

Sept. 23, 1969

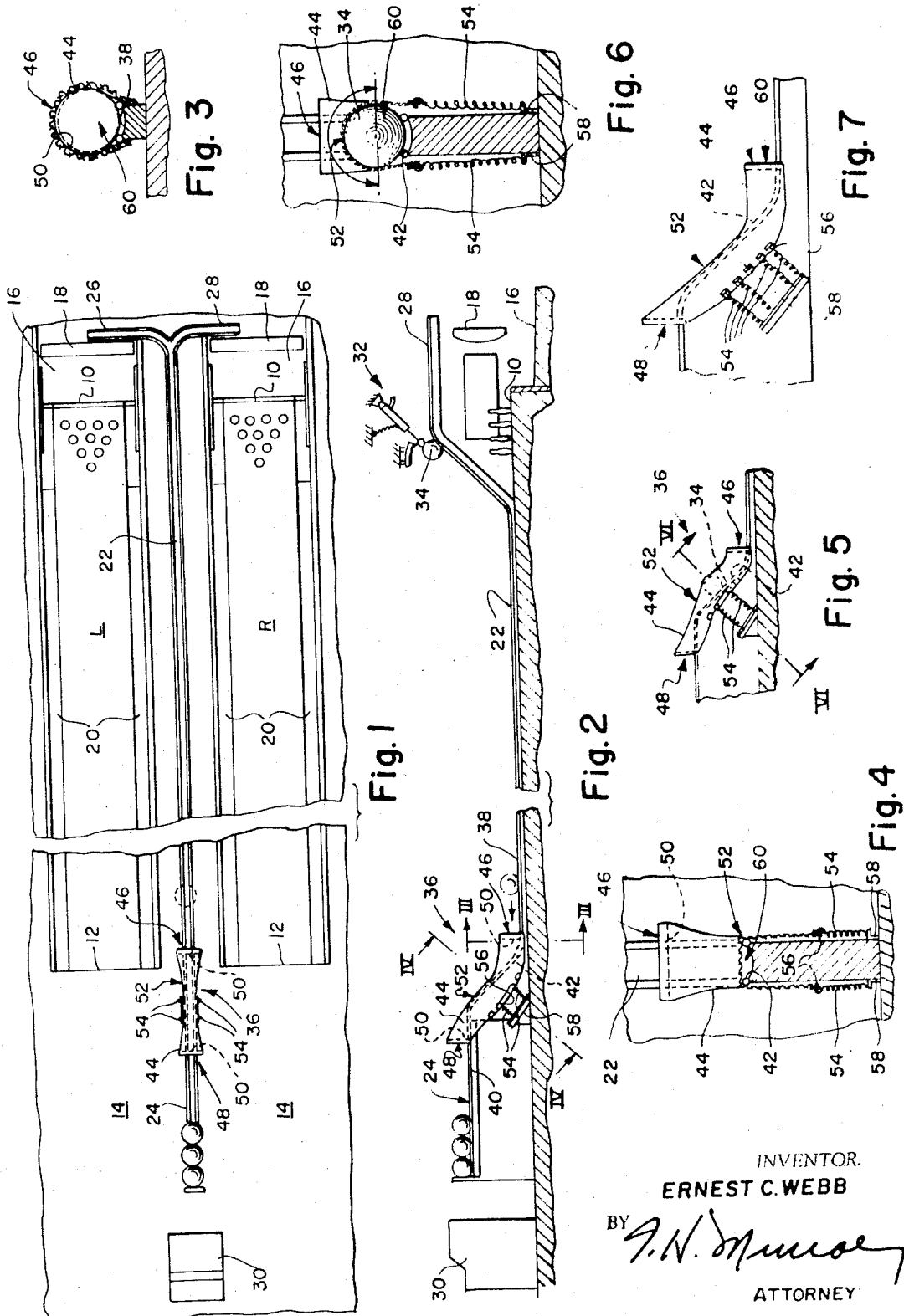
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3,468,537

BOWLING BALL DECELERATING APPARATUS

Filed June 22, 1965

2 Sheets-Sheet 1



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2 Sheets-Sheet 1

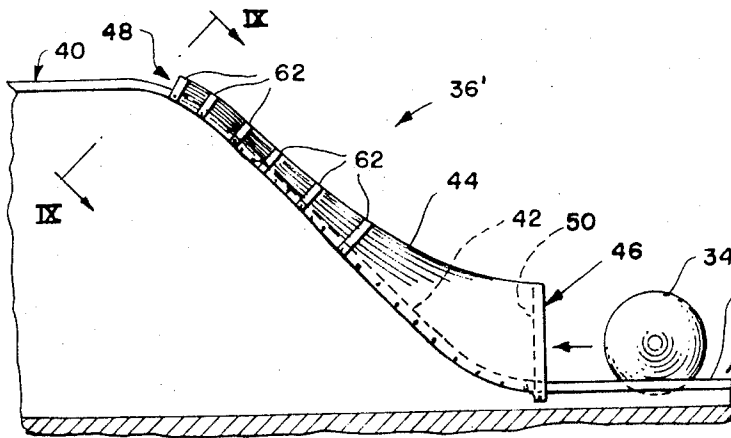


Fig. 8

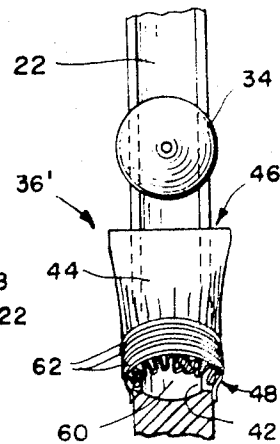


Fig. 9

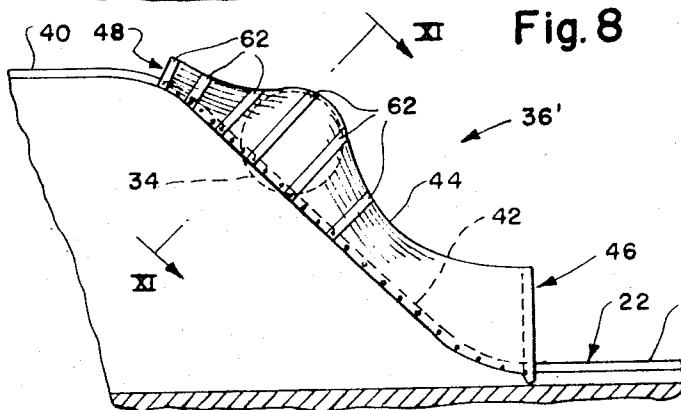


Fig. 10

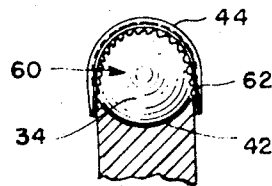


Fig. 11

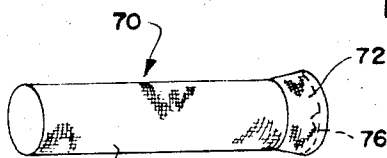


Fig. 13

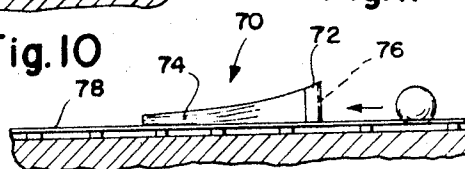


Fig. 14

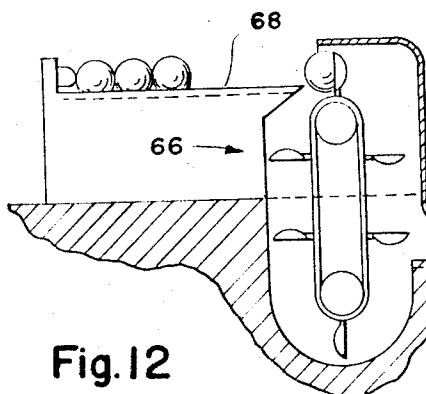


Fig. 12

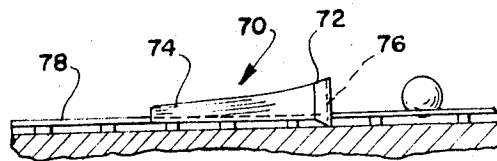


Fig. 15

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BOWLING BALL DECELERATING APPARATUS
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U.S. Cl. 273—49

4 Claims

ABSTRACT OF THE DISCLOSURE

This patent discloses bowling ball decelerating and cleaning apparatus comprising an elongated, plicated limber hood or passage having an open entry end and provided with resilient means against which a bowling ball works, expanding the passageway, in going through the hood or passage.

This invention relates to bowling apparatus, and more particularly to improved means associated with the bowling apparatus for simultaneously cleaning and decelerating a bowling ball during its travel from the pit area to the approach area of a bowling alley.

As is known, ball return mechanisms are available today which reduce, by a considerable amount, the time required to return a bowling ball from the pit area to the approach area. These mechanisms are positioned in the pit area and serve to accelerate the bowling ball along the ball return track. The speed at which the balls travel along the ball return track is considerably greater than the speed at which balls are returned by conventional gravity acceleration. Therefore, it is imperative that some mechanism be provided, preferably adjacent to the approach area, for decelerating the bowling balls to a lower speed such that, for example, impact with other balls on the storage rack will not damage the ball. Furthermore, it is very desirable, for obvious reasons, to decelerate the bowling ball prior to entering those types of storage racks in which the path of travel of the ball is alternately changed so as to position the ball adjacent to that alley of two adjacent alleys on which the player is to bowl.

As is known, bowling balls will pick up lint, grease, dirt and the like in the process of bowling. Therefore, it is also very desirable to provide some means for wiping the bowling balls prior to directing them onto the storage rack.

Accordingly, as an overall object, the present invention seeks to provide improved means for decelerating spherical articles, such as bowling balls, from a relatively high linear velocity to a relatively low linear velocity.

Another object of the invention is to provide improved means for wiping lint, grease, dirt and the like from the entire outer surface of spherical articles.

Still another object of the invention is to provide improved means for simultaneously decelerating spherical articles from a relatively high linear velocity to a relatively low linear velocity and wiping clean the entire outer surface of these spherical articles.

A further object of the invention is to provide improved means for wiping clean the entire outer surface of spherical articles, which means is self-cleaning. That is to say, the accumulated dust transferred from the spherical articles to the cleaning means is subsequently shaken loose from the cleaning means.

Still another object of the invention is to provide means for effectively decelerating different size balls, different weight balls and balls with surfaces that vary from glass smooth to those having very rough, nicked and pitted surfaces.

A still further object of the invention is to provide

means for decelerating and cleaning balls which means does not damage the ball in any way.

In accordance with the present invention, an improved means for decelerating spherical articles, such as bowling balls, is provided comprising a flexible hood disposed in overlying relation with a ball return track. The flexible hood and the track cooperate to provide, in effect, an expansible passageway or tunnel through which the bowling balls must pass. One end of the hood is maintained in an open condition to permit free entry of the bowling ball into the expansible passageway. Means is provided for resiliently urging a downstream portion of the hood toward the track so as to resiliently restrict the expansible passageway. Hence, when a bowling ball enters the expansible passageway, it is simultaneously cleaned by contact with the interior surface of the hood and decelerated by expending some of its kinetic energy to dilate or expand the hood against the force of the resilient means urging the hood toward the track.

The length of the hood is at least equal to and preferably greater than the circumference of the bowling ball. Therefore, the entire area of the bowling ball will be contacted by a portion of the hood and therefore wiped clean. The resilient means urging the hood toward the track also causes flexure of the hood which, in turn, disengages any dust and the like transferred from the bowling ball to the hood.

The above and other objects and advantages of the present invention will become apparent from the following description by reference to the accompanying drawings, in which:

FIG. 1 is a top view of a pair of adjacent bowling alleys showing the preferred position of the decelerating means of the invention with respect to the adjacent bowling alleys;

FIG. 2 is a side view of the bowling alley shown in FIG. 1;

FIG. 3 is a cross-sectional view taken along the line III—III of FIG. 2;

FIG. 4 is a cross-sectional view taken along the line IV—IV of FIG. 2;

FIG. 5 is a fragmentary side view illustrating a bowling ball passing through the decelerating means of the invention;

FIG. 6 is a cross-sectional view taken along the line VI—VI of FIG. 5;

FIG. 7 is a fragmentary side view illustrating means for varying the tension of the decelerating means of the invention;

FIG. 8 is a fragmentary side view, similar to FIG. 5, illustrating an alternative embodiment of the decelerating means of the invention;

FIG. 9 is a cross-sectional view taken along the line IX—IX of FIG. 8;

FIG. 10 is a fragmentary side view, similar to FIG. 8 illustrating a bowling ball passing through the decelerating means of FIG. 8;

FIG. 11 is a cross-sectional view taken along the line XI—XI of FIG. 10;

FIG. 12 is a fragmentary side view, schematically illustrating an under-the-floor return track provided with the ball decelerating means of the invention;

FIG. 13 is an isometric view of an alternative embodiment of the hood employed in the ball decelerating means of the invention;

FIG. 14 is a fragmentary side view of a ball return track provided with the hood of FIG. 13; and

FIG. 15 is a fragmentary side view of a ball return track, similar to the track of FIG. 14, illustrating an alternative position of the hood.

Referring now to the drawings, and particularly to FIGS. 1 and 2, a pair of adjacent bowling alleys L and

R are each provided with a pin deck 10 at the forward end of the alley and a foul line 12 at the opposite end. Ahead of the foul line 12 of each alley is an approach area 14; while behind the pin deck 10 is a pit, generally indicated at 16. At the back of each pit 16 is a backstop 18 which is struck by each bowling ball delivered down the alley.

On either side of each alley L and R are gutters 20, and between the alleys L and R is a main or common ball return track 22 which terminates between the approach areas 14 in a ball rack or ball storage means 24. As shown, the main ball return track 22 is connected to two branches 26 and 28 disposed in the pit areas 16. In the usual case, automatic pinspotting machines will be employed to set the pins on the pin decks 10. In accordance with usual practice, these automatic pinspotting machines are such as to deposit balls in the branches 26 and 28 from whence they are both fed to the common ball return track 22 and thence to the ball rack 24.

Working in conjunction with the automatic pinspotting machines is a console 30 which is disposed between the approach areas 14 and behind the ball rack 24. The console 30 houses automatic scoring, totalizing and printing apparatus such as that shown in U.S. Patent No. 3,124,355, issued Mar. 10, 1964. The console 30 houses two automatic scoring, totalizing and printing units, one for each of the alleys L and R, each unit being employed to print the scores of each bowler of each team in accordance with the rules of the American Bowling Congress. The operation of the scoring, totalizing and printing units is completely described in the aforesaid Patent No. 3,124,355. In conjunction with the console 30, there is usually provided a projector, not shown, which projects images of the score sheets onto screens, also not shown, above the alleys L and R. One type of projector which may be used for this purpose is shown, for example, in copending application Ser. No. 200,555, filed June 6, 1962, now Patent No. 3,257,898, granted June 28, 1966, and assigned to the assignee of the present application.

As shown only in FIG. 2, a ball return mechanism 32 is provided above the main ball return track 22. The ball return mechanism 32 is adapted to accelerate a bowling ball 34 along the ball return track 22 to the ball rack 24. That is to say, the ball return mechanism 32 imparts kinetic energy to the bowling ball 34 whereby the bowling ball 34 traverses the distance between the pit area 16 and the approach area 14 in approximately half the time required by conventional ball return mechanisms. The ball return mechanism 32 may comprise, for example, that mechanism described and illustrated in copending application Ser. No. 257,651, filed Feb. 11, 1963, now Patent No. 3,265,391, granted Aug. 9, 1966, and assigned to the assignee of the present application.

Under the impetus of the bowling ball return mechanism 32, bowling balls will travel along the main ball return track 22 at a high rate of speed. Therefore, means, indicated generally at 36, is provided for decelerating the balls from their relatively high linear velocity to a relatively low linear velocity upon entering the ball rack 24.

As can best be seen in FIG. 2, the main ball return track 22 comprises a lower track segment 38 extending between the bowling alleys L and R, an upper track segment 40 leading into and forming part of the ball rack 24, and an inclined track segment 42 which connects the lower and upper track segments 38, 40. As will become apparent later in the specification, the decelerating means 36 is preferably provided in the region of the inclined track segment 42 so that deceleration of the bowling ball is accomplished both by the decelerating means 36 and by the force of gravity acting on the bowling ball as it rises up the inclined track segment 42 onto the upper track segment 40. Alternatively, the decelerating means 36 may be provided ahead of apparatus which mechanically elevates the bowling balls to the storage rack.

As shown in FIGS. 2 and 3, the decelerating means 36

preferably comprises a flexible hood 44 which overlies the inclined track segment 42 and extends slightly beyond either end thereof. The flexible hood 44 may, for example, be formed from canvas, felt, woven elastic material and the like. The flexible hood 44 has an inlet end 46 disposed upstream of the ball rack 24 and an outlet end 48 adjacent to the ball rack 24. At least the inlet end 46 and preferably both ends 46, 48 of the hood 44 are maintained in an open condition so as to permit bowling balls to enter and leave the hood 44. The ends 46, 48 are maintained in an open condition, for example, by means of a frame or hoop 50 which has its lower ends secured to the ball return track 22 and which extends thereabove.

Reference is now directed to FIGS. 2 and 4. The hood 44 has an intermediate portion 52 which, in this embodiment, is resiliently urged into engagement with the inclined track segment 42 by means of spring members 54 connected between the opposite longitudinal side edges 56 and angle members 58 secured to the lower portion of the inclined track segment 42. Alternatively, the intermediate portion 52 may be resiliently urged toward the inclined track segment by rubber bands or other resilient elements.

It should be evident now that the hood 44 cooperates with the inclined track segment 42 to provide an expandable passageway or tunnel 60 through which the bowling balls must pass in their travel to the ball rack 24. Hence, as illustrated in FIGS. 5 and 6, the bowling ball 34 has entered through the inlet end 46 and is now positioned within the intermediate portion 52 of the hood 44. As can be seen, the bowling ball 34 forces the hood 44 away from the inclined track portion 42 thereby expanding the passageway 60 to permit passage of the ball therethrough. It should be noted, however, that the intermediate portion 52 is being expanded by the bowling ball 34 against the force provided by the spring members 54. Therefore, a portion of the kinetic energy associated with the speeding bowling ball 34 is expended against the force provided by the spring members 54, while a second portion of its kinetic energy is expended in rising up the inclined track segment 42, i.e., against the force of gravity. The amount of kinetic energy expended, is sufficient to lower the velocity of the bowling ball to a value which will prevent damage to the bowling ball 34 when it strikes those balls, shown in FIGS. 1 and 2, already stored on ball rack 24.

As stated above, the hood 44 serves the secondary purpose of wiping the bowling balls clean of any accumulated dust. In this respect, the length of the hood 44 should be equal to and preferably greater than the circumference of the bowling ball 34 thereby insuring that the entire outer surface of the bowling ball 34 contacts the inner surface of the hood 44. As can best be seen in FIG. 6, the hood is arranged so that its circumferential contact with the bowling ball 34 is greater than 180°. Therefore, as the bowling ball rolls through the expandable passageway 60, its entire surface will contact the inner surface of the hood 44 and be wiped clean. As can best be seen in FIG. 5, the hood 44 is flexed during passage of the bowling ball therethrough. Therefore, the dust transferred thereto will be shaken loose during flexing of the hood 44.

Accordingly, the hood 44 cooperates with the spring members 54 to decelerate the ball to a sufficiently low speed to prevent damage while simultaneously serving to wipe the balls clean prior to their being stored on the ball rack 24.

As can best be seen in FIG. 7, additional ones of the springs 54 may be connected between the side edges 56 of the hood 44 and the angle member 58 so as to increase the force required to expand the passageway 60. Alternatively, other well-known adjustable resilient elements may be provided for resiliently urging the hood 44 toward the track segment 42.

Reference is now directed to FIGS. 8-11, wherein an

alternative embodiment of the decelerating means is illustrated. Corresponding numerals will be employed to identify corresponding parts heretofore described.

Referring in particular to FIGS. 8 and 9, decelerating means 36' is shown overlying the inclined track segment 42. The decelerating means 36' comprises a flexible hood 44 having an inlet end 46 adjacent to the lower track segment 38 and an outlet end 48 adjacent to the upper track segment 40. The inlet end 46 is maintained in an open condition by the frame or hoop 50.

In this embodiment and as can best be seen in FIG. 9, the hood 44 is plicated or alternately folded beginning at the outlet end 48 and extending substantially along its entire length back toward the inlet opening 46. The hood 44 is maintained in its alternately folded condition by means of a plurality of transversely extending elastic members 62, each of which is secured to the hood 44 at spaced points along its length. The hood 44, therefore, is resiliently urged toward the inclined track segment 42 and cooperates therewith to provide the expansible passageway 60 through which the bowling balls must pass.

As illustrated in FIGS. 10 and 11, a bowling ball 34 is passing through the expansible passageway 60. The bowling ball 34 will be simultaneously decelerated by expending some of its kinetic energy to dilate or expand the hood 44 against the force provided by the elastic members 62 and will be cleaned by contacting the inner surface of the hood 44. In this embodiment, the length of the hood 44 is at least equal to and preferably greater than the circumference of the bowling ball whereby the entire outer surface of the bowling ball 34 will be contacted by the hood 44 and thereby cleaned. It is preferred, that the elastic elements 62 be disposed on the exterior surface of the hood 44 so as not to interfere with the passage of the bowling ball 34.

It should be evident that the decelerating means 36 and 36' are not limited to use with ball return tracks having inclined track segments. In this connection, reference is now directed to FIG. 12 wherein there is illustrated a horizontal ball return track 64 which is positioned between and beneath the bowling alleys L and R. The ball return track 64 guides bowling balls 34 to a ball lift 66 of the elevator type which is schematically illustrated herein. The lift 66 elevates the bowling balls to the level of a ball storage rack 68 and deposits the same on the rack 68. The decelerating means 36, for example, would be positioned on the return track 64 in advance of the lift 66. Hence, the bowling balls are simultaneously decelerated and cleaned prior to being lifted to the storage rack 68.

The hood of the present decelerating means may take the form of a cylindrical member 70 illustrated in FIG. 13. As can be seen, the cylindrical member or hood 70 has an inlet end 72 having a diameter which is larger than a bowling ball, and a decelerating portion 74 having a diameter which is smaller than a bowling ball. A hoop 76 is employed to maintain the inlet end 72 in its enlarged condition. The hood 70 is formed from a woven elastic material so as to provide an expansible passageway through which the bowling balls must pass. It should be evident that in order to expand the hood 70, the bowling ball must expend some of its kinetic energy and therefore, the bowling ball will be decelerated. Furthermore, the cylindrical form of the hood 70 insures substantially complete wiping of the outer surface of the bowling ball passing therethrough.

The hood 70 may, as illustrated in FIG. 14, be positioned entirely above a ball return track 78 and be provided with a hoop 76 which maintains the inlet end 72 in an open condition. The decelerating portion 74 of the hood 70 would, of course, be secured at spaced points along its length to the track 78. The decelerating portion may be unsupported, as illustrated, in which case, it would collapse or be folded upon itself.

Alternatively, the return track 78 may extend through the hood 70 in the manner illustrated in FIG. 15. In this embodiment, the hood 70 would have its inlet end 72 supported by means of the hoop 76. However, the decelerating portion need not be secured to the track 78. It should be noted that either of the arrangements shown in FIGS. 14 and 15 may be employed with the inclined track segment 42 of FIG. 2.

Although the invention has been shown in connection with certain specific embodiments, it will be readily apparent to those skilled in the art that various changes in form and arrangement of parts may be made to suit requirements without departing from the spirit and scope of the invention.

I claim as my invention:

1. In bowling apparatus having a pit area, an approach area, and a bowling alley extending between said pit area and said approach area, the combination comprising: track means for returning bowling balls from said pit area to said approach area; a flexible hood overlying a length of said track means and providing an expansible passageway through which said bowling balls must pass; means for supporting an upstream end of said hood in an open condition thereby permitting free entry of bowling balls into said passageway; a longitudinal portion of said hood being longitudinally plicated to reduce the cross-sectional area of said expansible passageway; and means for resiliently maintaining said longitudinal portion in its plicated condition, whereby bowling balls passing through said expansible passageway are simultaneously cleaned by contact with said flexible hood and are decelerated by expending a portion of their kinetic energy in dilating said portion of said hood.

2. The combination of claim 1 wherein said resilient means comprises a plurality of elastic strips, each extending transversely of said hood and secured thereto at spaced points, said elastic strips being spaced apart longitudinally of said hood.

3. The combination of claim 2 wherein said elastic strips are secured to the outer surface of said hood.

4. In bowling apparatus having a pit area, an approach area, and a bowling alley extending between said pit area and said approach area, the combination comprising: track means for returning bowling balls from said pit area to said approach area; a flexible hood overlying a length of said track means; means for supporting an upstream end of said hood in an open condition to permit free entry of bowling balls into said hood; means for securing the opposite longitudinal side edges of at least a downstream end of said hood to the opposite sides of said track means; said hood being alternately longitudinally folded at its downstream end to provide an expansible passageway between said hood and said track means, said expansible passageway having a diminishing cross-sectional area from its upstream end to its downstream end; and means connected at spaced points along the length of said hood for maintaining said longitudinal portion in its alternately folded condition, whereby bowling balls passing through said passageway are simultaneously cleaned by contact with said hood and decelerated by expending a portion of their kinetic energy to dilate the alternately folded portion of said hood.

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