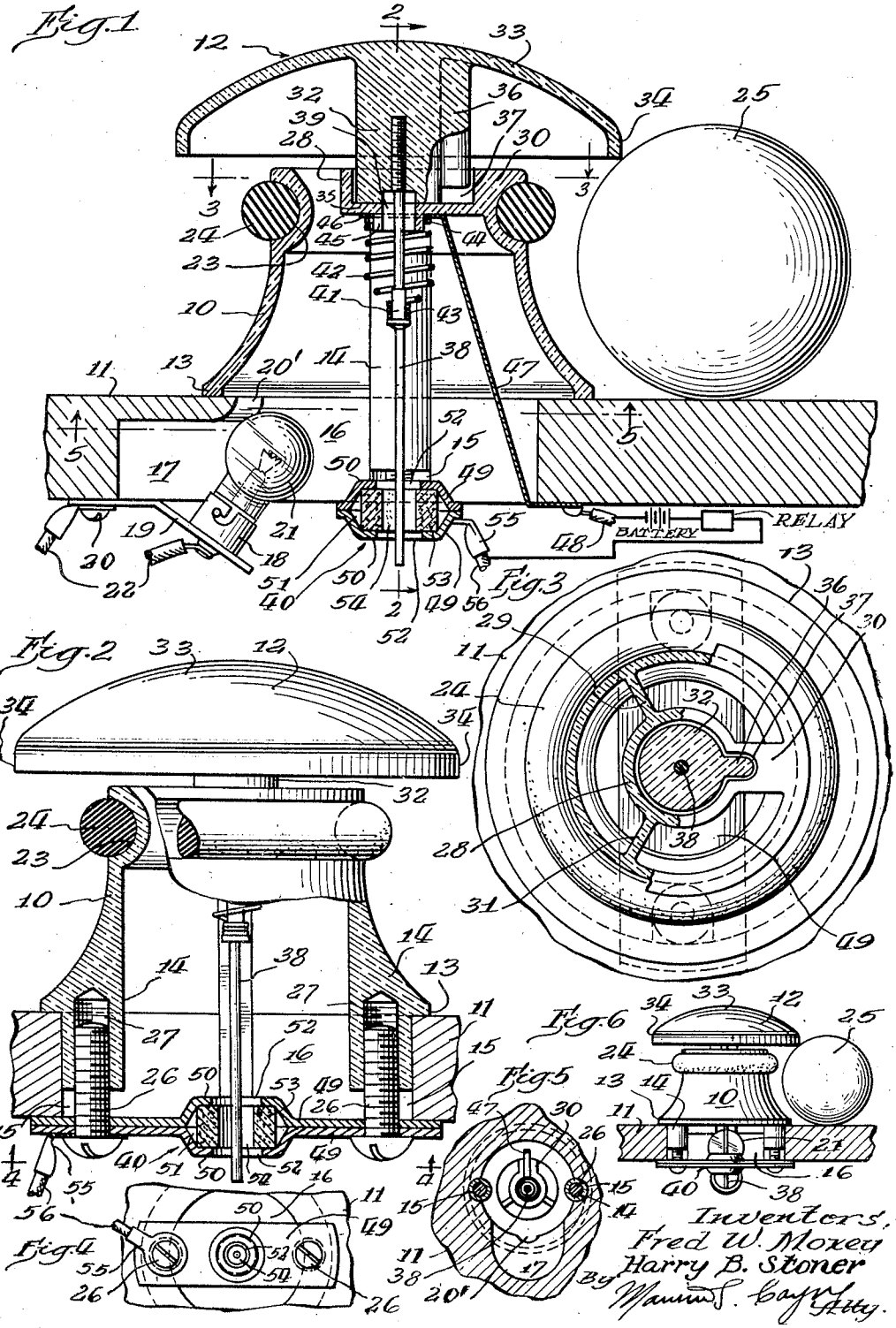
March 24, 1942. H. B. STONER ET AL 2,277,274

BUMPER CONTACT SWITCH

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BUMPER CONTACT SWITCH

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Fig. 7.

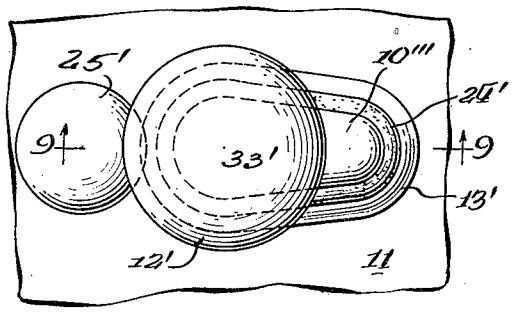


Fig. 8.

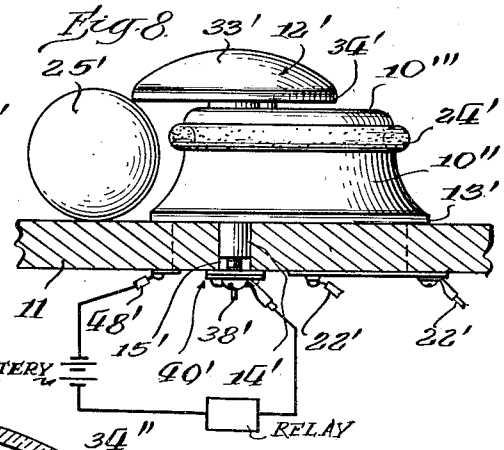
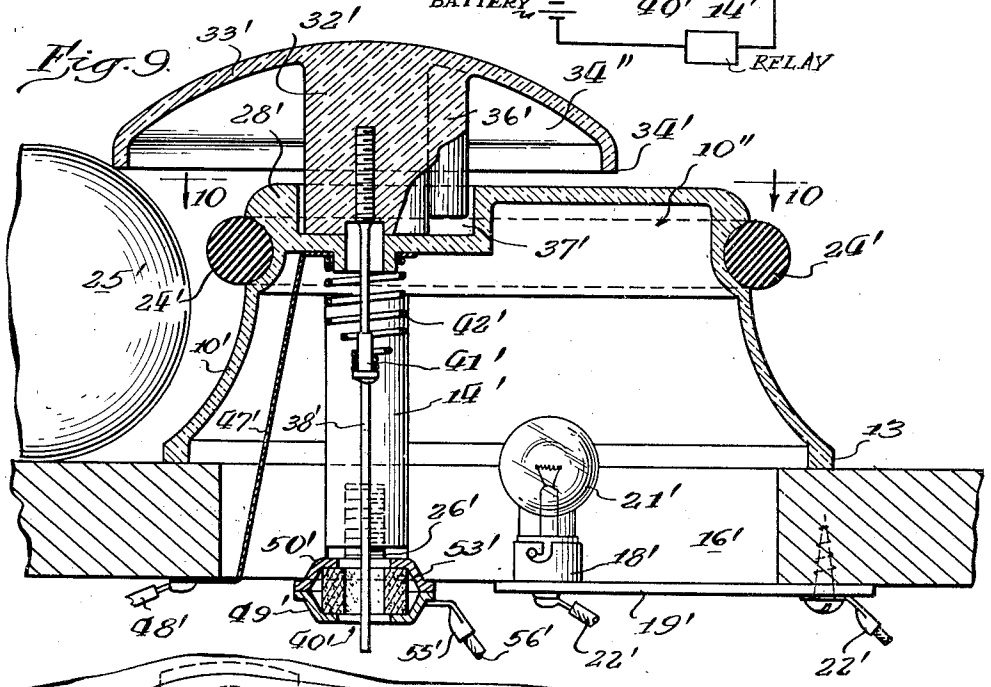


Fig. 9.



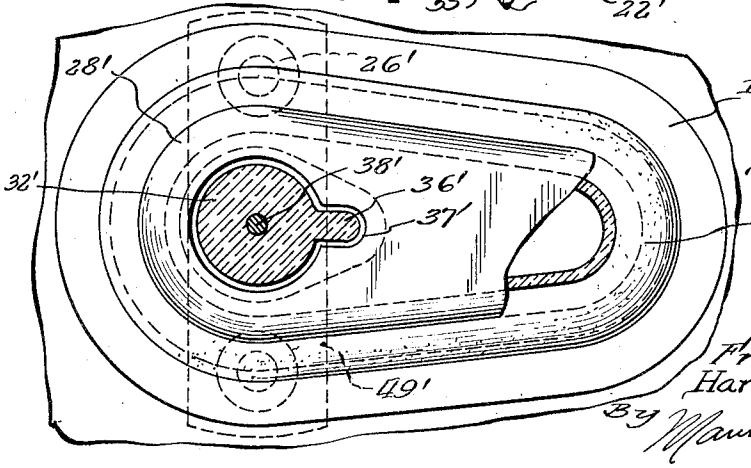


Fig. 10.

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2,277,274

BUMPER CONTACT SWITCH

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Application March 21, 1940, Serial No. 325,202

9 Claims. (Cl. 200—52)

This invention relates to a contact switch for use in game devices such as for example in ball rolling games.

The use of a device of this nature lends itself to any game in which targets are disposed upon a game board and objects such as balls or the like are adapted to be projected or directed to strike or come in contact with said targets. The momentary meeting of object and target being equivalent to scoring of points or the like, the target must have associated therewith means or mechanism whereby the score is registered, or some device is operated to represent the accomplishment of striking the target. In this connection, the target may have associated therewith a circuit closer or switch which will momentarily operate when the target is struck to actuate a relay, for example, in a manner well known in this art.

Accordingly, targets and switches have been constructed which provide resilient means for reacting to the striking thereof by an object to close circuits, the closure causing electrical impulses in said circuits. Numerous disadvantages have accompanied the constructions of devices heretofore used. The devices have had a tendency to "flutter" or cause a series of impulses to occur when the target is struck by the object. The devices heretofore used have been more or less complicated in structure and have required much manipulation to adjust to perfect contact, hence causing constant surveillance to maintain them in proper working order. The construction of such targets has been such that the entire operating mechanism was necessarily exposed, subjecting same to deterioration by wear and causing dust and the like to accumulate on the working parts thereof to prevent perfect operation. A still further objection has been that the association of parts has been such as to promote short circuits and burning of contact points.

It is the primary object of the present invention to provide a new and improved construction of a bumper contact switch which will eliminate all the disadvantages enumerated above.

An object of this invention is to provide a device of the character described comprising a support for a tiltable member adapted to be struck by objects directed thereat, said member being so arranged on the support as to immediately regain its normal untilted position when said object rebounds after striking same.

A further object of the invention is to provide in a device of the character described a member having a flattened surface and resting on the flattened surface of a support, said device having means for urging said two surfaces into contact with one another to oppose tilting of said member upon said support.

Still a further object of the invention is to provide in a device of the character described, a support and means tiltable on said support by being struck by objects directed thereat, the impact of an object only causing a single impulse in the electrical circuit with which the device is associated.

A further object of the present invention is to provide a bumper contact switch made of translucent material to enable indicating illumination to be used in combination therewith.

Still a further object of this invention is to provide a device of the character described which will be sturdy, simple in construction and operation, easy to install, economical to manufacture and efficient in operation.

A further object of the invention is to provide a device of the character described in which the mechanism thereof will be concealed and enclosed, thereby permitting obvious advantages of operation, maintenance and appearance, besides making possible limitation of the striking area of an object thereon by variation of size and shape of housing thereof.

Still a further object of this invention is to provide a novel and improved construction of a device of the character described which will have novel shock absorbing means for cushioning the object in its striking thereof.

Still a further object of the present invention is to provide, in a device of the character described, novel disposition and construction of the electrical contact means thereof.

Further objects lie in the advantageous construction and arrangement of parts.

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 my invention, we have illustrated in the accompanying drawings a preferred embodiment thereof, from an inspection of which, when con-

sidered 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 throughout the several figures of the drawings:

Fig. 1 is a sectional view of our improved bumper contact switch with the diagram of an electrical circuit which may be employed therewith.

Fig. 2 is a sectional view of our improved bumper switch but taken generally along a plane perpendicular to that in which the sectional view of Fig. 1 is taken, i. e. substantially on line 2—2 of Fig. 1.

Fig. 3 is a transverse section taken at the line 3—3 of Fig. 1 and in the direction indicated.

Fig. 4 is a bottom plan view of our device installed.

Fig. 5 is a sectional view taken along line 5—5 of Fig. 1 and in the direction indicated.

Fig. 6 is a generally elevational view of the device taken from the reverse direction in which Fig. 2 is taken.

Fig. 7 is a plan view of a modification of our bumper contact switch.

Fig. 8 is an elevational view of the embodiment shown in Fig. 7 showing a diagram of a suggested circuit which may be used therewith.

Fig. 9 is a median sectional view taken along line 9—9 of Fig. 7 and in the direction indicated.

Fig. 10 is a transverse sectional view taken along the line 10—10 of Fig. 9 and in the direction indicated.

Referring now to the specific details of Figs. 1 to 6, inclusive, the reference character 10 designates generally a shell or housing disposed upon a game board 11 and generally supporting our improved bumper contact switch. While the housing or support may be formed from any suitable material, we prefer that it and the cap member 12 be moulded or pressed from one of the phenol condensation products commonly known as "plastics," preferably colored and translucent.

The housing or support 10 is generally bell-shaped and the flange or lip 13 of the bell is adapted to be disposed upon and fixed to the game board 11 as shown. Integrally moulded with the member 10, are a pair of diametrically disposed cylindrical posts or columns 14 depending below the lip 13. Said posts 14 project into openings 15 provided therefor in the game board 11 which is usually of wood or similar substance.

The housing or support 10 overlies a substantially circular opening 16 in the game board, said opening 16 having the openings 15 adjacent thereto. A shallow depression 17 is provided on the underside of the game board contiguous with the opening 16, and a socket 18 is generally fixed therein, as by attachment of the base 19 thereof at 20 by screws or the like. A bulb 21 is adapted to be disposed in the socket 18 for the purpose of illuminating the housing or support 10, and the cap member 12. A portion 20' is preferably cut away as shown to accommodate said bulb. The usual leads 22 are attached to the socket base in the well known manner.

Near the top of the bell-shaped housing or support 10, an annular groove 23, semi-circular in section is formed. A ring 24 of soft rubber is disposed within the groove 23. When an object, such as a ball, 25 is directed at the device which represents a target on the game board, it strikes against the cap member 12 as will be explained below to make the desired electrical contact, and its motive force is completely cushioned and absorbed by the rubber bumper ring 24. The ball 25 rebounds immediately, the force for said rebound being supplied by the deformation of the rubber bumper ring 24 independent of any mechanism of the device by which electrical contact is obtained.

The housing or support 10 is secured to the game board 11 by means of screws engaging in screw threaded openings 27 formed in the cylindrical posts 14, said screws being also the means for maintaining a washer housing 40 in assembly, as will be explained below. Said washer housing 40 extends across the opening 16 between the openings 15 and having portions thereof extending beyond said openings 15 to enable the screws 26 to be tightened considerably for holding the entire device in position upon the game board 11.

Centrally of the housing or support 10, at the top thereof, a socket 28 is formed, being held in position by a plurality of legs 29, 30 and 31 in the manner of a spider. The socket and the legs are all integrally formed with the housing 10 in our preferred embodiment, but is should be obvious that the contruction may take other forms.

Said socket 28 is adapted to loosely accommodate the stem portion 32 of the head 12. Said head comprises a substantially convex, button-like mushroom-shaped portion 33 having a depending contact rim 34. Said head 12 is made in our preferred embodiment shown as a rather thin-walled member, to promote the effect obtained by reason of translucency, and may or may not have strengthening ribs. The stem portion 32 is substantially cylindrical as shown and depends into the socket 28, having its bottom surface resting on the bottom wall 35 of the socket 28 so that the stem is more or less loosely positioned in the socket, and the rim 34 is spaced above the game board 11.

In order to attain the stability and advantages referred to in the objects, it is essential to have the stem 32 so positioned within the socket 28 as to remain therein in substantially vertical position, or to regain said vertical position upon tilting or rocking thereof. The bottom surface of the stem 32 is therefore made substantially flat to engage with the cooperatingly flat surface 35 formed on the bottom of the socket 28. Thus said surface 35 is in substance a platform upon which the member 12 is vertically disposed.

By reason of the flat surface to flat surface engagement, the member 12 tends to retain its stable vertical position upon the housing or support 10, and further, if tilted from that position, it tends to recover it.

In order to assure seating of the stem 32 properly within the socket 28 and in order to assure that the head 12 will not rotate during operation of the device, the stem is provided with a radially extending longitudinally disposed feather, or key 36 which is received within a key way 37 provided in the leg 30 of the spider supporting the socket 28. It will be noted that the said leg 30 is thicker than the legs 29 and 31 for this purpose.

An elongated rod member 38 is positioned within the center of the stem portion 32 of the head 12, as by screw threading or moulding same therein. Said member 38 extends through an opening 39 provided in the socket 28 and passes through opening 16 and the washer housing 40.

Intermediate the ends of the member 38, a sleeve of metal 41 is rigidly secured, as for example by soldering. A helical tapered spring 42, having a series of convolutions surrounding the sleeve 41 and a plurality of larger convolutions extending upwardly therefrom to engage the underside of the wall of the socket 28, is secured at its smaller end to said sleeve 41. The portion 44 of the helical spring 42 having the larger convolutions, surrounds a depending annular flange 45 integrally formed with and extending downward from the bottom wall of the socket 28 and surrounding the opening 39 thereof. A washer 46 of electrically conducting material, such as for example phosphor bronze, is interposed between the portion 44 of the spring 42 and the bottom wall 35 of the socket 28. Said washer 46 is provided with an elongated extension 47 integrally formed therewith and leading to below the game board 11 where an electrical lead 48 may be attached thereto as shown, as for example by soldering.

In assembled position the spring member 42 is partially compressed so that its normal tendency is to pull the stem portion 32 and the member 38 downward relative to the fixed housing 10 and the socket 28. Thus, any movement of the head 12, as for example by a ball 25 striking the rim 34 thereof and lifting same upwards will be opposed by the downward force exerted on said head by the spring 42. It will be obvious that in view of the comparatively great weight of the object 25 the striking of the edge 34 will cause the stem 32 to tilt in the socket 28, but as soon as the ball 25 is rebounded by the rubber bumper ring 24, the spring 42 will immediately restore the stem 32 and head 12 to its original vertical position, none of the force of the spring 42 being required to cause the rebound of the ball.

Because of the fact that the flat bottom surface of the stem 32 is in engagement with the cooperatingly flat surface of the platform or bottom 35 of the socket 28 when the member 12 is tilted and the ball 25 rebounds, the spring 42 will immediately cause the member 12 to right itself in vertical disposition. The regaining of this position will cause the two flat surfaces to snap back into engagement and being non-resilient, the impact of flat surface to flat surface will result in no rebound whatsoever. Thus, a single stroke of the ball 25 will cause a single tilt of member 12 and will only result in a single contact between member 38 and washer 53 and result in a single electrical impulse in the external electrical circuit.

The member 38, extends through the washer housing 40, as explained above. Said washer housing consists of a pair of metallic plates 49 each having a central cup-like depression 50 struck or drawn therein. Said depressions are disposed face to face with the convex sides outwards so that a space 51, substantially cylindrical in configuration is formed therebetween when said plates 49 are held in assembly by screws 26 as explained above. The plates 49 are each provided with an opening 52 disposed centrally of the cup-shaped depression 50, said openings being adapted to register with one another when the plates 49 are assembled to form the housing 40. Disposed within the cylindrical space 51 of the housing 40, is a washer or annular member 53 of carbon having its central opening 54 of a diameter smaller than the diameter of the openings 52. Said member 53 is fixedly secured within the housing 40 so that the inner surface of the central passage 54 thereof presents a contact surface to the depending member 38 which passes therethrough. The openings in the plates 49 for the accommodation of the screws 26 may be slotted to permit adjusting of the housing 40 so that member 38 passes through the exact center of the opening 54.

A contact lug 55 is held in place by one of the screws 26 and an electrical lead is attached thereto as shown at 56.

In operation, when the head 12 is contacted at its rim 34 by the ball 25, the stem 32 is tilted in its socket 28 upon the platform 35 of the socket to one side thereof. Note that although the feather 36 extends substantially the entire length of the stem 32, it terminates short of the end thereof to permit free tilting of the stem in any direction. The tilting occurs against the force of the helical spring 42. Inasmuch as the rod member 38 is fixed to the stem 32, the said member 38 also rotates about the point of tilting. The free end thereof, which extends through the housing 40, will, therefore, move a distance greater than the amount of rocking or tilting because of the disposition thereof so far from the bottom wall 35 of the socket 28. Hence, only slight tilting will cause great movement of said free end of rod member 38. Inasmuch as the rod member is confined within the passage 54 of the carbon washer or annular member 53, the tilting of head 12 will cause said rod member 38 to momentarily contact said washer 53 on the inner surface of said passage 54.

It is obvious that the momentary contact above referred to is sufficient to establish electrical connection between the rod 38 and washer 53. If we assume that the device is connected in a circuit with a source of electrical energy and devices operative thereby, such as for example, relays or indicating devices, said electrical contact above referred to will operate as a switch to close the circuit and cause the operation of said relay or devices. Such a circuit is shown in Fig. 1. The electrical path through the bumper contact switch is as follows: from lead 48 of the external electrical circuit along extension 47 to washer 46, through spring 42 and sleeve 41 to rod member 38, through carbon washer 53, plate members 49 lug 55 to lead 56 of the external electrical circuit.

We have shown the contact washer or annular member 53 as carbon since we find it best suited for the purpose. The tendency of small surface contact connections to spark usually causes burning of the points of contact, and we have found that the tendency of burning by sparking has been considerably reduced in our device by forming the washer 53 of carbon.

We have shown in Figs. 7 to 10, inclusive, a modification of our bumper contact switch, slightly different in construction, but nevertheless similar in operation to the embodiment above described. The construction of our device in general is such that the entire operating mechanism is enclosed and concealed, procuring numerous advantages. Important of these is the fact that the housing of the device may be so constructed that the striking area about the target, that is the area in which the ball 25 will close the electrical circuit when the head 12 is struck, is limited to any desired amount.

The device illustrated in Figs. 7 to 10, inclusive, is provided with a housing 10' having an elongated rearward extending portion 10'' which prevents approach of the ball 25 to the button head 12' from the rear. If the ball 25 does approach the target, it is fended off by the rubber bumper ring 24 with which the housing 10' is provided.

The elongated housing 10'' is ideally adapted for various illumination schemes, such as, for example, the one shown in which a bulb 21', socket 18' and base 19' are disposed centrally of the space formed therein. The extension 10' has a top wall 10''' covering same as shown.

The only other structural variation of this embodiment is in the formation of the socket 28'. Said socket 28' is disposed directly in the top of the housing 10' without a spider or legs. All of the other operating mechanism and structure of the device are the duplicates of those shown in Figs. 1 to 6, inclusive, and are designated by similar characters primed.

It is to be noted that the head 12' is provided with a plurality of ribs 34'' for the strengthening thereof as has been previously suggested.

The opening 16' in the game board may be of any suitable size and shape to accommodate the device and enable same to be fixed thereto by means of the housing 40' and its associated screws 26'.

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. In a game of the character described, the combination of a game board, a support disposed upon said game board, a member presenting a target at which objects movable upon said game board may be directed disposed upon said support and arranged to be tilted thereon when struck by said movable objects, said member having its lowest engageable portion substantially higher above said game board than the center of gravity of said movable objects whereby when said objects engage thereagainst, same will move inwardly of and underneath said member, lifting said engageable portion and causing tilting thereof, said objects being adapted to continue in their motion after striking said target member to impact and expand all of their kinetic energy against said support, said support being provided with shock absorbing means for cushioning said impact, said member having a downwardly extending electrical conductor, an electrical contact presenting a contact surface to said conductor, said conductor being normally maintained out of contacting engagement with said contact and an electrical circuit within which said conductor and contact are connected adapted to be closed upon the tilting of said member.

2. In a game of the character described, the combination of a game board, a support disposed upon said game board, a member presenting a target at which objects movable upon said game board may be directed disposed upon said support and arranged to be tilted thereon when struck by said movable objects, said member having its lowest engageable portion substantially higher above said game board than the center of gravity of said movable objects whereby when said objects engage thereagainst, same will move inwardly of and underneath said member, lifting said engageable portion and causing tilting thereof, said objects being adapted to continue in their motion after striking said target member to impact and expand all of their kinetic energy against said support, said support being provided with shock absorbing means for cushioning said impact, said member having a downwardly extending electrical conductor, an electrical contact presenting a contact surface to said conductor, said conductor being normally maintained out of contacting engagement with said contact and an electrical circuit within which said conductor and contact are connected adapted to be closed upon the tilting of said member and means normally holding said member against tilting upon said support.

3. In a game of the character described, the combination of a game board, a support disposed upon said game board, a member presenting a target at which objects movable upon said game board may be directed disposed upon said support and arranged to be tilted thereon when struck by said movable objects, said member having its lowest engageable portion substantially higher above said game board than the center of gravity of said movable objects whereby when said objects engage thereagainst, same will move inwardly of and underneath said member, lifting said engageable portion and causing tilting thereof, said objects being adapted to continue in their motion after striking said target member to impact and expand all of their kinetic energy against said support, said support being provided with shock absorbing means for cushioning said impact, said member having a downwardly extending electrical conductor, an electrical contact presenting a contact surface to said conductor, said conductor being normally maintained out of contacting engagement with said contact and an electrical circuit within which said conductor and contact are connected adapted to be closed upon the tilting of said member and resilient means normally holding said member against tilting upon said support.

4. In a game of the character described, the combination of a game board, a support disposed upon said game board, a member presenting a target at which objects movable upon said game board may be directed disposed upon said support and arranged to be tilted thereon when struck by said movable objects, said member having a central downwardly extending electrical conductor passing through said support and said game board, an electrical contact presenting a contact surface to said conductor, said conductor being normally maintained out of contacting engagement with said contact and an electrical circuit within which said conductor and contact are connected adapted to be closed upon the tilting of said member and resilient means normally holding said member against tilting upon said support, said means comprising a coiled spring surrounding said conductor and having one end attached thereto, the other end bearing against said support and normally urging said member towards said support.

5. In a game of the character described, the combination of a game board, a support disposed upon said game board, a member presenting a target at which objects movable upon said game board may be directed disposed upon said support and arranged to be tilted thereon when struck by said movable objects, said member having a central downwardly extending electrical conductor passing through said support and said game board, an electrical contact presenting a contact surface to said conductor, said conductor being normally maintained out of con-

tacting engagement with said contact and an electrical circuit within which said conductor and contact are connected adapted to be closed upon the tilting of said member and resilient means normally holding said member against tilting upon said support, said means comprising a coiled spring surrounding said conductor and having one end attached thereto, the other end bearing against said support and normally urging said member towards said support, said coiled spring having substantially larger convolutions at one end than at the other end thereof, the larger end bearing against said support and the smaller end being attached to said conductor.

6. In a game of the character described, the combination of a game board, a support disposed upon said game board, a member presenting a target at which objects movable upon said game board may be directed disposed upon said support and arranged to be tilted thereon when struck by said movable objects, said member having a portion thereof loosely received within a socket provided therefor in said support, and being confined therein, whereby said member may be substantially rocked upon or lifted off of said support without dissociating same therefrom.

7. In a game of the character described, the combination of a game board, a support disposed upon said game board and having a platform provided thereon, a member presenting a target at which objects movable upon said game board may be directed resting upon said platform and adapted to be tilted thereon when struck by said movable objects, and means urging said member to rest normally upon said platform and to oppose said tilting, said means comprising a coiled spring having one end attached to said member and the other end bearing against said support and normally urging said member downward upon said platform of said support.

8. In a device of the character described, a game board, a support member positioned upon said game board, a member overhanging said support member and adapted to present a target for balls adapted to be rolled along said game board to engage said target member and rock same upon said support, said target member having a flat ended downwardly extending portion, said support member being provided in the top thereof with a flat bottomed recess within which the downwardly extending portion of said target member is adapted to project, said downwardly extending portion loosely engaging within said recess with said flat surfaces in contact, a conducting member fixed to said downwardly extending portion and projecting through said support and said game board and adapted to engage an electrical contacting device to thereby complete a circuit upon the rocking of said flat surfaces relative to one another, said conductor having resilient means attached thereto and bearing against the bottom of said support member and serving to normally pull said flat surfaces into engagement with one another thereby preventing rebound of said surfaces if same have been caused to rock relative to one another by reason of one impact of said target member by one of said rolled balls.

9. A bumper switch adapted for use with a ball rolling game, said switch comprising a hollow substantially bell-shaped target member, a standard adapted for mounting in upright position relative to a ball rolling surface in said game, said target member being disposed substantially around said standard and having an upper inner portion resting on an upper portion of the standard whereby the target member is mounted to rock on the standard, an elongated contact member extending concentrically of said member from the central upper portions thereof, spring means cooperating with said contact member and standard to urge said central inner portions of the bell-shaped member firmly but yieldably in seated condition on the standard for rocking movement as aforesaid and normally maintaining said target member in a predetermined condition of alignment with respect to the standard, and companion contact means including an annular contact freely surrounding a portion of said elongated contact member, said elongated contact member when in normal condition as aforesaid being out of contacting engagement with said companion contact means and engaging the same to close a circuit when the target member is rocked from a predetermined condition of alignment as aforesaid.

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