

April 14, 1959

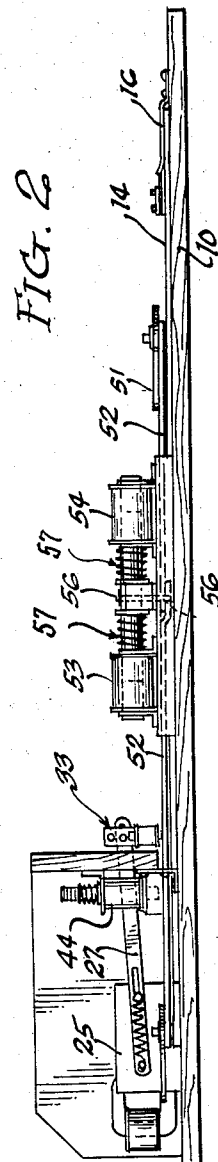
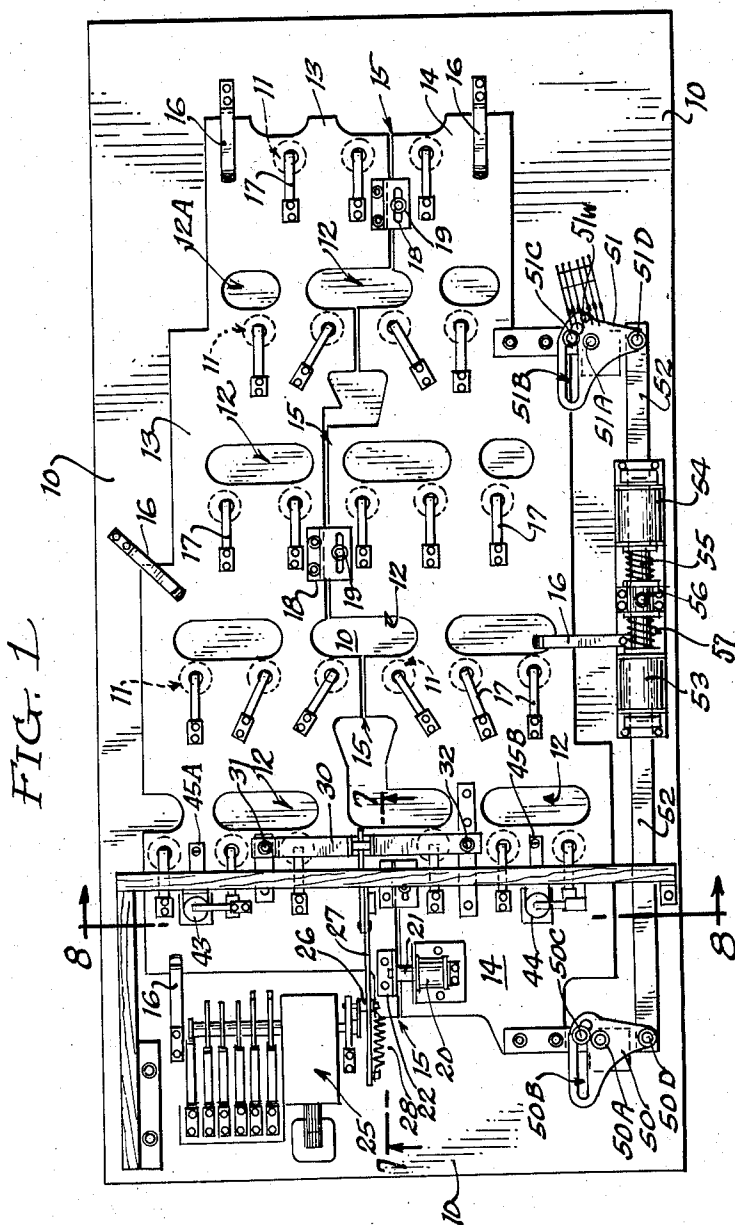
D. E. HOOKER

2,882,057

SELECTIVE MULTI-SECTION BALL SHUTTER

Filed June 28, 1954

4 Sheets-Sheet 1



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SELECTIVE MULTI-SECTION BALL SHUTTER

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FIG. 3

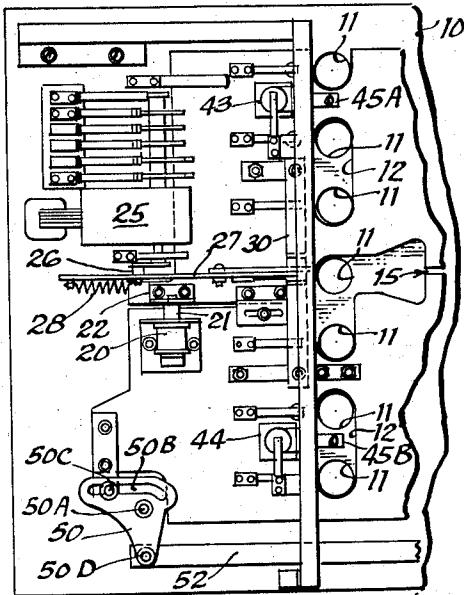


FIG. 4

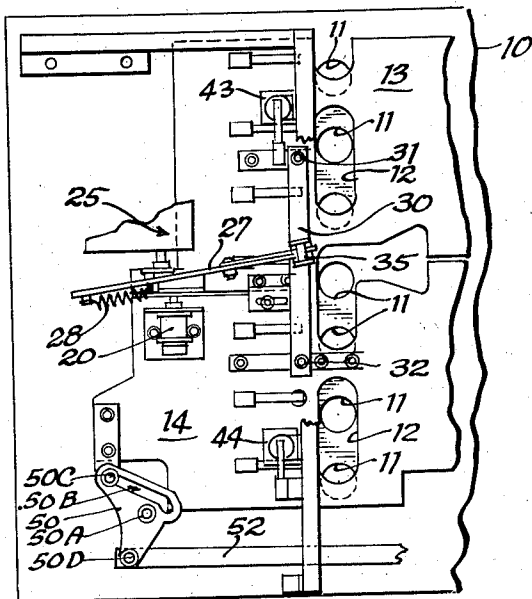
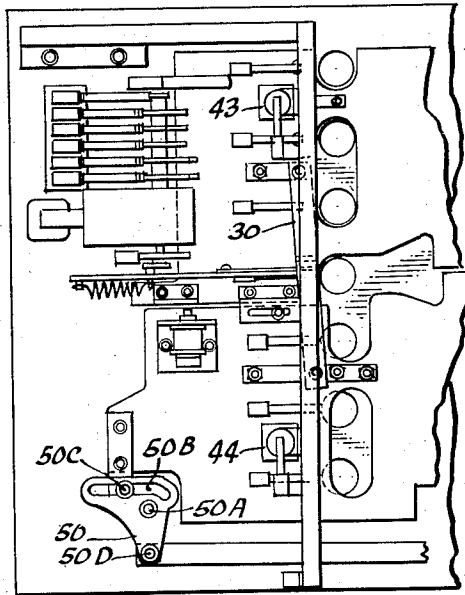


FIG. 5

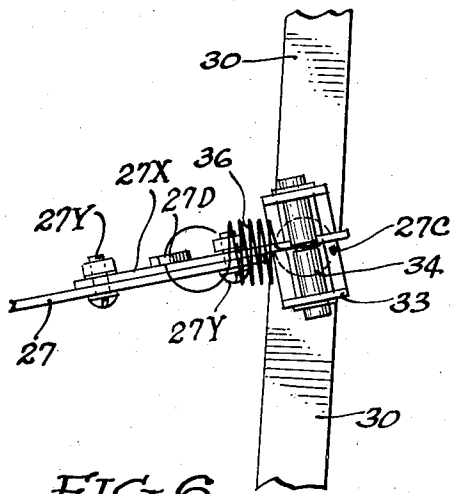


FIG. 6

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FIG. 7

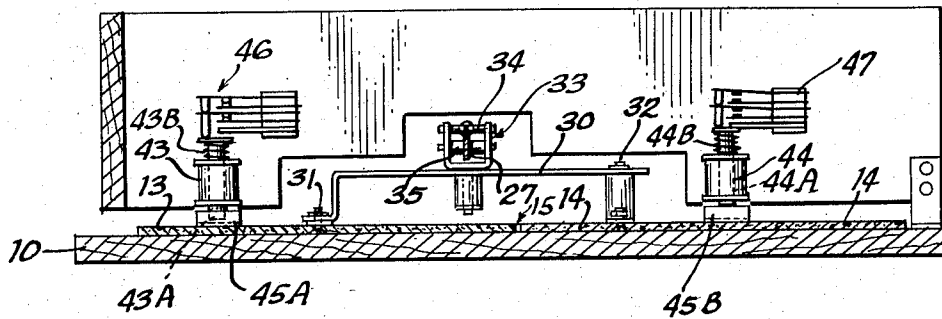
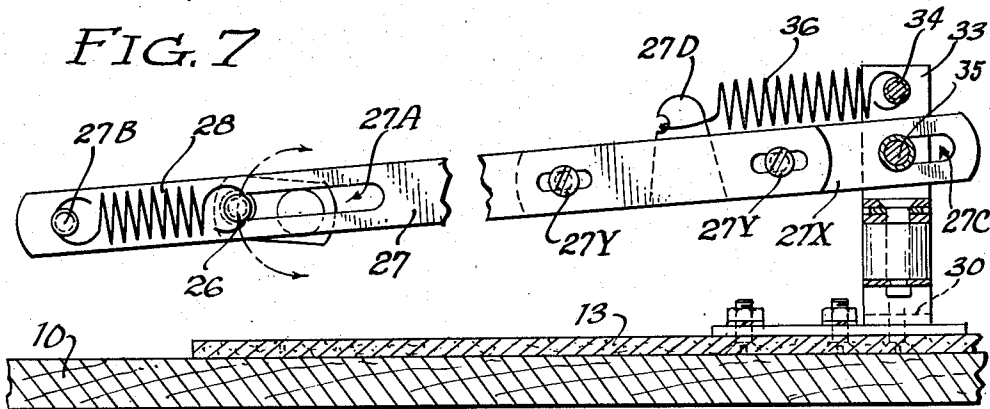


FIG. 8

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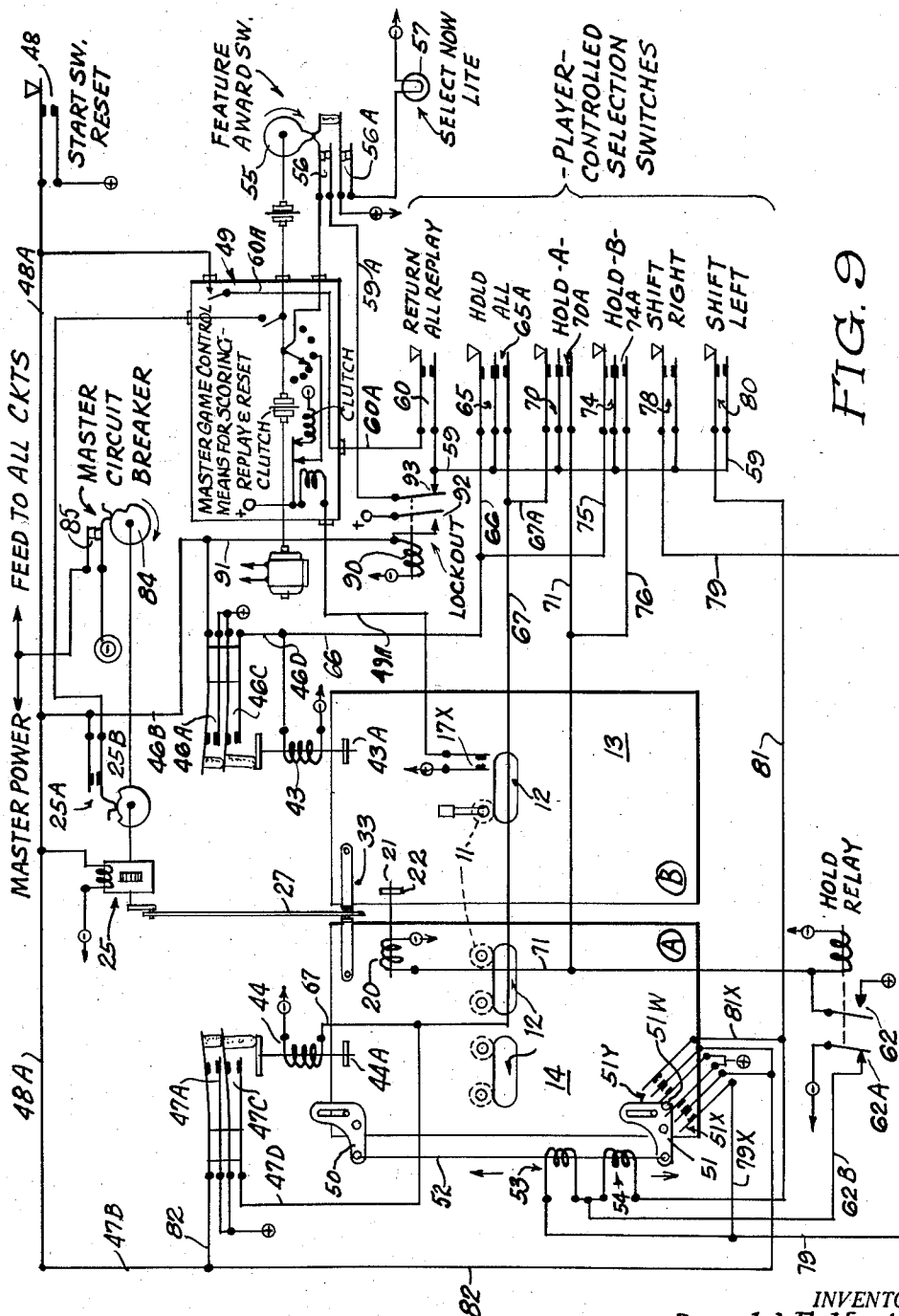
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SELECTIVE MULTI-SECTION BALL SHUTTER

Filed June 28, 1954

4 Sheets-Sheet 4



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SELECTIVE MULTI-SECTION BALL SHUTTER

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Application June 28, 1954, Serial No. 439,558

7 Claims. (Cl. 273—125)

The present disclosures relate to improvements in selective ball-holding and releasing shuffle panels for ball-rolling games, such as shown in my copending application, Serial No. 387,940, now Patent No. 2,710,756, in which one of the features emphasized is the arrangement of a shuffle panel to move in different directions so as to selectively register the ball exits with different ball pockets, in order that all of the pocketed balls, or less than all, in certain groups, may be released.

The improvements described hereinafter provide a multi-section shuffle panel structure which is also mounted for movement in any direction, and in addition is divided into at least two independently movable sub-sections, with means for releasably coupling the sections for joint movement, and means operable to shift the two sections, together with means for holding either of the sections against shifting.

Accordingly, it is a principal object of the present invention to provide a selective ball-releasing shutter device which is divided into independently shiftable sections, as well as selectively operable mechanism for shifting the sections together, or for holding one section while another is shifted. Other features relate to selective controls for actuating the novel shutter system in the foregoing, and other, operations of which it is capable, as will appear more fully hereinafter.

Additional features of novelty and utility relate to details of construction and operation of the embodiment illustrated, including such things as the panel coupling means, the electromagnetic panel blocking or holding means, the differential panel shifting means by which the several panel sections are urged to shift by a common driving arm and motor which will act even though one of the panel sections is held against movement, as well as control means for effecting the various panel shifting and holding operations, all of which will appear in detail as the following description proceeds in view of the annexed drawings, in which:

Fig. 1 is a bottom plan view of a game board and the new multi-panel shutter thereon;

Fig. 2 is a side elevation of the structure of Fig. 1;

Fig. 3 is a fragmentary plan view of the new shutter means in fully open position to release all balls;

Fig. 4 is a view similar to Fig. 3 but showing one panel section in ball-holding position, and another section in ball-releasing position;

Fig. 5 is another fragmentary plan view of the shutter means showing the sections shifted to the right and both partly in ball-releasing condition and partly in ball-holding position;

Fig. 6 is an enlarged fragmentary plan view of the differential panel-driving or shifting linkage;

Fig. 7 is an enlarged vertical sectional detail, with parts shown in elevation, of the differential linkage, the view being taken in the direction of line 7—7 of Fig. 1 but with the linkage shown in a different (open) position;

Fig. 8 is a cross-sectional detail taken transversely of

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the shutter and game board along lines 8—8 of Fig. 1, showing the selective panel-holding means and part of the differential linkage;

Fig. 9 is a circuit diagram.

Referring to Fig. 1, the multi-panel shutter means is mounted on the underside of a ball-rolling board 10 in which are the usual ball scoring pockets or holes 11, arranged, however, in accordance with a predetermined plan in critical locations relative to certain ball exit passages 12 in the shutter panel sections 13 and 14, as will more fully appear. These two sections meet freely along an irregular line 15 extending lengthwise of the assembly.

The panels 13 and 14 are slidably carried on the underside of the ball board 10 by simple cleats 16, which permit the panels to shift in any direction, such freedom of movement being somewhat limited, however, by certain guide means later to be described.

The usual ball scoring switches 17 are carried on sections 13 and 14 in association with the ball pockets 11, to be operated by balls lodged in the latter in the known manner.

Near the center and right-hand end of the split panels (in Fig. 1) are additional guide means in the form of cleats 18, each fastened to one of the panels and having a headed member 19 in the other panel and working in a long slot in the cleat, so that either panel may shift lengthwise or longitudinally of the board 10, independently of the other panel when the panels are uncoupled for individual displacement.

Means for selectively coupling and uncoupling said panel sections 13 and 14 for joint or several lengthwise movements as aforesaid, includes an electromagnet 20 (Fig. 1) fixedly carried on section 14 and having a retractable plunger 21 spring-urged (by a spring in the solenoid, not seen) into coupling engagement with a cleat 22 on the other panel 13. When coil 20 is energized, the coupling member or plunger 21 disengages the cleat 22 and then either panel 13 or 14 may shift longitudinally (to the right or left as viewed in Fig. 1) independently of the other.

Means for shifting the shuffle sections (Fig. 1) includes an electric motor 25 of the geared-down variety having a crank pin 26 (see also Fig. 7) drivingly engaging a long slot in shutter stroke arm 27, there being a traction spring 28 hooked onto the crank pin and a pin 27B in the arm yieldingly coupling the motor crank to the drive arm. The crank pin 26 fits loosely in the arm slot 27A so that the arm can shift transversely in the angular manner depicted, for example, in Figs. 5 and 6, when one of the sections is held fast, or the shift is diagonal.

The drive arm 27 is part of a differential linkage shown in Figs. 6, 7, and 8, and including a whiffle bar 30 of offset shape to raise it above the panels, and pivotally connected at one lower end by means 31 to one of the shutter panels 13, its opposite, higher, end being pivotally connected at 32 to the other shutter 14.

Pivoted between the ends of the whiffle bar is a pivot yoke 33 having a pair of pins 34, 35, seated in between the side arms of the yoke. The lower pin 35 engages in a long slot 27C (Fig. 7) in the stroke arm, and the latter is urged against said pin by a traction spring 36 hooked at one end on a lug 27D thereon, and at its other end on the pivot yoke pin 34, this spring transmitting the retractive effort of link 27 to the shutter means to open the same, and spring 28 transmitting the closing thrust of link 27 via pin 35 to the shutter means.

For purposes of stroke adjustment, the drive or stroke arm 27 is actually in two sections, the adjustable section 27X (Fig. 7) being secured to the main part by nut and bolt means 27Y.

The aforesaid differential linkage and drive means 25, 27, 30, 31, 32, 33, makes it possible to reciprocate both panels simultaneously, or either panel alone, said linkage assuming the rectilinear or straight fore-and-aft attitude shown in Fig. 3 for joint displacement, and one or the other of the angular attitudes shown in Fig. 4 or 5 for the singular shutter displacements there shown.

If both shutters should be held against opening movement, the driving linkage would yield, for reasons which can be seen from Fig. 7, which shows the linkage in the full stroke necessary to open both shutters, it being noted that the crank pin 26 is at the limit of its driving stroke at the left of the long slot 27A. In the case where both shutters are held, the relative positions of the parts would be almost the same as shown as to pin 26 in slot 27A, with the difference that the panel 13 would relatively be disposed somewhat to the right of its position in Fig. 7, so that pin 35 would then appear at the right-hand end of its slot 27C, spring 36 being thereby further tensioned. The slot 27C serves additionally to permit limited adjusting movement to pin 35 when one or the other ends of the bar 30 remain stationary while the opposite end moves, as when one shutter is held but the other opens.

Selectively operable means for positively holding either of the sections 13 or 14 against ball-releasing or shuffling displacement, includes electromagnetic solenoids 43 or 44 (Fig. 1) respectively mounted to overlie the panels 13 and 14 (as in Figs. 2 and 8) and each having a lower end portion of its plunger 43A, or 44A, respectively, adapted to project downwardly into the path of a corresponding stop cleat 45A or 45B, fixed on the appertaining panel section 13 or 14.

Normally, the two panel sections are in the fully closed position shown in Figs. 1 and 2, and the stop cleats 45A, 45B are then located to the right of the plungers 43A, 44A, so that if either stop or hold solenoid 43 or 44 should be energized its plunger would be attracted downwardly to thrust the lower end thereof into the path of the appertaining stop cleat 45A or 45B and thus block the corresponding panel section from longitudinal shifting by the motor means.

Each holding solenoid has a normalizing spring 43B or 44B, respectively (Fig. 8), elevating its plunger and the head of the latter against a corresponding supervisory switch 46 or 47 to operate the same in ready condition.

Energization of these holding solenoids causes the respective plungers to be lowered to stopping position before the corresponding stop cleats, as at 43A, 45A, Fig. 8.

Means for selectively effecting lateral shifts of the shutter system includes a pair of pivoted guides 50, 51 (Fig. 1) each having a pivotal attachment 50A or 51A on the game board 10, and each also having an elongated slot 50B or 51B in which works a roller stud 50C or 51C fixed on the shutter panel 14.

Each guide member has an eccentric pivotal or crank pin connection 50D or 51D, respectively, to an end of a shift bar 52 passing beneath a pair of shift solenoids 53 and 54, the latter having a common plunger means 55 (Figs. 1 and 2) from the mid-region of which depends a pin 56 engaging in the shift bar 52. Opposed normalizing springs 57 dispose the plunger means in a mid-position.

Energization of guide shift solenoid 54 will cause the shift bar 52 to move toward the right in Fig. 1 and thereby pivot both guides 50, 51 counter-clockwise, while energization of the other solenoid 53 will produce the reverse action, disposing the guides clockwise into the condition shown in Fig. 5. If at this time the motor 25 is energized, the two panels 13 and 14, being intercoupled by solenoid plunger 21, will be jointly displaced toward the left in Fig. 5, and also (in this view) upwardly, because of the attitude of the guides 50, etc., so that there will be a resultant shift in a general direction toward the upper left-hand corner of the drawing and

the direction of length of the guide slot 50B, as a final result of which the whole shutter system, i.e. panel sections 13 and 14, will shift diagonally as a unit, to open certain ball pockets, while maintaining others closed, substantially in the manner described and shown in applicant's co-pending application, Serial No. 387,940.

A similar diagonal shifting (but toward the lower left-hand corner of the drawing in Fig. 5) would follow turning of the guides 50, 51 in the counter-clockwise direction.

When the guides are in the normal position shown in Figs. 3 or 4, however, there is no compound or diagonal joint shifting of the two panel sections, but merely a linear displacement thereof toward the left, unless one of the panels happens to be held.

In the illustrative circuit diagram of Fig. 9, a game cycle may be initiated by operation of the start switch means to close its contacts 48, this switch means commonly being coin-controlled, there also being another starting or "replay" switch operable without use of a coin in cases where the player has scored suitably in a previous round of play to actuate certain "free-play" award circuit controls (not shown) which condition the replay switch for operation to procure another round of play without use of a coin, as will appear.

If the start switch contacts 48 are closed, as aforesaid, power will be applied via conductor 48A to pulse the shuffle motor 25 and start the latter sufficiently to permit its cycling contacts 25A to close for the duration of one complete shuffling cycle during which both shutter panels 13 and 14 will be opened and closed to release all pocketed balls. This would involve movement of said panels 13 and 14 from the closed (ball-retaining) position shown in Fig. 9 to the fully open position (Fig. 3) in which all exit openings 12 register with all pockets 11, the panels being returned ultimately to the fully closed condition shown in Figs. 1 and 9, it being understood that the ball exits and pockets shown in Fig. 9 are merely symbolic of an actual arrangement such as shown in Fig. 1.

By means of various complicated circuits and mechanisms known in the art but not illustrated herein as unnecessary to an understanding of the present improvements, certain master control scoring, reset, and replay means indicated generally at 49 in Fig. 9, will reset the game and scoring apparatus for a round of play, the aforesaid full release of all pocketed balls being one incident of such a resetting operation.

If the player succeeds in lodging played balls in appropriate pockets to attain a certain score, he may be awarded the privilege of another round of play without necessity of employing a coin to release or actuate the start switch at 48. This is illustrated in simplest form in the case where the player lodges a ball in a certain high-score pocket to close the ball switch contacts 17X, for instance (actually several of these ball switches must ordinarily be closed), with the result that power is connected from said ball switch via conductor 49A to the master control to actuate the latter to cause rotation of a switch cam 55 sufficiently to close the feature-selection switch contacts 56 and 56A, the latter causing illumination of a "select-now" lamp 57 to signify that the selection privilege is available, while the other contacts 56 connect power via common conductor 59A—59 looped to all of the player-controlled selection switches so that all of the latter will now be rendered effective for selective operation by the player, who may now elect to "return all" or "hold all" pocketed balls, or he may "hold A" or "hold B" shutter sections (13 and 14); or he may produce the compound or diagonal "shift left" or "shift right," by actuating the correspondingly designated selection switch.

Should the player desire to return all pocketed balls to play, operation of the correspondingly labeled switch to close contacts 60 will achieve this by pulsing the reset

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motor 25 via conductors 60A and 48A around the open cam cycling switch 25A, with a resultant full-reciprocation of the several shutter panels 13 and 14 (also respectively designated A and B in Fig. 9) in the manner heretofore described.

Likewise, operation of any of the other "selection switches" at a time when the "feature-award" switch contacts 56 are closed, as aforesaid, will produce the requisite action of the shutter means, as follows:

Closure of "hold all" switch contacts 65—65A applies power via conductors 66, 67 to both hold solenoids 43 and 44 with consequent movement of the plungers 43A, 44A into blocking position before the stop cleats to block displacement of both shutter sections A and B when the shuffle motor 25 is energized by closure of either (in this example, both) of the hold supervisory switches, and more particularly by closure of contacts 46A or 47A of the latter when the appertaining solenoid plungers move into blocking position, as aforesaid.

Closure of supervisory switch contacts 46A, 47A, for instance, will respectively cause a pulsing of the motor 25 via conductors 46B—48A, or 47B—48A, sufficiently to start the resetting cycle.

Operation of the "hold A" switch to close contacts 70 will energize the hold solenoid 44 via conductors 67A—67, and also the coupling solenoid 20 via contacts 70A and conductor 71; and the shuffle motor will be started by a pulse from supervisory switch contacts 47A and conductor 47B. A hold relay is operated with coupling solenoid 20 to close contacts 62 to apply holding power to conductor 71 so that the panels will remain uncoupled during this resetting cycle.

In like manner, operation of the "hold B" switch to close contacts 74, will energize the hold solenoid 43 via conductors 75 and 66, along with the coupling solenoid 20 via contacts 74A, and conductors 76 and 71, with starting of the shuffle motor via hold supervisory switch contacts 46A and conductor 46B, so that shutter section 13 or B will stand still while section 14 completes a ball-releasing reciprocation.

In order to maintain the hold solenoids 43 or 44 energized during these selective resets following the usual momentary closure of the "selection switch," the hold supervisory switches each include holding contacts 46C or 47C respectively closing upon descent of the appertaining blocking plunger to connect holding power for said solenoid via conductors 46D or 47D, respectively.

Finally, the compound or diagonal selective shift to left will be effected by closure of contacts 78 to energize guide solenoid 53 via conductor 79, with a resultant clockwise turning of guides 50, 51 to slant the guide slots therein for a shift upwardly to the right upon starting of the shuffle motor, which will ensue as a result of the action of guide pin 51W in closing the guide supervisory contacts at 51X, thereby pulsing the motor circuit via conductors 82, 47B, 48A, and applying holding power via conductor 79X to guide solenoid 43.

Closure of "shift left" switch contacts 80 will produce energization similarly of guide solenoid 54 via conductor 81, with closure of guide supervisory contacts 51Y by pin 51W in the resultant counter-clockwise displacement of guide 51 when the guide bar 52 is moved downwardly by solenoid 54, so that the latter will have holding power connected thereto via conductor 81X and the shuffle motor will be started by power applied by closure of said supervisory contacts 51Y via conductor 82.

As previously emphasized, the shuffle motor 25 is geared down, and the switch cam 25B will open cycling switch contacts 25A at the conclusion of each full resetting reciprocation of the shutter means.

Moreover, just before the completion of the shuffle cycle and opening of the cycling switch contacts 25A, as aforesaid, a master breaker switch cam 84 driven by the shuffle motor will momentarily open the master breaker switch power contacts 85 from which all negative

(—) terminals are fed, and drop out all holding circuits to any and all energized coils including any ball-switch circuits, the coupling solenoid 20, the holding relay, hold solenoids 43 and 44, or the guide solenoids 53 or 54, etc., in readiness for a repeat operation when next the feature award switch contacts 56, 56A shall become closed, or another reset and full round of play is to ensue.

Whenever any selection switch is operated the shuffle motor conductor 48A is always pulsed, and a lockout means will likewise be operated to prevent further selections until the selection switch circuit means is recycled, or the game is reset. This lockout means includes relay coil 90, pulsed via conductors 91—46B, from motor feeder 48A, and which locks up its own holding circuit at its contacts 92, while opening the selection lockout contacts 93 to disconnect power from the common selection feed conductor 59.

In order to prevent improper operation, as by accidental or deliberate attempts to operate certain selector switches simultaneously, a localized lockout of the guide shift solenoids 53, 54 occurs whenever the "hold A" or "hold B" selector switches are actuated, it being recalled that in these cases the coupling solenoid 20 is always pulsed and the hold relay locks up, by reason of which contacts 62A on the latter cut off power for the two shift solenoids via conductor 62B, in the absence of which one might hold up one or the other of the shutter sections and thereafter simultaneously operate a "shift" switch and interfere with the proper operation of the machine.

It will be understood that any suitable power supply may be employed, and that the symbolism for a battery source in Fig. 9 is not limiting and is employed merely for convenience to simplify the number of connections.

I claim:

1. In a ball-rolling game, shutter means comprising a plurality of independently shiftable ball-releasing shutters; motor means for shifting said shutters; a yieldable driving linkage means interconnecting said shutters with said motor means such that the latter is operable to exert a driving force capable of shifting any shutter which is free to move; electrically controlled means for blocking shifting movement of each shutter; and selective circuit means connecting with said motor means and said electrically controlled means for actuating the same selectively to effect shifting of any or all of said shutters.

2. In a ball-rolling game, a shuffle panel divided into at least two sections, a shuffle motor and means including a relief linkage interconnecting said motor with both panel sections for shifting the same severally or jointly under driving urgency of said motor when the panel sections are free to move; holding means for both panel sections and operable to restrain either section from shifting movement; and coupling means operable to drivingly interconnect said panels for joint shifting movement; together with selectively operable control means for actuating said holding means, said coupling and said shuffle motor to produce desired shifting of either one or both of said panel sections.

3. In a selective ball shutter mechanism, a plurality of shutter panels, a common shifting mechanism yieldably interconnected with all panels for shifting the same in ball releasing action, holding means cooperable with said panels and operable to restrain shifting movement thereof; releasable means for coupling said panels for joint shifting movement and selectively operable means for actuating said holding means and said coupling means to condition any said shutter panel for shifting movement alone or concomitantly with any other said panel responsive to operation of said shifting mechanism.

4. In a selective ball shutter mechanism, at least two ball shutters and means mounting the same side by side to shift in the same direction; electrically controlled holding means for holding either shutter against shifting, electrically controlled coupling means for interconnecting said shutters for joint shifting; a shifting motor means and

means yieldingly connecting same with both shutters and operable to shift the latter severally as well as jointly if the same are not held by said holding means; and a control circuit including selectively operable switch and circuit connection means for actuating said holding, coupling, and motor means for actuating the latter selectively to effect operation of said motor means and a shifting of neither, either one, or both shutters.

5. In a selective ball shutter mechanism for ball-rolling game boards, a shutter divided into at least two independently shiftable sections, an electromagnetic coupling device carried by one of said sections and normally coupling the latter to the other section for joint shifting movement therewith; an electromagnetic blocking device for each said section and each energizable to position a blocking member in obstructing relation to one of said sections to block shifting thereof; an electric motor device for shifting the sections; and a shift member having yieldable driving connection with said motor device for reciprocation by the latter; means providing a differential driving linkage between both shutter sections and said shaft member whereby reciprocation of the latter imparts a like shifting force to both shutter sections to shift both or either of the latter if the same are not blocked as aforesaid, said yieldable connection yielding when both shutter sections are blocked as aforesaid; together with circuit means and switch means connected for operation to energize said motor device and selectively energize said electromagnetic coupling and blocking devices to produce operation of said motor device and prevent shifting thereby of any or all of said shutter sections.

6. In a selective ball shutter mechanism for ball-rolling game boards, a plurality of independently shiftable shutter sections mounted side by side for movement in a plane; a first electrically-controlled means for imparting a reciprocatory shifting force to all said sections; a second electrically-released means normally inter-coupling all sections for joint shifting; electrically-controlled hold means operatively associated with each shutter section and respectively operable to prevent shifting movement of the appertaining section; angularly adjustable guide means operatively associated with one of said sections and movable into selected guide positions to change the direction of shifting movement of said one section and any section inter-coupled therewith from the direction of movement normally imparted by said first means; a third electrically-controlled means selectively operable to move said guide means into any of said guide positions; and control circuit means including a plurality of switch devices connected for operation to energize said first, second, and third means, and any or all of said hold means to effect shifting of all or any selected shutter section free of any guide effect of said guide means; or to effect joint movement of all sections under influence of selected angular adjustment

of said guide means; together with further switch means cooperable with said second inter-coupling means responsive to release operation of the latter for disabling said third means.

7. In a shutter system for ball-rolling games, a shutter panel divided lengthwise into at least two sections and means mounting the same for shifting movement lengthwise and also sidewise; electromagnetic coupling means normally coupling said sections for joint shifting movement; separately energizable electromagnetic holding means for each section and respectively operable to prevent lengthwise displacement of the appertaining section; electromagnetically controlled guide means cooperable with a particular section and selectively energizable for altering and guiding the lengthwise displacement of at least said particular section to impart thereto a sidewise component of shifting motion responsive to the shifting force applied thereto to produce lengthwise displacement; electrically controlled shifting mechanism for applying a lengthwise displacing force to the shutter sections; and mechanism including differential means drivingly and yieldingly interconnecting each section with said shifting mechanism whereby the shifting force applied by the latter as aforesaid will act to displace any said section which is free to move lengthwise notwithstanding that another section may be held by the appertaining holding means; together with control circuit means including switch means connected therewith and with said coupling means, said holding means and said guide means for selective operation to actuate said shifting mechanism, said guide means, and said coupling and holding means in predetermined combinations to produce any of a plurality of different shifting actions of said shutter sections, including lengthwise shifting simultaneously of all sections or any particular one of the same; or opposite sidewise shifting of all sections coupled by said coupling means and under influence of said guide means in a selective operation thereof concurrently with the application of lengthwise shifting force to said particular shutter section; and electromagnetically controlled supervisory and lockout means connected with said control circuit and automatically operating to disable said guide means whenever any said holding means is operated in holding action.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 2,882,057

April 14, 1959

Donald E. Hooker

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 7, line 21, claim 5, for "shaft" read -- shift --.

Signed and sealed this 18th day of August 1959.

(SEAL)

Attest:

KARL H. AXLINE

Attesting Officer

ROBERT C. WATSON
Commissioner of Patents