overhead at one end of a playing court (not shown) by suitable supporting means (not shown). The backboard 10 is commonly formed of glass and is transparent.

The goal or target member of the game constitutes a rigid horizontal annular member 12, commonly referred to as a "basket" or "hoop" and usually of substantially circular shape in cross-section. The member 12 is supported by a bracket 14 which is secured to the backboard 10 by suitable securing means 16. The bracket 14 is preferably formed of metal and comprises an upper horizontal plate portion 18 substantially flush with the upper surface of the member 12, a depending plate portion 20 which is secured to the backboard 10 by the securing member 16, and side flanges or reinforcing parts 22. Brace members or struts 24 preferably extend angularly upwardly from the lower portion of the bracket 14 at opposite sides thereof to portions of the member 12 spaced

from and at opposite sides of the bracket 14. A tubular net 26 is anchored at its upper end to the member 12 and depends therefrom to constitute means to assist in determining whether or not a properly directed ball has passed through the member 12 to make a score.

Our invention contemplates the provision of means adapted for actuating a signal device whenever a ball passes through the annular member 12 and for correlating said signal device with timing means to indicate whether the ball passed through the member 12 during the game period or after the game period had ended. In general, our new and improved device comprises a light source, and means for directing said light source at a light-sensitive means for controlling an electrical circuit. The electrical circuit is also under the control of the timing means. Signalling or indicating means are conditioned by the light-sensitive means for energization whenever a ball passes through the member 12, and the nature or character of the action in the electrical circuit produced by the light-sensitive means depends upon the setting and condition of the timing means. If desired, one signal may occur when a ball passes through member 12 during the playing period, and a different signal may occur whenever the ball passes through the member 12 after the playing period has ended.

We prefer to employ photoelectric means to intersect a light beam passing across the member 12 in a path which is intercepted whenever a ball or game member (not shown) passes through the goal member 12. For this purpose we preferably provide upon the member 12 at 28, diametrically opposed from the bracket 18, a member or part 28 which is highly reflective and capable of reflecting a light beam therefrom in a predetermined direction. As seen in FIG. 1, means 30 may be provided for producing and directing a light beam at the reflective surface 28, as long as the beam line 32. Means 30 will preferably be located at the rear of the backboard 10 and at one side of the supporting bracket 18 so that the light beam 32 has unobstructed passage from means 30 to surface 28. The light generating means 30 will preferably include an incandescent lamp or other light source 34 and a focusing lens 35 each supported in a housing or support of any desired character fixedly secured to the backboard 10.

A light-receiving or light-sensitive unit 36 is also carried by the backboard 10 preferably at the rear thereof and includes a housing mounting or receiving a photoelectric cell 38. The housing will shield photoelectric cell 38 from ambient light and will admit impingement upon the cell 38 only by light directed properly thereat, as along the beam line 40, along which light is reflected from the light source 30 by the reflective surface 28. Thus the housing of the part 26 may include a narrow tubular light-directing element 42 aligned with the reflective surface 28 and with the photoelectric cell 38.

The arrangement of the parts, as seen in FIG. 1, will be such that whenever the light source 34 is energized, light therefrom will be directed at the reflective surface 28 and reflected thereby along the beam line 40 to impinge upon the photoelectric cell 38. Since the purpose of the device is to indicate the passage of a ball through the member 12, the light source 30 and the light-sensitive member 36 are located below the member 12 so that the beams 32 and 40 extend at an angle to the member 12 as illustrated in FIG. 3, in order to avoid interception of the light beam by a ball which partially enters the member 12 and then rebounds therefrom without passing therethrough.

Another consideration of importance in the device, if the device operates each time a ball passes through member 12, is that the light beam shall be sufficiently broad, both at 32 and 40, to prevent interception thereof

and interference therewith by a cord of the tubular net 26 as the same may move in a position crosswise of said beam during the play of the game, for example, due to vibration of the member 12 when struck by a ball which is not properly directed to pass through said member.

In the embodiment of the invention illustrated in FIG. 2, both the light-generating means 34 and the light-sensitive means 38 are housed within a common housing 44 which may be of a size and shape to fit within the bracket 14 below the panel 18 and between the sides 22. As illustrated in said figure, the light beams 32 directed at the reflective surface 28 and the light beam 40 reflected from the reflective surface 38 may be vertically divergent as well as or in place of being laterally divergent as illustrated in FIG. 1.

In both FIGS. 1 and 2 the mechanism is so located relative to the member 12 as not to interfere in any way with the play of the game of basketball or with a travel of a ball to and through the member 12. The factors involved include, not only physical location in an out-of-the-way spot out of the line of travel of a properly directed ball, but also the factor of so mounting the device as to be substantially inconspicuous so as not to detract from the aim of the player nor alter the rebounding properties of the backboard with respect to a ball bounced thereagainst.

The photoelectric cell 38 is interposed in an electrical circuit capable of amplifying the current generated thereby and preferably possessing one or more amplifying tubes 46 of any suitable type and arranged in any suitable manner well known in the electronic arts. One such circuit is illustrated in FIG. 4, wherein power leads 48 have a control switch 50 and lead to the primary coil 52 of a transformer having a secondary coil 54 connected by leads 56 with the element of the light source 34. A lead 58 branches from one of the power leads 48 and extends to the plate 60 of the tube 46. A lead 62 branches from the other of the power leads 48 and energizes the tube heater 64. A lead 66 branches from the lead 58 and extends to the cathode 68 of the tube 46. A lead 70 branches from lead 66 to one terminal of the photoelectric cell 38. The other terminal of the said photoelectric cell 38 is connected by a lead 72 to one of the grid or control elements 74 of the tube 46. Lead 76 branches from lead 72 to a variable resistor connected with lead 62. A lead 78 branches from the output element 80 of the tube 46 and is connected to the coil of a spring loaded relay 82 which in turn is connected by a lead 84 to lead 58. The relay 82 includes the switch element 86 which is normally biased to the position shown in FIG. 4 when the photoelectric cell 38 is energized by and intercepts light of beam 40, said position being spaced from terminal 88. The amplifier tube or tubes 46 and the photoelectric cell 38 are preferably housed in a common housing at or adjacent to the backboard 10, as illustrated in FIGS. 1 and 2, and the relay 82 may be housed in the same housing or may be positioned remotely, as at a control station at which the game-timing official is located.

A game control panel (not shown) will be provided at the station at which the game-timing and scoring official is located, and said panel will preferably have three distinct signals, here shown as lights 90, 92 and 94. Thus light 90 may be a green light, light 92 may be amber, and light 94 may be red. The signals may also be audible signals, such as bells or buzzers used either in place of the other signals, and particularly in place of signals 92 and 94, or used in conjunction therewith. In the circuit shown, the primary 96 of a transformer is connected across the supply lines 48, and the secondary 98 of the transformer supplies power for operating the signals 90, 92 and 94. A lead 100 from the secondary 98 extends to the switch element 102 of a relay 104, having two terminals 106 and 108. The relay coil is connected by leads 110 with a timer switch 112, in turn connected to line by leads 114. The relay 104 is preferably so biased that during playing time the switch 102 thereof will contact terminal 106. Upon expiration of playing time, as determined by the timer switch 112, which may be a time control switch of any of the types well known in the art, the switch will be energized by the relay to contact the terminal 108.

A lead 116 extends from terminal 106 to the signal 90, and a lead 118 connects the signal element 90 with the transformer secondary 98. Thus during the normal playing of the game when the timer switch indicates that the playing period is under way, the transformer will energize the signal 90 through the circuit, transformer secondary 98, lead 100, switch 102, terminal 106, lead 116, signal 90 and lead 118 back to the transformer secondary 98. A lead 120 is connected to terminal 108 of the relay and leads to the signal element 92, and a lead 122 connects signal element 92 with the lead 118. Thus when the timer switch energizes the relay 104 incident to the ending of the playing period to shift the switch 102 into contact with the terminal 108, a circuit is closed leading to the signal 92 as follows: transformer secondary 98, lead 100, switch 102, terminal 108, lead 120, signal 92, leads 122 and 118 back to transformer secondary 98.

A relay 130 has a switch 132 and a terminal 134. Lead 136 connects the coil of the relay 130 with the transformer secondary 98. Lead 137 connects switch 132 with lead 136. A lead 138 connects the coil of the relay 130 in series with the terminal 88 of the relay 82. A lead 140 connects the terminal 134 of relay 130 with the signal 94. A lead 142 connects the switch 86 of the relay 82 with the lead 120. A lead 144 connects the signal 94 with the lead 142.

Assuming that the playing time is running, so that the relay 104 is in the position shown in FIG. 4 to close a circuit to the signal 90, such as a green light, and assuming further that a basket is made which causes interception of the light beam focused upon the photoelectric cell 38, the impulse so created by the cell 38 and amplified by the amplifier serves to actuate the relay 82 momentarily until the photoelectric cell is reactuated by the light beam after the ball has passed beyond said light beam. The actuation of relay 82 moves the switch 86 into contact with the terminal 88 and thereby serves to energize the relay 130 whose switch 132 moves into contact with the terminal 134. The FIG. 4 setting of the device entails a deenergized condition of the signals 92 and 94 as a result of the open circuit terminal 108. The actuation of the relays 82 and 130 while the switch 102 is in the position shown in FIG. 4 does not alter the condition of the signals 92 and 94. Thus during normal playing of the game, as long as the green light 90 is operating, the signals 92 and 94 remain inoperative regardless of the energization of the relays 82 and 130.

Assuming, however, that game time has ended and that the timer switch has caused energization of the relay 104 to bring its switch 102 into contact with the terminal 108 to thereby close a circuit to the signal 92, for example, the amber light, indicating the end of a game-playing period, and assuming further that the light beam is intercepted by a ball after such contact of switch 102 with terminal 108, the signal resulting from the interception of the beam of light upon the photoelectric cell creates an impulse amplified at 46 and serving to operate the relay 82 and thus also in turn to operate the relay 130. As the relay 130 is operated to bring the switch 132 into contact with the terminal 134, a circuit is closed from transformer secondary 98, lead 136, lead 137, switch 132, terminal 134, lead 140, signal 94, leads 144, 142 and 120 to terminal 108, switch 102 and lead 100 back to the transformer secondary 98. This circuit is in parallel to the circuit which operates the signal 92. Since the relay 82 is operated only momentarily as a result of the passage of the ball through the member 12, the energization of the

member **94**, whether it be a light or a signal, will be momentary and will be of such nature that it will be understood to indicate that the passage of the ball through the member **12** was not legal and therefore does not result in a score.

It will be apparent from the foregoing description that my improved device provides means for automatically indicating to a timing and scoring official both the time factor of a game, that is, whether playing time is running or has ended, and also indicates automatically, as soon as playing time has ended, the illegal or non-counting nature of any movement of the ball through the hoop member **12** at any time when playing time is not running. The switch **50** will preferably be located near the timer's panel or thereon so that the entire system may be deenergized during such time as practice is being conducted or at any other time when the device is desired to be inoperative.

FIG. 4 also shows a holding circuit serving to hold the coil of relay **130** energized as long as relay **104** closes a circuit at terminal **108**. Thus the switch of the relay **130** is shown as a double pole unit with the second switch **131** normally spaced from a terminal **133** when the coil of relay **130** is not energized. Switch element **131** is connected to lead **142** by lead **135** and terminal **133** is connected by lead **139** to lead **138** between relay **130** and terminal **88** of relay **82**. Whenever switch **131** contacts terminal **133** while switch **102** contacts terminal **108**, the coil of relay **130** will remain energized after the momentary energization of relay **82** ends. If the relay **82** is energized while the switch of relay **104** contacts terminal **106**, the holding circuit remains inoperative.

It will be understood that, while the preferred embodiments of the invention have been illustrated and described, changes may be made within the scope of the appended claims without departing from the spirit of the invention.

We claim:

1. A game timing device comprising a goal member through which a game member is passed to produce a score, means for directing a beam of light across the goal member to be intercepted by passage of a ball through said goal member, light-sensitive means normally impinged by said light beam, a signal, a time responsive means having timing and elapsed time conditions, and signal actuating means actuatable by said light-sensitive means only when said time-responsive means is in its elapsed time condition.

2. A game timing device comprising a goal member through which a ball is passed to produce a score, means for directing a beam of light across the goal member to be intercepted by passage of a ball through said goal member, light-sensitive means normally impinged by said light beam, a signal, a time responsive means having timing and elapsed time conditions and signal actuating means actuable by said light-sensitive means only while said time responsive means is in its elapsed time condition, said light beam directing means including a reflective member carried by said goal member for intercepting a light beam in one path and reflecting the same in a second path at an angle to said first path.

3. A game timing device comprising a goal member through which a ball is passed to produce a score, means for directing a beam of light across the goal member to be intercepted by passage of a ball through said goal member, light sensitive means normally impinged by said light beam, a signal, a time responsive means having time measuring and elapsed time conditions, and signal actuating means actuatable by said light sensitive means only while said time responsive means is in its elapsed time condition said light beam directing means and light sensitive means being located remote from said goal member and clear of the path of travel of a ball passing to and through said goal member.

4. A game timing device comprising a time responsive means, signal means controlled by said time responsive means and including a first signal element operable in one setting of said time responsive means and a second signal element operable in another setting of said time responsive means, a game goal member, means responsive to passage of a game piece through said goal member, and a third signal energized under conjoint control of said last named means and said time responsive means.

5. A game score signaling device comprising a basketball goal unit including a vertical backboard and a horizontal goal ring carried by said backboard, said goal ring having a reflective portion opposite said backboard, means for focusing a beam of light across the path of a ball passing through said goal ring and upon said reflective portion from a position adjacent said backboard and below the level of said ring, a light sensitive element positioned adjacent said backboard and below the level of said goal ring to intercept the reflection of said beam, and signal means responsive to actuation of said light-sensitive element.

6. A game score signaling device comprising a basketball goal unit including a vertical backboard and a horizontal goal ring carried by said backboard, said goal ring having a reflective portion opposite said backboard, means for focusing a beam of light across the path of a ball passing through said goal ring and upon said reflective portion from a position adjacent said backboard and below the level of said ring, a light sensitive element positioned adjacent said backboard and below the level of said goal ring to intercept the reflection of said beam, and signal means responsive to actuation of said light-sensitive element, and tubular netting formed of intersecting strands and suspended from said goal ring, said light-focusing and light-reflecting means providing beams of a width exceeding that which a strand of said netting is capable of completely intercepting.

7. A game score signaling device comprising a basketball goal unit including a vertical backboard and a horizontal goal ring carried by said backboard, said goal ring having a reflective portion opposite said backboard, means for focusing a beam of light across the path of a ball passing through said goal ring and upon said reflective portion from a position adjacent said backboard and below the level of said ring, a light sensitive element positioned adjacent said backboard and below the level of said goal ring to intercept the reflection of said beam, and signal means responsive to actuation of said light-sensitive means, said goal ring being supported by a bracket carried by and projecting from said backboard, said light-focusing means and said light-sensitive means being supported by and positioned below said bracket and spaced from said ring.

8. A game score signaling device comprising a basketball goal unit including a vertical backboard and a horizontal goal ring carried by said backboard, said goal ring having a reflective portion opposite said backboard, means for focusing a beam of light across the path of a ball passing through said goal ring and upon said reflective portion from a position adjacent said backboard and below the level of said ring, a light-sensitive element positioned adjacent said backboard and below the level of said goal ring to intercept the reflection of said beam, and signal means responsive to actuation of said light-sensitive element, said backboard being translucent and said light-focusing means and said light-sensitive means being positioned at the side of said backboard opposite the side from which said goal ring projects.

9. A game timing device comprising a basketball goal unit including a vertical backboard and a horizontal goal ring carried by said backboard, said goal ring having a reflective portion opposite said backboard, means for focusing a beam of light across the path of a ball passing through said goal ring and upon said reflective portion from a position adjacent said backboard and below the level of and spaced from said ring, a photoelectric cell spaced from said ring for intercepting said reflected light

beam, an amplifier controlled by said cell, a time responsive means having an elapsed time setting, and a signal actuable by cell-controlled impulses of said amplifier only when said time responsive means is in its elapsed time setting said time responsive means.

10. A game timing device comprising a time responsive means having a timing setting and an elapsed time setting, a signal member controlled for actuation by said time responsive means in said timing setting, a game goal member, means responsive to passage of a game member through said goal member, and another signal member energized under conjoint control of said last named means and of said time responsive means when in its elapsed time setting.

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