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ROTARY BOWLING BALL LIFT MECHANISM WITH OVERRUNNING CLUTCH FOR HANDLING RAPIDLY RETURNED BALLS

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Fig. 1.

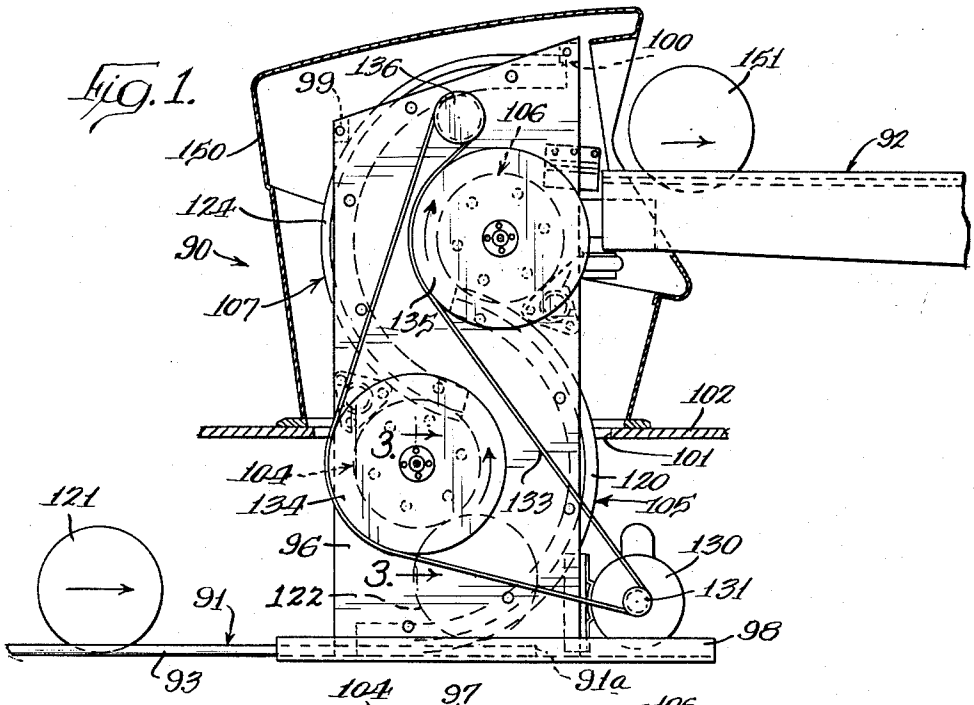


Fig. 2.

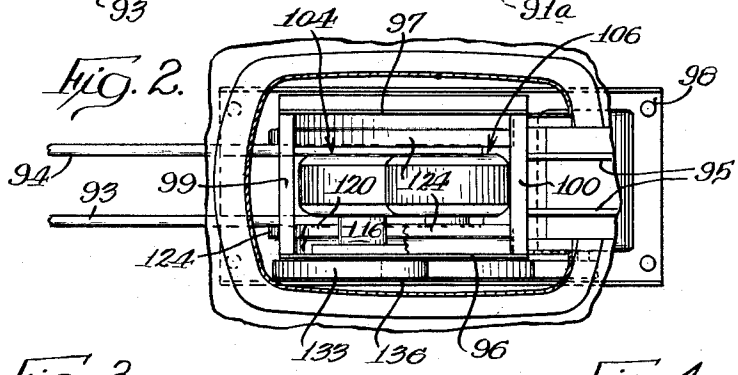


Fig. 3.

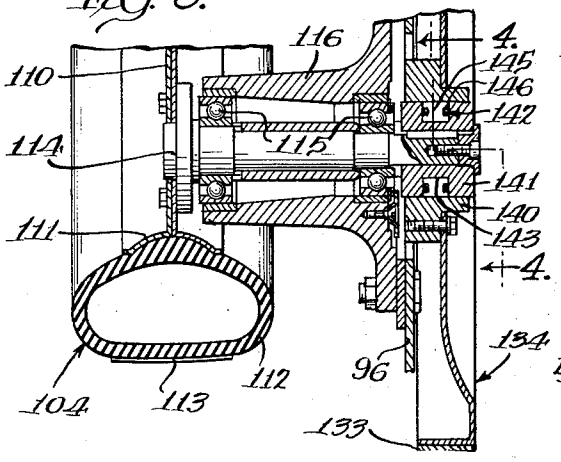
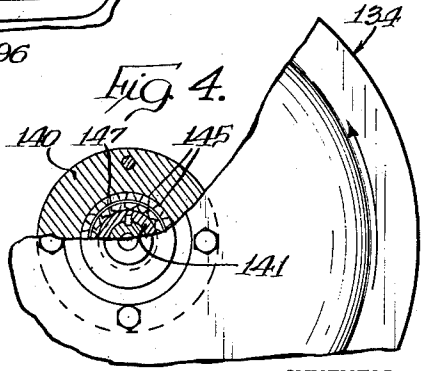


Fig. 4.



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ROTARY BOWLING BALL LIFT MECHANISM WITH OVERRUNNING CLUTCH FOR HANDLING RAPIDLY RETURNED BALLS

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This invention relates to a bowling ball lift mechanism, and more particularly to a ball lift mechanism located at the player's end of a bowling alley.

This application is a continuation-in-part of our copending application Serial No. 796,017, filed February 27, 1959, now abandoned.

An object of this invention is to provide a new and improved ball lift.

Another object of this invention is to provide a ball lift which receives a ball traveling at any speed along a ball return track disposed beneath the level of the alley without stoppage or slowing down of the ball prior to entry into the lift and discharges the ball therefrom onto a storage rack at a controlled low speed whereby the momentum of a ball traveling along the return track is taken up by the ball lift mechanism and the ball is discharged at a controlled drop-off rate onto the storage rack.

Another object of the invention is to provide a ball handling mechanism comprising a ball storage rack at the player's end of the alley, a ball return track spaced from said rack for conveying a ball to the player's end of the alley, means positioned between said track and rack for transporting a ball therebetween comprising, a first ball conveying mechanism positioned adjacent said return track to receive a ball traveling along said track, and a second ball conveying mechanism positioned adjacent the first ball conveying mechanism and the storage rack for receiving a ball from the first conveying mechanism and discharging the ball onto the rack.

A further object is to provide a new and improved ball lift mechanism including a first ball elevating wheel and track for receiving a fast moving ball, a second ball elevating wheel and track for receiving a ball from the first and delivering the same at a controlled speed, and means for driving both wheels including an overrunning clutch in the drive to the first wheel to allow the latter to speed up when engaged by a ball moving at a rate greater than the wheel.

Further objects and advantages will become apparent from the following detailed description taken in connection with the accompanying drawings in which:

FIG. 1 is a vertical sectional view illustrating a preferred embodiment of ball lift mechanism;

FIG. 2 is a top plan view of the mechanism illustrated in FIG. 1;

FIG. 3 is an enlarged fragmentary sectional view taken at about the line 3—3 of FIG. 1; and

FIG. 4 is a fragmentary view, partly in section, taken on the line 4—4 of FIG. 3.

While this invention is susceptible of embodiment in many different forms, there is shown in the drawings and will herein be described in detail a preferred embodiment of the invention with the understanding that the present disclosure is to be considered as an exemplification of the principles of the invention as is not intended to limit the invention to the embodiment illustrated. The scope of the invention will be pointed out in the appended claims.

Referring now to the drawing, a power lift mechanism generally designated 90 is interposed between a ball return track as at 91 and a ball storage rack as at 92, for elevating balls from the track to the rack. The track 91 may comprise a pair of rod-like track members 93 and

94 which extend to terminal positions at at 91*a* beneath the power lift mechanism 90. The ball storage rack 92 includes a pair of track portions as at 95 which enable the balls to roll along the storage rack from the power lift mechanism to storage positions.

The power lift mechanism includes a suitable framework comprising a pair of spaced side plates as at 96 and 97 attached to a suitable support in the form of a plate as at 98, and braced at the upper ends by transverse connecting members as at 99 and 100. The plates 96 and 97 project upwardly through an opening as at 101 in the floor of the bowling alley as at 102.

A first ball handling or conveying mechanism includes a first, lower wheel as at 104 and a cooperating track 105, and a second ball handling or conveying mechanism includes a second, upper wheel as at 106 and a cooperating track as at 107. Each of the wheels 104 and 106 is constructed substantially as illustrated in FIG. 3, and includes a central plate or web 110 having a rim 111 supporting an inflatable tire 112 having a suitable wear-resistant cover such as leather as at 113. The central web 110 includes a hub 114 fixed thereto and rotatably mounted as by bearings 115 in a housing 116 supported in cantilever fashion on the side plate 96.

The lower track 105 cooperating with the wheel 104 includes a pair of track members 120 spaced apart a distance less than the diameter of a ball to be rolled thereover, and spaced from the outer periphery of the wheel by an amount somewhat less than the diameter of a bowling ball such as that illustrated in FIG. 1 in full lines at 121 and in broken lines at 122. The lower ends of the track members 120 are adjacent the terminal portion 91*a* of the track 91 and disposed beneath the wheel 104. From this position, the track members 120 are arcuately curved concentrically about the axis of rotation of the wheel 104 and extend upwardly to a position adjacent the upper wheel 106.

The track 107 associated with the wheel 106 includes a pair of track members 124 similar to those illustrated at 120, having lower portions terminating beneath the upper ends of the track members 120 for receiving a ball from the latter, and including intermediate portions arcuately curved concentrically about the axis of rotation of the wheel 106 and extending to terminal portions overlying the wheel and adjacent to the storage rack 92.

In operation, it will be understood that the wheels 104 and 106 are driven by a suitable drive mechanism to rotate in opposite directions indicated by the directional arrows of FIG. 1, the lower wheel 104 rotating in a counterclockwise direction and the upper wheel 106 rotating in a clockwise direction. As the balls are delivered to the power lift mechanism, they engage the lower tracks 120 and the lower wheel 104, the latter being operable to roll the balls up the track members 120, delivering the same to the track members 124 whereupon the wheel 106 is effective to roll the balls upwardly on the last-mentioned track members for delivery to the rack 92. It will be understood that the balls may enter the lift mechanism traveling at a high rate of speed and are delivered from the mechanism to the rack 92 at a controlled lower rate of speed, traveling in the same direction.

The drive mechanism for both wheels 104 and 106 preferably includes a drive motor as at 130 suitably supported on the frame members 96 and 97 and including a drive pulley 131 having a belt 133 trained thereabout and passing around drive pulleys 134 and 135, and about an idler pulley 136. The pulley 135 is secured directly to the hub of the wheel 106 and is rotatable therewith. The pulley 134 is associated with the lower wheel 104 for rotation therewith and relative thereto.

In order to reduce noise and ball marking when balls enter the lift mechanism traveling at a greater rate of

speed that the lower wheel 104, the wheel is connected to the pulley 134 through the medium of an overrunning one-way clutch, by means of which the pulley 134 is enabled to drive the wheel 104, but which enables the wheel 104 to overrun the pulley if driven fast enough by a ball entering at a high rate of speed.

Referring particulary to FIGS. 3 and 4, the pulley 134 constructed with a hub as at 140 which comprises one clutch member rotatable relative to a second clutch member 141 which is secured to the hub 114 of the wheel 104. Preferably, the one-way clutch 142 is a sprag-type clutch, wherein an annular groove 143 in the clutch member 141 is provided with a series of sprags 145 each provided at the lateral edges thereof with a recess as at 146 for receiving a circular coiled spring as at 147 for retaining the sprags in assembly. This is a conventional form of clutch, and the sprag members are formed such that when the pulley 134 is rotated in a counterclockwise direction, the individual sprag members roll in a manner to bind the clutch member 140 to the clutch member 141 for rotation together. One the other hand, when the clutch member 141 and the wheel 104 are rotated in a counterclockwise direction relative to the pulley 134, the former is free to rotate relative to the latter, and this enables the wheel to overrun the pulley if the wheel is driven by an entering ball traveling at a speed greater than the wheel.

Preferably, that portion of the power lift mechanism projecting above the floor 102 is enclosed by a suitable hood as illustrated at 150 which is supported on the floor 102 and includes an opening at the bottom surrounding the lift mechanism and an opening at the top enabling egress of balls onto the rack 92 as at 151.

We claim:

1. A ball lift for receiving a moving bowling ball and elevating said ball comprising, a frame, a first ball conveying mechanism mounted on said frame including a first ring-shaped member rotatable about an axis and a first curved guide track spaced from said member, said guide track having a ball entrance end and an intermediate part to hold a ball against the member, a second ball conveying mechanism on said frame including a second ring-shaped member rotatable about an axis and positioned generally above the first member and a second curved guide track spaced from said second member, said second guide track having an end adjacent said first guide track and a ball discharge end with an intermediate part to hold the ball against the second member, and means for rotating both members including an overrunning clutch permitting overrun of the first member when engaged by a bowling ball moving at a speed greater than the speed at which the first member is driven.

2. A ball handling mechanism comprising, a ball storage rack, a ball return track for returning a ball to an alley approach area, means for transferring a ball from said track to said rack including a ball return ball lift comprising, a frame, a first ball conveying mechanism mounted on said frame including a first wheel rotatable about an axis and overlying the return track and a first arcuately curved guide track spaced from said wheel, said guide track having a ball entrance end adapted to lie adjacent the return track and an intermediate part to hold a ball against the wheel, a second ball conveying mechanism on said frame including, a second wheel rotatable about an axis and positioned generally above the first wheel and a second arcuately curved guide track spaced from said second wheel, said second guide track having an end adjacent said first guide track and the other end adjacent the ball storage rack with an intermediate part to hold the ball against the second wheel, and drive means for rotating said wheels including an over-running clutch in the drive to the first wheel enabling overrun of the first wheel when engaged by a ball moving at a greater speed than that at which the first wheel is driven.

3. A ball lift comprising, a frame, a first ball conveying mechanism mounted on said frame including a first wheel and a first generally semicircular guide track spaced from said wheel, said guide track having a ball entrance end adapted to lie adjacent an alley return track and an intermediate part curved about the periphery of the wheel to hold a ball against the wheel, a second ball conveying mechanism on said frame including a second wheel positioned above the first wheel a distance sufficient to pass a ball therebetween and a second semicircular guide track spaced from the second wheel and facing in a direction opposite to said first guide track, said second guide track having an end positioned to receive a ball discharged from the first guide track and the other end adapted to be positioned adjacent a ball storage device with an intermediate part curved about the periphery of the wheel to hold the ball against the second wheel, and means for rotating said wheels in opposite directions whereby a ball rolls in one direction up the first guide track and reverses its rotation while rolling up the second guide track to discharge the ball from the ball lift traveling in generally the same direction as that when entering the ball lift, said means for rotating including a pulley rotatable with the second wheel, a pulley rotatable relative to the first wheel, a one-way clutch connecting the first wheel and the pulley associated therewith permitting overrun of the first wheel relative to the pulley associated therewith when engaged by a ball travelling at a greater speed than that at which the first wheel is driven, and a belt trained about the pulleys for rotating the latter.

4. A ball handling mechanism, comprising, a ball storage rack, a ball return track for returning a ball to an alley approach area and including at least a portion thereof disposed at a level below the level of the storage rack and a ball lift for transferring a ball from said return track portion to said rack including a frame, a wheel rotatable on the frame about a generally horizontally disposed axis and overlying said return track portion, an arcuately curved guide track spaced from the wheel including a ball entrance end adapted to lie adjacent said return track portion, an intermediate part disposed to hold a ball against the wheel, and an exit end for directing a ball in a path leading to said storage rack and drive means for rotating the wheel including an overrunning clutch enabling overrun of the wheel when driven by a ball moving at a greater speed than that at which the wheel is driven.

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