April 27, 1965 H. L. SEIDEN ETAL 3,180,645

LINEAR ACTION BALL BUMPER

Filed March 14, 1963

Fig. 1.

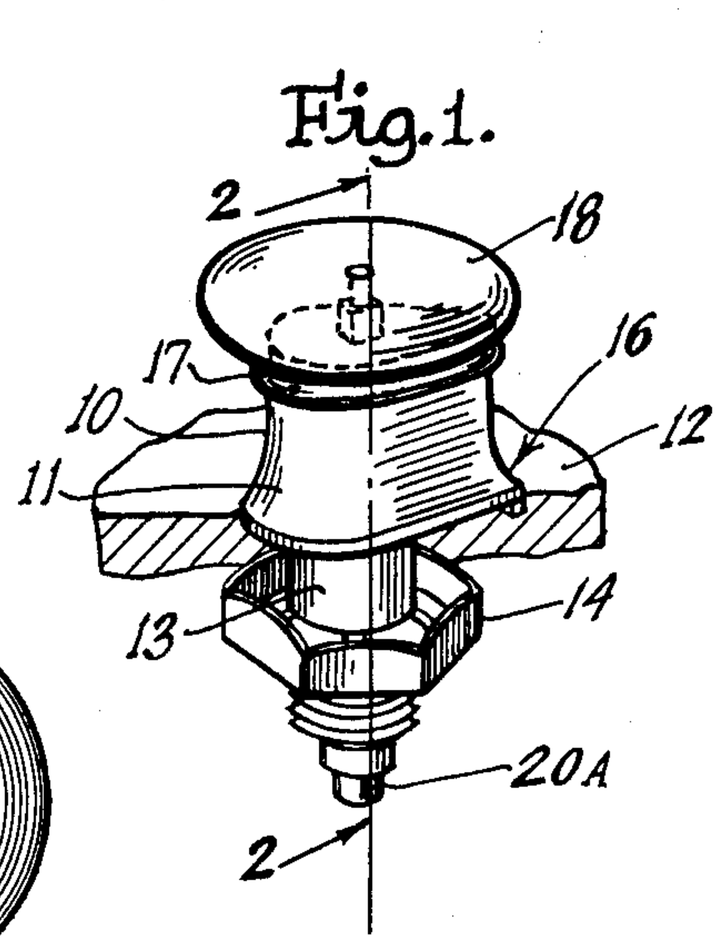


Fig. 2.

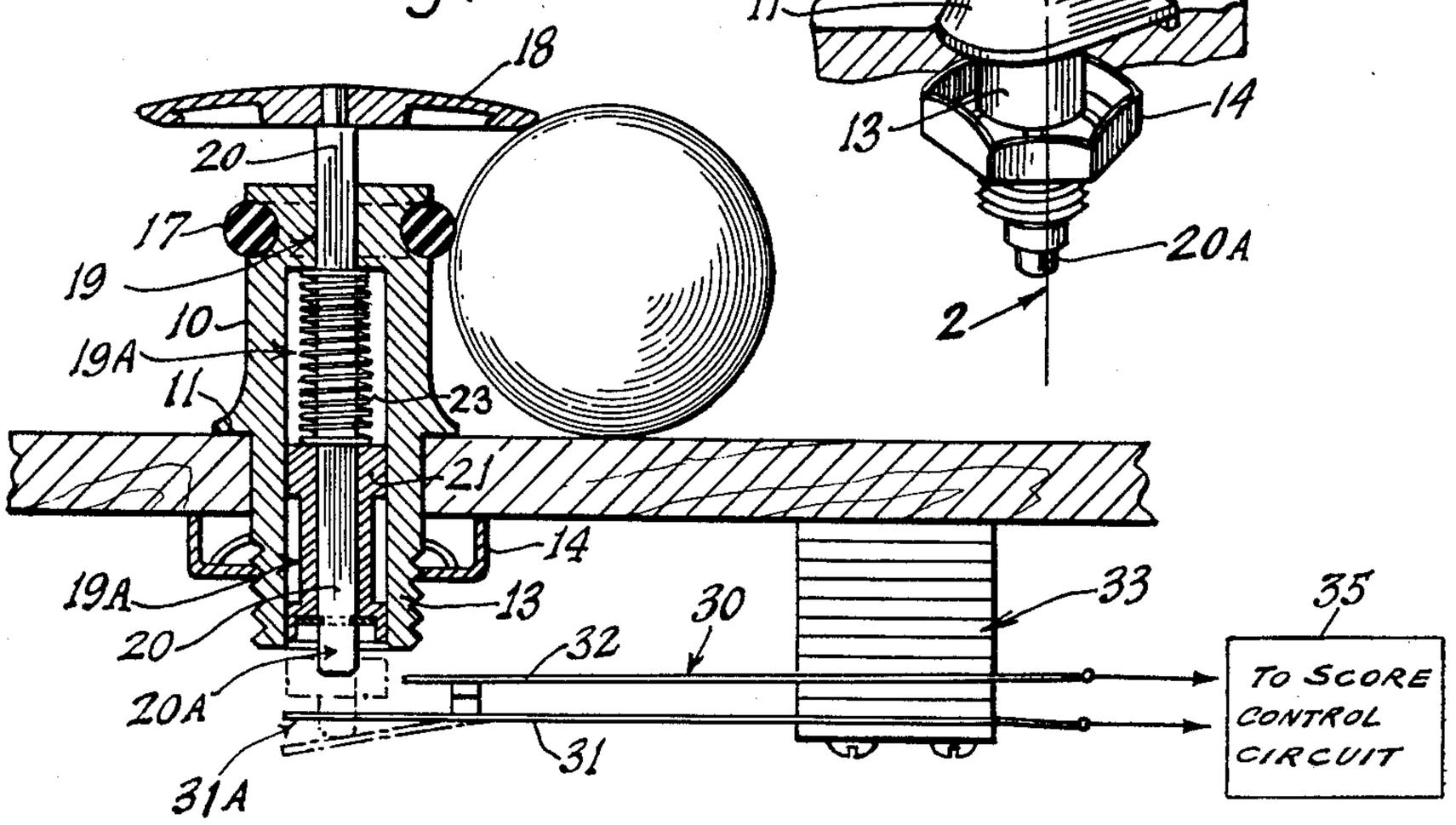
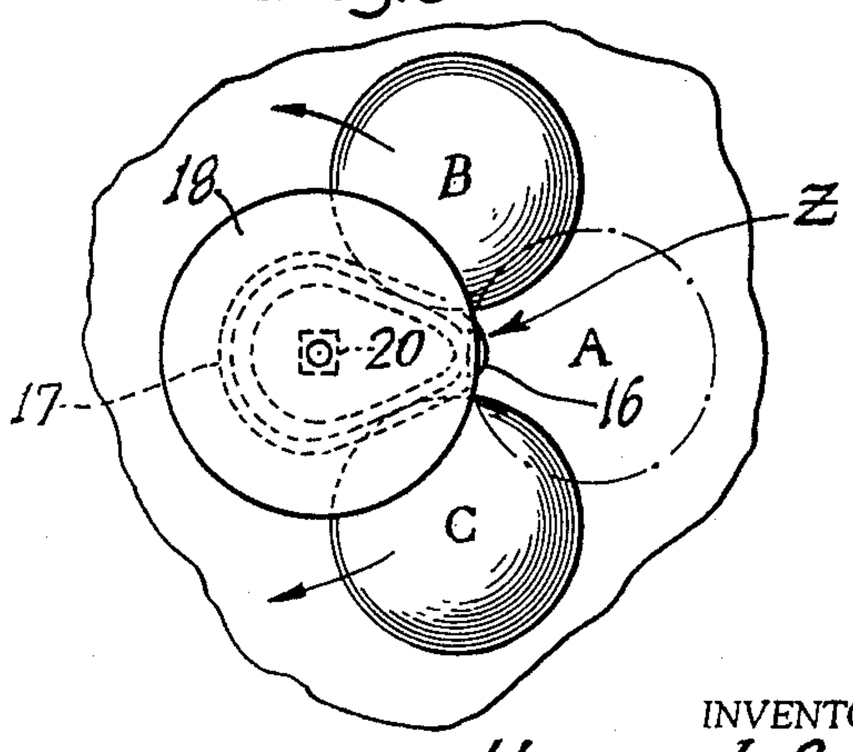


Fig. 3.



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LINEAR ACTION BALL BUMPER

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This invention pertains to improvements in bumpers for ball-rolling games of the type in which one or more metal or like balls are projected onto an inclined roll-down board to engage various scoring instrumentalities including switches, rebound obstacles, scoring pockets, and the like.

Ball bumpers of the class described are well-known and of considerable variety whether used merely as obstacles or as means for controlling scoring circuits and devices.

The principal achievement of the present improvements is to provide a bumper primarily intended to control a scoring switch or the like and characterized by the fact that the switch means can be wholly separate from the bumper and the bumper is provided with a sensitive, strictly linearly-moving switch-operating member actuated by impact of the ball against the bumper post in a wedging action beneath a vertically shiftable dome piece which is lifted by the ball and constrained to linear up and down displacement regardless of the angle of approach or degree of momentum of the ball.

It is a further object to shape the bumper in a way to prevent stalling of a ball by having a salient projection or radial promontory of the post structure adapted, as in other prior bumper structures, to extend upgrade on the playing board, but unlike prior to stall projections to lie in almost flush vertical alignment beneath the periphery of the vertically movable dome piece so that a ball can approach the bumper nearly head-on down grade and glance off the stall-preventing salient and still wedge in beneath the dome piece sufficiently to actuate the switch while possessed of a minimum energy content.

A further object is to provide a bumper with vertically-linearly-movable control member and spring means normally depressing the same with a force sufficient to hold a score switch in open condition, thereby increasing sensitivity and positive switch action because the closure of the contacts is made to depend upon the spring action of the switch blades themselves and not the weight or impact of the ball in forcing contacts together as in most prior bumper switch arrangements.

Additional objects and aspects of novelty and utility relate to details of the construction, combination, and mode of operation of the illustrative embodiment hereinafter described in view of the annexed drawing, in which:

FIG. 1 is a perspective view of the new bumper;

FIG. 2 is an enlarged vertical sectional view of the same and fragmentary portions of a ball rolling board;

FIG. 3 is an illustrative functional diagram viewing the bumper from the top.

Referring to FIG. 1, a preferred embodiment of the bumper comprises a post or upright body section **10** preferably molded from a suitable synthetic plastic for economical production and having a radially flared foot or base portion **11** adapted to seat upon the surface of a ball-rolling board **12** with a downward extension **13** projecting beyond the lower surface of the board for engagement by a retaining means such as the nut **14** adapted to engage molded threading on said extension.

From one side of the post projects a stall-prevention formation or promontory **16** which is intended to point upgrade on the ball-rolling board to prevent the lodgement of a very slow moving ball in a stalled condition of exact balance at this side of the bumper, the provision of such formations being used in other bumper construc-

tions (for example, that shown in U.S. Patent No. 2,277,274 to Stoner), but in the present construction, as seen particularly in FIG. 3 at Z, being distinguished by the fact that the radial outermost peripheral boundaries of the promontory or stall-preventing projection lie in almost flush vertical alignment beneath the adjacent peripheral boundaries of a circular dome plate **18** surmounting the posts, the purpose of this arrangement being explained more fully hereafter.

The bumper body is provided with a resilient rebound tire or collar **17** beneath the dome plate **18** and the post structure is provided with an internal bore **19** which is preferably of some angular cross section (e.g. square) to key with a slideable plunger **20** of like cross section intended to reciprocate within the post, the upper end of said plunger extending upwardly beyond the post for attachment integrally or by other means such as cementing, with the central area of the dome plate **18**.

The internal post bore **19** is enlarged at **19A** to provide room for a vertically-shiftable collar **21** fixed on the plunger **20** either as a molded part thereof or by cementing or like attachment, the same serving as an abutment for one end of a compression spring **23** surrounding the upper internal reaches of the plunger between the collar and the top of the bore, whereby the plunger and therefore the dome plate, are urged downwardly into a normal, non-hit position, the lower end of the plunger **20A** projecting below the attaching foot **13** of the post for engagement with a controlled instrumentality such as the blade switch **30**.

The switch means **30** may comprise an ordinary stack switch consisting of a pair of contact blades **31, 32** secured in a stack of insulating washers **33**, the contact blades in this construction being biased normally to close together in circuit-closing relation, and the projecting end **31A** of the longer blade being disposed to underlie the lower end **20A** of the plunger in a relationship such that the spring-depressed normal position of said plunger flexes the switch blade **31** downwardly (as in dotted lines, FIG. 2) into open-circuit relation relative to the companion blade **32**. When a ball engages the bumper appropriately, as illustrated in FIG. 2, the dome plate will be elevated slightly with a corresponding rise of the plunger which is sufficient to permit closure of the switch blades **31, 32** to actuate any desired control means or circuit indicated diagrammatically by the block **35**.

It will be apparent from inspection of FIG. 2 that the ball in moving beneath the dome plate exerts a wedging action on the latter which is at once smooth and uniform as distinguished from the prior impact types of switch operation characteristic of the bumpers having built-in switch means, such as rocking contact plates or contact posts of the class typically illustrated in the aforesaid Stoner patent, or U.S. Patent No. 2,804,514 to Peters, which discloses a form of stack switch wholly separate from the bumper, but actuated by a rocking ball and socket lever.

In consequence of the wedging lift-action of the ball, a slowly moving, low-energy ball can actuate the plunger and the switch means consistently without contact flutter and does not depend to any extensive degree upon momentum or its energy content and the resulting displacement of the linearly-moveable plunger eliminates the objectionable fluttering type of switch contact closure which is encountered in many prior ball bumper contact arrangements. Moreover, the plunger displacement is consistently responsive whether the ball is moving slowly or strikes the rubber tire and dome at high speed, because rebound does not depend at all upon engagement of the ball with the sensitive dome plate itself, the latter being either positively elevated or not moved at all since it is permitted no sidewise movement or play.

Referring to the functional illustration of FIG. 3 looking down upon the dome of the bumper, the ball –A– may be considered as approaching the stall-prevention promontory 16 head-on, in which case the dome plate would not be engaged or lifted at all by the ball, but would remain unmoved; but engagement of the ball in either of the angular positions at –B– or –C– immediately adjacent the promontory will permit the ball to displace the dome and operate the score-control switch means, it being further evident that the same switch-actuating response will result from engagements of the ball at all other angular approaches about the periphery of the dome piece.

Ball bumpers are known in which there is a central plunger surmounted by some type of cap which has a sloping or wedge-like under surface normally elevated by a spring means and positively driven by some form of electromagnet triggered on impact of a ball to cause the wedge cap to descend abruptly and forcibly to throw the ball energetically away from the bumper, such a device being exemplified by the construction shown in U.S. Patent No. 2,219,898, it being noted that all such devices are considered as reprojectors because they positively drive the ball from beneath or radially away from the bumper in distinction to the simple rebound action occurring on the disclosed bumper provided, of course, that the ball strikes with sufficient force to produce such rebound, it being possible, for example, in the present device for a ball to roll or dribble slowly along the side of the bumper and cause switch operation but without force sufficient to cause the ball to rebound, for instance as from positions –B– or –C–, FIG. 3.

We claim:

1. A ball bumper comprising an upstanding post section having a plunger slideable up and down therein with minimized side play, a dome plate secured to the upper end of the plunger with peripheral portions lying circumambiently about the post so that a ball of given diameter striking the post tends to engage the underside of the dome plate and lift the same linearly and elevate the plunger, spring means carried within the post and normally lowering the plunger and its dome plate to a normally depressed position, said plunger having a part projecting beyond the lower margins of the post for engagement with a switch-actuating member of a type operably responsive to up and down motion coaxially with the movement of the plunger.

2. A bumper and switch combination for use on a horizontally-inclined ball-rolling board comprising a switch mounted on the underside of said board and having an operating member disposed for substantially up and down motion to actuate the switch, and a bumper structure including a post body mounted on the upper side of said board substantially above said switch operating member, and further including a vertically linearly reciprocable plunger having a lower end portion overlying and engageable with said switch operating member; a dome plate surmounting the upper end of said plunger and of a diametric configuration to overlie and project radially about the post body at a predetermined level above said board so that a ball of predetermined diameter on the board can engage beneath the dome plate and lift the same with a wedging action to elevate the plunger and cause operation of said switch.

3. The construction of claim 2 further characterized by the provision of a salient promontory projecting in a radial sense from one side of the post body a distance substantially terminating in vertical alignment with a peripheral edge portion of the dome plate whereby a ball engaging the bumper promontory at one particular position angularly thereabout is prevented from displacing the dome plate, said promontory being shaped and confined nevertheless to present a minimum obstruction to the ball from engaging the dome plate on either side thereof immediately adjacent said particular angular position whereby the lifting action of the ball in engaging dome plate at all other angular positions thereabout is not interfered with.

References Cited by the Examiner

UNITED STATES PATENTS

2,219,898	10/40	Hooker	273—129
2,277,274	3/42	Stoner et al.	200—61.11
2,793,861	3/57	Konopka.	

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