Sept. 8, 1936. K. C. SHYVERS ET AL 2,053,379

GAME

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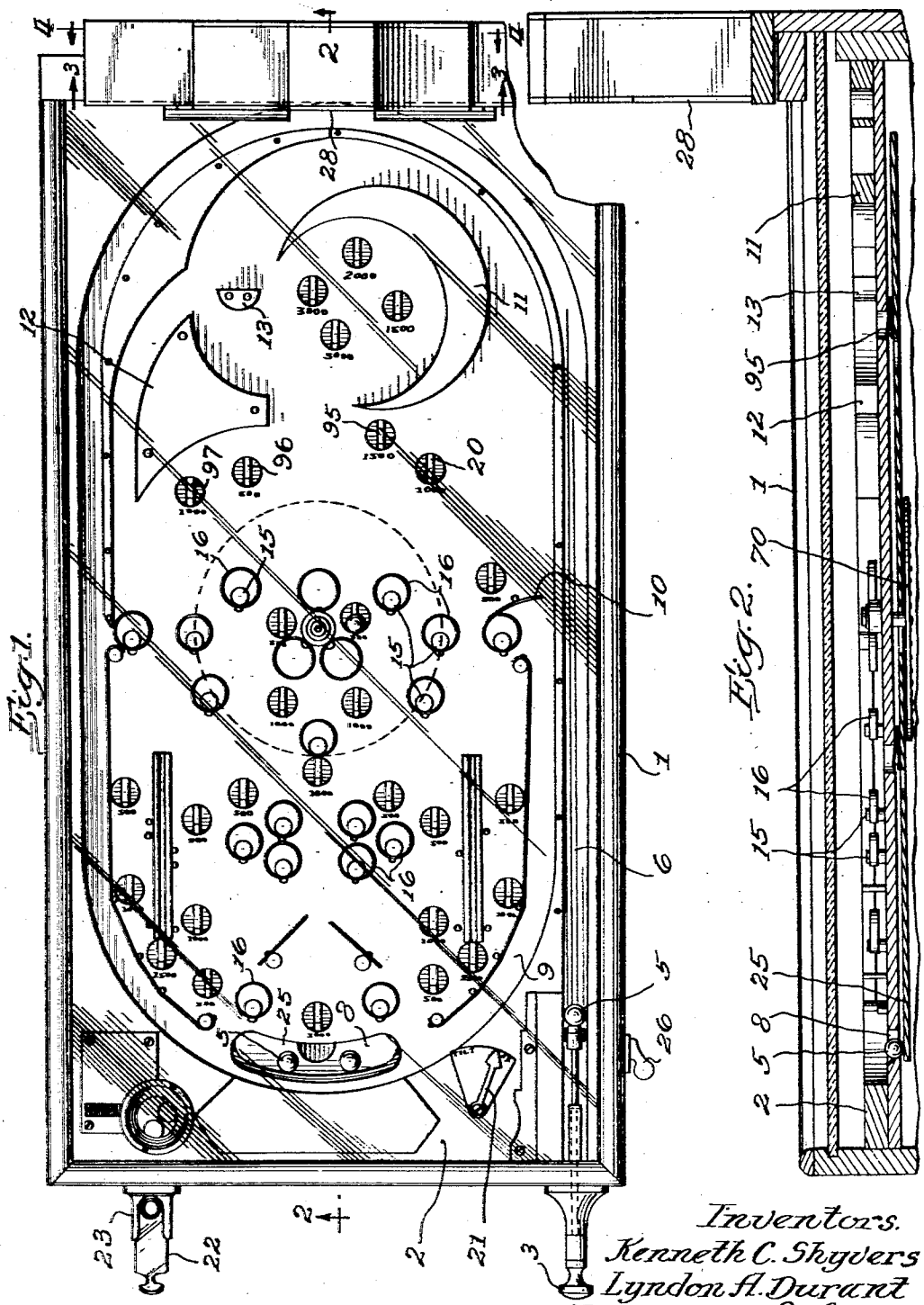


Inventors.
Kenneth C. Shyvers
Lyndon A. Durant
By Wyman S. Bayne
Atty.

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GAME

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Fig. 3.

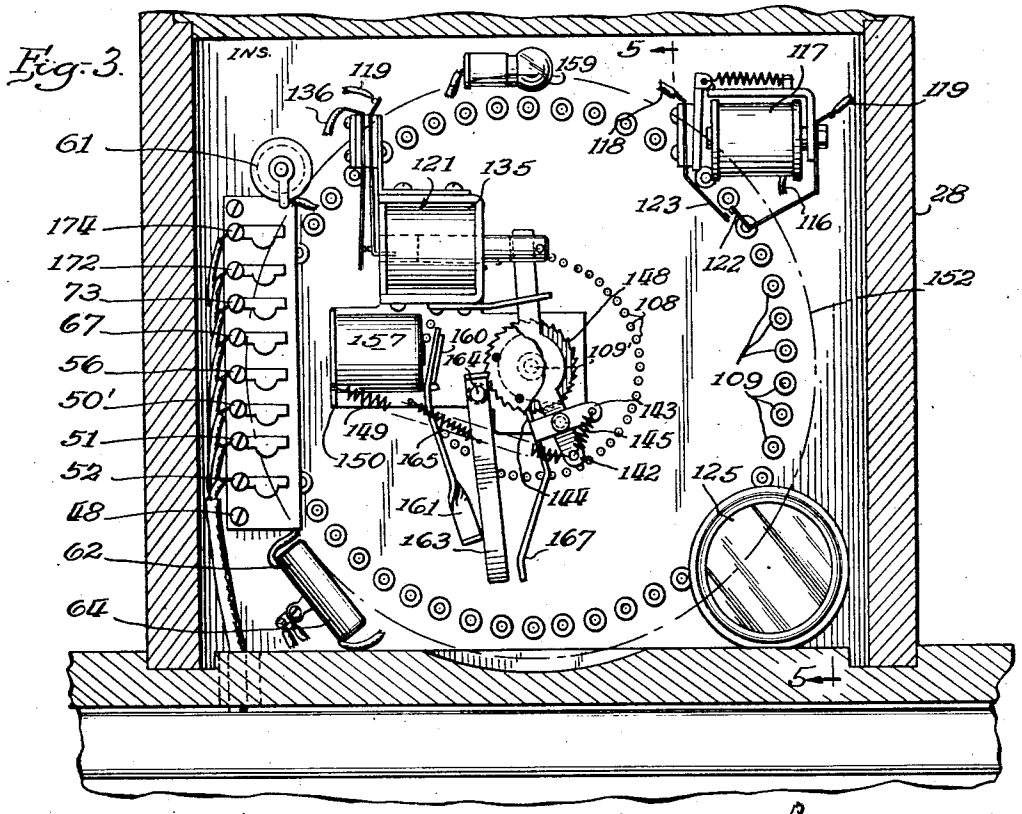
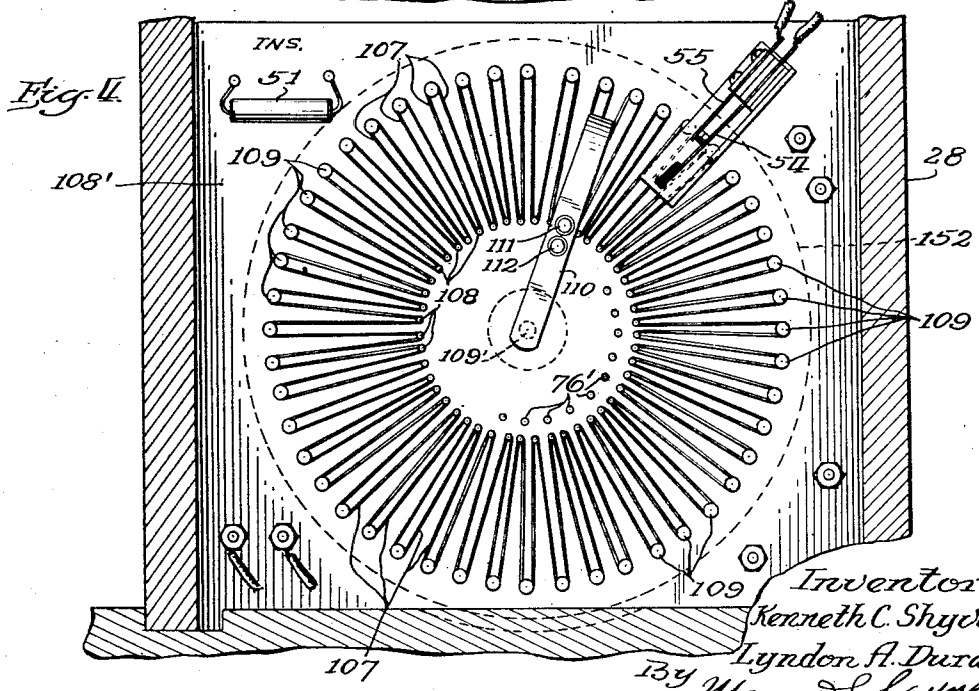



Fig. 4.




Inventors.
Kenneth C. Shyvers
Lyndon A. Durant
By Maynard Bayne Fitty.

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GAME

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Fig. 6.

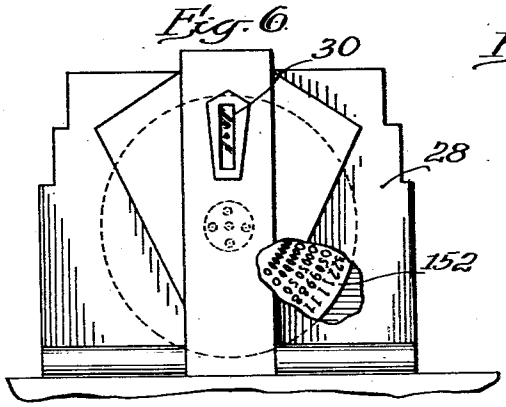



Fig. 5.

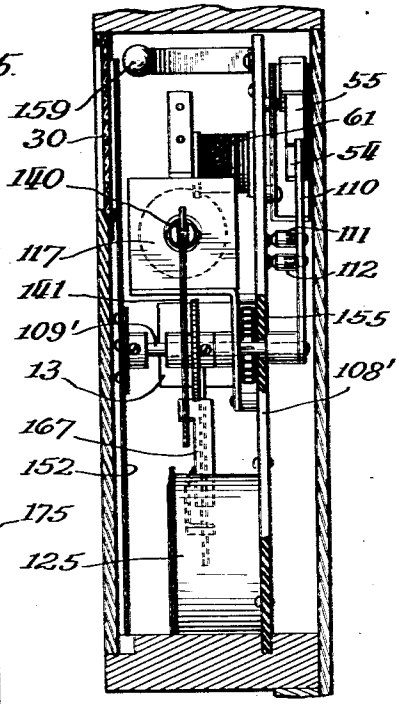
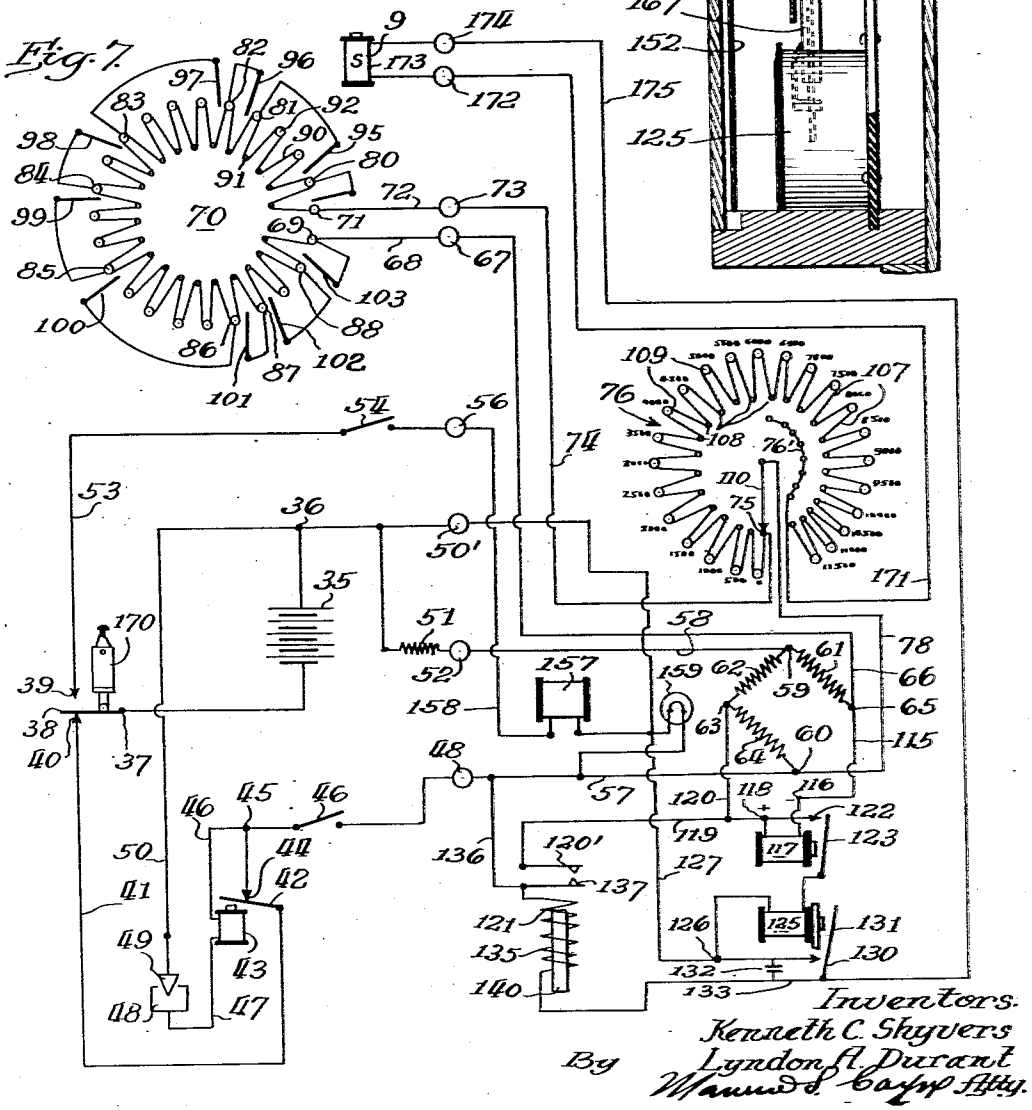



Fig. 7.




Inventors.
Kenneth C. Shyvers
Lyndon A. Durant
By Mann & Baynes Attys.

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# UNITED STATES PATENT OFFICE

2,053,379

## GAME

Kenneth C. Shyvers and Lyndon A. Durant,
Chicago, Ill.

Application February 10, 1936, Serial No. 63,056

14 Claims. (Cl. 273—121)

This invention relates to a pin game of the type wherein a plurality of balls are impelled to various scoring positions and to an electric totalizing means for indicating the number of points scored at any time during the game. Games of this character are located in various public places and must be capable of operation with a minimum of servicing.

An object of this invention is to devise a game of this character wherein a totalizing means is provided, which is cheap, effective and operates quickly to indicate the number of points scored at any time during the game.

With the foregoing and other objects in view which will appear as the description proceeds, the invention consists in certain novel features of construction, arrangement and combination of parts hereinafter fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportion, size and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

For the purpose of facilitating an understanding of our invention, we have illustrated in the accompanying drawings, a preferred embodiment thereof, from an inspection of which when considered in connection with the following description, our invention, its mode of construction, assembly and operation, and many of its advantages should be readily understood and appreciated.

Referring to the drawings in which the same characters of reference are employed to indicate corresponding or similar parts through the several figures of the drawings:

Figure 1 is a top view of a complete game;
Fig. 2 is a section along line 2—2 of Fig. 1;
Fig. 3 is a section along line 3—3 of Fig. 1;
Fig. 4 is a section along line 4—4 of Fig. 1;
Fig. 5 is a section along line 5—5 of Fig. 3;
Fig. 6 is a detail of the indicating means; and
Fig. 7 is a circuit diagram of the totalizing means.

Referring to Figs. 1 and 2, the game comprises a frame 1 of wood or metal. Supported by the frame is a panel 12 of wood, upon which may be located the various paths and traps for the balls. A plunger 3 suitably journaled in the frame is adapted to be pulled back in the well known fashion and propel a ball 5 along chute 6, which extends to the rear of the panel and to the other side thereof. The ball 5 is adapted to pass a trap 8, if it has sufficient momentum, and up an inner chute 9 beyond a spring gate 10 and thence into the playing field.

The field may have suitably shaped blocks 11, 12 and 13 for guiding the ball. There may also be provided a plurality of posts 15 carrying spring rings 16 offset therefrom and adapted to impart interdeterminate impulses to the ball in its travels. A plurality of holes 20 into which each ball may drop is provided, each hole having a predetermined scoring value. Inasmuch as the arrangement of posts, guide blocks and holes may be changed to suit the taste of players and since it forms no part of the present invention, it will not be described.

The entire machine is provided with a level indicator 21 and a coin chute 22. This coin chute is provided with a circular cut-out 23, into which any suitable coin may be disposed, after which lever 22 is pressed inwardly. Upon the pressing in of lever 22, a board 25 immediately below playing panel 2 is moved in its own plane to uncover the various holes 20 and permit the balls to drop through to the bottom of the cabinet. A suitable pick-up device, operated by a lever 26 of well known construction, is adapted to elevate one ball at a time into the chute 6.

At the rear of the cabinet a vertically disposed panel 28 is disposed into which the totalizing mechanism is adapted to be mounted. The scoring total may be read through a small window 30 (Fig. 6).

The totalizing mechanism proper, in general, comprises a pair of equal resistances having corresponding predetermined taps permitting the shutting out or insertion of corresponding and predetermined resistance values. The total value of the two resistances in series tends to remain constant. In the event that any balls operate to change the value of one of the resistances, automatic mechanism is provided tending to change the value of the other resistance to an equal amount, but in the reverse sense. These two resistances are adapted to form one arm of a Wheatstone bridge, the other three arms of which have fixed values. The balls, when played, are adapted to disturb one of the resistance values causing the bridge to become unbalanced. By suitable step up mechanism the other resistance carrying the scoring values is suitably operated upon to automatically balance the bridge.

Electrically controlled means are provided to reset the mechanism to "zero" upon the initiation of a play and to render the mechanism inoperative in the event that the game apparatus

is not level. Additional means are provided whereby at certain predetermined scoring values a return coin chute may be operated as a reward for playing skill.

Referring to Figs. 3 to 7, inclusive, a battery 35, or any suitable source of power, has one terminal connected to a junction point 36 and the other terminal connected to a terminal 37 of a single-pole, double-throw reset switch 38. The switch 38 is adapted to contact the point 39 during the resetting operation and contact point 40 during the playing operation. The point 40 is connected by a line 41 to movable contact 42 of a level control relay 43. The movable contact 42 normally touches fixed contact 44 which is connected to a junction point 45. This junction point 45 is connected by a line 46 through the winding of the relay 43 to a line 47 and thence to a cup member 48.

A freely swinging contact 49 is adapted to be clear of the cup member 48 if the cabinet is level, so that no circuit through this switch is made. A movable contact 49 is connected by a line 50 back to the junction 36. It is clear that if the cabinet is not level, a circuit through 49 and 48 will be established, energizing the winding 43 of the relay and causing the movable contacts 42 to break away from the contact 44, thus breaking the main circuit and also circuit to tilt device.

The junction point 45 is connected through a clock control switch 46 to a terminal 48. The junction point 36 is connected to a terminal 50 and also through a voltage reducing resistance 51 to a terminal 52. The reset contact 39 is connected by a line 53 to a terminal 56.

The contacts 48 and 52 are connected by lines 57 and 58, respectively, to the opposite points 59 and 60 of a bridge for energizing the same. The junction 59 has resistances 61 and 62 connected thereto. The resistance 62 is connected to a junction 63 and between this point and 60, a resistance 64 is provided. The resistances 61, 62 and 64 are invariable values and between the junction 60 and junction 65 there is adapted to be connected a pair of oppositely variable resistances. From the junction point 65 a line 66 is provided going to a terminal 67. The terminal 67 is connected by a jumper 68 to terminal 69 of a resistance generally designated as 70. The other terminal 71 of this resistance is connected by a jumper 72 to a terminal 73, thence by a line 74 to a terminal 75 of a resistance generally designated as 76. A wiper 77 forms the other terminal of this resistance as far as current conduction is concerned and is connected by a line 78 to the junction 60 of the bridge.

Referring to the resistance 70, this resistance is made up of suitable resistance units having a plurality of contact points 80 to 88, inclusive. Between these contact points predetermined values of resistances may be disposed in any suitable manner. As shown here, the resistance wire 90 is wound zigzag around an inner series of posts 91 and an outer series of posts 92. A plurality of switch arms 95 to 103, inclusive, may be provided for engagement with the contacts 80 to 88, respectively, and the terminal at the other end of the corresponding resistance section, a short circuiting conductor 105 may be provided, so that upon the closure of any switch with its corresponding contact, a predetermined portion of the entire resistance is cut out. Switches 95 to 103, inclusive, are mounted on the lower panel 25, and in the normal playing position are adapted to be in holes 20 so that when a ball drops in, the switch will be closed.

The resistance 76, whose total value may be equal to that of resistance 70, is constructed so that its resistance wire 107 is threaded back and forth between an inner series of posts 108 and an outer series of posts 109. This resistance wire is carried on a board 108' through the center of which a shaft 109' is rotatively mounted.

The shaft 109' carries an arm 110 balancing a pair of wipers 111 and 112. The wiper 111 cooperates with the inner series of posts 108 which are preferably of metal and have suitable flat tops. As the balls close the various switches in the resistance 70 and vary its value in a predetermined fashion, it is evident, therefore, that the arm 110 with the wiper 111 must be moved to add a predetermined amount of resistance from the resistance 76 to keep the bridge balanced.

Assuming that the system is unbalanced because of the operation of one or more switches in the resistance 70, it is clear that a difference of potential between the points 63 and 65 of the bridge will be set up. In order to take advantage of this difference of potential, the point 65 is connected by a line 115 to the terminal 116 of a sensitive relay 117. The other terminal 118 of this relay is connected to a line 119, to which bridge point 63 is connected by a wire 120 and the line 119 is connected to the fixed contact 120' of a step up solenoid 121. The line 119 also goes to the fixed contact 122 of the relay 117. The movable contact 123 of this relay is connected to the winding of a time delay relay 125, the other terminal of the winding being connected to point 126. The point 126 is connected back by a line 127 to terminal 50'. The fixed contact 130 of the relay 125 is connected to the junction 126 and co-operates with the movable contact 131. A condenser 132 is connected across these contacts to suppress sparking to protect the relay contacts. The fixed contact 131 is connected to a line 133 which goes through the winding 135 of the solenoid 121 and thence by a wire 136 to the line 57. A movable contact 137 is connected to the line 136.

Upon the unbalancing of the bridge and the existence of a difference of potential between the points 63 and 65, current will flow through the line 115 and the winding of the relay 117, through the line 120 to the point 63. This will cause the relay contacts 122 and 123 to close which will energize the time delay relay 125. With the relay 125 energized, the contacts 130 and 131 will close to establish a circuit from the point 36 above the battery 35 through the junction 50', line 127, contacts 130 and 131, line 133, solenoid winding 135, line 136 to the junction 48 and thence through the switch 46, point 45, contact points 42 and 44, line 41, contact points 40 and 39, thence back to the battery. The solenoid 121 will thereupon be actuated and close the contacts 120' and 137. This completes a circuit from the line 136 to the line 119, bridge point 63, resistance 64, bridge point 60, line 57, line 136 and back to solenoid contacts 120' and 137. In effect, the closing of these two contacts 120' and 137 shunts out resistance 64 of the bridge and unbalances it in the reverse sense as compared to the condition of the bridge during its automatic balancing action. This results in a reverse difference of potential between points 63 and 65 of the bridge, reversing the flow of current through the first relay 117. This reverse current rapidly opens the relay contacts and overcomes any tendency for contact sticking,

which might otherwise occur. The opening of the relay 117 will in its turn result in opening the relay 125, which, because of its slow operation, is adapted to permit the step up solenoid 121 to go through with its step up operation more positively.

The mechanical operation whereby the step up solenoid 121 changes the value of the resistance 76 to balance the bridge, will now be described.

The step up solenoid 121 is provided with a core 140 which is adapted to be sucked into the solenoid upon energization thereof. The free end of the core 140 is pivotally secured to a lever 141 rotatively secured to the shaft 109'. Beyond the shaft 109' the lever 141 has a portion 142 upon which is pivotally mounted a lever 143 carrying a ratchet dog 144. A spring 145 between the members 142 and 143 presses dog 144 against the teeth of a ratchet 148 rigidly secured to shaft 109'. A spring 149 secured between the member 142 and a rigid plate 150 tends to keep the core 140 of the solenoid in its projected position. Upon the energization of the relay winding 135, the core 140 is sucked into the relay winding and moves the lever 141 anti-clockwise, as seen in Fig. 3. The dog 144 rides over the teeth of the ratchet 148. The core 140 which opens the contacts 120' and 137 in its lowermost position and de-energizes the winding is thereupon pulled out by the action of a spring 149, which advances the ratchet 148 a tooth in a clockwise direction. This serves to move the arm 110 with its wiper 111 from one contact post 108 to another one. Assuming that the bridge still remains unbalanced, another step up cycle will occur until the resistance relationship between 70 and 76 is such that they both add up to the predetermined amount necessary to balance the bridge. The shaft 109' in its turning movement rotates a scale 152 carrying suitable numbers thereon and in the balanced condition of the bridge is adapted to show a suitable indication through the window 30.

In order to reset the mechanism back to "zero" position in preparation for a playing cycle, means are provided for releasing the ratchet to permit the scale to assume its starting position. As the totalizing means operates to turn the scale from a lower to a higher reading, the shaft 109' tends to wind up a spring 165.

In order to reset the mechanism, a reset coil 157 is provided connected by a line 158 to the terminal 56. The coil 157 is mounted on the plate 150 and has pivoted thereto an armature 160. This armature is provided with a long lever portion 161 adapted to contact against a dog 163 pivoted at 164 and engaging ratchet wheel 148. A spring 165 between the dog 163 and the base plate 150 tends to keep the dog in engagement with the ratchet. During the normal step up operation of the step up coil 121, the ratchet 148 is adapted to turn in a clockwise direction and the dog 163 merely slips over the teeth of the ratchet.

During the inward movement of the core 140 of the step up magnet, when the step up ratchet 143 is slipping backward to engage a new tooth, the dog 163 prevents the ratchet 148 from being driven backwards by the spring 155. The dog 144 of the step up ratchet is provided with a long ear 167. When the release coil 157 is energized, the armature 160 is attracted causing the lever 161 to swing the dog 163 clear of the ratchet and at the same time by pressing against the ear 167 causes the step up ratchet 143 to clear the ratchet teeth. There being no restraint on ratchet 148, the spring 155 reverses the shaft 109' until the "zero" position is reached. The reset coil 157 is energized by the starting switch 38 being raised upwardly to close with the contact 39. By means of a dashpot 170 on the switch 38, 38 is kept in contact with the point 39 long enough to permit the mechanism to reset back to "zero" and therefrom the switch 38 is dropped to close against the contact 40. When the shaft 109' is driven back to the "zero" position, the arm 110 carried thereby is adapted to open up the contacts 54 and 55 at the "zero" position of the indicating means. This is accomplished by the arm 110 striking an extension of the contact 54 and serves to open up the reset circuit as soon as resetting is accomplished and thus save drain on the battery 35 in the event that the dashpot on the switch 38 operates too slowly.

It may be desirable to provide a coin return or suitable indicating means in the event that certain high scoring values are obtained. For this purpose, the wiper 112 on the arm 110 is adapted to co-operate with a series of contacts 76' inwardly spaced from the inward series of contacts 108. These contacts 76' may be connected in any suitable manner and, as shown here, are all connected to a line 171, leading to a terminal 172 to magnet 173 and back again through a terminal 174 and line 175 to the line 133. In the event that the arm 110 travels far enough to engage any one of the contacts 76', a circuit from the bridge point 60 through the line 78, arm 110, wiper 112 and thence through the various lines down to the line 133, is established. This circuit will be energized from the battery 35 only when delay relay 125 closes the contacts 130 and 131.

In order to illuminate the dial or member 152 upon which the score values are marked, there is provided a light 159 disposed directly in the rear of the opening 30, which light is connected in the main battery circuit.

It is believed that our invention, its mode of construction and assembly, and many of its advantages should be readily understood from the foregoing without further description, and it should also be manifest that while a preferred embodiment of the invention has been shown and described for illustrative purposes, the structural details are nevertheless capable of wide variation within the purview of our invention as defined in the appended claims.

What we claim and desire to secure by Letters Patent of the United States is:

1. An electrical means for indicating the position of a body at a remote distance comprising a bridge having three fixed resistances for the three arms thereof and a pair of equal resistances in series as a fourth arm, said pair of resistances being remote from each other and being adapted to have a constant combined resistance, means on one of said resistances for varying the value thereof in accordance with the position of one or more bodies, means co-operating with one of said resistances tending to change the value of said other resistances by an equal amount and in the reverse sense to said first resistance to maintain said bridge in balance, said means being energized by a difference of potential across said bridge when unbalanced and comprising a step up relay, a step-by-step mechanism co-operating with said other resistance to vary its value, means whereby said step up relay in its movement stores energy in said step up mechanism and means whereby said step-by-step mechanism varies upon the de-energization of said step-up relay.

2. An indicating means, comprising a bridge

having three fixed resistances as the arms thereof, a first and second resistance in series with each other as the fourth arm, means for energizing said bridge from two opposite points, means for varying the value of said first resistance to unbalance said bridge thereby causing a difference of potential to automatically vary said second resistance to bring the bridge into balance, said last named means comprising a relay for utilizing said difference of potential in said bridge, a step up relay controlled by said first relay, a wiper on said second resistance and adapted to contact therewith, a dog and ratchet mechanism co-operating with said wiper to impart step-by-step movement thereto, means whereby said step up relay operates said dog and ratchet to advance said wiper for a small unitary value of resistance, means controlled by said step up relay to reverse said bridge unbalance whereby said control relay is sharply released to begin another step up cycle and an indicator carried by said wiper calibrated to indicate the condition of said first resistance.

3. The system of claim 2, wherein said wiper is adapted to progress forward in one direction only against a spring, and means for freeing said ratchet of its dog for returning said wiper to a starting position.

4. An indicating system for showing the position of a body at a distance remote from the indicating means, comprising a bridge having three fixed resistances as the arms thereof and a fourth arm comprising two resistances in series, means for energizing said bridge across two points, and means for utilizing any potential difference across the other two points of said bridge, one of said resistances being remote from the other, means for varying the value of said one resistance in accordance with the body positions to be measured, thereby unbalancing said bridge and means responsive to the difference of potential across said bridge due to its unbalanced position for varying the other resistance an equal value in a reverse sense, said means comprising a wiper playing over said resistance, a shaft coupled to said wiper and carrying an indicating means, a ratchet mechanism coupled to said shaft and tending to turn said shaft in one direction only, a spring coupled to said shaft and wound up by said ratchet mechanism as said shaft is turned thereby, relay means responsive to the unbalanced condition in said bridge for operating said ratchet mechanism step by step until said bridge is automatically balanced, an independent means for rendering said ratchet advance inoperative whereby said spring returns said shaft to a "zero" position.

5. The system of claim 4, wherein said relay means for operating said ratchet comprises a pair of successive relays, one of said relays being directly responsive to the unbalanced condition of said bridge, the other relay being responsive to said first relay, said other relay in its energized condition being adapted to unbalance said bridge in the reverse direction to cause a quick release on said first relay.

6. The system of claim 4, wherein said ratchet operating means comprises a magnet and a spring system so that when said magnet is energized, the ratchet dog slips the ratchet and a spring advances said ratchet.

7. The system of claim 4, wherein said ratchet advancing means comprises a string-pressed dog, a magnet for operating on said dog to advance said ratchet, an additional spring-pressed dog on said ratchet, an additional magnet for releasing both dogs from said ratchet and a spring wound by said ratchet during its advancing position for returning said ratchet to a "zero" position.

8. A totalizer operatively associated with a game board having a plurality of switches adapted to be closed by projectiles projected onto said game board, comprising a resistance connected to said switches and having its effective value varied thereby a second resistance in series with said first resistance, said two resistances in series forming one arm of a bridge, three other resistances forming the three additional bridge arms, means for impressing a potential difference across one pair of opposite bridge points, means connected across the other pair of opposite bridge points for responding to a difference of potential as a result of bridge unbalance, and means controlled by said last mentioned means for varying the value of said second resistance to balance said bridge, said means comprising a wiper playing over said second resistance and movable in steps, a relay responsive to a condition of bridge unbalance for moving said wiper one step at a time, said relay being controlled by said bridge only at the beginning of each operating cycle, and indicating means carried by said wiper to correspond with the switches in said first resistance changed by said operator.

9. The totalizer of claim 8, wherein a relay is connected across said other opposite bridge points and responsive to a condition of unbalance, and a slow acting relay system controlled by said first relay for actuating said wiper, said slow acting relay system, when energized, being adapted to throw out said first relay in preparation for a new operating cycle.

10. The totalizer of claim 8, wherein said wiper operates against the spring, a ratchet system controlling said wiper, a step-by-step relay system for advancing said ratchet in one direction in response to the potential difference across said bridge when in unbalanced condition, a release magnet and means controlled by said release magnet when energized for releasing said ratchet to permit said spring to return said wiper to a starting position.

11. The totalizer of claim 8, wherein said wiper rides over a series of contacts corresponding to predetermined wiper conditions and an unlocking circuit controlled by said contacts whereby at predetermined wiper conditions said unlocking circuit operates giving special indications for predetermined high scoring values.

12. A score indicating means operatively associated with a game board having a plurality of switches adapted to be closed by balls projected onto and travelling over said game board, said indicating means including a bridge having three fixed resistances as the arms thereof and a fourth arm comprising two resistances in series, a plurality of switches disposed one in each of said openings and adapted to be closed by the disposition of a ball within said openings, said switches being connected to one of said last mentioned resistances and arranged so as to have its effective value varied thereby, means for impressing a potential difference across one pair of opposite bridge points, means connected across the opposite pair of bridge points for responding to a difference of potential as a result of bridge unbalance, and means including the indicating means controlled by said last men-

tioned means for actuating said indicating means to move the same to correspond with the change in value of said first resistance caused by the disposition of the balls in the openings on the playing surface.

13. A totalizer operatively associated with a game board having a plurality of switches adapted to be closed by balls projected onto said game board, including a resistance, all of said switches being connected to said resistance, which resistance has its effective value varied by the closing of said switches, a second resistance in series with said first resistance, said two resistances in series forming one arm of a bridge, three other resistances forming the three additional bridge arms, means for impressing a potential difference across one pair of opposite bridge points, means connected across the other pair of opposite bridge points for responding to a difference of potential as a result of bridge unbalance, means controlled by said last mentioned means for varying the value of said second resistance to balance said bridge, and indicating means associated with said last mentioned means calibrated to indicate the condition of said first resistance.

14. A totalizer operatively associated with a game board having a plurality of electrical switches adapted to be closed by balls projected onto said game board, said totalizer including an electrical resistance connected with said switches, which resistance has its effective value varied by the closing of said switches, whereby a predetermined amount of resistance is cut out upon the moving of said switches to closed positions, and means responsive to the action of the cutting out of the resistance for actuating the totalizer.

KENNETH C. SHYVERS.
LYNDON A. DURANT.