

Jan. 2, 1962

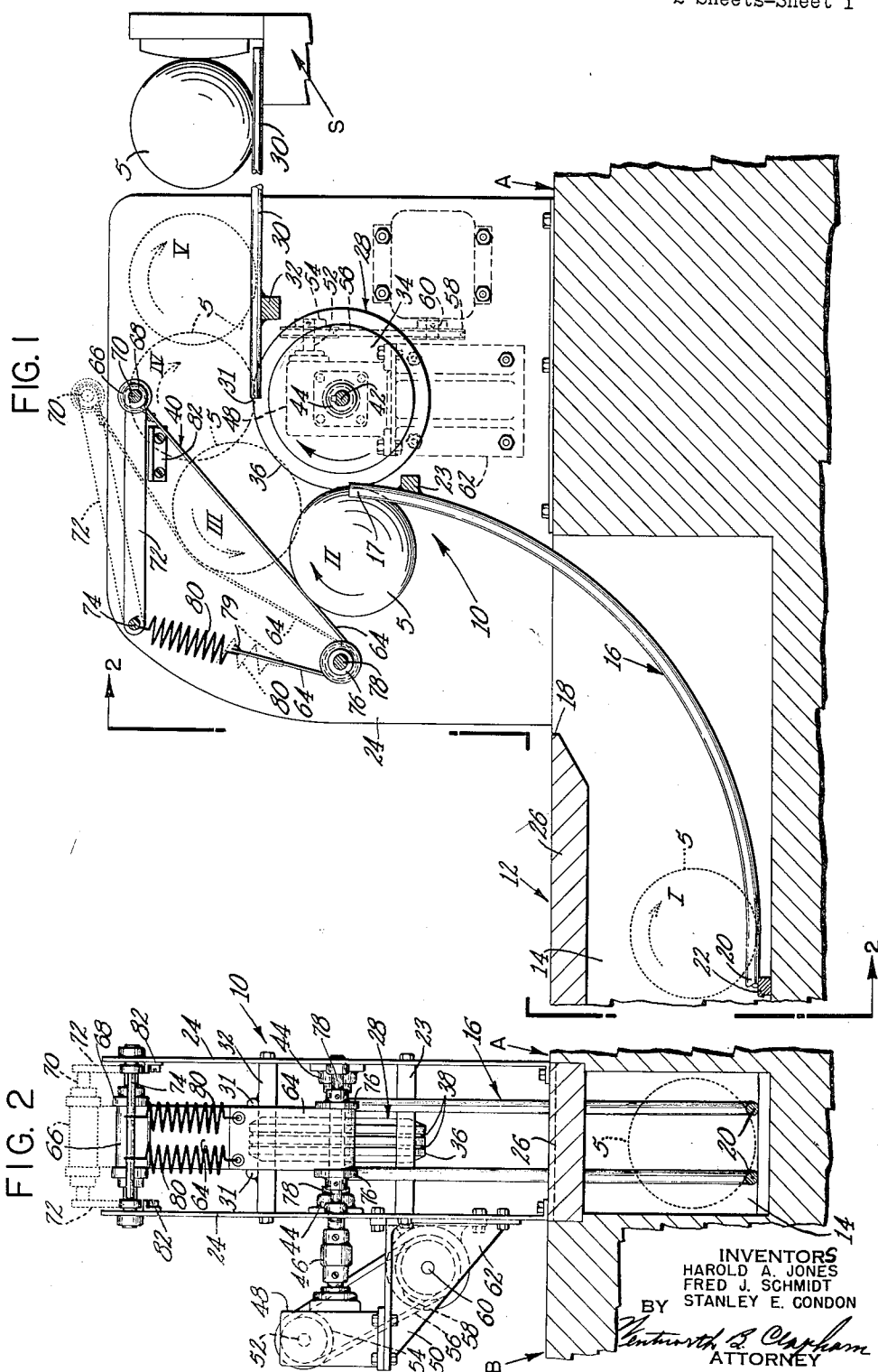
H. A. JONES ET AL

3,015,489

BOWLING BALL STOP MECHANISM

Filed June 18, 1958

2 Sheets-Sheet 1



1

3,015,489

BOWLING BALL STOP MECHANISM

Harold A. Jones, Shelby, Ohio, Fred J. Schmidt, Stamford, Conn., and Stanley E. Condon, Plymouth, Ohio, assignors to American Machine & Foundry Company, a corporation of New Jersey

Filed June 18, 1958, Ser. No. 742,908

23 Claims. (Cl. 273-47)

This invention relates to bowling apparatus, and more particularly to improvements in bowling ball stops or bowling ball retarding devices operative to reduce the momentum of bowling balls rolling along a bowling ball return of a bowling alley en route to a position of rest at the player's location at the approach end of the alley.

The invention relates particularly to a bowling ball check or retarding device wherein the exit angular and linear velocity of a bowling ball is independent of its weight. This constitutes an important advance in the art because generally in all conventional types of ball checks known to applicants and now on the market, exit velocity increases with the weight of the ball.

As used herein, exit velocity means the velocity of a ball at the time it is delivered by or from the ball stop or retarding device onto the infeed track portion of a bowling ball return, or the velocity of a ball at the time it is delivered by or from the ball check or retarding device directly into the ball storage rack at the end of the bowling ball return.

In bowling alley installations with known types of ball checks or bowling ball retarding devices, the kinetic energy of rotation and translation stored in a freely rolling ball is dissipated against gravity forces in completely elevating the ball to clear the uppermost point on the riser or upsweep section of the bowling ball return runway en route to the storage rack. It will be evident that with devices of these types, there are occasions when a ball does not have sufficient momentum to insure that it will be delivered along the riser or upsweep section into storage because of insufficient kinetic energy being stored in the ball to insure such transit of the upsweep section. In bowling alleys provided with bowling ball return runways which are located beneath the alleys or separating members between two adjacent alleys, failure of a ball to roll up and off the upsweep section causes a serious problem, since if the ball rolls downwardly and comes to rest beneath the alley or the separating members between two adjacent alleys, considerable time must be used in removing boards and reaching down in order to lift the ball manually and carry it back to the storage rack.

The present invention completely eliminates the problem above mentioned because due to the positively operated ball engaging and rolling member which forms a part of the invention, each ball rolling along the upsweep section is positively and firmly, yet resiliently gripped by the moving surface of a traveling member and propelled thereby upwardly to the point of discharge from the riser or upsweep section. Thus at no time can a ball roll downwardly once it has reached a point where it is engaged by the traveling ball propelling member. A ball stop mechanism constructed in accordance with the invention does not require any resetting in order to ready it for use, and therefore eliminates the chance of collision of a first delivered ball by a succeeding ball.

In addition to the above, the traveling member, constructed in accordance with the invention, operates to roll or propel a ball upwardly through a transfer passage. Its action on each ball upon which it operates converts the forward angular velocity of a ball when first engaged thereby to zero velocity; it next imparts a different direction of rotation to each ball, and as each ball is de-

2

livered from the passage by the rotary member, it again passes through zero velocity so that when delivered into storage, or onto an infeed track leading to storage, the ball is moving slowly with practically no velocity as it gravitates downwardly on slightly inclined tracks into the storage rack where it comes to rest in a markedly improved manner and wherein all damage to balls from impact by one on another and accidents to players' hands are substantially eliminated.

It is an object of the invention to provide a novel ball check or ball retarding device for use with a bowling alley ball return and a novel method of checking the movement of balls wherein each ball is resiliently, yet firmly, gripped by a rotating ball engaging and displacing member, and delivered into a storage rack.

It is a further object of the invention to provide a novel ball return check or stop having a slowly moving endless traveling member provided with a resilient peripheral surface located between the upsweep section and the infeed section of a bowling ball return runway, and wherein the member co-operates with a spaced guiding device to deliver a ball to the storage rack of the bowling ball return runway in a greatly improved manner regardless of the weight of bowling balls handled thereby.

The invention is further characterized by a bowling ball return check or retarding device comprising a slowly moving member having a resilient peripheral surface operative to engage bowling balls as they roll along the upsweep section of a bowling ball return runway, and wherein each ball engaged by the member is brought to zero angular velocity and then rolled by the member beneath ball guiding and holding means to a point of delivery onto the infeed track section of the ball return runway, whence the ball may roll slowly to a position of rest.

The invention is further characterized by the provision of a novel method of retarding bowling ball movement and a novel ball retarding mechanism for use with a bowling ball return runway wherein a rotary resiliently tired member coacting with a snubbing and guiding device spaced therefrom, effectively controls the velocity of bowling balls of varying weights rolling along the bowling ball return runway so that each bowling ball delivered by the mechanism arrives in the bowling ball storage rack of a bowling ball return with minimum velocity.

The invention is further characterized by the provision of a novel ball stop or retarding device operative in connection with a bowling ball return runway having an arcuate upsweep section and a section leading into a storage device wherein a slowly traveling member having a ball engaging surface lifts a rolling ball off the upsweep section of the ball return runway track and presses the lifted ball against a snubbing surface and wherein because of the frictional coaction between the two surfaces, and the direction of movement of the traveling member, the angular and linear velocity of the ball is reduced to zero, and the ball is moved by the surface and delivered onto the infeed track of the ball return track for subsequent movement into the storage rack.

It is a further object of the invention to provide a novel ball check or ball stop for use with a bowling alley ball return and a novel method for checking the movement of balls rolling along the ball return, wherein each ball is resiliently, yet firmly, gripped by a slowly moving ball engaging and displacing member moving at a speed equal to a small fraction of the velocity of the ball it engages in order to check the momentum of such ball for delivery at a slow rate of speed into a ball storage rack.

It is a further object of the invention to provide a novel ball stop or retarding device which because of its

construction and operation is free from any parts or operating elements in the path of travel of or engageable by a ball which could damage it as by scratching or chipping, as it moves to a position of rest.

It is a further object of the invention to provide a novel ball stop or retarding device which because of its construction is compact, easy to install and service, and does not interfere with the movements of bowlers or constitute a hazard to them when playing the game.

With these and other objects not specifically mentioned in view, the invention consists in certain combinations and constructions which will be hereinafter fully described, and then set forth in the claims hereunto appended.

In the accompanying drawings which form a part of this specification, and in which like characters of reference indicate the same or like parts:

FIGURE 1 is a sectional side elevation of a preferred form of a bowling ball check and retarding device.

FIGURE 2 is an end elevation taken on line 2—2 of FIGURE 1.

FIGURE 3 is a sectional side elevation of a modification of a bowling ball check and retarding device embodying the invention.

FIGURE 4 is an end elevation taken on line 4—4 of FIGURE 3.

FIGURE 5 is a partial sectional end elevation taken on line 5—5 of FIGURE 3 illustrating a detail of the ball guide rail arrangement.

The bowling ball stop mechanism or retarding device made in accordance with the invention can be used on any type of bowling alley ball return as long as it can be mounted such that the ball engaging surface of a slowly moving ball engaging and speed checking and propelling member is located in the path of travel of balls rolling towards the ball delivery or infeed section or into the storage rack portion of the ball return runway on which it is installed. Because of the problems referred to hereinabove, it will be evident that the bowling ball stop mechanism of the present invention is especially well adapted for use with bowling alley ball return runways wherein the latter extend from a point adjacent the pit of a bowling alley or between the pits of two adjacent bowling alleys beneath and parallel with the bowling alleys or beneath the separators between adjacent bowling alleys to the head ends of such alleys. Such ball returns, therefore, are invisible and balls rolling therealong cannot be seen until they emerge from the upsweep section thereof adjacent the approach or head ends of the alleys served by the return as they roll to a position of rest or into a storage rack.

Referring to the drawings, FIGURES 1 and 2 disclose a preferred embodiment of the invention in which the ball stop mechanism or retarding device is designated generally 10. It is shown mounted for operation at the approach or player's end 12 of two side by side bowling alleys A and B (FIGURE 2). If desired, the ball stop mechanism could be used with a single alley.

In the construction shown in FIGURES 1 and 2, bowling alleys A and B are provided with a common ball return runway 14 which extends in parallel relationship therewith beneath and between the alleys as shown in FIGURE 2. Runway 14 is provided with an arcuate riser or upsweep section 16 extending upwardly through opening 18 in the approach between the two alleys A and B.

Ball return runway 14 comprises two spaced rods 20 so positioned as to allow bowling balls 5 to roll therealong from a point adjacent the pit (not shown) to a point of delivery at the end of the upsweep section 16 for placement on infeed track portion 30 which may form a part of a storage rack S or deliver balls into the storage rack S. Tracks 30 preferably are inclined slightly downwardly to the right, as viewed in FIGURE 1, in order

that balls placed thereon may gravitate and roll therealong to a final rest position in rack S. Ball runway 14, upsweep section 16 and infeed track portion 30 are supported by cross bars 22 (only one is shown), suitably mounted between alleys A and B and on cross bars 23 and 32 fastened to side frames 24 of ball stop mechanism 10. Side frames 24 are secured in upright spaced relationship (FIGURE 2) on a support board 26 secured in the space between the approaches of alleys A and B.

As viewed in FIGURE 1, the upper free ends of spaced rods 17 which form upsweep section 16, preferably are located at substantially the nine o'clock position relative to the moving ball stopping and handling member, described more in detail hereinafter. The ends of rods 17 may be extended to a higher operative position, if desired, or may form an integral part with track portions 30. Located at the twelve o'clock position are the infeed ends of the spaced rods 31 which form infeed track portion 30 of ball return runway 14. It will be understood that balls are placed either manually or by suitable automatic means (not shown) on the portion of ball return runway 14 adjacent the pit (not shown) from which they are propelled by either mechanical or gravity means (not shown) along the extent of runway 14 en route to ball stop mechanism 10.

Mounted in the gap between the upper free ends of the spaced rods 17 of upsweep section 16 and the free infeed ends of spaced rods 31 is a ball engaging and handling member, such as a wheel designated generally 28. Member 28 comprises a small conventional metal disk 34 having a circumferential tire supporting flange on which is mounted a rubber tire 36 providing, with snubbing device 40, a resilient coupling for gripping, stopping and rolling balls 5 coming under its influence and traveling upwardly from upsweep section 16 to infeed track section 30. Tire 36 can be inflated if desired. It functions equally well, however, if the air pressure therein is zero. If desired, other suitable resilient surfaces could be mounted on member 28. The main point is to provide a resilient yet firm gripping or holding action for balls fed by member 28 through the passageway formed by the snubbing device designated generally 40 and resilient surface 36 on member 28. Disk 34 is keyed to shaft 42 rotatably supported in suitable bearings carried by frames 24. Collars 44 secured to shaft 42 maintain member 28 in proper centered operating position on shaft 42. Shaft 42 is connected by a coupling 46 to the shaft of a suitable conventional type of speed reducer 48 mounted on a bracket 50 suitably attached to one of the side frames 24 (see FIGURE 2). Speed reducer 48 is provided with a shaft 52 to which is attached a pulley 54 on which runs a suitable driving belt 56 tracking pulley 58 attached to shaft 60 of motor 62 supported by the same side frame 24 which mounts bracket 50. The driving relationship between motor shaft 60 and shaft 42 is such that shaft 42 is driven at a slow rate of speed. We have found that a speed of about 70 r.p.m. gives a satisfactory result. Obviously it can be higher or lower if desired. For example, the magnitude of ball exit velocity or the velocity of exit of a ball delivered by member 28 onto infeed track portion 30 can be changed simply, as by altering the speed reduction between the drive motor and wheel. This can be done by any suitable adjustable type of pulley system, such for example as a Reeves drive. Also the speed can be changed by merely changing pulley sizes and belt lengths. In short, the exit velocity desired is that which will insure that each ball delivered onto track section 30 will slowly reverse its direction of rotation and roll down track 30 at a slow rate of speed into the storage rack S proper. For this reason, infeed track portion 30 is inclined slightly downwardly to the right, as viewed in FIGURE 1.

Device 40, referred to hereinabove, is located above and to the left of member 28, as viewed in FIGURE 1. This device comprises a belt 64 whose width is slightly

5

greater than the width of tire 36. One end of belt 64 is provided with a loop encircling a sleeve 68 supported on shaft 70, the ends of which shaft are mounted in the free ends of lever 72 pivotally supported on pins 74 in side frames 24. Belt 64 runs upon a sleeve 76 rotatably mounted on shaft 78, the free ends of which are suitably fixed in side frames 24. The other end of belt 64 is connected at 79 to one end of spring 80, the other end of which is connected to shaft 74. Stop brackets 82 mounted on the inner faces of and adjacent the upper ends of side frames 24 limit the downward movement of lever 72 to the full line position shown in FIGURE 1.

The operation of ball stop mechanism or retarding device 10 is as follows:

When a ball 5 reaches position I in FIGURE 1, it is rolling with considerable momentum resulting from the force by which it was delivered from the pit of either bowling alley A or B, and also the weight of the ball itself. As ball 5 rolls from position I to position II, its momentum is diminished somewhat because of the upward travel to position II. However, at position II, the angular and linear velocity of the ball is almost immediately diminished to zero as the result of its coming in contact with the periphery of resilient surface 36 of member 28 and snubbing belt 64 because the space between resilient surface 36 and belt 64 is less than the diameter of a bowling ball. Thus as a ball advances through the passage formed by surface 36 and belt 64, its direction of rotation is reversed. As the result of the continued movement of member 28 and the pressure exerted thereby against ball 5, it is rolled to the broken line position III shown in FIGURE 1. The conjoint outward radial force of tire 30 which in effect lifts the ball radially outwardly off track 17, and the resilient frictional pressure of belt 64, holds the ball firmly, yet resiliently, against slippage. As ball 5 is moved upwardly, levers 72 move upwardly away from stops 82 to the broken line position shown in FIGURE 1. Due to the movement of member 28 and its coaction with belt 64, as described, the angular velocity of ball 5 in moving from position II to that of position III, is changed from zero to an angular velocity somewhat greater than that of member 28 since the diameter of a ball, as shown in FIGURE 1, is less than that of member 28, at which time the ball is given a new direction of rotation as illustrated by the broken arrow at position III opposed to its original direction of rotation. In other words, as a ball is moved by the frictional pressure of surface 36 of member 28 beneath resiliently mounted snubbing belt 40, to position IV directly above shaft 42, it rolls in a counter-clockwise direction, as viewed in FIGURE 1. At position IV, the ball, freed from contact with tire 36, rests upon spaced rails 31 of infeed track portion 30, which because of their downward inclination, support ball 5 in such manner that ball 5 reverses its direction of rotation through zero velocity at position IV and rolls in a clockwise direction as shown at position V along track portion 30 and into storage rack S.

The width of belt 64 preferably is such that it will tend to drape itself about a ball 5 during the travel of the latter through the fourth quadrant of wheel 28, or the active length of surface 36 extending into the space between the upper free ends of rods 17 and the free ends of rods 31 of infeed track portion 30. Although circumferential peripheral grooves 38 may assist in maintaining a ball properly disposed for handling by member 28, nevertheless, in view of the coaction between belt 64 and resilient surface 36, any desired tread pattern may be used.

FIGURES 3, 4 and 5 illustrate a modified form of the invention in which the ball stop mechanism or ball retarding device is designated generally 110. This mechanism comprises a pair of spaced side frames 24 suitably mounted on a support board 26 located between two side by side bowling alleys A and B. Rotatably mounted between side frames 24 on shaft 42 is a handling member, such as wheel 28 having a resilient ball engaging surface

6

such as tire 36, as in the case of the mechanism shown in FIGURES 1 and 2. Bowling balls delivered from the pits (not shown) of bowling alleys A and B roll along a common return runway 114 located beneath the separating members (not shown) between bowling alleys A and B. The approach end of alleys A and B is provided with an opening 18 through which the upsweep section 116 of bowling ball return runway 114 extends. As in the case of bowling ball return runway track 14, described hereinabove, runway 114 is composed of two spaced rods 117 which terminate in upsweep section 116 adjacent member 28. Track 114 is mounted on cross bars 22 suitably secured in the space between bowling alleys A and B. Upsweep section rods 117 are supported by a cross bar 123 suitably secured to board 26, and a cross bar 125 attached at its ends to side frames 24. The upper free ends of spaced rods 117 of upsweep section 116 extend to a suitable position, such as approximately the ten o'clock position with respect to member 28, or if desired, they could form an integral extension with rods 131 of track section 130. Member 28 is located in the gap between the free ends of the rods 117 and the free ends of the spaced rods 131 of infeed track 130 onto which a ball is delivered by mechanism 10 for movement into a suitable storage rack (not shown) connected to slightly downwardly inclined track section 130. The rods 131 comprising track section 130 are supported by bar 132, the ends of which are attached to side frames 24. The free ends of rods 131 of track section 130 lie in a position designated IV approximately directly above the center of shaft 42 to which wheel 28 is attached. Shaft 42 is driven at a relatively low rate of speed by a drive mechanism designated generally D of the same construction as that disclosed in FIGURES 1 and 2, described hereinabove.

As shown particularly in FIGURE 3, located above and spaced from the periphery of surface 36 of member 28 is a ball snubbing and holding device designated generally 140. This device in the illustrated embodiment comprises two spaced rods 137 and 139 covered by a resilient material 141, preferably formed of an elastomer, such as rubber. The ends of rods 137 and 139 are secured to brackets 166 and 178, respectively suitably connected at their ends to the inner faces of side frames 24. Rods 137 and 139 are arcuate in shape and form a part of a concentric circle spaced from the periphery of surface 36 a distance less than the maximum diameter of a bowling ball, such that whenever a bowling ball rolling up upsweep track section 116 comes under the influence of surface 36, which moves in a clockwise manner as viewed in FIGURE 3, it is in effect resiliently wedged between moving surface 36 and rods 137 and 139. In this manner rods 137 and 139, and member 28 maintain a resilient frictional engagement upon a ball as it is rolled by member 28 onto rails 131 at position IV.

The operation of ball stop mechanism 110 disclosed in FIGURES 3, 4 and 5, is essentially the same as that described hereinabove in FIGURES 1 and 2, and hence further detailed description is considered unnecessary.

It will be seen that we have provided a simple and extremely effective ball stop mechanism or retarding device which is capable of handling balls of all weights and insuring that they will be delivered into a ball storage rack in a markedly improved manner and with a minimum of damage to balls due to one ball banging against another.

What we claim is:

1. The method of retarding the speed of a rolling bowling ball and delivering it slowly to a position of rest comprising positively engaging and holding a rapidly rolling bowling ball and substantially immediately bringing its forward travel to a standstill and reversing its direction of rotation, and while holding said ball moving said ball with said reverse direction of rotation to a point of delivery onto a surface directing it to said position of rest, releasing said ball at said point of delivery, and causing

said ball to again reverse its direction of rotation and roll slowly to said position of rest.

2. The method of stopping a rolling bowling ball and then delivering it slowly to a position of rest comprising positively engaging and holding a rapidly rolling bowling ball moving along a forward path of travel and reducing its velocity to zero, reversing the direction of rotation of said ball and moving said ball in the same path of travel with said reverse direction of rotation at a substantially reduced angular and linear velocity to a point of delivery onto a surface for delivery to said position of rest, releasing said ball at said point of delivery, causing the direction of rotation of said ball to be reversed, and causing said ball to move slowly to said position of rest.

3. The method of checking a bowling ball and delivering it to a position of rest comprising engaging substantially opposite spaced points on the surface of a rapidly rolling bowling ball between a moving surface and a relatively fixed surface and snubbing its forward travel momentarily to a state of immovability, reversing the direction of rotation of said ball and moving said ball with said reverse direction of rotation to a point of delivery onto a downwardly inclined surface for supporting said ball and directing said ball to a position of rest, releasing said ball at said point of delivery, and causing said ball to again reverse its direction of rotation and move at a slow rate of speed along said downwardly inclined surface to said position of rest.

4. The method of controlling the forward movement of a rolling bowling ball traveling along a ball return runway comprising changing the path of movement of said ball from a substantially horizontal path of travel to an upwardly inclined path of travel, positively and resiliently engaging said rolling ball adjacent the end of said upwardly inclined path of travel between a first surface and a traveling surface spaced therefrom to snub the movement of said ball and convert its movement momentarily to substantially a state of immovability, causing said moving surface to reverse the direction of rotation of said ball and deliver it beneath said first surface and in the same path of travel to a point of discharge therefrom, the operation of said moving surface relative to said first surface being such as to cause said ball to roll with its reverse direction of rotation along said same path of travel to said point of discharge at a speed substantially that of the moving surface, and causing said ball at said point of discharge to reverse its direction of rotation and move slowly to a position of rest.

5. The method of checking the forward movement of a rolling bowling ball traveling along a bowling ball return runway and delivering it slowly to a position of rest comprising changing the path of movement of said ball from a substantially horizontal path of travel to an upwardly inclined path of travel, resiliently and frictionally engaging said rolling ball adjacent the end of said upwardly inclined path of travel between a relatively fixed resilient surface and a traveling surface spaced therefrom a distance less than the maximum diameter of a bowling ball, whereby to snub the movement of said ball and convert its angular and linear velocity to zero, causing said moving surface in cooperation with said relatively fixed surface to reverse the direction of rotation of said ball and deliver it to a point of discharge, the operation of said spaced surfaces being such as to cause said ball to roll to said point of discharge at a speed substantially equal to that of the moving surface, and causing said ball at said point of discharge to reverse its direction of rotation and roll slowly to said position of rest.

6. The method of controlling the forward movement of a rolling bowling ball traveling along a ball return runway to a position of rest comprising engaging said rolling ball adjacent said position of rest between a fixed arcuate surface and a traveling rotating surface spaced therefrom to snub the movement of said ball and momentarily halt any substantial forward movement of said ball, causing

said rotating surface to reverse the direction of rotation of said ball and deliver it beneath said fixed surface to a point of discharge therefrom, the operation of said fixed arcuate and rotating surfaces being such as to cause said ball to roll with its reverse direction of rotation to said point of discharge at a speed substantially that of the rotating surface, and causing said ball at said point of discharge to reverse its direction of rotation and move slowly to a position of rest.

7. A bowling ball stop mechanism for a bowling alley comprising a ball track extending from a ball receiving position adjacent the pit of a bowling alley to a ball rest position adjacent the approach end of said alley, a ball storage rack located at said rest position, an upwardly inclined upsweep track portion forming a part of said track and operative to deliver a ball rolling therealong in a forward direction only to said storage rack, a traveling ball engaging and displacing member located in the path of travel of a ball rolling upwardly along said upsweep track portion, means coacting with said member to maintain said ball in engagement with said member, means for driving said member at a speed substantially lower than that of said ball rolling into engagement with said member and in a direction such as to reverse the direction of rotation of a ball engaged thereby, whereby balls engaged by said member are first substantially completely stopped and then rolled toward said storage rack at a reduced rate and with a direction of rotation opposite to that with which balls approach said member, and means constructed and disposed to receive balls from said member and deliver them at a slow rate of rolling motion to said storage rack.

8. A bowling ball stop mechanism for a bowling alley comprising a ball track extending from a ball receiving position adjacent the pit of a bowling alley to a ball rest position adjacent the approach end of said alley, a ball storage rack located at said rest position, means operative to deliver a ball rolling along said track in a forward direction only to said storage rack, a traveling ball engaging member located in the path of travel of a ball along said track, ball holding means spaced from said member a distance less than the maximum diameter of a bowling ball coacting with said member to maintain said ball in engagement with said member while said ball engages said member, means for driving said member to effect the substantially complete momentary stoppage of movement of said ball engaged by said member and held thereon by said holding means, said member being operative in response to its rotation to then reverse the direction of rotation of said ball and move it to a point of discharge, and track means located at said point of discharge for receiving said ball and directing it at a slow rate of movement into said storage rack.

9. The invention defined in claim 7 wherein said traveling member comprises a rotatably mounted wheel having a resilient peripheral surface, and said means for driving said member being effective to rotate said wheel in the same direction in which balls rotate as they approach said member.

10. The invention defined in claim 9 wherein said means for maintaining a bowling ball in engagement with said wheel includes a belt spaced from said member, and means resiliently supporting at least one end of said belt.

11. Mechanism for checking the rolling movement of a bowling ball along a bowling ball return having an upsweep track section and an infeed track section for delivering bowling balls into the storage rack, comprising a ball guiding device mounted above said upsweep section and forming with said return an arcuate passage for the ball, a moving engaging and displacing member located between said upsweep section and said infeed section and positioned to engage a ball en route from said upsweep section to the storage rack, and means for driving said member in a direction to impart to balls engaged thereby rotational motion opposite to that with which balls approach said member, said member being operative with

said device in response to the delivery of a ball therebetween to momentarily stop the movement of said ball, and then deliver the ball with a slow rolling movement along said device and in a forward direction only to a discharge station, and means mounting said infeed track section with its ball receiving end located at said discharge station in position to receive a ball from said member.

12. The mechanism defined in claim 11 wherein said guiding device comprises spaced elastomeric covered arcuate guide bars.

13. The invention defined in claim 11 wherein said rotating member comprises a wheel, and wherein said driving means includes means for rotating said member in the same direction of rotation as the original direction of rotation of a ball engaged thereby, and a pneumatic tire mounted on said wheel.

14. The invention defined in claim 11 wherein the main portion of said ball return track extends beneath said alley, and said upsweep track portion extends upwardly therefrom in said approach section, and wherein said moving member is moved at a slow rate of speed in comparison to the speed at which said ball rolls along said track into the space between said device and member.

15. Mechanism for checking the rolling movement of a bowling ball along a bowling ball return having an upsweep track section, a storage rack and an infeed track section for delivering bowling balls with a forward direction of movement only into said storage rack, comprising a yielding ball guiding and snubbing device mounted above and spaced from said upsweep section and forming with said upsweep section a passage for said ball en route to said infeed track portion, a moving ball engaging surface located between said upsweep section and said infeed section and positioned to engage a ball en route from said upsweep section to said storage rack, and means for driving said surface in a direction such that a ball engaged between said device and said moving surface in rolling up said upsweep section and into said passage is brought substantially to a standstill, said moving ball engaging device being operative in response to its direction of rotation corresponding to the initial direction of rotation of said ball and the holding action of said device on said ball to reverse the direction of rotation of said ball but deliver said ball onto said infeed track section for delivery thereby in said forward direction of movement into said storage rack, said infeed track being inclined downwardly towards said storage rack and operative to direct said ball with a slow rolling movement to said rack.

16. The invention defined in claim 15 wherein said device includes a belt spaced from said moving surface a distance less than the maximum diameter of a bowling ball for holding said ball with a forward movement only on said surface, and means supporting said belt in operative position relative to said surface, said means including resilient means attached to at least one end of said belt for maintaining said belt tensioned for firm yet resilient engagement with a ball being moved by said member along said belt.

17. A bowling ball stop mechanism comprising in combination a ball return runway, said runway including an elongated track section and an infeed track section connected thereto for delivering a ball with a forward movement only to a position of rest, a traveling member having a frictional ball engaging and displacing surface located between said elongated section and said infeed track section, ball guiding and holding means spaced from said traveling surface a distance less than the maximum diameter of a bowling ball, means mounting said traveling surface to engage and bias a ball engaged thereby against said guide and holding means, and means for moving said traveling surface to effect successively the conversion of rotational movement of a ball in one direction into a reverse rotational movement in the opposite direction and the delivery of said ball with said reverse

rotational movement to a point of discharge onto said infeed track.

18. The invention defined in claim 17 wherein said traveling member comprises a wheel, and said traveling surface comprises a tire formed from elastomer extending about the periphery of said wheel.

19. In a bowling ball return for delivering bowling balls from the pit end of a bowling alley to a storage rack, the combination of track means including a portion along which balls normally roll with a velocity in excess of that with which it is desirable to deliver balls to the storage rack; a positively actuated ball-controlling device including travelling, ball-engaging means; and means mounting said ball-controlling device with said ball-engaging means disposed to operatively engage balls as they travel along said portion of said track means, said ball-controlling device comprising power means operatively connected to said ball-engaging means to drive the same in a direction such that a ball rolling along said portion of said track means into engagement with said ball-engaging means will be caused first to come substantially to a stop and then to rotate in a direction opposite to that in which balls being returned rotate as they roll along said track means toward said ball-controlling device, a second portion of said track means being disposed to receive balls from said ball-controlling device and allow the balls so received to roll by gravity to the storage rack.

20. Apparatus in accordance with claim 19 wherein said ball-engaging means is disposed beneath said track means, said ball-controlling device further comprising additional ball-engaging means spaced above said first-mentioned ball-engaging means by a distance such that bowling balls travelling said portion of said track means are engaged between said first-mentioned ball-engaging means and said additional ball-engaging means.

21. In a bowling alley installation, the combination of a return runway having an end portion spaced from the pit end of the alley; ball storage means including an infeed track having an entrance end disposed at a higher level than said end portion of said return runway; a ball controlling device mounted for rotation about a horizontal axis spaced below the entrance end of said infeed track; ball elevating means for transferring balls from said end of said return runway to said ball controlling device, said ball elevating means comprising upwardly curving track means mounted with its lower end portion adjacent said end of said return runway and its upper end portion adjacent said ball controlling device, said ball controlling device having a peripheral ball-engaging portion and being so disposed that, as said device is rotated, said peripheral portion travels through an arcuate path extending between said upper end portion of said track means and the entrance of said infeed track and curving oppositely with respect to said upwardly curving track means; ball opposing means spaced from said ball controlling device in such manner that a ball rolled upwardly along said track means is engaged between said peripheral portion of said ball controlling device and said opposing means; and drive means operatively connected to said ball controlling means to rotate the same in the same direction as balls rotate when they are rolled upwardly along said track means whereby, upon engagement with said peripheral portion of said ball controlling device, a bowling ball is first stopped and then rotated in a direction opposite to that in which it rotated as it was rolled upwardly along said track means, said ball controlling device and said opposing means then coacting to cause the ball to roll, with such opposite direction of rotation, to the entrance of said infeed track and to there release the ball for delivery to said storage means via said infeed track.

22. In a bowling alley installation, the combination of a return runway having an end portion spaced from the pit end of the alley; ball storage means including

11

an infeed track having an entrance end disposed at a higher level than said end portion of said return runway; first track means having a lower end portion disposed to receive balls from said end portion of said runway, said first track means curving upwardly and having an upper end portion adjacent to but spaced below said entrance end of said infeed track; a ball controlling device mounted for rotation about a horizontal axis spaced below said entrance end of said infeed track, said ball controlling device having a peripheral ball-engaging portion and being so disposed that, as said device is rotated, said peripheral portion travels through an arcuate path which curves oppositely with respect to said first track means and extends between the upper end portion of said first track means and said entrance end of said infeed track; second track means of at least generally arcuate form, said second track means being spaced radially outwardly from said arcuate path and curving in the same direction as said path from a point adjacent the upper end portion of said first track means to a point adjacent the entrance of said infeed track, the space between said peripheral portion of said ball controlling device and said second track means being such that a bowling ball rolled upwardly along said first track means is positively engaged between said peripheral portion of said ball controlling device and said second track means; and drive means operatively connected to

12

said ball controlling means to rotate the same in the same direction as balls rotate when they are rolled upwardly along said first track means whereby, upon being engaged between said ball controlling device and said second track means, a bowling ball is first stopped and then rotated in a direction opposite to that in which it rotated as it was rolled upwardly along said first track means, said ball controlling device and said second track means then coacting to roll the ball, with such opposite direction of rotation, to said entrance end of said infeed track and to there release the ball for delivery to said storage means via said infeed track.

23. A bowling alley installation in accordance with claim 21 and wherein said upwardly curving track means, said ball opposing means, and said ball controlling device coact to define a generally S-shaped path interconnecting said return runway and said infeed track.

References Cited in the file of this patent

UNITED STATES PATENTS

974,400	Lee	Nov. 1, 1910
1,160,018	Vearing	Nov. 9, 1915
1,431,695	Severence	Oct. 10, 1922
2,306,955	Karbusky	Dec. 29, 1942
2,505,932	Anderson	May 2, 1950
2,796,261	Turner	June 18, 1957

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,015,489

January 2, 1962

Harold A. Jones et al.

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 9, line 53, strike out "with a forward movement only".

Signed and sealed this 19th day of February 1963.

(SEAL)
Attest:

ESTON G. JOHNSON
Attesting Officer

DAVID L. LADD
Commissioner of Patents