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H. L. SEIDEN

3,391,937

CANTILEVER TYPE BALL BUMPER

Filed Dec. 13, 1966

Fig. 1.

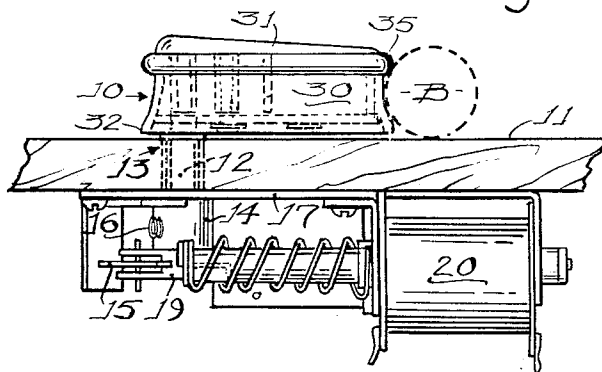


Fig. 2.

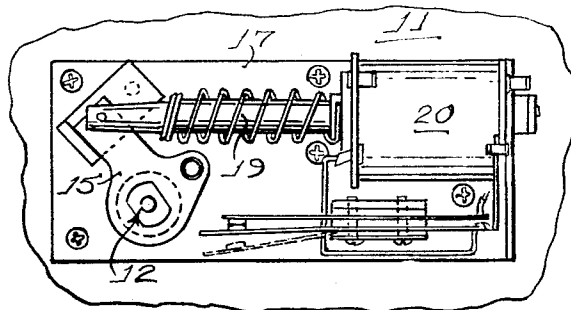


Fig. 3.

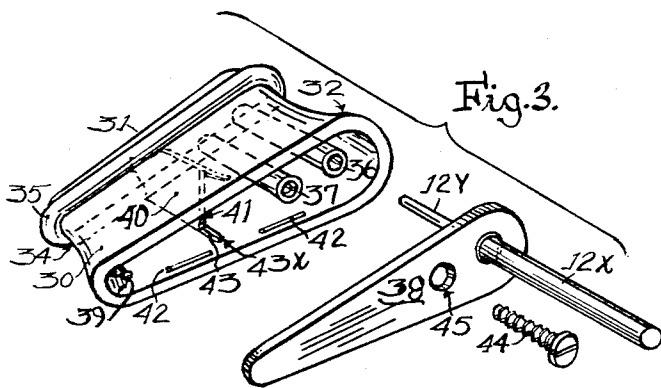


Fig. 4.

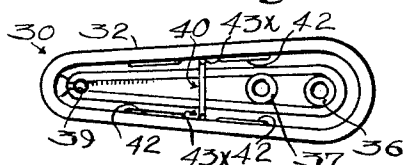


Fig. 5.

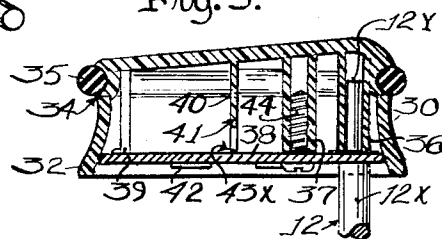
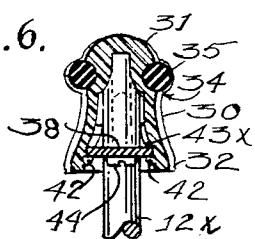


Fig. 6.



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3,391,937

CANTILEVER TYPE BALL BUMPER

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8 Claims. (Cl. 273-129)

ABSTRACT OF THE DISCLOSURE

The improved bumper structure is characterized in that it consists in a molded bumper body of synthetic plastic material in the form of a lightweight shell having only one open side with internal supporting rib, web and post formations constituting supporting lands exposed at that side, including snap-in formations bordering the margins of the opening at such side engageable with a rigid cantilever base plate fitting into and closing the opening against the ends of the post formations and lands, the base plate having a spindle affixed thereto at one end for cantilever support of the body with an end of the spindle penetrating one post formation for added support and centering and securing means offset from the spindle and penetrating the plate to engage another post formation, whereby the body is releasably attached to the plate in a rigid and sturdy assembly.

This application discloses and claims subject matter disclosed and claimed in a copending application Ser. No. 323,660, filed Nov. 14, 1963, now Patent No. 3,298,961. The invention hereinafter described relates to the construction of ball bumpers for use in ball-rolling games and has for its principal object the provision of structural improvements particularly adaptable to the fabrication of the so-called cantilever type of bumper which is commonly employed in a pivotal manner for operation as a ball reprojector in which function the bumper is caused by suitable electromagnetic or like means to swing sharply and strike a blow against a ball to alter its course on a ball-rolling panel, the ball being generally of steel and subjecting the bumper to severe stresses which become destructive over a period of time and require replacement, among other parts, of the ball-engaging bumper body.

When bumpers of the class described are employed as reprojectors, electromagnetic drive means, for example a solenoid is frequently employed as the source of pivoting or driving power; and to minimize the loading thereof while procuring maximum striking force and speed in the response of the bumper in such reprojecting action, it is desirable to achieve maximum strength in the bumper body with minimal weight in the entire moving assembly.

The several objects and aspects of novelty and utility characterizing the invention may be realized in the preferred embodiment thereof described in detail hereinafter in view of the annexed drawing in which:

FIGURE 1 is a fragmentary sectional view of a ball-rolling board with the improved bumper mounted thereon for actuation by reprojecting drive mechanism;

FIGURE 2 is a bottom plan view of the apparatus seen in FIGURE 1;

FIGURE 3 is an exploded perspective view of the components of a preferred form of the bumper assembly;

FIGURE 4 is a plan view of the open bottom of the bumper body;

FIGURE 5 is a vertical sectional detail lengthwise through the bumper structure with parts of the spindle broken away;

FIGURE 6 is a lateral section of the structure seen in FIGURE 5.

In its reprojecting adaptation seen in FIGURE 1, the

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bumper 10 is mounted upon the upper ball-rolling surface of a playfield panel 11 by shaft means 12 extending downwardly through a bushing 13 to a level beneath the panel where the shaft engages in the hub member 14 of a crank lever 15 in which it is secured as by a set screw 16, said crank being journaled in a mounting plate 17 forming part of a driving unit.

The driving means may be of the type disclosed in U.S. Patent No. 3,298,691 (Ser. No. 323,660, aforesaid) comprising an electromagnetic solenoid 20 secured on said base plate 17 and having a plunger 19 attractable thereby and pivotally connecting with said crank member 15 for operation to pivot the latter when the solenoid is energized, whereby to pivot the hub portion 14 and the cantilever bumper spindle 12 affixed therein, thereby swinging the bumper body 10 abruptly to impart a blow to a ball -B- within striking range thereof.

As viewed in FIGURE 3, the bumper structure 10 comprises a body 30 which is of an elongated configuration tapering downwardly from a somewhat rounded dome portion 31 to an outwardly-flared bottom skirt portion 32 bordering a bottom opening 33 exposing the hollow interior of the body. Thus, the bumper body is a substantially closed shell having only one open side constituting a bottom entry adapted for snap-in interfit with the cantilever supporting and pivoting means to be described.

Externally, near the dome or top, the molded shell is provided with a circumambient groove 34 which seats a resilient bumper or rebound band 35, FIGURES 1, 5 and 6, having a diameter sufficient to cause outer peripheral portions thereof to stand outwardly from the body for engagement by the ball -B-, it being observed that the skirt portion 32 flares outwardly into the region which underlies the curved part of the ball so that upper portions of the ball engage the band rather than the bumper body itself, the band being intended to absorb some of the shock of impact when the ball strikes the bumper or vice versa when the bumper moves in reprojecting action, but is also intended to cause a ball striking the bumper in its stationary condition to rebound therefrom.

Internally, certain structural formations are provided for strengthening the shell and interconnecting with certain cantilever supporting and rotating means, including, FIGURES 3, 4 and 5 particularly, a pair of posts 36 and 37 extending from the dome portion normally to a plane included through the open portion or body of the shell, said posts having free end portions constituting lands terminating substantially at said plane or at a point close to the opening for supporting engagement with a cantilever plate 33 in a manner further explained hereafter.

The posts 36 and 37 are disposed near one of the longitudinal ends of the body in the region of cantilever support, but there is a third post-like formation 39 (FIGURES 4 and 5) adjacent the opposite end thereof which affords another land or support for opposite end regions of the plate 38, or conversely, support for the body upon the plate.

Situated at a point between the opposite longitudinal ends of the body shell is a lateral cross web 40 integrally connecting with the dome portion and parts of the opposite adjoining side walls, and as viewed particularly in FIGURES 3 and 5, the upper margin 41 of this web terminates at a point substantially below the free ends or lands of the other posts, that is to say a substantial distance below the lip margins of the shell at the open side thereof, so as not to prevent some yieldability of the relatively thin side wall portions of the shell in a lateral sense in this region to effectuate the snap-action engagement and disengagement of a number of longitudi-

dinally-extensive integral snap-in ribs 42, FIGURES 3 and 4, disposed close to the margins of the open side of the body so as to overlie edge portions of the plate 38 when the latter is inserted in, or withdrawn from assembled relation with the body member.

However, what may be regarded as slender rib-like remnants or continuations 43 of the web extend to the level of the post lands, and the extremities of these ribs or remnants constitute additional lands 43X contributing to the seating of the plate 38.

As viewed in plan, FIGURE 4, the contour of the bumper body is of an elongated pear-shape with wider portions at the end thereof which is engaged in cantilever support, the opposite free end tapering somewhat to a point, as is customary in this class of bumper, because such devices are commonly installed on a tilted ball-playing field or panel down which the played balls roll with more or less speed depending upon how and in what directions they have been impelled; and frequently the narrower or pointed end of such a bumper body will be located at a lower position down the incline of the panel than the fixed end, so that the slower balls engaging the portions thereof at the higher level (and not rebounding) will tend to follow and hug along the side thereof leading to the narrower end without stalling or slowing up appreciably, whereby to enhance the overall ball action.

Therefore, the base plate 38 is shaped conformably, as seen in FIGURE 3, and dimensioned so as to fit substantially flush within the borders of the shell at the bottom thereof, as in FIGURES 5 and 6, to snap beneath the snap-in ribs 42 with the inner face of the plate engaging the several dispersed lands afforded by the free ends of the posts 36, 37 and 39, the side walls of the shell yielding for this purpose, as previously explained, it being further provided that the plastic material of which the body shell is molded will preferably not be entirely rigid but will have some inherent yieldability not only aiding the aforesaid snap-in action, but also rendering the body less subject to rupture from the shock of repeated ball impact.

The bumper structure is completed by provision of the supporting shaft or spindle 12 in fixed attachment with one end of the plate 38 and having a major portion 12X of its length of a predetermined diameter and projecting normally to the plane of the plate a considerable distance therebeyond to serve as a pivot shaft, while a shorter end portion 12Y, which is of reduced diameter, projects a distance beyond the opposite or inner face of the plate for entry into a bore provided in the post 37, by which the bumper body is further registered and stabilized in attachment to the plate and the cantilever spindle support.

Means for releasably locking or fixing the plate in assembly with the bumper body comprises a pin or screw 44 passing through a hole 45 in the base plate and engaging in a bore in the subjacent post 36. In this condition of assembly, the base plate fits and is drawn against all of the post ends and lands, whereby the body is securely supported by the spindle, the shell-like structure being reinforced against the stress and shock of repeated ball impact by the internal and external configurations described.

I claim:

1. In a ball bumper of the cantilever reprojecting type including a spindle and a bumper body supported for rotative motion thereby, improvements characterized, namely, in that: said bumper body is substantially hollow and has a bottom opening, together with a closure plate fitting into said opening, said closure plate having said spindle affixed thereto with a portion of the spindle projecting into the hollow of said body, means within said body closely embracing said spindle projection; means within the hollow of said body providing seating lands for said plate, and means adjacent the rim of the bottom open-

ing of the body having snap-action insertion engagement with marginal portions of said plate to releasably retain the latter in inserted engagement with the body, said spindle being adapted to have driving connection with actuating means for rotatively moving the spindle and bumper body.

2. A cantilever type reprojecting ball bumper comprising an elongated, substantially hollow shell having an open bottom and constituting a bumper body, a closure plate fitting into the shell at said bottom, yieldable rim portions on said shell having snap-in holding engagement with marginal portions of the closure plate to retain the latter removably engaged with the shell; a spindle fast with said plate and including a coaxial portion extending into the shell; a post portion within the shell and having a bore aligned with said projecting portion of the spindle; and seating means for the plate including land formations interiorly of the shell engaged by the plate in inserted snap-in condition thereof.

3. A cantilever type of ball bumper for use in ball-rolling games of the type in which a ball is propelled on a playfield panel and the bumper is in the form of an elongated body which is supported at one end for pivotal movement about an axis extending approximately normally to the ball-rolling surface of such panel to project into space thereabove for engagement by a ball or in pivotal movement about said axis to strike and project a ball within range thereof, wherein the improvement consists in the formation of the bumper body as an elongated shell comprising a dome portion from which depend surrounding sidewall and skirt portions terminating in an open bottom; a supporting and closure plate fitting within the margins of said open bottom, said plate having affixed thereto a spindle member extending at right angles thereto with portions projecting from both sides of the plate, the outer portion of the spindle being of a given diameter constituting a cantilever supporting and pivoting post adapted for cooperation with a further supporting means, and the portion on the opposite and inner side of the plate being of reduced diameter to constitute a body supporting pin extending into the cavity in the bumper body when the plate is in assembled relation therewith; and means formed integrally with interior portions of said body providing lands against which said plate fits in assembly as aforesaid and engaging said pin to locate the plate in predetermined substantially flush relationship with the margins of the bottom opening aforesaid, together with further formations in said cavity formed integrally with internal portions of the body and constituting a holding means engaging said plate to maintain the plate releasably in assembled relationship with the body as aforesaid.

4. A bumper construction according to claim 3 wherein a first one of said lands is defined by the end of an integral post formation disposed near one end of said body and terminating opposite the confronting inner face of said plate in assembled condition as aforesaid, and the pin portion of the spindle of the plate projects into said post.

5. A bumper construction according to claim 4 wherein a second one of said lands comprises the end of a second integral post formation confronting the inner face of the plate and there is further provided a securing member penetrating the plate and removably fastening within the body of the second post formation.

6. A bumper construction according to claim 5 wherein a third land is provided by the end of a third integral post formation terminating in confrontation with the inner face of said plate near the end of the bumper body which is remote from the first-mentioned post formation.

7. A bumper construction according to claim 6 wherein said body is molded from a plastic material having some yieldability and still further lands are provided along opposite longitudinal sides of the bumper body within the margins of the open bottom thereof by rib-like continuations of a cross web formed intermediately of the ends

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of the body in said cavity and integrally with said opposite sides and continuing respectively along said sides to terminate in lands close to said bottom margins for engagement by the inner face of the plate in assembled condition therewith, serving to stiffen the body laterally between said sides, at least, said web terminating a substantial distance short of the land-forming ends of said ribs in the region adjoining the said lands whereby to permit limited lateral yieldability of the sidewalls adjacent the margins of the bottom opening for reception and withdrawal of the plate in assembled relation.

8. A bumper construction according to claim 7 wherein longitudinally-extensive snap-in ribs are provided in the body adjacent the web lands in position to overlie and releasably retain opposite marginal portions of the plate positioned against said lands, said limited yieldability of the bottom margins of the body permitting a snap-action movement of the plate past said ribs on moderately forced

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entry and withdrawal of the plate into and from assembled relation with the body as aforesaid.

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