

March 4, 1958

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COLOR-SELECTIVE BALL GAME REGISTER

Filed Sept. 17, 1956

2 Sheets-Sheet 1

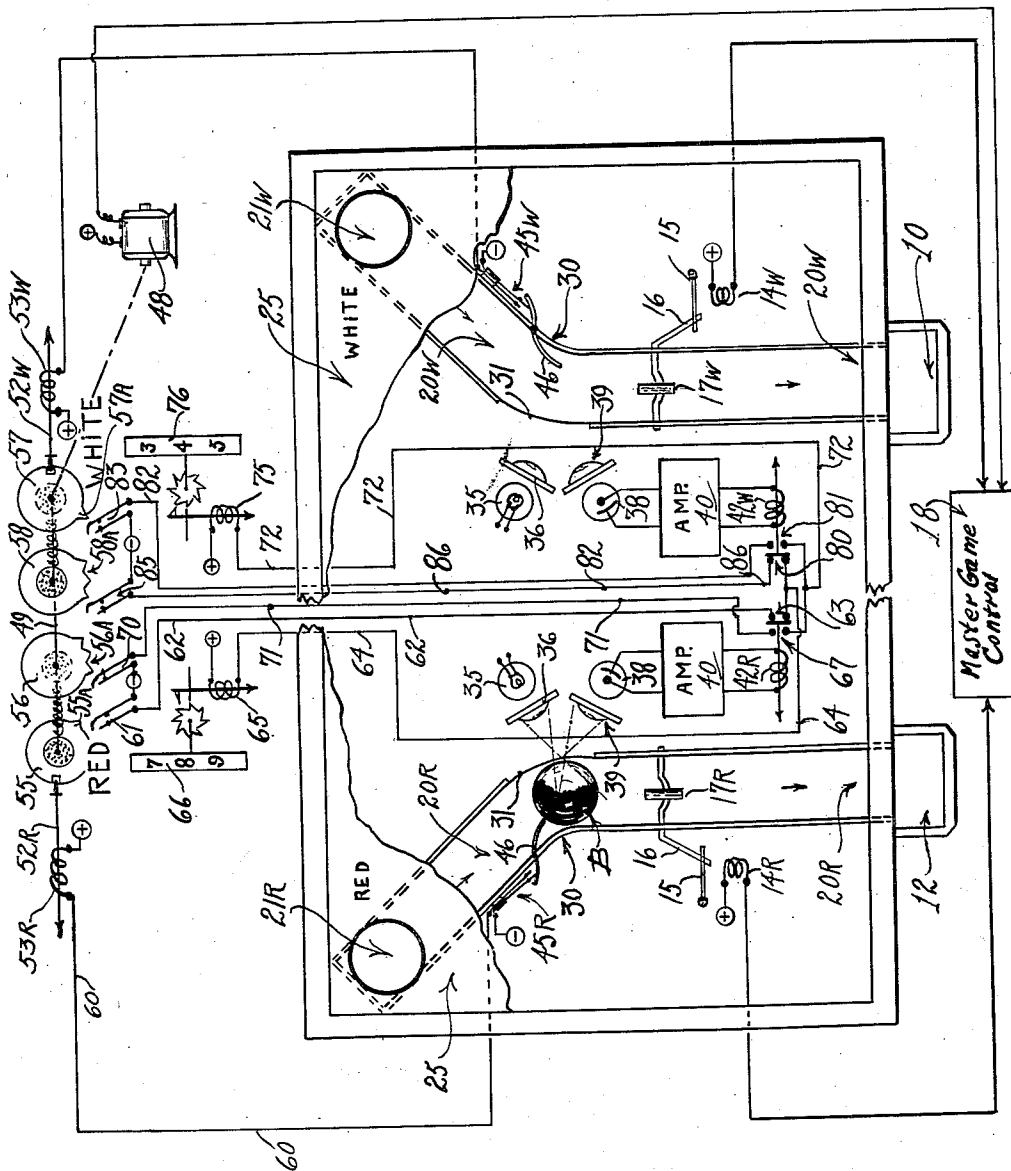


Fig. 1

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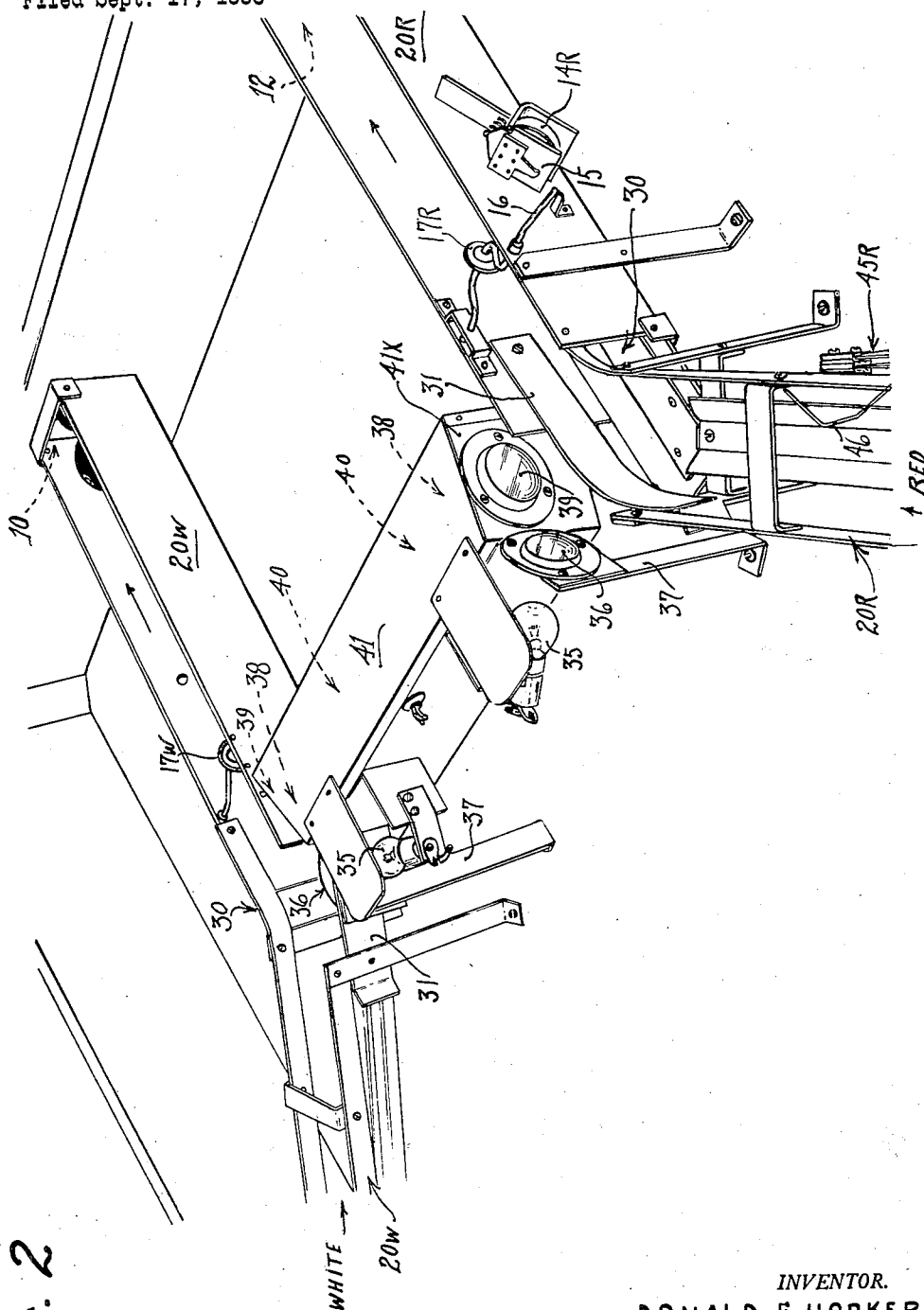
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COLOR-SELECTIVE BALL GAME REGISTER

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Application September 17, 1956, Serial No. 610,174

4 Claims. (Cl. 273—125)

This invention pertains to score control mechanism for use with various types of ball-rolling games, the principal object being the provision of photoelectric apparatus operating in accordance with the color of a ball to determine whether a score is to be made or to alter the value of a score.

It is a more particular object to provide score control means useful in conjunction with a pool or billiard type of game in which a ball is directed into certain pockets, and the score registered depends upon the color of the scoring ball with respect to the particular pocket it enters.

A further object is the provision of photoelectric color sensing means and a ball runway of special construction having a curve with a side opening therealong and means for directing a beam of light at the open portion of said curve, and further means at another open portion of said curve for picking up light reflected from a spherical surface, such as that of a billiard ball, as the same negotiates the curve.

Additional aspects of novelty and utility relate to details of the construction and operation of the preferred embodiment disclosed hereinafter in view of the annexed drawings in which:

Fig. 1 is a top-plan schematic view of a portion of a ball-rolling table and coacting photoelectric and ball runway means and circuit connections for controlling score registering means;

Fig. 2 is a fragmentary perspective view of the interior of a game table with the upper ball-rolling surface removed to disclose the novel ball runway means and photoelectric sensing means.

Referring to Fig. 1, a preferred embodiment of the novel score control means is utilized in conjunction with a modified pool game in which each player is allotted a set of two balls, one set being white and the other red, for example; and in a coin-controlled variety of the game, each set of two balls is automatically released upon deposit of a coin into a delivery pocket 10 for the white balls and another pocket 12 for the red balls, such delivery being effected by energization of ball-release electromagnets 14R and 14W for the red and white balls respectively, such energization attracting the appertaining armatures 15 to withdraw the same from blocking relation to the arms 16 of a corresponding rocker wheel 17R or 17W normally gravitated into lowered blocking position in a special ball guide or runway 20R or 20W.

The ball-blocking rocker wheels 17 are sufficiently light in weight to be raised by a ball to permit the latter to gravitate back to the appertaining return pocket; however, if the corresponding blocking armature 15 is not attracted and withdrawn from the path of the appertaining arm 16, then the wheel cannot be raised and the ball will be held against return to play.

Energization of the ball release electromagnets is automatically effected by master control means 18 not detailed and forming no part of the claimed invention.

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The players retrieve their respective sets of colored balls from the return pockets at the front of the cabinet and place them upon the table 25, and by use of cues they seek, among other objectives, to lodge balls of appropriate color, in one of the outpockets 21R or 21W, the former being above one end of the runway 20R and the latter above one end of the other runway 20W so that the pocketed balls drop into a corresponding runway and gravitate therealong in the general direction of the appertaining return exit, being blocked nevertheless by the corresponding rocker wheel 17R or 17W until the latter is released as aforesaid.

Not only are the respective runways inclined toward their return exits or pockets, but each has a marked inflection or curve about midway along its course, as at 30, there being a lowered side rail means 31 providing a side exposure at this position in each runway to remove obstruction to the projection and reflection of light therein relative to the upper surfaces of a ball rounding the curve at this point. (See Fig. 2 also.)

A light source in the form of a lamp 35 is positioned at the exposed curve in each runway, together with lens means 36 for concentrating a maximum amount of the light on the surface of a ball entering and rounding the curve.

Close to each lamp and facing the ball approach is a corresponding photosensitive cell 38 provided with a collecting lens means 39 for directing an optimum amount of the light which will be reflected from said ball rounding the curve and especially illuminated by the corresponding lamp 35, the placement of the light source and the corresponding photosensitive cell being at such an angle with respect to each other and the diameter of the ball and the proximity and radius of curvature of the curve negotiated thereby to afford an optimum sensing operation of the photosensitive means in the average time required for the ball to alter its direction of travel in rounding the curve, whereby reliable operation of the photoelectric sensing means is achieved without resort to expensive apparatus and critical adjustments.

Referring still to Fig. 1, when a white ball negotiates any curve 30, sufficient light of proper color content is reflected onto the photocell 38 to actuate the appertaining amplifier means 40 and thereby actuate the corresponding relay 42R or 42W with score-control results now to be described.

Mounted on the side of each runway 20R, 20W (see Fig. 2, lower right) is a ball-operated feeler or runway switch 45R or 45W, and each such switch has a long wire operating lever or feeler 46 projecting into the appertaining runway to be engaged and pivoted by a ball approaching the inflection or curve 30 to close the associated runway switch; and this triggers a cycling or timing circuit in the score control apparatus to set up a scoring circuit and award a score the value of which will depend upon the color of the ball responsible for the triggering of the cycle.

When the game is first conditioned for a round of play by operation of the master game control means 18, one of the results is the energization of the ball-release coils 14R, 14W, so that the two sets of balls are released into the delivery pockets 10 and 12 to be retrieved by the player and placed either one at a time or all together on the table 25, depending on the rules for a particular game involved.

In some forms of the game, for example, the release coils 14R and 14W remain energized a predetermined time so that the balls continue to return to play until a certain score is reached, whereupon the blocking means 17R, 17W automatically becomes effective until a new round of play is initiated.

Another result of initiating a round of play by action of the master control means 18 is that of starting a cycling motor 48 to drive a shaft 49 on which are two sets of pulsing cams 55, 56 and 57, 58, which are frictionally coupled to the drive shaft by conventional slip-clutch means known in the art, and operating in such manner that if one pulse disc 55 or 57 in either set is restrained against rotation, the companion pulse disc is likewise restrained; and when the restrained disc is freed, both discs in the appertaining set will be rotated by the shaft 49.

The pulse cams or discs 55, 57 are each normally restrained by a corresponding plunger brake 52R or 52W; and will respectively be freed to rotate upon withdrawal of the appertaining brake by a corresponding release coil 53R or 53W.

If a player lodges a dark or red ball in the "red" pocket 21R, the score will have a certain nominal or normal value; but if he lodges the same dark ball in the opposing "white" pocket 21W, his score will be multiplied. The same differential scoring applies to the opposing player's white ball, as will presently be made to appear.

The means for effecting differential scoring according to the color of the scoring ball will now be described by assuming, with reference to Fig. 1, that a dark red ball B has been played into the score pocket 21R and has rolled down the runway 20R and operated the corresponding feeler switch lever 46 to close switch 45R just before entering the inflected region or turn 30 to move into the exposed area at 31 and be illuminated by the corresponding light means 35-36.

The reflected light redirected by lens means 39 upon the photosensitive means 38 is inadequate to actuate the corresponding amplifier 40, and therefore the corresponding photo relay 42R remains unoperated and in normal condition.

When this ball actuated the feeler switch 45R an operating circuit was thereby closed via conductor 60 to clutch-release coil 53R, withdrawing brake plunger 52R momentarily to allow the pulse discs 55 and 56 to rotate for one cycle.

Since the photo relay 42R is not affected by this scoring, the first or low-score pulsing cam switch 61 will be effective (when closed by the single cam lobe 55A) to energize the score-register step coil 65 once via conductor 62, normally closed contacts 63 on photo relay 42R, and conductor 64, thereby stepping the score register dial 66 once.

But let it be assumed that, instead of a "red" or dark ball B having been scored in pocket 21R, a white ball has scored and actuated the runway score switch 45R and released the score cam discs 55 and 56, as before and now stands in the place of ball B at the turn in the guideway; in such case, sufficient light or light of appropriate color quality, will now affect the photocell means 38 to actuate the photo relay 42R, thereby breaking the normal-single-score-pulse circuit at relay contacts 63 to disable the single-pulse "red" cam switch 61, and closing the multipule-pulse-score contacts 67 on the relay to actuate the opposing or "white" score register means.

The aforesaid scoring operation of the opposing or "white" score register means is effected by closure of cam switch 70 a plural number of times by the several lobes 56A on the cam disc 56, thereby transmitting several score pulses via conductor 71, said relay contacts 67, conductor 72 to "white" register coil 75 so that the "white" score register dial 76 will be advanced several steps.

Thus, the player who lodges his ball of a particular color (white in the last example) in the score pocket of the opposing color (red in the said last example) will be rewarded by a higher score than if he had lodged his ball in a pocket of his own particular color (white in said last example), it being recalled that when scoring by the red ball B was described, the score dial 66 was pulsed only once.

The operation of the score control circuit for the

"white" pocket 21W is identical to that just described with the controlling colors of the balls reversed.

For instance, if a white ball scores in pocket 21W, the photo relay 42W will pull in to break its normal score contacts 80 and close contacts 81, thereby connecting the score register coil 75 via conductor 72, said contacts 81, conductor 82 to the low-score cam switch 83 which will be closed only once by cam lobe 57A.

But, if we assume that a red ball had been scored in pocket 21W, the photo relay 42W would have been unaffected and the register coil 75 would have been pulsed a plurality of times by action of lobes 58A in closing cam switch 85 several times and energization of said coil via conductor 86, normal relay contacts 80, and conductor 64 to the "red" dial coil 65.

It will be understood that the showing in Fig. 1 is mainly symbolic; that the use of positive and negative battery symbols is a mere convenience to simplify wiring, and is not limiting; and that the number of balls to be employed may be varied as well as the score values awarded by the scoring of different colors in the several pockets.

One structural embodiment of the runway and photoelectric sensing means is shown in Fig. 2, wherein like reference characters identify the similarly identified parts described in view of Fig. 1.

In particular, the two photoelectric cells 38, as well as the appertaining amplifier and relay components 40, 42R, 42W, are compactly contained in a housing 41 having oppositely pitched end walls 41X each supporting one of the pick-up lenses 39 at the proper angle relative to the confronting curve portion 30 of the runway means. This housing also serves to support both light sources 35 and partly supports the corresponding projecting-lens means 36 in conjunction with uprights 37, which in turn serve to support the housing 41 in elevated condition relative to exposed inflection area opposite the lowered side rail portions 31.

In one successful embodiment of the score control means described, one set of balls was of substantially white color, and the darker opposing set was of red color, and the color sensing was achieved by employing photoelectric cells having an inherent sensitivity to the color blue, by reason of which the photo relays would be pulsed by passage of a white ball, but not by a red ball since the latter would absorb sufficient blue energy to prevent effective excitation of the particular blue-sensitive photocell involved, whereas the white balls would reflect light having a high blue content.

Filters may be employed before the cells 38 to achieve color selective excitation with photocells which are sensitive to several colors; or photocells sensitive to particular colors other than blue may be employed with like effect in procuring differential operation of the score circuits as a function of the different colors of the balls, and it is therefore not intended that the description of "red" and "white" balls shall be limiting as the photo-sensitive control means may be made selective to other colors if desired.

I claim:

1. In a ball rolling game, means for guiding balls for travel along a predetermined path from a point of scoring to a certain destination; means along said path for directing a beam of light onto the balls as each passes a certain location; photoelectric means positioned adjacent said location to receive reflected light from a passing ball; a score control circuit connected for actuation by said photoelectric means; ball-actuated switch means located along said path; and electrically controlled score register means connected for joint control by said control circuit and said switch means to effect registration of a first nominal score value when said switch means is actuated without accompanying actuation of said photoelectric means and to effect registration of a different score value when

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said switch means and said photoelectric means are actuated both by one and the same ball.

2. In a game employing playing pieces moved to score objectives; electrically actuated score register means; playing pieces differing in light-reflective properties; switch means including photoelectric means positioned relative to each of not less than two of said objectives and respectively connected in a control circuit with said score register means for differential operation, firstly to actuate the register whenever one of said playing pieces moves to scoring relation with one of said objectives to register a predetermined nominal score, and secondly with said photoelectric means actuated responsive to light of a certain characteristic reflected from a said playing piece in conjunction with scoring action thereof in effecting the nominal scoring operation of the register as aforesaid, to further actuate said circuit and cause said register to indicate a score different from said nominal score.

3. In a ball-rolling game employing balls of differing light-reflective properties and scoring objectives to which said balls are directed and from which scoring balls are redirected for further play, control means including, namely an electrically controlled score signalling means; guide means for balls redirected as aforesaid, means for directing light onto a ball guided by said guide means; score-control means positioned relative to said guide means including a first switch means actuated by a mass property of a ball guided thereby, and a further switch means which is operatively controlled by certain light-reflective properties of said ball; together with circuit means including operative connections with said first and further switch means to actuate the signalling means either under

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joint control of the switch means or under several control of one of the same, depending upon the light-reflective properties of the particular ball involved; and means comprised with said circuit for modifying the signalling operation of said signal means dependently upon whether such operation is effected by a joint or several actuation of the switch means as aforesaid.

4. In a ball game employing balls having differing light-reflective properties, and ball-scoring objectives to which said balls are to be directed; score control means comprising, runway means for receiving balls attaining at least certain ones of said objectives; runway switch means actuated by a ball in said runway means; a photosensitive switch means to be controlled by light of a certain character reflected from said last-mentioned ball; means for directing light upon said ball; an electrically-controlled scoring device connected in operating circuit having first and second operating conditions to produce different scoring results; said runway switch means and said photosensitive switch means being connected with said circuit to produce the first or second operating conditions dependently upon whether both or only one of the said switch means is actuated by one and the same ball.

References Cited in the file of this patent

UNITED STATES PATENTS

1,722,751	Jones	July 30, 1929
2,162,529	Dawson et al.	June 13, 1939
2,531,236	Snell et al.	Nov. 21, 1950
2,657,799	Johnson et al.	Nov. 3, 1953