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2,501,021

BALL BUMPER

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Fig. 1.

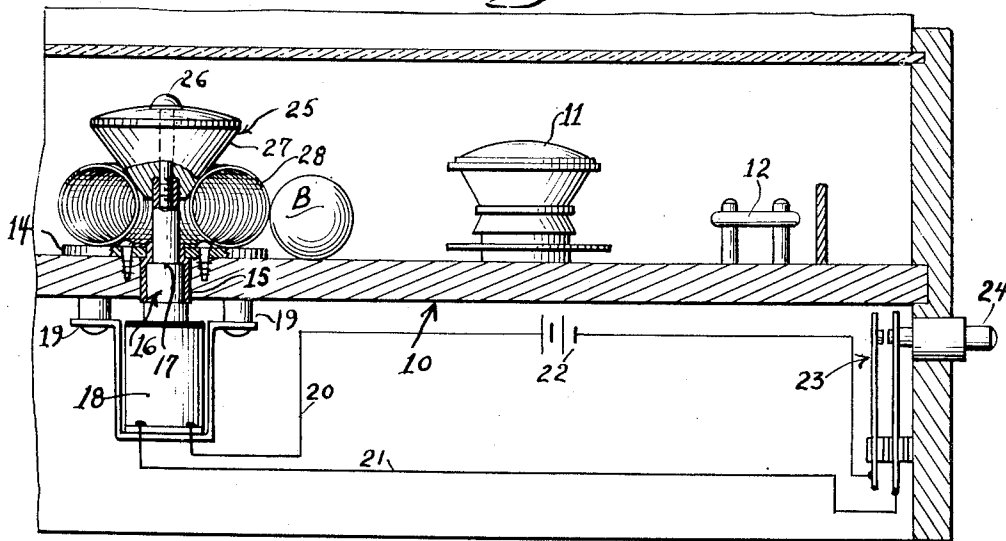


Fig. 2.

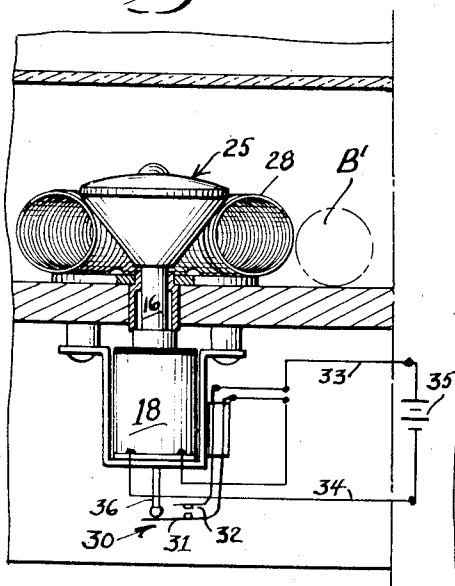


Fig. 3.

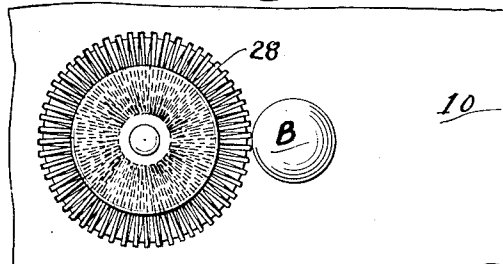
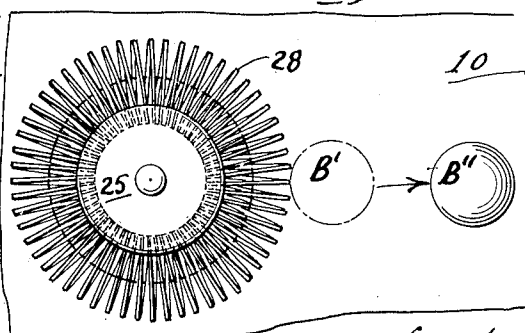


Fig. 4.



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BALL BUMPER

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8 Claims. (Cl. 273-118)

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This invention pertains to ball rolling games, and more particularly to target and bumper devices used therein, the principal object being the provision of an improved ball bumper having a novel appearance, structure, and action.

More particularly stated, the invention provides a ball bumper consisting mainly of a toroidal spring, that is to say, a spiral spring with its ends brought together in the manner of a doughnut, and a conical plunger in the central opening and movable to spread the spring and thereby reproject a ball engaged with the bumper.

A further object is the provision of a reprojecting ball bumper comprising a spiral spring formed in the manner of a doughnut with a conical plunger in the central hole thereof, and electromagnetic means for attracting the plunger so as to spread the convolutions of the spring, energization of the electromagnetic means preferably being at the option of the player of the game by means of a switch to be closed whenever it is desired to reproject a ball touching or close to the spring.

Another object is to provide means for automatically actuating the bumper in reprojecting action whenever a ball lies in a certain area or proximity thereto.

Another object is to provide such resiliency in the spring that it will afford some rebounding effect when struck by a ball, apart from the electromagnetic reprojecting action thereof.

Additional objects and advantages of the invention pertain to details of the construction and operation of the embodiments described hereinafter in view of the annexed drawing in which:

Fig. 1 is a sectional view through a ball rolling game cabinet showing the novel bumper means partly in elevation and partly in section;

Fig. 2 is a fragmentary sectional detail of the game cabinet and means shown in Fig. 1, showing a modification of the bumper operating means;

Fig. 3 is a top plan view of the bumper in normal position;

Fig. 4 is a top plan view of the bumper in operated or expanded condition.

The novel bumper, as viewed in Fig. 1, is adapted for mounting on the playfield 10 of a known type of ball rolling game, and on which are disposed various ball objectives or target devices 11 and 12 to be struck by a ball projected onto the field by the player. The objectives 11 are another form of ball bumper well-known in the art, and they usually involve some form of score switch means (not shown) connected in a scoring circuit, such that striking these bumpers 11 will cause indication, usually by lamps on a score panel, of the player's score.

The novel bumper is of the reprojecting type,

by which is meant that it can be actuated to propel a ball away from it with the object usually of causing the ball to strike some particular objective, such as the wafer-type bumper 11, for increased scoring.

In the preferred construction, the novel bumper of Fig. 1 includes a base plate 14 mounted on the playfield and having a bore or stem 15 leading through the playfield and in which is disposed a plunger 16, shouldered as at 17 for limiting upward movement thereof.

The lower portion of the plunger 16 is received in the core of an electromagnetic solenoid 18, mounted by means 19 on the underside of the playfield, said solenoid being connected by conductors 20 and 21 in circuit with power supply or battery 22 and a switch 23, actuated preferably by push button 24 on the side of the game cabinet.

Within the bore of the solenoid may be a light spring (not shown) for maintaining the plunger 16 in normal, upwardly displaced position.

Surmounting the plunger is an actuator element 25 in the preferred form of a plastic member of attractive color secured to the plunger by means 26. The actuator 25 has a sloping or tapered side portion 27 and may be a simple conical configuration.

Bumper means in the form of a toroidal spring 28, and of annular or doughnut-like form, surrounds the plunger 16 beneath the actuator 25 on base plate 14, said spring having some yieldability to the impact of a ball B striking the same, preferably, so that the device, even in its normal or unoperated state, serves as a bumper.

Assuming that a ball B, as in Fig. 1, happens to be in close proximity or contact with the spring or bumper means 28, and at this time the plunger 16 is caused to be more or less abruptly depressed, carrying downwardly with it the actuator 25, the tapered portions 27 driving into the central opening or core of the spring will expand the latter into the condition illustrated in Fig. 2 and throw the ball B' outwardly, for example, toward another target objective or bumper 11, as in Fig. 1.

The normal or at rest condition of the bumper is illustrated in Fig. 3 with the ball B touching the expandible bumper element 28, while in Fig. 4, the bumper member 28 is expanded, as by movement of the actuator 25 downwardly, to throw the ball from the position of the ball B' to that of the ball B''.

Under one operating condition, the solenoid 18 may be optionally energized by the player of the game by pushing the switch button 24 to close switch 23, the player exercising some judgment and skill in deciding the proper moment for actuating the bumper to achieve a desired result.

In a modified operating arrangement, as in

Fig. 2, a switch 30 is connected for closure of contact 31 against contact 32 to energize the solenoid via conductors 33 and 34 from battery 35, the contact 31 being normally held away from contact 32 by an extension 35 on plunger 16, and all normalizing spring means (not shown) alluded to hereinabove as being within the solenoid core for raising the plunger 16, are omitted, and the normalizing spring effort of the helical or spiral spring bumper element 28 is sufficient to elevate or normalize the actuator and plunger, the actuator being mounted on the plunger so as not to raise the latter fully against the stopping shoulder 17.

Under these conditions, when a ball strikes the spring member 28, a sufficient lifting effort is exercised by the latter against the actuator to raise the plunger 16 slightly and permit contact 31 to close against contact 32 and energize the solenoid. Thus, the ball striking the bumper operates a switch, which results in operation of the actuator, which in turn effects a reprojection of the ball.

The expandible bumper member 28 may be conveniently made by securing together the ends of a suitably resilient helical or spiral spring so as to afford the configuration shown best in Fig. 4.

I claim:

1. A ball bumper comprising a spiral spring with its ends closed together to form a circle, a conical plunger disposed in the center of said circle in engagement with the inner convolutions of the spring, said plunger being elevated by the normal spring action of said convolutions on the conical portions of said plunger, said convolutions being displaced outwardly by movement of said plunger inwardly of the said center, whereby to expand said spring in a direction outwardly of said center.

2. A ball bumper comprising a spiral spring arranged in the form of a doughnut, a mounting member underlying the spring, a plunger carried by the mounting member and extending upwardly through the center of said spring, a tapered expander on said plunger and movable downwardly into the central region of the spring with said plunger to displace the inner parts of the spring and thereby expand said spring outwardly of said center, said spring normally forcing said expander and plunger upwardly to a predetermined position, and electromagnetic means for moving the plunger and expander downwardly as aforesaid.

3. A ball bumper comprising a support for mounting on a ball rolling field, a plunger reciprocable in said support, a conical head on said plunger with its widest dimension outermost, an elongated spiral spring having its extremities joined to form an annular spring having a central opening, said spring being mounted about said head with the latter in said central opening, said spring and head coacting in reciprocations of the head and plunger to expand and contract the spring in directions radial of said head and plunger.

4. A ball bumper comprising a mounting plate, a plunger reciprocable in said plate, a conical actuator carried by said plunger above said plate, and a bumper member in the form of a helical spring formed into an annulus circumambient of said actuator and disposed between the latter and

said plate, said bumper spring normally raising said actuator and plunger, together with electromagnetic means energizable to attract said plunger downwardly and force the actuator centrally into the spring to expand the same for purposes of propelling a ball engaged with said spring in its range of expanding movement.

5. A ball bumper comprising an annular spring helix, a wedge movable into the annulus to expand the same, and means mounting said wedge for movement into and out of the annulus.

6. A ball bumper comprising an annular spring helix, an expanding device movable into and out of the annulus, a solenoid having a plunger reciprocable to move said expanding device into and out of the annulus, an energizing circuit for said solenoid, a spring switch biased to closed-circuit condition in said circuit and having an operating extension in alignment with said plunger, and means moved by said plunger holding said switch in open-circuit condition when the plunger and expanding device are in normal condition, said means being moved by said plunger to effect closure of said switch responsive to movement of the expanding device by engagement of a ball with said helix, whereby the latter will be expanded to reproject said ball.

7. A ball bumper comprising an annular spring helix, a conic wedge movable into the annulus to expand the same, an electromagnetic device having an armature portion carrying said wedge for movement into and out of the annulus as aforesaid, spring action of the annulus normally disposing said wedge out of the annulus, a circuit for energization of said electromagnetic device, a switch in said circuit and coacting with said armature portion whereby the switch is held open in normal condition of the armature portion and wedge with the latter substantially out of said annulus, the latter being movable by a ball striking the same to urge said wedge in a sense outwardly of the annulus a distance sufficient to effect closure of said switch for energization of the electromagnetic device to repropel said ball.

8. A rebound device for a ball rolling game comprising a game board, a stationary member mounted on the board, a conical shaped member movably supported by the board for movement toward said stationary member, means for moving said conically shaped member toward said stationary member, a resilient radially expandible ball projecting ring arranged between said stationary member and said conical shaped member in engagement with the conical surface of said conical shaped member and adapted to be expanded radially to project a ball therefrom upon said board by said conical shaped member when said conical shaped member is moved toward the stationary member by said moving means.

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