March 17, 1942. H. E. WILLIAMS ET AL 2,276,813

AMUSEMENT APPARATUS CONTROL CIRCUIT

Filed Jan. 22, 1940

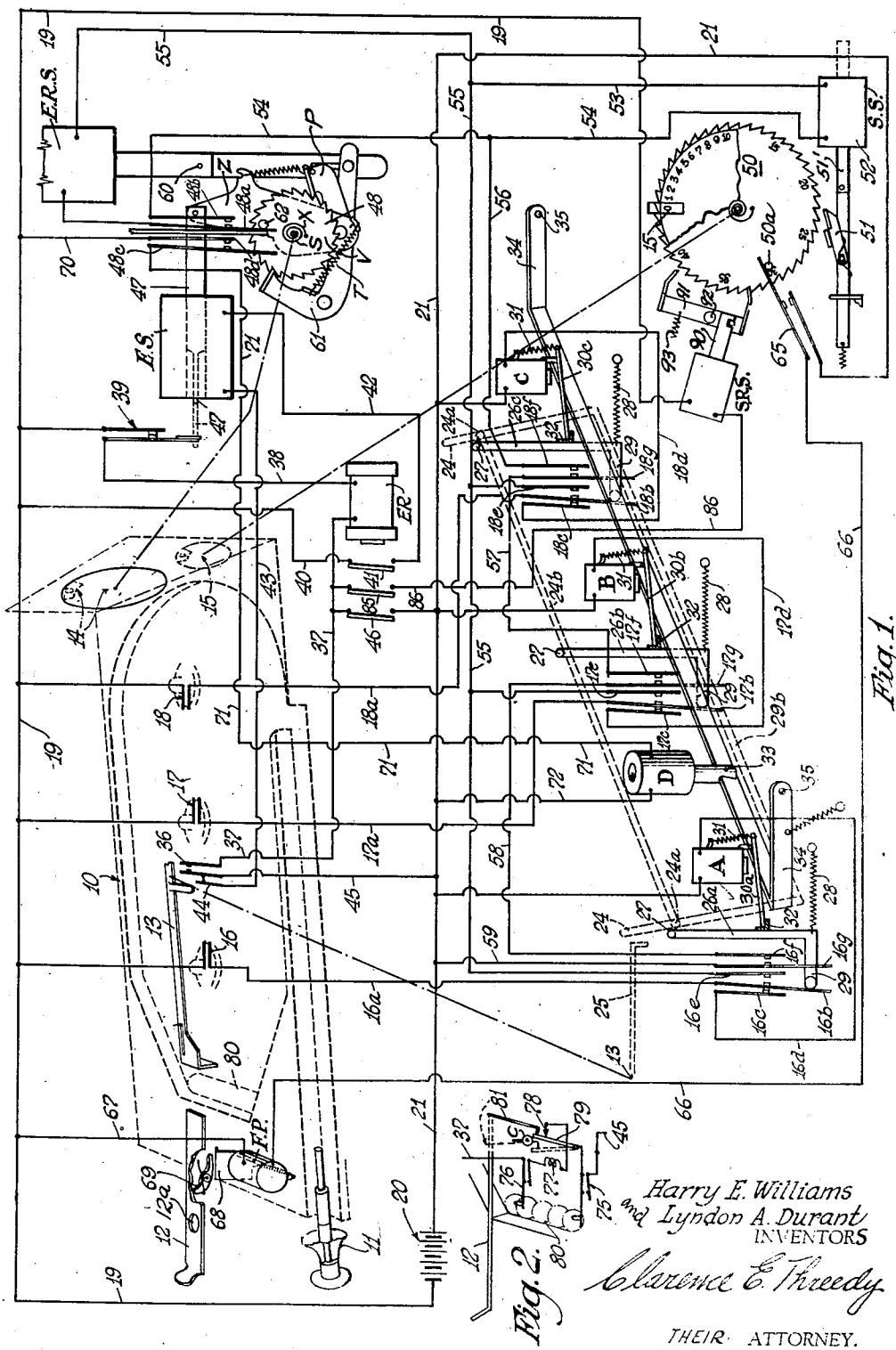


Fig. 1.

Fig. 2.

Harry E. Williams
and Lyndon A. Durant
INVENTORS

Clarence E. Threedy

THEIR ATTORNEY.

Patented Mar. 17, 1942

2,276,813

UNITED STATES PATENT OFFICE

2,276,813

AMUSEMENT APPARATUS CONTROL CIRCUIT

Harry E. Williams and Lyndon A. Durant, Chicago, Ill.

Application January 22, 1940, Serial No. 315,002

6 Claims. (Cl. 273—1)

This invention relates to an amusement apparatus in the nature of a ball rolling or bagatelle game and has as its principal object the provision of novel score indicating means and circuit control means further operating to provide novel objectives for the player and to provide an incentive for the player to continue his efforts even though he may fail in successive attempts to achieve the desired score.

Viewed from another aspect, it is an object to provide in a ball rolling game an electrically operated equity indicator and an electrically operated score indicator together with ball operated switches and switching mechanism cooperable therewith, as well as a master control, all arranged so that whenever the master control is operated to free the game for play, the equity indicator will set up an indication designating by numbers, preferably in ordinal succession, the value of the equities at any given time depending upon how many times the master control has been operated prior to a resetting of the equity indicator.

The arrangement is further such that the score indicator is freed for opeartion by any ball switch only following the operation of a certain number or combination of ball switches, and when the score indicator is thus freed for operation by direct actuation of any ball switch (as distinguished from a combination thereof) the equity indicator is automatically set back to zero. Therefore, should the player fail successively to score, that is to operate the score indicator, the equity indicator is arranged to operate a switch to free the score indicator for operation directly by the ball switches notwithstanding the prior failure to achieve the necessary score.

A further object of the invention, when the game is coin controlled, is the provision of a free play device controlled by the score indicator as long as the latter is out of zero position for rendering the game operable without the employment of a coin.

Other objects, advantages and novel aspects of the invention relate to certain details of construction as well as the arrangement, operation, and cooperation of the various circuit connections and switching instrumentalities employed in the novel control circuit, as described hereinafter in view of the drawing, in which:

Fig. 1 is a circuit diagram with parts of the game apparatus shown in dotted lines;

Fig. 2 is a modified diagram of the equity indicator control.

The instrumentalities principally employed in the novel arrangement include a ball playing board and means for projecting balls thereon to operate ball switches. The game also includes a coin freed master control and a free play device operable to render the master control effective without use of a coin in those instances in which the game is arranged for coin controlled operation. There are further included an equity indicator including a dial visible to a player, a score indicator also having a dial visible to a player, a plurality of locking switches each provided with an electro-magnet for releasing the same, a master releasing electro-magnet common to all locking switches, as well as a stepping switch for each of the equity and score indicators.

The foregoing electrical instrumentalities are each connected in circuits such that whenever the master coin control is operated to free the game for play the equity indicator will step once from zero position (unless it has been left in an advanced position by a previous player) to indicate one "equity" which, in other terms, may be regarded as a contribution toward a cumulative number of equities, which represent a condition in which the mechanism is automatically conditioned for direct operation of the score indicator.

Assuming that one equity is indicated on the equity indicator and that the player is successful in causing certain ball switches to be operated, then in that case certain locking switches will be released and set up circuits which will automatically restore the equity indicator to zero and also free the score indicator for direct operation by any ball switch. The term "direct operation" as applied to the score indicator means that the actuation of any ball switch will operate the score indicator without regard to any particular combination or order of operation of the ball switches such as is otherwise necessary to release the score indicator in the first instance.

Should the player be unsuccessful in achieving the desired score after a predetermined number of plays of the game, that is to say, after having been obliged to deposit a certain number of coins in the coin control, say six, then in that case the player has the option of abandoning the game and the equities he has set up therein, or he may deposit a given number of coins and operate the master coin control a corresponding number of times (without projecting any balls) to step up the equity indicator to its limit wherein the score indicator is automatically rendered operative for

direct actuation. It may be assumed that the player has operated the coin control four times in this manner in addition to the six original operations, making a total of ten equities as designated by the equity indicator. If this value of ten equities is the necessary value or objective for which the game has been set then the score indicator will be automatically released for direct operation, and it is a feature of the invention that thereafter the player may run up a very large score since all of the ball switches are rendered active without regard to any particular combination of operations thereof.

With this generalized statement of the organization and operation of the invention, the detailed arrangements thereof are described in view of the drawing as follows.

The game apparatus includes a play board generally indicated at **10**, means in the form of a plunger **11** for projecting balls onto the board in the well-known manner, and a coin freed master control slide **12** which must be operated to free the game for play. The game also includes a shuffle panel or operating member **13** reciprocated by the coin slide and arranged to actuate certain control switches hereinafter to be described. Conveniently situated at one end of the board is an equity indicator dial **14** and a score indicating dial **15**.

Disposed in various positions on the play board are a plurality of ball operated switches, **16**, **17**, **18**, of the roll-over variety, that is to say, adapted to be transiently or momentarily operated by the passage thereover of a ball. Such ball switches are illustrated in our U. S. Patents Nos. 2,184,868 and 2,209,589. Each of the ball switches **16**, **17**, and **18** has one of its terminals connected to a common conductor **19** leading to one terminal of a battery **20**. The remaining terminal of each ball switch is connected by a conductor **16***a*, **17***a*, or **18***a* to a spring contact **16***b*, **17***b* or **18***b* on an associated locking switch.

Each locking switch is provided with a releasing magnet A, B, and C, respectively, adapted for energization under certain conditions, by operation of the corresponding ball switch to release the corresponding locking switch from set or locked position. The several locking switches are shown in locked condition with their respective contacts **16***b*, **17***b*, and **18***b* in closed circuit engagement with contacts **16***c*, **17***c* and **18***c* respectively, each of which contacts is respectively connected by conductors **16***d*, **17***d*, and **18***d* to one terminal of the corresponding releasing magnet A, B, or C, the remaining terminals of these magnets being connected to the common conductor **21**, leading to the remaining terminal of the battery.

All of the locking switches are set simultaneously from released to locked condition by a resetting mechanism including a rocking lever **24** pivoted at **24***a*—**24***a* to a stationary crossbar **24***b* and having free ends adapted to be engaged by an inner end **25** of the shuffle panel **13**, the member **25** is a part of and is movable with the shuffle panel **13** on the under side of the game board, the resetting means and associated parts being conveniently situated in the game cabinet beneath the board **10**. The arrangement of the coin silde and shuffle panel being well known as shown in our U. S. Patent No. 2,184,867, with detents of the shuffle panel functioning to actuate resetting means when the shuffle panel is moved inwardly by an inward stroke of the coin chute.

Each locking switch is provided with a latch arm **26***a*, **26***b* or **26***c* pivoted as at **27** and urged into a normal position by action of springs **28**, off-set arms **29** on the latch arms being adapted to engage certain contacts on the locking switches for operation in the manner hereinafter to be described. The arms **26***a*, **26***b* and **26***c* are engageable by a cross bar **29***b* formed as a part of the rocking lever **24** so that when the latter is rocked by action of the shuffle panel **13** and its portion **25** as aforesaid each of the arms **26***a*, **26***b* and **26***c* will be urged into locked position against the action of its spring **28**, as shown.

Each latch arm **26***a*, **26***b*, or **26***c* of the several locking switches is provided with a locking armature **30***a*, **30***b* or **30***c* urged by spring means **31** to dispose an end portion of the armature in a latching catch **32** on the corresponding latch arm to hold the latter out of normal position and in the locked position shown in the drawing. Energization of either of the magnets A, B, or C withdraws the corresponding armature and releases the latch arm so that the corresponding locking switch is restored to released position.

The several releasing magnets A, B, and C, it will be recalled, are each energized by one of the ball switches. However, the entire group of locking switches may be released by energization of a common release solenoid D, the plunger of which is connected as at **33** to a releasing bail **34** pivoted as at **35**—**35** so that the latter may bear against each of the armatures **30***a*, **30***b*, **30***c*, etc., simultaneously disengaging all catches at **32**.

For purposes of description it may be assumed that both the equity and score indicating dials **14** and **15** are set at normal zero position. Operation of the coin slide **12** and shuffle panel **13** will cause the equity indicator to be stepped to indicate "1," this being accomplished by operation of a switch **36** which is closed by action of the shuffle member **13**, bearing against the switch **36**, the latter connecting power from the common terminal **21** via a conductor **37** to one terminal of an equity relay ER, the remaining terminal of which is connected by conductor **38** to one terminal of a switch **39** whose other terminal is connected to the common battery conductor **19** thus energizing the coil of equity relay ER and causing switch arms **41**, **85**, and **46** to be attracted toward the coil to place the relay switches in closed circuit condition. Operation of this relay connects power via conductor **40** from common battery conductor **19** and relay contact **41** and conductor **42** to one terminal of an equity stepping solenoid ES, the remaining terminal of which is connected by conductor **43**, normally closed switch **44** and conductor **45** to the remaining common electric conductor **21**. It being understood that switch **44** is opened momentarily when the coin chute **12** and shuffle panel **13** are operated, for the purpose of preventing a play of the game until the coin chute and shuffle panel are returned to normal position and the switch **44** closed.

Associated with the equity stepping relay is a step-up mechanism generally indicated at **48**. This means **48** includes a ratchet V which is carried by and rotatable with a shaft S fixedly mounted on a base plate (not shown). A rocker lever Z is floatingly carried by the shaft S and has one end pivotally connected to the plunger **47** of the ES solenoid. The lever Z carries a pawl *p* which is spring urged into engagement with the teeth of the ratchet V, and lever Z is itself spring urged in a clockwise direction by tension spring *t*, the opposite end of which is

fixed to a release pawl 61 pivotally arranged on the base plate (not shown). The pawl 61 is urged into engagement with ratchet V to prevent retrograde movement thereof and has its opposite end pivotally connected to the armature 60 of an equity resetting solenoid ERS to be hereinafter explained.

The ER relay locks itself momentarily through its contact 36 which is connected to the common battery conductor 21 to connect circuit through conductor 37 to the coil of the ER relay and by conductor 38 through normally closed switch 39 and to the common battery conductor 19. Operation of the ES solenoid quickly breaks the locking circuit for the ER relay since the plunger 47 of the ES solenoid is arranged to open switch 39 thus breaking the holding circuit and deenergizing the coil of the ER relay to release the switch arms so that they may return to normal position.

Having operated the master control slide 12 with a consequent setting of all locking switches in locked condition and a consequent operation of the equity stepping solenoid, the game is now ready for play, and assuming that the player causes a ball to operate the switch 16, releasing magnet A will attract the latching armature 30*a* releasing the latch arm 26*a* thus permitting the off-set portion 29 to be withdrawn by action of spring 28 thus opening contacts 16*b*, and 16*c* so that releasing magnet A may not again be energized until the associated locking switch is reset. If the player is unable to cause the operation of any other ball switches and he exhausts the predetermined number of balls released for operation by the master control or coin slide, he may abandon the game or not. In the event of abandonment there will be left indicated one equity to the advantage of the next player who operates the game.

Assuming that another coin is deposited to free the slide 12 for another operation, the equity solenoid and associated mechanism will be operated as heretofore described to cause the equity dial to indicate two equities, operation of the coin slide restoring the locking switch associated with magnet A to locking position through the shuffle panel 13 and detent 25 thereof as heretofore explained. Assuming this time that the player is successful in operating all three of the ball switches, magnets A, B, and C will be energized to release the corresponding locking switches, which will set up circuit connections to free the score indicator for direct operation.

The score indicator includes a ratchet disc 50 and stepping pawl 51 actuated by an armature 51′ of a solenoid 52 adapted to be energized through conductors 53 and 54 receiving power through contacts in the released locking switches. Conductor 53 connects with a conductor 55 which is common to all of the contacts 16*e*, 17*e* and 18*e* of the several locking switches, these contacts being respectively engaged by the companion normal contacts 16*b*, 17*b* and 18*b* in the several switches, the latter it being recalled each being connected with one of the ball switches. The remaining conductor 54 of the score solenoid connects with a conductor 56 connected to contact 18*f* on the last of the locking switches, this latter contact being adapted to be engaged by a companion contact 18*g* when this locking switch is released, and the offset arm 29 on locking lever 26*c* bears against the leaf spring contact 18*g* to urge it over into engagement with contact 18*f*. The contact 18*g* receiving power through the remaining locking switches by a connection 57 with the contact 17*f* on the next locking switch and which is adapted to be engaged by its companion contact 17*g* by the arm 29 on locking lever 26*b* and the contact 17*g* in turn is connected by conductor 58 with a contact 16*f* on the first locking switch. The contact 16*f* is engaged by a normal contact 16*g* by the offset arm 29 on latch arm 26*a* when this locking switch is released, contact 16*g* being connected by conductor 59 to a common battery conductor 21.

Thus release of all locking switches connects the conductor 53 of the score solenoid to receive power from one battery terminal 19 through any ball switch, the return connection to the other battery terminal 21 with the conductor 54 being effected through the series contacts 16*f* and 16*g*, 17*f* and 17*g*, 18*f* and 18*g* and conductor 59 to the return side of the battery by way of conductor 21.

However, it will be observed that after the several locking switches have been thus released by operation of each of the ball switches 16, 17 and 18 it is thereafter necessary to cause a ball to engage one of these switches again to energize the stepping solenoid and move the ratchet 50 one step. The ratchet 50 rotates with a shaft which carries the indicator dial 15 and as indicated by the dot-dash line this dial 15 is arranged so as to be visible through an upright back panel in a manner well known in the art. When the score solenoid is energized as aforesaid the equity indicator is restored to zero position this being accomplished by simultaneous connection of power from conductor 55 to one terminal of the equity reset solenoid ERS, the remaining terminal of this solenoid being connected to a contact 48*a* which closes a circuit through a switch 48*b* to conductor 54 thus connecting the equity resetting solenoid in parallel with the score stepping solenoid, and attracting the plunger 60 of the equity resetting solenoid to release the pawl 61 which permits the ratchet 48 to be restored by the usual spring means *x* to the zero position shown in the drawing, there being a pin 62 on the ratchet disc which pin 62 when the ratchet is in zero position separates contact spring 48*a* from contact 48*b* thus opening the circuit to the equity resetting solenoid so that the latter will not be energized during the remaining energization of the score stepping solenoid.

Free plays are afforded the player through the closing of a free play switch 65 which is permitted to close by withdrawal of pin 50*a* on the score ratchet disc 50 as soon as the latter is stepped one or more times from its normal zero position, closing of this switch connecting power via conductor 21 from the battery to conductor 66 and one terminal of a free play magnet FP, the other terminal of which is connected by conductor 67 to the other common battery conductor 19. The free play magnet attracts the armature 68 and positions the latter beneath a dog 69 in the coin control means 12 permitting the latter to be operated without a coin. The dog 69 under normal conditions is adapted to be urged into latching engagement with the slide 12, and when there is no coin in the aperture 12*a* the pawl 69 will engage in the aperture 12*a* thus latching the slide 12 against complete operative movement to effect movement of the shuffle panel 13. However, if the armature 68 is disposed beneath the pawl 69 as heretofore described, the pawl 69 will be prevented from engaging in the aperture 12*a* and the slide 12 will be free to move inwardly as though there were a coin in its aperture. Such a free play device is described in detail in U. S.

application, Serial No. 241,310, filed November 19, 1938.

Thus if all of the locking switches are released by successful playing of the balls and if thereafter one of the ball switches is operated, the score indicator will be stepped once for each such operation and the player will be entitled to operate the coin control 12 without deposit of a coin once for each step the score indicator ratchet 50 may have taken from normal or zero position.

Each time the coin slide 12 is pushed in to energize equity relay ER and close its respective relay switches switch 85 is closed to complete circuit from line 21 via switch 46, conductor 37, through switch 85 and conductor 86 to score reducing solenoid SRS through the latter and to the line 19 to step off one score upon each operation of the free play device. The SRS solenoid includes a plunger 90 arranged as an armature in the solenoid and having its outer end linked to an escapement pawl 91 pivoted at 92 and normally urged by a spring 93 into the position shown. The pawl 91 engages the teeth of ratchet 50 and upon each energization of the SRS solenoid as aforesaid the pawl 91 will be rocked to permit the ratchet to make one step clockwise and thereby deduct one score as registered on the dial 15.

In the illustrative embodiment, the pin 62 on the equity indicator ratchet has been set for a maximum of twenty-two equities, meaning that the ratchet 48 must be stepped twenty-two times before the cumulative equity objective can be reached. When this number of equities is accumulated the pin 62 will close switch contact 48*c* against contact 48*d* thus connecting power via the common conductor 19, conductor 70 and conductor 71 to one terminal of the common releasing solenoid D, the other terminal of which is connected by conductor 72 to the remaining common battery conductor 21, thus causing solenoid D to raise the common releasing bail 34 displacing all locking armatures 30*a*, 30*b*, and 30*c* from latching engagement with the corresponding operating arms 26*a*, etc., of the corresponding locking switches.

As a result of such release upon achieving the equity objective it will be apparent that the game is automatically conditioned so that the score indicator and associated mechanism may be directly operated by the ball switches.

The alternative means for operating the equity dial once for each game played comprises the provision of a pair of switches 75 and 76 (Fig. 2) connected in series by a winding 77 of a cutout electro-magnet through a normal contact 78 thereof and an armature 79 arranged to be attracted by the winding 77 when the latter is energized. Switches 75 and 76 are positioned at the opposite ends of a ball receiving trough 80 situated at the lower end of the play board to receive the played balls which line up therein in the manner illustrated in Fig. 2 so that the balls at the opposite ends of the trough close switches 76 and 75. In order to modify the arrangement of Fig. 1 for operating the equity solenoid by the played balls at the end of the game instead of by the shuffle panel and coin slide, it is simply necessary to disconnect conductors 37 and 45 from the shuffle panel switch 36 and connect them to the terminals of switches 75 and 76 in the manner shown in Fig. 2. When this modification is effected the line-up of balls in trough 80 will close a series circuit through the winding 77 of the cut-out magnet and the equity relay ER to complete circuit to the ES solenoid, the resistance of winding 77 being adequately low so as not to interfere with the proper operation of the coil of the equity relay, the latter being cut-out of the circuit automatically upon energization of winding 77 which attracts its armature 79 thus breaking the series circuit. When the winding 77 is energized the armature 79 is attracted to dotted line position to the left of a resilient catch *c*.

The cut-out magnet is reset by each operation of the coin slide through the engagement of the inner end of the slide 12 with an arm 81 connected to and movable with the armature 79 so as to move the latter back into contacting engagement with its normal contact 78, again restoring the series circuit into condition for automatic energization as soon as the complement of balls is again lined up in the trough. It will be understood of course by those skilled in the art that the operation of the coin slide 12 effects removal of the balls from trough 80 by operation of a gate or shuffle member in a manner well-known in the art.

So far as the operation of the equity indicator is concerned in the arrangements of either Fig. 1 or Fig. 2, the player is provided with an inducement to continue his efforts to achieve a score, the difference being simply that the equity indicator is actuated at the beginning of the game in the arrangement of Fig. 1, and at the end of the game in the arrangement of Fig. 2.

In any event, assume that the player has played sixteen of the twenty-two possible games, as heretofore mentioned, and then left the machine. A different player may decide to step the equity dial the remaining six steps necessary to condition the machine automatically for direct operation of the score indicator, then in that case if the arrangement of Fig. 1 is employed the player may deposit six coins in the chute and operate the latter six times without playing the games to which these deposits would otherwise entitle him. In consequence of this, the equity dial will step six times until it indicates a total of twenty-two equities whereupon the common release magnet D will operate in the manner heretofore described and the player may then proceed in an effort to run up a score by direct operation of the score indicating mechanism each time a ball operates a ball switch 16, 17 or 18.

It is therefore seen that we have provided a game apparatus in which a player retains what we term an "equity" in the game. That is to say, each time he deposits a coin in the slide 12 and pushes it inward to set the game for play he establishes an "interest" in the game which is recorded on the equity dial 14. By accumulating these equities, the player eventually will have a predetermined number of equities in his favor, in the present instance 22, at which time the common releasing solenoid D will be operated to condition the ball switches 16, 17 and 18 on the play field so that the player may by directing balls at any one of these switches accumulate a score commensurate with the number of successful hits made.

The modified arrangement of Fig. 2 does not permit the player to invest any equities without actually playing the game. However, its modified circuit arrangement may be easily adjusted to operate in this manner by arranging armature 79 in a normal open circuit condition with the operating arm 81 yieldable and close enough to the end of the coin slide so that the circuit

through 78—79 will be closed before the balls are released from trough 80. This will automatically energize the ES relay and open the circuit at once by attraction of armature 79 back into its normal open circuit condition relative to contact 78.

It will be understood that a larger number of ball switches and locking switches may be employed if desired.

The various advantages and objects of the invention may be accomplished by modification of the particular embodiment specifically described herein, and it is intended that the appended claims shall include all equivalent arrangements fairly coming within their call.

Having thus described our invention, what we claim as new and desire to protect by Letters Patent is:

1. In an amusement apparatus including ball switches operated by instrumentalities employed in playing the amusement apparatus and coin controlled means for releasing the apparatus for play, the combination of a plurality of locking switches normally disposed in locked condition, individual electrical releasing means for each locking switch, circuit connections between said ball switches and said individual releasing means for effecting release of certain locking switches when certain ball switches are operated, electrically operated score indicating means said locking switches having an electrical connection with said score indicating means and arranged to effect operation of said score indicating means provided certain locking switches are first released by operation of the ball switches in playing the amusement apparatus as aforesaid and means cooperable with said coin controlled means for setting said locking switches in locked condition each time the apparatus is released for play.

2. In a game apparatus of the type including switches operated by balls in playing a game and coin controlled means for releasing the game apparatus for play, the combination of electrically operated score indicating means, electrically operated equity indicating means, a plurality of locking switches, electro-magnetic means connected in circuit with and operated by individual ball switches for releasing individual locking switches, switch means adapted to be closed by said coin controlled means between said last named switch means and said electrically operated equity indicating means circuit connections for effecting the operation of the latter to indicate equity values cumulatively each time the game is released for play, resetting means for said equity indicating means connected electrically through circuit connections with said locking switches when the latter assume released condition as aforesaid, and at least one of said ball operated switches when operated by a ball as aforesaid, to restore said equity indicating means to zero position whenever said score indicating means operates in score indicating movement, and lever means arranged to engage all of said locking switches and to be operated by said coin controlled releasing means for setting said locking switches in locked condition.

3. In a game apparatus including an inclined play board over which balls are rollable, and ball switches on said board against which balls may be directed together with coin controlled means for initially setting said game apparatus for play, the combination of a plurality of locking switches including means for locking said switches and an individual electrical release for each of said locking switches, said electrical release having electrical connection with a particular one of said ball switches and adapted to be energized when the latter is engaged by a ball as aforesaid to release the corresponding locking switch, lever means arranged with respect to said locking switches and adapted to be operated by the coin controlled means to set said locking switches in locked position, an equity step-up mechanism, switch means arranged in circuit with said equity step-up and adapted to be actuated by said coin controlled means when the latter is operated to set the game apparatus for play, score indicating mechanism including a step-up solenoid, series switch means operatively associated with said locking switches and operable therewith, said step-up solenoid arranged in circuit through said series switches when all of the latter are released by operation of their respective ball switch as aforesaid to condition said solenoid for operation by said ball operated switches, a master releasing solenoid, means operatively connected to the latter and arranged to bear against the means for locking said locking switches to release the latter, switch means on said equity step-up mechanism adapted to be disposed in closed circuit condition when the latter has been advanced a predetermined number of steps, said last named switch connecting circuit to said master releasing solenoid whereby all of said locking switches will be released when a predetermined number of steps have been effected on said equity step-up mechanism.

4. In a ball playing game, in combination a master control, ball operated switches, an electrically operated equity indicator, switch means operated by said master control and effecting operation of said equity indicator, an electrically operated score indicator, a plurality of locking relays each including a coil, a plurality of normally closed switches each adapted to connect circuit from one of said ball operated switches to one of said coils, a normally open series switch having circuit connection with like switches of the remaining locking relays and connecting said score indicator to one side of a source of electrical supply, and a normally opened switch for connecting circuit to said score indicator, through said ball operated switch from an opopsite side of the source of supply, and latch means associated with each of said coils for locking said locking relay in normal condition as aforesaid, means operatively connected with said master control and adapted to engage all of said latch means to move the latter into locked condition when the master control is operated as aforesaid, said latch means arranged with respect to said coil to be attracted by the latter into released condition to reverse the condition of said relay switches, a gang release including a solenoid and a lever mechanism connected thereto arranged with respect said latch means on all the locking relays, a switch arranged adjacent said equity indicator, said equity indicator having a ratchet movable in steps, means on said ratchet adapted to actuate the last named switch when a predetermined number of operations of the ratchet have occurred as aforesaid, and means connecting said last named switch with said solenoid.

5. In a device of the class described including a playboard having ball operated switches arranged thereon and means for initially setting

the device for play, the combination of a counter mechanism operatively related to said means for setting the device for play for recording the number of times the device is set for play, a plurality of relays having coil means connected in circuit with individual ball operated switches on the play board for operation by the latter, a master solenoid and a common releasing bail linked thereto and arranged to effect operation of all of said relays, switch means arranged adjacent said counter mechanism, said switch means normally disposed in open circuit condition and having circuit connection with said master solenoid, and means on said counter mechanism arranged to be moved toward said switch means to urge the latter into closed circuit connection when said counter mechanism records a predetermined number of plays as aforesaid.

6. In a device of the class described including ball operated switches and means for initially setting the device for play, the combination of a counter mechanism operatively related to said means for setting the device for play for recording the number of times the device is set for play, a plurality of relays having coil means connected in circuit with individual ball operated switches on the play board for operation by the latter, a master solenoid and a common releasing bail linked thereto and arranged to effect operation of all of said relays, switch means arranged adjacent said counter mechanism, said switch means normally disposed in open circuit condition and having circuit connection with said master solenoid, and means on said counter mechanism arranged to be moved toward said switch means to urge the latter into closed circuit condition when the counter mechanism records a predetermined number of play as aforesaid, a score indicating mechanism including a step-up solenoid, series switch means on said relays for conditioning the step-up solenoid for operation when all of said relays are operated by their respective ball switches as aforesaid, and auxiliary switch means on said relays having circuit connection with said step-up solenoid and said ball operated switches when the relay is operated as aforesaid whereby to effect energization of said step-up solenoid by operation of said ball operated switches.

HARRY E. WILLIAMS.
LYNDON A. DURANT