United States Patent

Clark

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[54] RANDOM SELECTION AND REGISTRATION APPARATUS

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[52] **U.S. Cl.** .....**273/124 A,** 273/141 A

[51] **Int. Cl.** **A63b 71/06,** A63f 7/00

[58] **Field of Search** .....273/138 A, 141 A, 142 R, 142 A, 273/142 B, 142 C, 142 D, 142 E, 142 F, 142 G, 142 H, 142 HA, 142 J, 142 JA, 142 JB, 142 JC, 142 JD, 142 K, 143 R, 143 A, 143 B, 143 C, 143 D, 143 E, 123 A, 124 A, 125 A, 121 A, 122 A

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[57] **ABSTRACT**

A motor actuated spinning indicator coasts to a stop after deactuation to make a random selection. Information regarding the selection is then transmitted to an appropriate register, transmission of the information being precluded until the indicator has stopped. Such an arrangement has particular applicability in a game scoring situation.

16 Claims, 5 Drawing Figures

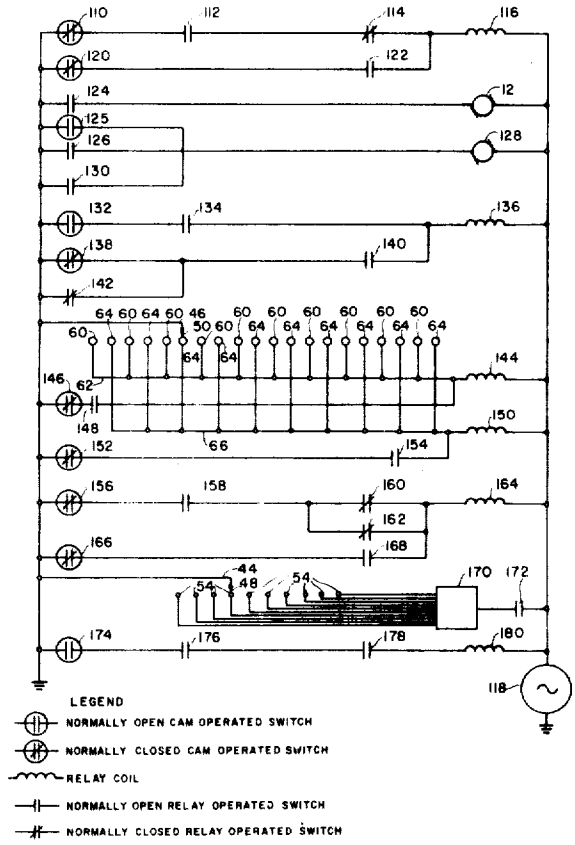


FIG 2

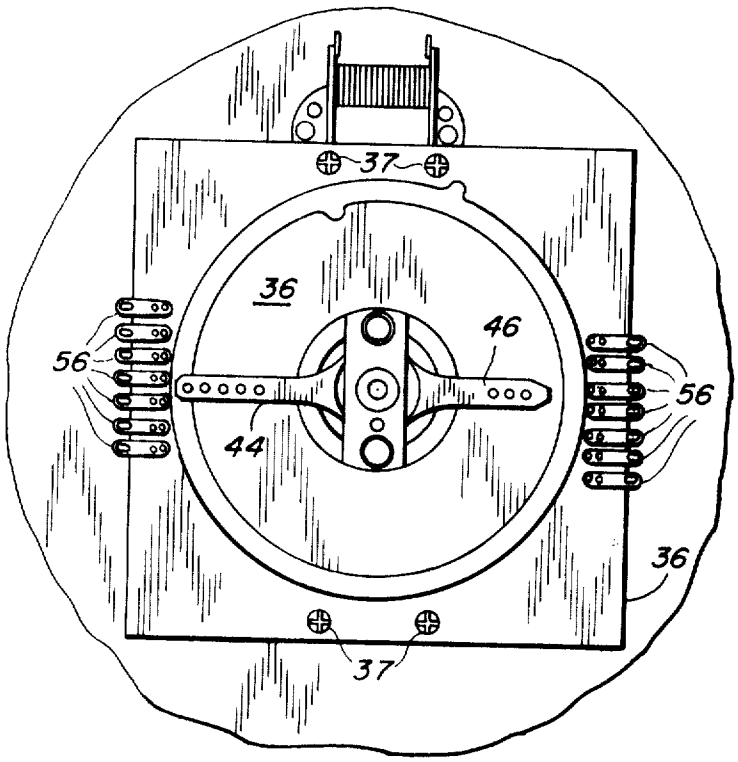
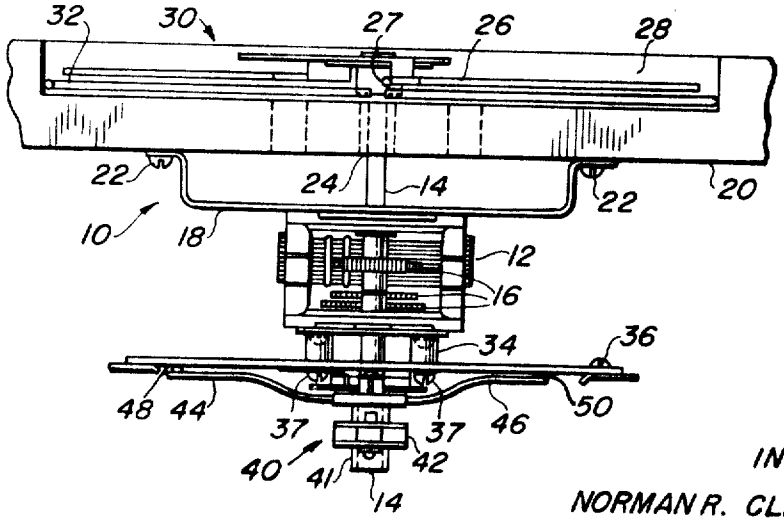


FIG 1



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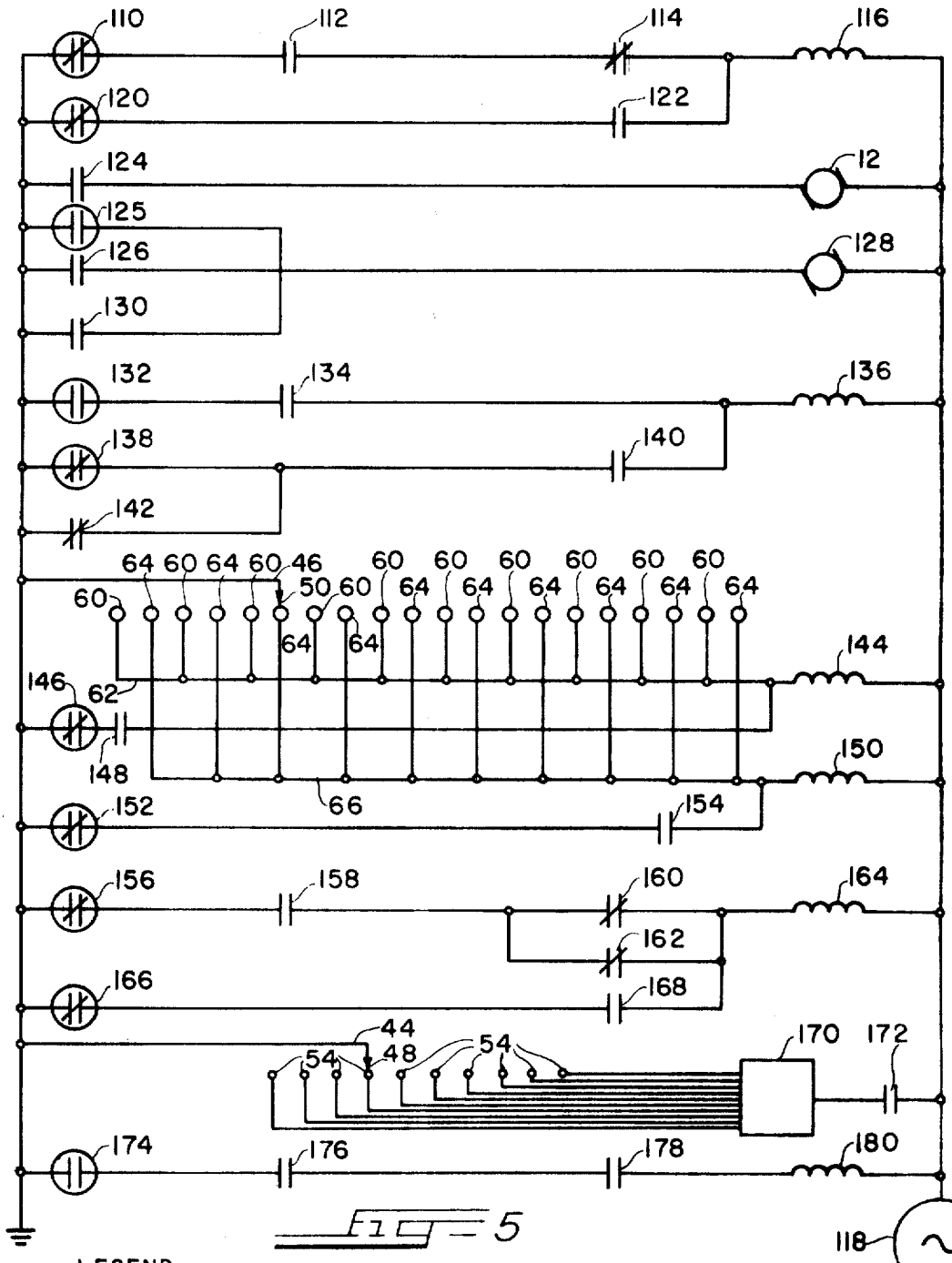


Fig. 5

LEGEND

- NORMALLY OPEN CAM OPERATED SWITCH
- NORMALLY CLOSED CAM OPERATED SWITCH
- RELAY COIL
- NORMALLY OPEN RELAY OPERATED SWITCH
- NORMALLY CLOSED RELAY OPERATED SWITCH

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Fig. 3

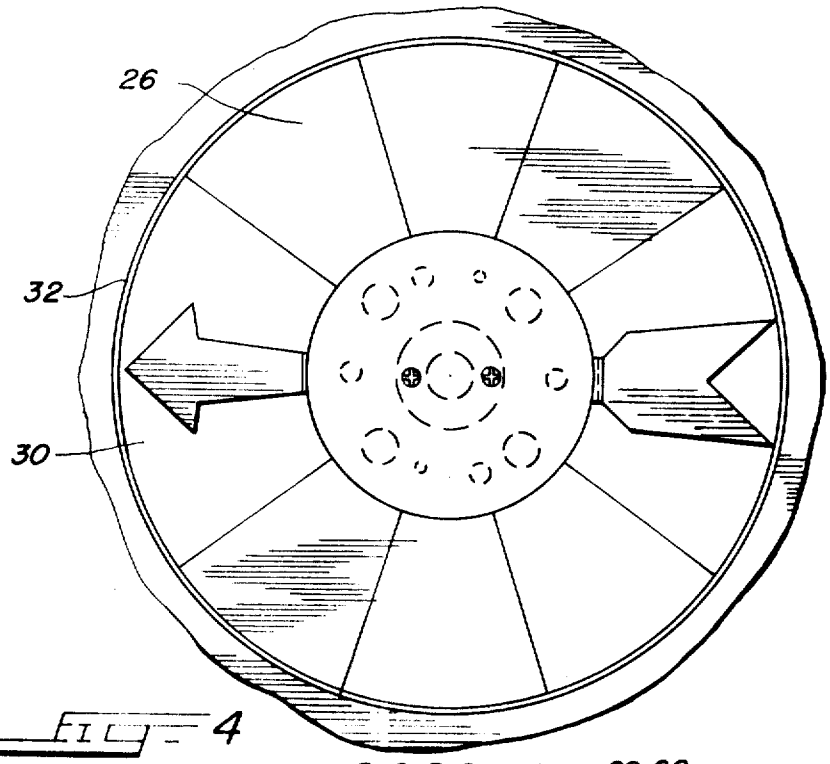
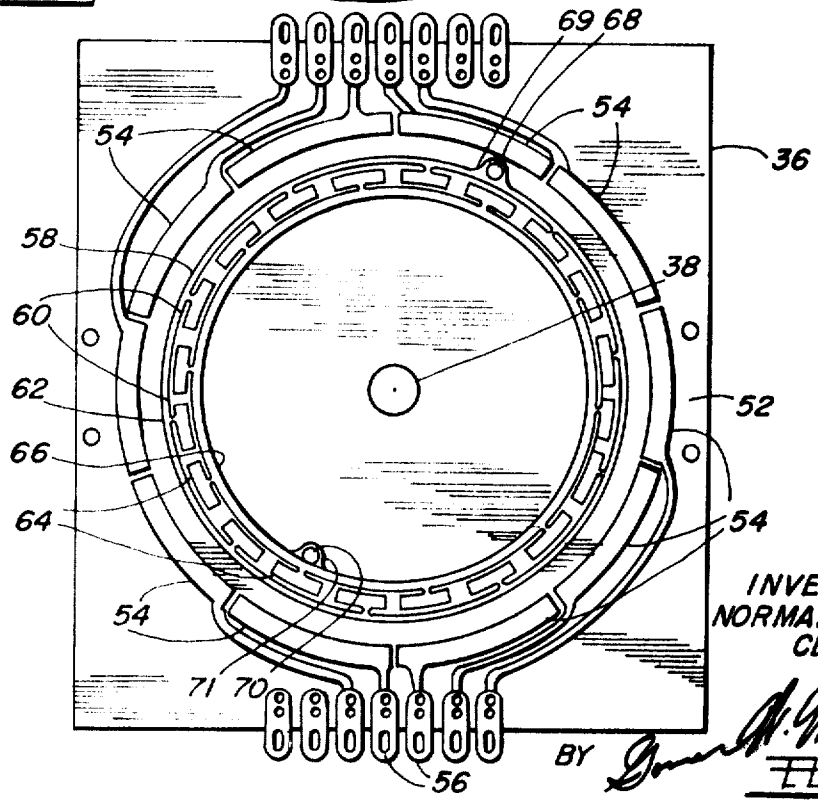


Fig. 4



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RANDOM SELECTION AND REGISTRATION APPARATUS

BACKGROUND OF INVENTION

1. Field of Invention

This invention generally relates to an arrangement for making random selections and registering information regarding the same and, more specifically, this invention relates to a random spin score generating device for use in conjunction with a pinball machine or other apparatus for playing a game involving elements of chance and skill.

2. Description of the Prior Art

A great deal of ingenuity and originality have gone into the variety of games that can be played on a pinball machine. For example, the simplest type of game that can be played on a pinball machine merely involves the totaling of scores achieved by a pinball contacting various switches and bumpers corresponding to various score units as it rolls down the inclined play field of the pinball machine. Various denominations of scoring units may be provided in this type of machine, and in addition, one play field switch may be provided to initiate activation of a random scoring unit. The random score unit may be utilized to either provide a bonus score or bonus games independent of the other scoring opportunity switches on the play field. Typically, the random scoring unit is in the form of a "wheel of fortune" the circumference of which is divided into various score denominations and the final score achieved is determined by the stopping point of an indicating arrow. However, this "wheel of fortune" is not the only type of possible random scoring unit. Depending on the type of game for which the pinball machine is set up to play, the random scoring unit can be utilized to provide bonus games, additional balls above and beyond the normal of balls per game, a multiplication factor by which the next score achieved by the ball contacting the bumper is multiplied, or the selection of cards, characters, or other opportunities which figure into the particular game being played.

For example, one possible game for which a pinball machine could be set up to play could closely approximate the card game of poker. Various play field switches on the play field could be provided corresponding to the 52 cards in a deck of cards. Thus, a poker hand could be made by the contact of the balls with the various play field switches. The additional feature of a random scoring unit which could achieve "-pat" hands such as a royal flush, a flush, a straight, a full house, etc. could be additionally provided. Other pinball games approximating such sports as football, baseball, horse racing, hockey, etc. as well as games such as tic tac toe can be achieved on a pinball machine. Thus, it is apparent that a random score unit to be incorporated in a pinball machine must be extremely flexible to provide a multiple type of scoring opportunities for the machine.

The random spin scoring device heretofore known to the art has not provided this flexibility and has required complete redesign of the device to adopt it to a new game. However, the random scoring device of the present invention provides a great deal of flexibility in varying the type of games that may be played without appreciable changes in either the circuit or the mechanical configuration of the device. Thus, the random score initiating device of the present invention provides the desirable feature of being capable of being utilized to play a variety of games without costly redesign and manufacture.

Random spin score initiating devices heretofore known to the art have embodied the undesirable feature of appearing to be pre-programmed or otherwise controlled or pre-set for a pre-determined score result. For example, one spin score unit heretofore known to the art embodies a score indicating arrow and ratchet indexing means which stops the score indicating arrow in the exact center of the segment of the circle representing the score units. Thus, as the score indicating arrow loses rotational momentum the ratchet means may either bring the arrow to a sudden stop or if there is insufficient momentum to rotate the arrow to the next score segment

the ratchet means may cause the arrow to back up to the center of the score segment. Thus, it appears to the player that the spin score unit is either pre-programmed, pre-set or otherwise controlled. In the typical pinball machine, if the total score is high enough the player may receive a free or a bonus game. Thus, if a player believes that the spin score unit is pre-controlled or pre-programmed to hold the score down and reduce the number of free or bonus plays or games, the machine may be less desirable from a player's subjective standpoint even though, in fact, the spin score unit is completely uncontrolled and unprogrammed.

Another type of random scoring unit heretofore known in the art involves a multi-contact rotational switch with individual contacts connected to lights or other visual means on the front of the pinball machine corresponding to the various elements of the score. When the spin score unit is initiated, a motor causes the rotational switch to rotate. When the motor is de-energized the switch stops on a switch contact corresponding to a score. In this type of prior art device, the rotational switch is inside the pinball machine and the player only sees the flashing lights on the front of the machine. Thus, it appears to the player that the resulting score is controlled electronically rather than mechanically, and thus may believe that the operation of the scoring unit is pre-programmed or pre-set.

A further disadvantage of the prior art random scoring units results from the score lockout arrangement of those devices which prevents scoring while the score indicating arrow is in motion. In the prior art devices, various lockout means are utilized including centrifugal switches and direct current time delay switches. Centrifugal switches have proved unsatisfactory since they are subject of constant maintenance and repair, and also because of their initial expense. D.C. time delay switches usually embody a capacitor connected across a relay so that the relay is held open during the charge decay period of the capacitor. The capacitor and relay are energized by electric pulses while the spin motor is energized and the capacitor is selected to assure sufficient decay time so that the system stops rotation before the relay is closed. This type of D.C. time delay lockout system has the disadvantages of necessitating the use of direct current in the machine thereby increasing the cost of the machines since D.C. rectifiers are required; necessitating the additional expense of a large capacitor with sufficient decay time to hold the relay open until rotation stops; and failing to assure lockout of the scoring function if the capacitance of the capacitor changes due to age or the rotation time changes due to "breaking in" or lubrication of the spin motor bearings.

In addition, both the centrifugal switch and the D.C. time delay circuit require the undesirable feature of an indexing arrangement for the score indicating arrow. With the centrifugal switch, the indexing arrangement brings the arrow to a sudden stop when there is insufficient rotational momentum to rotate the arrow to the next index position thereby bringing the arrow to a rapid stop before the centrifugal switch closes. Without the indexing arrangement, the switch would close once the centrifugal force was reduced even if the arrow was still rotating. Indexing is required for the D.C. time delay arrangement since typically, the stopping of the arrow at the center of the index segment breaks the circuit to the lockout relay thus permitting the capacitor to decay and close the relay switch. Without indexing there would be no way to break the circuit to the relay and thereby close the score circuit to permit scoring.

SUMMARY OF THE INVENTION

In a conventional pinball machine is provided a control motor and a spin motor with a score indicating arrow attached to the shaft of the spin motor. Appropriate circuitry to energize the spin and control motor when a pinball hits an appropriate switch on the pinball machine play field is provided. Operably associated with the control motor are a multiplicity

of cam operated switches which may be actuated at various positions of the control motor. The spin motor is de-energized in response to a cam operated switch while the score motor is maintained in an energized condition by another cam operated switch controlled circuit. The score indicating arrow coasts to a stop and indicates a scoring opportunity by the tip of the arrow. Aligned with the arrow and attached to the shaft is a wiper contact that rubs across a detachable printed circuit board. Circuits corresponding to the scoring opportunities are provided on the circuit board. A lockout circuit is provided to prevent registering of the score until after the arrow has stopped rotation and one of corresponding pair cam switches is closed. Once scoring is completed, the ball is ejected from a hole on the play field and the entire system is returned to an index or rest position so that a new scoring cycle can be commenced upon subsequent activation of the play field switch.

The present invention completely eliminates the adverse impression to the player since the rotation of the score indicating arrow in the present invention rotates freely without an indexing means and thus can stop anywhere on the circumference of the circle traversed by the point of the score indicating arrow. The necessity for an indexing means is eliminated by the inclusion of the lockout circuit of the present invention. As a consequence, the arrow does not necessarily stop in the center of a score division of the circumference of the score circle. Thus, it is clear to the player that the final stopping point of the spin indicator is purely a matter of the momentum and friction of the device and is not in any way pre-programmed or controlled. For example, in the present invention the score arrow can stop on the dividing line between two scoring units and in this situation the highest of the two scores is the award to the player. Thus, it is clear to the player that the operation of the machine is not pre-programmed to hold down the score.

In addition, the present invention provides a flexible structure that allows a minimum of effort to convert the random score initiating device of the present invention to a new game involving different scoring opportunities by a simple physical change of the printed circuit board.

Thus, it is a primary object of the present invention to provide a random score generating device which completely and obviously randomly selects a scoring opportunity and conveys the impression to the player that the random selection is not in any way pre-selected or pre-programmed.

It is a further object of the present invention to provide a score generating device for randomly selecting a scoring opportunity which can be utilized for a multiplicity of possible game opportunities without costly redesign or structural changes.

These and other objects, advantages and features of the present invention will hereinafter appear, and, for the purpose of illustration, but not of limitation, an exemplary embodiment of the present invention is shown in the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a side partially fragmentary plane view of the random spin apparatus of the present invention.

FIG. 2 is a bottom partially fragmentary plane view of the apparatus shown in FIG. 1.

FIG. 3 is a top partially fragmentary plane view of the apparatus shown in FIG. 1.

FIG. 4 is an elevational plane view of the face of the printed circuit board of the invention.

FIG. 5 is a circuit diagram of the circuit of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 shows a random spin apparatus **10** comprising a spin motor **12**, a freely rotating shaft **14** mechanically rotated by mechanical gear linkage **16** driven by spin motor **12**. Spin motor **12** is attached to a mounting bracket **18** which is affixed to a wall of the pinball machine **20** by screws **22**.

Shaft **14** extends through opening **24** in the wall of pinball machine **20**. Attached to the end of shaft **14** extending through opening **24** by set screw **27** is score indicating arrow **26** (more clearly shown in FIG. 3). In the wall of the pinball machine **20** is provided a circular recessed area **28**. Held firmly against the bottom surface of circular recessed area **28** by circular expanding spring **32** is a circular score indicating disk **30**.

In the present embodiment, circular score indicating disk **30** is divided into 10 equal segments to provide 10 separate scoring opportunities. As can be seen in FIG. 3, score indicating arrow **26** is positioned immediately over circular score indicating disk **30** and the point of score indicating arrow **26** indicates the scoring opportunity segment selected by random spinning.

Mounted to the bottom of spin motor **12** by screws **37** is mounting bracket **34** to which is attached printed circuit board **36**. An opening **38** (shown in FIG. 4) is provided in printed circuit board **36** to allow shaft **14** to extend through printed circuit board **36**. Mounted to the end of shaft **14** extending through printed circuit board **36** is wiper-arm assembly **40**. Wiper-arm assembly **40** comprises attaching structure **42** mounted to shaft **14** by set screw **41**. Affixed to attaching structure **42** is first wiper-arm **44** and second wiper-arm **46**. Provided at the free end of first wiper-arm **44** is rubbing contact **48** and at the free end of second wiper-arm **45** is rubbing contact **50**.

FIG. 4 shows the circuit configuration of printed circuit board **36** of the present embodiment. An outer circuit ring **52** is divided into 10 separate score opportunity circuits **54** corresponding to the 10 scoring opportunity segments of circular score indicating disk **30**. Score opportunity circuits **54** are individually connected to lugs **56**. Rubbing contact **48** on first wiper-arm assembly **40** is rotated by shaft **14**. During assembly of the device, wiper-arm assembly **40** and score indicating arrow **26** are positioned on shaft **14** so that rubbing contact **48** contacts the score opportunity circuit **54** corresponding to the score opportunity indicated on the circular score indicating disk **30**.

Also provided on printed circuit board **36** is inner circuit ring **58**. Inner circuit ring **58** is divided into 10 equally spaced first individual contacts **60** connected by circuit connector **62** and 10 equally spaced second individual contacts **64** positioned between first individual contacts **60** and connected by circuit connector **66**. Through circuit board **36** is provided rivet hole **68**. Provided around rivet hole **68** is a protruded portion **69** of circuit connector **62**. A rivet (not shown) may be inserted through hole **68** to affix a contact lug (not shown) on the opposite side of the printed circuit board **36** for providing electrical continuity to circuit connector **62** and first individual contacts **60**. Also provided through printed circuit board **36** is rivet hole **70**. Provided around rivet hole **70** is a protruded portion **71** of circuit connector **66**. A rivet (not shown) may be inserted to affix a contact lug (not shown) on the opposite side of printed circuit board **36** to provide electrical continuity to circuit connector **66** and second individual contacts **64**.

Rubbing contact **50** is positioned on second wiper-arm **46** to circularly traverse the inner circuit ring so that contact is alternately made with first individual contacts **60** and second individual contacts **64**.

FIG. 5 shows a simplified circuit diagram representing the circuitry of the present embodiment. The switches shown in FIG. 5 represent the position of the switches in a rest or index position of the apparatus. A first cam operated switch **110** normally closed at the index position of the apparatus is connected from ground to play field switch **112**. Play field switch **112** is connected in series to eject relay controlled switch **114** and spin relay coil **116**.

Electromotive force is applied across the circuit by power source **118** represented by an actuating current generator symbol. However, it should be realized that any conventional source of alternating current or a direct current power supply will operate this circuit. However, alternating current is util-

ized in this embodiment since it provides the advantage of reducing cost since a D.C. rectifying power supply is not required.

In parallel with first cam operated switch **110**, play field switch **112**, and eject relay controlled switch **114**, is second cam operated switch **120** in series with spin relay operated switch **122**. Connected in series from ground to power source **118** is spin relay operated switch **124** and spin motor **12**. Also connected in series from ground to power source **118** is spin relay operated switch **126** and control motor **128**. Connected in parallel with spin relay operated switch **126** is third cam operated switch **125** and eject relay operated switch **130**. Connected in series from ground to power source **118** are fourth cam operated switch **132**, spin relay switch **134**, and eject relay coil **136**. Connected in parallel with switch **132** and **134** is fifth cam operated switch **138** and eject relay operated switch **140**. Also connected in parallel with fifth cam operated switch **138** is spin score relay operated switch **142**.

Connected to ground is a graphical representation of second wiper-arm **46** and rubbing contact **50**. Also graphically represented are first individual contacts **60** and circuit connector **62**. Circuit connector **62** is connected in series with first delay relay coil **144**. Also connected in series from ground to first delay relay coil **144** is sixth cam operated switch **146** and first delay relay operated switch **148**.

Also graphically represented are second individual contacts **64** and circuit connector **66** in series with second delay relay coil **150**. Also connected in series with second delay relay coil **150** is seventh cam operated switch **152** and second delay relay operated switch **154**.

Connected from ground to power source **118** is eighth cam operated switch **156**, eject relay operated switch **158**, the parallel combination of the first delay relay operated switch **160** and the second delay relay switch **162** and spin score relay coil **164**. Connected in parallel with switches **156**, **158**, **160**, and **162** and in series with spin score relay coil **164** is ninth cam operated switch **166** and spin score relay operated switch **168**.

Graphically represented are first wiper-arm **44** and rubbing contact **48** in contact with graphically represented score opportunity circuits **54**. Score opportunity circuits **54** are connected in series with a means for receiving, interpreting, and totaling electric signals **170** represented by a rectangular box. In series with means **170** is spin score relay operated switch **172**.

Finally, connected in series from ground to power source **118** is 10th cam operated switch **174**, eject operated relay switch **176**, spin score relay operated switch **178**, and eject coil **180**.

Control motor **128** rotates a ganged group of cams (not shown) which operate first through 10th cam operated switches **110**, **120**, **125**, **132**, **138**, **146**, **152**, **156**, **166**, and **174**. The cams (not shown) are divided into six positions (hereafter referred to as index position and positions 1 through 5). FIG. **5** shows the position of the switches at the index position of the cam and control motor.

Not shown is a conventional pinball machine comprising an inclined play field; various bumpers and switches on the play field for scoring purposes; roller balls; a magazine to store the roller balls; means for individually propelling the roller balls to the top of the inclined play field; means for containing the roller balls on the play field; means at the bottom of the play field for receiving the roller ball and returning the roller ball to the magazine.

In the present embodiment, the play field switch **112** is positioned on the play field of the pinball machine at the bottom of an indented portion of the play field which will retain the roller ball and prevent the roller ball from further rolling down the play field when it enters the indented portion. When a roller ball enters the indented portion and contacts play field switch **112**, play field switch **112** is closed and electrical current is passed through first cam operated switch **110** (which is closed only at the index position), eject relay operated switch **114** (normally closed) and spin relay coil **116**. The passage of current through spin relay coil **116** causes spin relay operated switches **122**, **124**, **126**, and **134** to close. The closing of switches **124** and **126** activate spin motor **12** and control motor **128**. As control motor **128** rotates past the index position, first cam operated switch **110** (closed only at indexed position) opens. However, because second cam operated switch **120** (open only at fifth position) and spin relay operated switch **122** are closed, a circuit is maintained to spin relay coil **116**. At the first position of the control motor **128**, fourth cam operated switch **132** (closed only at first position) is closed thus completing a circuit through previously closed spin relay operated switch **134** and eject relay coil **136**. Current through eject relay coil **136** causes eject relay operated switch **114** (normally closed) to open and eject relay operated switches **130**, **140**, **158**, and **176** (normally open) to close. The closing of eject relay operated switch **130** maintains a circuit to control motor **128** independent of spin relay operated switch **126**. Control motor **128** continues to rotate to its fifth position whereupon second cam operated switch **120** (only open at fifth position) is opened. Since first cam operated switch **110** (closed only at index) is open at the fifth position of the control motor **128**, both circuits to spin relay coil **116** are broken and spin relay operated switches **122**, **124**, **126**, and **134** are opened. The opening of spin relay operated switch **124** breaks the circuit to spin motor **12**, but the rotational momentum of spin motor **12** and score indicating arrow **26** causes shaft **14** to continue to rotate until friction overcomes the momentum and causes shaft **14** to stop. Meanwhile, since eject relay operated switch **130** is closed a circuit is maintained to control motor **128** independent of spin relay operated switch **126**. While shaft **14** is rotating, either by operation of spin motor **12** or by momentum after the circuit to spin motor **12** is broken, rubbing contact **50** on second wiper-arm **46** is passing alternately over first individual contacts **60** and second individual contacts **64** of inner circuit ring **58** of printed circuit board **36**. Contact of rubbing contact **50** with first individual contact **60** completes an electrical circuit through first delay relay **144**. This closes first delay relay operated switch **148** and opens normally closed first relay operated switch **160**. Similarly, when rubbing contact **50** contacts second individual contact **64** a circuit is completed through second delay relay coil **150**. This closes second delay relay operated switch **154** and opens normally closed second delay relay operated switch **162**. Thus, after rotation has commenced a circuit is maintained to the first delay relay coil **144** through sixth cam operated switch **146** (only open at first position of control motor) and first delay relay operated switch **148**. Similarly, a circuit is maintained to the second delay relay coil **150** by a circuit through seventh cam operated switch **152** (open only at the third position of the control motor) and second delay relay operated switch **154**. As long as current is maintained in the first and second delay relay coils, normally closed first delay relay operated switch **160** and second delay relay operated switch **162** are held open. When control motor **128** reaches its first position, the sixth cam operated switch **146** (open only at first position) is opened, thus breaking the circuit to first delay relay coil **144**. However, as long as shaft **14** is rotating, either by operation of spin motor **12** or by momentum, current will be pulsed through rubbing contact **50** and first individual contact **60** thereby maintaining a pulsing current through first delay relay coil **144** until a control motor **128** passes the first position and sixth cam operated switch **146** closes. Thus, as long as shaft **14** is rotating, first delay relay operated switch **160** is held in an open position. However, if rubbing contact **50** is on first individual contact **64** when sixth cam operated switch **146** is opened at its first position, first delay relay coil **144** is momentarily deactivated allowing first delay relay operated switch **160** to momentarily close, but since eighth cam operated switch **156** is only closed at the index position, spin score relay **164** is not activated at this time.

Similarly, when control motor **128** reaches its third position, seventh cam operated switch **152** (open only at third position) is opened, thereby breaking that circuit to second delay relay coil **150**. However, if shaft **14** is rotating, either by operation of spin motor **12** or by momentum, the contact of rubbing contact **50** with second individual contact **64** maintains a pulsing current through second delay relay **150**, and second delay relay operated switch **162** is held in an open position. Thus, as long as shaft **14** and wiper-arm **46** are rotating, or as long as eighth cam operated switch **156** (closed only at index position) is open, it is impossible for a circuit to be completed through spin score relay coil **164**. Once rotation of spin motor **12**, shaft **14** and wiper-arm **46** has ceased and control motor **128** has passed either the first or third positions, the circuit to either the first delay relay coil **144** or second delay relay coil **150** is broken, and the corresponding first delay relay operated switch **160** or second delay relay operated switch **162** is closed permitting a circuit to be completed through spin score relay **164** (eject relay operated switch **158** was previously closed by completion of circuit through eject relay **136**) when eighth cam operated switch **156** (closed only at the index position) is closed. Thus, when control motor **128** reaches its index position after spin motor **12** shaft **14** and wiper-arm **46** have stopped rotation, a circuit is completed through spin score relay **164**. This actuates spin score relay switch **168** thus maintaining a circuit through the spin score relay **164** after eighth cam operated switch **156** has passed the index position of the control motor **128** and re-opened.

Also closed when a circuit is completed to spin score relay coil **164** is spin score relay operated switch **178**. At the third position of the control motor, tenth cam operated switch **174** (closed only at third position) is closed and a circuit is completed through eject relay operated switch **176** (previously closed) and eject coil **180**. Eject coil **180** operates a mechanical plunger (not shown) which ejects the roller ball from the indented portion of the play field thus opening play field switch **112**.

Activation of spin score relay **164** also opens normally closed spin score relay operated switch **142**. When control motor reaches its fourth position, fifth cam operated switch **138** (open only at the fourth position) is opened and the circuit to eject relay **136** is broken. This closes normally closed eject relay switch **114**, opens normally opened eject relay operated switches **130**, **140**, **158** and **176**. The opening of eject relay **158** breaks one circuit to spin score relay coil **164**. The other circuit to spin score relay **164** is broken when seventh cam operated switch **166** (open only at fifth position) reaches the fifth position and is opened. A circuit is maintained to control motor **128** by third cam operated switch **125** (open only at index position) which allows the control motor **128** to rotate until it reaches the index position. At the index position the third cam operated switch **125** opens and the system is at its initial index or rest position.

The means to receive, interpret and total electric signals **170** is graphically shown as an enclosed box in FIG. **5**. The specific circuitry of means **170** does not specifically form a part of this invention and may take a variety of configurations depending on the type of scoring opportunities provided in the particular game for which the pinball machine is designed. As pointed out above, a variety of scoring opportunities may be provided, such as bonus games, extra balls, bonus points, or any other scoring opportunity which may be made a part of the game being played.

Moreover, the present embodiment shows the outer circuit ring **52** of printed circuit board **36** and circular score indicating disk **30** as divided into 10 equal segments. Thus in the present embodiment, 10 possible scoring opportunities are provided. However, as can be seen from FIGS. **1**, **2**, and **3** the present embodiment provides a very flexible means of changing the scoring opportunities of this invention. The outer circuit ring **52** of printed circuit board **36** can be designed to provide any number of scoring opportunities desired. Further, circular score indicating disk **30** can be designed to provide visual representation for any desired number of score opportunities. A redesigned printed circuit board can be easily substituted for printed circuit board **36** of the present embodiment by removing wiper-arm assembly **40** (by removing set screw **41**) removing printed circuit board **36** (by unscrewing screws **37**), and replacing with the newly designed printed circuit board. Similarly, a new circular score indicating disk corresponding to the scoring opportunities of the newly designed printed circuit board may be substituted by contracting circular expanding ring **32** and removing it from circular recessed area **28**, removing score indicating arrow **26** from shaft **14** (by loosening set screw **27**), removing circular score indicating disk **30** from circular recessed area **28**, and substituting in its place the score indicating disk corresponding to the newly designed printed circuit board. Once the new circular score indicating disk and printed circuit board are in position, the score indicating arrow **26** and wiper-arm assembly **40** can be reattached to the shaft **14** and aligned.

Thus, it can be seen that the present invention provides a great deal of flexibility and interchangeability between various pinball machines. Thus, repair and replacement of the present invention is less costly since fewer parts and replacement units need be kept in stock. Further, the means to receive, interpret and total electric signals **170** may be designed to facilitate interchangeability to permit variation of the games that may be played on a particular pinball machine. Thus, the present invention provides a great deal of flexibility in varying the possible scoring opportunities with only minor changes in the structure and circuitry.

It should be understood that various changes, variations, and modifications may be effected in the details and operations of the present invention, without departing from the spirit and scope thereof, as defined in the appended claims.

What is claimed is:

1. An apparatus for randomly selecting one of a multiplicity of opportunities and registering information based thereon comprising:
- a generating means for generating a randomly selected electric signal corresponding to an opportunity in response to activation and time elapsed deactivation of said generating means;
- an indicating means responsive to the generating means for indicating the selected opportunity;
- a control means;
- an initiating means for activating the generating means and the control means in response to external excitation;
- a maintaining means responsive to initial activation of the control means for maintaining activation of the control means after deactivation of the generating means;
- a deactivating means responsive to time elapsed activation of the control means for deactivating the generating means;
- registration means for receiving and registering the electric signal corresponding to the opportunity selected by the generating means;
- lockout means for activating said registration means in response to deactivation of the generating means and to further time elapsed activation of the control means,
- whereby a purely random selection of an opportunity is made and information regarding the selected opportunity is registered without the necessity of an indexing arrangement for said indicating means.

2. An apparatus, as claimed in claim 1, wherein said generating means comprises:
- a shaft;
- a means for rotating the shaft in response to activation by the initiating means;
- a circuit board position approximately perpendicular to and about the shaft;
- score generating circuit contacts positioned on the circuit board approximately in a circular path approximately centered at the center line of the shaft.

a wiper means attached to the shaft for traversing and individually contacting the score generating circuit contacts as the shaft rotates,

whereby electric signals corresponding to a respective opportunity are generated by individual contact of the respective circuit contacts by the wiper means.

3. An apparatus, as claimed in claim 2 wherein said indicating means comprises:

an arrow attached approximately perpendicular to the shaft; and

an indicating disk segmentally divided into visual representations of the opportunities, said disk positioned approximately perpendicular to and about the shaft and adjacent the arrow,

whereby the randomly selected opportunity is visually indicated by the point of the arrow coming into direct visual alignment with an opportunity segment.

4. An apparatus, as claimed in claim 2, wherein the control means comprises:

an electric control motor;

a multiplicity of cams operably rotated by the motor through six separate control positions.

5. An apparatus, as claimed in claim 4, wherein the maintaining means comprises:

a first cam switch operably closed by its corresponding cam when said cam is rotated to its first position upon activation of the control motor; and

a parallel circuit for providing and maintaining power to the control motor in response to the closing of the first cam switch.

6. An apparatus, as claimed in claim 4, wherein said lockout means comprises:

a second cam switch operably opened by its corresponding cam when said cam rotates through one of six positions; switch means for activating said registration means in response to cessation of rotation of the shaft and in further response to the opening of the cam switch after cessation of rotation of the shaft.

7. In a conventional pinball machine, said machine comprising roller balls, a magazine to store the roller balls, an inclined play field, means for propelling the roller balls individually from the magazine to the top of the play field, means for containing the roller balls on the play field, play field score means for providing score signals when contacted by the roller balls as they roll down the inclined play field, registering means for receiving, interpreting and totaling the score signals, means for receiving the roller balls at the bottom of the play field and returning the roller balls to the magazine; a random score initiating device comprising :

a score generating means for randomly selecting and generating electrical signals interpretive of the scoring opportunity selected in response to activation and time elapsed deactivation;

an indicating means operably associated with the generating means for visually indicating the randomly selected opportunity;

a control means;

an initiating means located on the play field responsive to the contact of a roller ball for activating the score generating means and the control means;

a maintaining means responsive to the initial activation of the control means for maintaining activation of the control means after deactivation of the score generating means;

a deactivating means responsive to the time elapsed activation of the control means for deactivating the score generating means;

a score lockout means actuated in response to deactivation of the generating means and to the further time elapsed activation of the control means for transmitting electric signals interpretive of the score from the generating means to the registering means after activation of the lockout means,

whereby a purely random selection of an opportunity is made and the selected opportunity is registered without the necessity of an indexing means for said indicating means.

8. A random score initiating device, as claimed in claim 7, wherein the score generating means comprises :

a freely rotatable shaft;

means to rotate the shaft;

means responsive to the angular position of the shaft for generating electric signals interpretive of the score.

9. A random score initiating device as claimed in claim 8, wherein the means to rotate the shaft comprises an electric spin motor operably connected to the shaft by a mechanical gear linkage.

10. A random score initiating device as claimed in claim 8, wherein said indicating means comprises :

a score indicating arrow attached approximately perpendicular to the shaft;

a circular score indicating disk positioned perpendicular to and around the shaft, immediately adjacent the score indicating arrow, said score indicating arrow and said score indicating disk positioned relative to the angular position of the shaft to visually indicate the respective scoring opportunity selected by the score generating means.

11. A random score initiating device as claimed in claim 10, wherein the means responsive to the angular position of the shaft for generating electric signals interpretive of the score comprises:

a circuit board positioned perpendicular to and about the shaft;

printed circuits located on the circuit board corresponding to the scoring opportunities, arranged in an outer circular path with the center of the circular path located approximately on the center line of the shaft;

a wiper-arm assembly including a first and a second wiper-arm affixed to the shaft;

a first rubbing contact positioned on the first wiper-arm to traverse the printed circuits of the printed circuit board,

whereby electrical signals interpretive of the scoring opportunity selected are generated by contact of the first rubbing contact with the respective printed circuit.

12. A random score initiating device as claimed in claim 11, wherein the control means comprises:

an electric control motor;

a multiplicity of connected cams rotated through six angular positions by the electric motor;

a multiplicity of cam operated switches operably connected to a corresponding cam and operably responsive to the angular position of the corresponding cam.

13. A random score initiating device, as claimed in claim 12, wherein the initiating means comprises:

an electrical power source for providing electric current;

a first cam operated switch closed only at the sixth position of the electric control motor;

a play field switch located in a recessed area of the play field operably responsive to a roller ball entering the recessed area, said play field switch in serial electrical continuity with the first cam operated switch;

a spin relay coil in serial electrical continuity with the play field switch;

a normally open first spin relay switch in serial electrical continuity with the electric spin motor, operably closed by electrical activation of the spin relay coil;

a normally open second spin relay switch in serial electrical continuity with the electric control motor operably closed by electrical activation of the spin relay coil,

whereby the spin motor and the control motor can be electrically activated when the control motor is at rest in its normal deactivated sixth position responsive to a roller ball closing the play field switch.

14. A random score initiating device as claimed in claim 13, wherein the maintaining means comprises:

a electrical power source for providing electric current;

a fourth cam operated switch closed only at the first position of the electric control motor;

a third normally open spin relay switch in serial electrical continuity with the fourth cam operated switch;

an eject relay coil in serial electrical continuity with the third spin relay switch;

a fifth cam operated switch open only at the fourth position of the electric control motor;

a normally open first eject relay switch operably closed by electrical activation of the eject relay coil in serial electrical continuity with the fifth cam operated switch and said first eject relay switch and said fifth cam operated switch in parallel electrical continuity with the fourth cam operated switch and the third spin relay switch;

a normally closed first spin score relay switch in parallel electrical continuity with the fifth cam operated switch;

a normally open second eject relay switch in parallel electrical continuity with the second spin relay switch operably closed by electrical activation of the eject relay coil;

whereby the second eject relay switch maintains electrical continuity to the control motor after the fourth cam operated switch closes and activates the eject relay coil thereby closing the first and second eject relay switches, until the fifth cam operated switch opens when the control motor reaches its fourth position after activation of the first spin score relay.

15. A random score initiating device, as claimed in claim 14, wherein the deactivating means comprises:

an electrical power source for providing electric current;

a second cam operated switch open only at the fifth position of the electric control motor;

a normally open fourth spin relay switch in serial electrical continuity with the spin relay coil and the second cam operated switch, said fourth spin relay switch operably closed by electrical activation of the spin relay coil;

whereby electrical continuity is broken to the spin relay coil when the electric control motor reaches its fifth position.

16. A random score initiating device, as claimed in claim 12, wherein the score lockout means comprises:

an electrical power source for providing electric current;

a first and second individual contacts alternately positioned about an inner circular path on the circuit board;

a first individual contact connector means for providing electrical continuity to the first individual contacts;

a second individual contact connector means for providing electrical continuity to the second individual contacts;

a second rubbing contact positioned on the second wiper-arm to traverse the inner circular path of the first and second individual contacts;

a first delay relay coil in serial electrical continuity with the first individual contact connector means;

a normally open first delay relay switch operably closed by electrical activation of the first delay relay coil;

a sixth cam operated switch open only at the first position of the electric control motor, said sixth cam operated switch and said first delay relay switch in serial electrical continuity with the first delay relay coil and in parallel electrical continuity with the first individual contacts;

a second delay relay coil in serial electrical continuity with the second individual contact connector means;

a normally open second delay relay switch operably closed by electrical activation of the second delay relay coil;

a seventh cam operated switch open only at the third position of the electric control motor, said seventh cam operated switch and said second delay relay switch in serial electrical continuity with the second delay relay coil and in parallel electrical continuity with the second individual contacts;

a spin score relay coil;

a normally closed third delay relay switch operably opened by electrical activation of the first delay relay coil;

a normally closed fourth delay relay switch operably opened by electrical activation of the second delay relay coil, said third and fourth delay relay switches combined in parallel electrical continuity and said parallel combinations in serial electrical continuity with the spin score relay coil;

a normally open third eject relay switch in serial electrical continuity with the parallel combination of the third and fourth delay relay switches, said third eject relay switch operably closed by electrical activation of the eject relay coil;

an eighth cam operated switch closed only at the sixth position of the electric control motor, said eighth cam operated switch in serial electrical continuity with the third eject relay switch;

a normally open second spin score relay switch operably closed by electrical activation of the spin score relay coil;

a ninth cam operated switch open only at the fifth position of the electric control motor, said ninth cam operated switch and said second spin score relay switch in serial electrical continuity with the spin score relay coil and in parallel electrical continuity with parallel combination of the third and fourth delay relay switches, the third eject relay switch and the eighth cam operated switch;

a normally open third spin score relay switch operably closed by electrical activation of the spin score relay coil, said third spin score relay switch in serial electrical continuity between the means for receiving, interpreting and totaling the score signals and the means for generating electronic signals interpretive of the score thereby preventing receipt of the score signals until the third spin score relay is closed;

whereby the third and fourth delay relay switches are held open by the pulsing current through the first and second delay relay coils caused by the movement of the second rubbing contact across the first and second individual contacts when the shaft is rotating, preventing scoring until the shaft stops rotating and the third and fourth delay relay switches can be closed thereby electrically activating the spin score relay coil and closing the third spin score relay switch thereby completing electrical continuity to the registering means and initiating scoring.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,656,754 Dated April 18, 1972

Inventor(s) Norman R. Clark

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 7, line 29, insert the following paragraph:

Completion of a circuit through spin score relay 164 closes spin score relay operated switch 172. This completes a circuit through first wiper-arm 44, rubbing contact 48, one of the score opportunity circuits 54, and means to receive, interpret and total electrical signals 170. Thus, it is apparent that scoring cannot take place until spin score relay operated switch 172 is closed after rotation of spin motor 12, shaft 14 and wiper-arm 46 have stopped.

Signed and sealed this 26th day of September 1972.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents

FORM PO-1050 (10-69)

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