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BALL CHECK FOR BOWLING ALLEYS

Filed Nov. 2, 1938

2 Sheets-Sheet 1

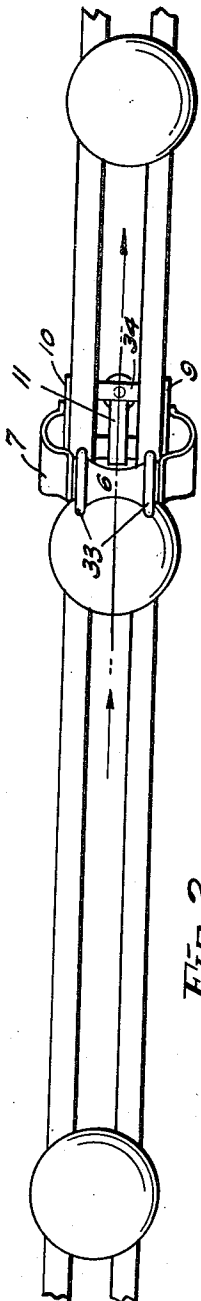


Fig. 2.

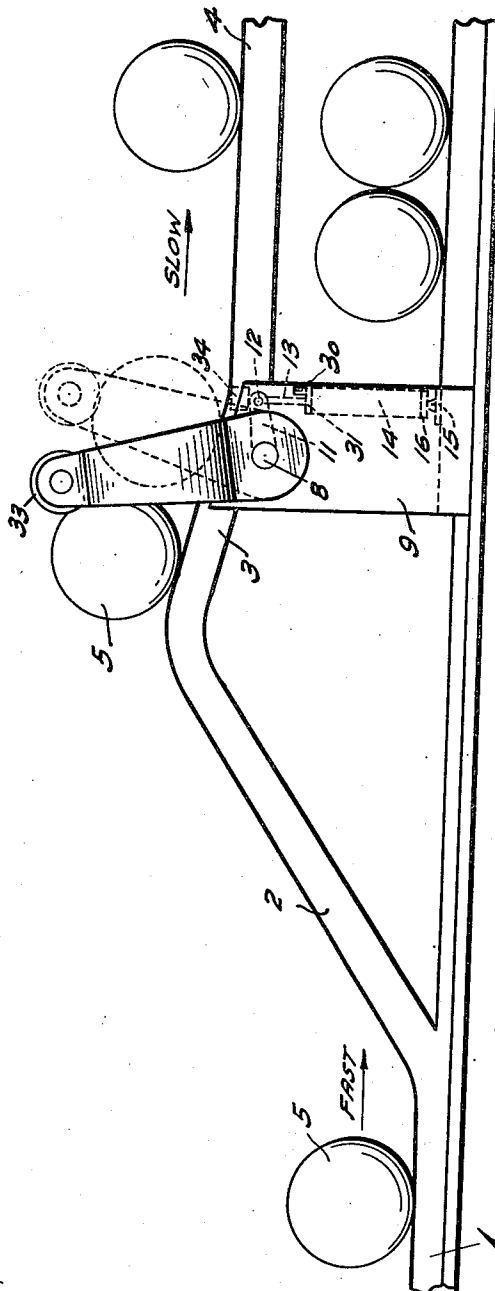


Fig. 1.

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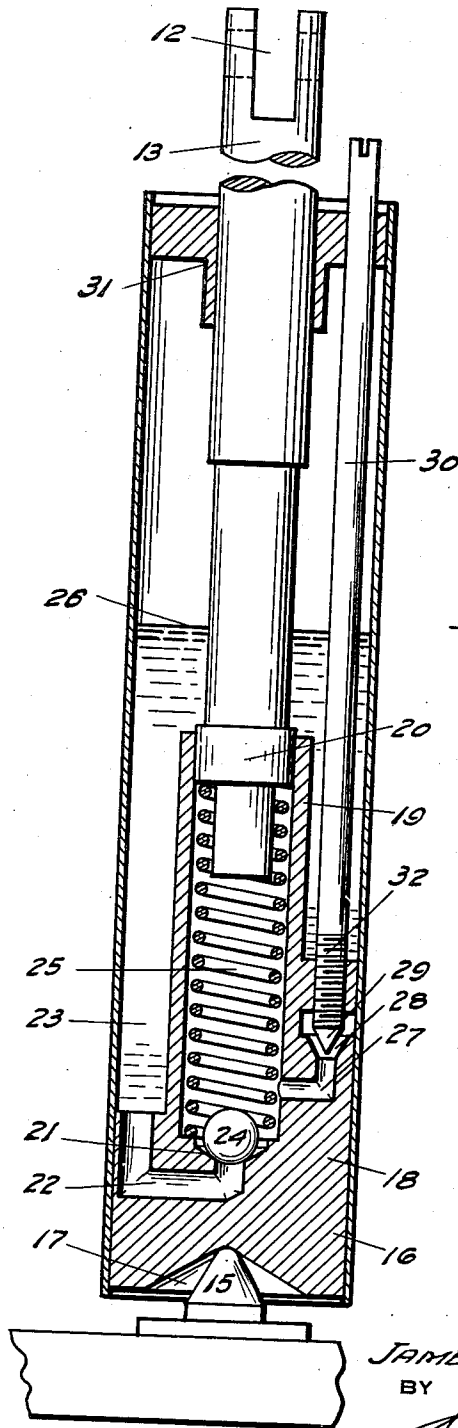


Fig. 3.

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BALL CHECK FOR BOWLING ALLEYS

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8 Claims. (Cl. 273-47)

This invention relates to bowling alleys and in particular to devices for retarding the movement of bowling balls on the returnways.

The principal object of the invention is to provide a bowling ball retarder which will check the kinetic energy of the ball when returning to the rack ready for use by the player, but which at the same time will permit the ball to pass and to assume its correct position adjacent other balls which may have been accumulated in the storage rack.

In most of the alleys today, the balls are returned by the pin boy to a return rack which is inclined to carry the balls back to the players' position, and at this position they roll up a U-shaped incline at the end of the track, whereupon they are deposited on a set of runners which are at a convenient height for the player. This loop type of return has the disadvantage of permitting the balls to bump, more or less dependent upon the number of balls in the players' rack, at the time when the return is made. This bump tends to develop flat spots in the ball, and after considerable usage the ball becomes out of round. Furthermore, the bumping of the balls is dangerous to the hand of the player which may be picking up a ball from the rack.

There are other ball checks which operate to retard the ball at some position prior to the players' rack, but these have the defect of causing a reversal in the direction of rotation of the ball which soon wears a slight groove in the rails supporting the ball.

The applicant desires to bring the ball to as gradual a stop as possible and without shock in order to avoid wear on the ball or the rail. He has therefore designed a mechanism which will engage the ball and move with it and carry it for a fixed distance, during which time the kinetic energy of the ball is absorbed by the mechanism. The mechanism then releases the ball and permits it to roll freely and easily to its final position in the players' rack. In order to check the ball without causing a reversal in its rotation, which would tend to wear a groove in the rails, the applicant has provided a roller which follows the natural rotation of the ball throughout the entire checking operation. Furthermore, the checking device is preferably provided with a dashpot damper which is adjustable so as to permit of a proper time being allowed for the mechanism to absorb the kinetic energy of the ball. As a result of this, applicant's device operates very smoothly and causes no wear at any point in either the ball or the rail.

It is understood that the detailed disclosures forming a part of this application show the preferred embodiment of the invention, but many variations in the mountings could be made without departing from the scope of the invention.

In order that the details of the invention may be more clearly understood, reference is made to the accompanying drawings, in which:

Figure 1 is a side elevation showing a bowling alley return with the ball check mounted therein.

Figure 2 is a top plan view of Figure 1.

Figure 3 is a section showing the detailed construction of the dashpot.

Similar reference numerals refer to similar parts throughout the drawings.

In the drawings, 1 is a return track on which the balls are returned by the pin boy to the player at the other end of the alley. This track has the usual form, and when it approaches the player position of the alley, it turns upward from the floor to an incline 2, and thence declines at 3 for a short distance, whereupon it joins into the player rack 4. The ball check is adapted to be mounted preferably near the end of the decline of the track at section 3. The ball 5 upon passing onto the decline 3 strikes a roller 6 which is mounted in a yoke 7. The yoke 7 is pivoted preferably at a point below the incline rails 3 on a hinge pin 8, which in turn is mounted in uprights 9 and 10. It will be noted in Figure 1 that due to the pivotal mounting of the yoke 7, the roller 6 when in its normal position stands in the path of the ball 5. When the ball 5 strikes the roller in its normal position it carries the roller with the yoke 7 with it to such a point as to permit the ball to pass through the yoke 7 and under the roller 6. Obviously, the proportions of the roller 6 and the yoke 7 must be worked out accurately to accommodate the diameter of the ball so that the right amount of passage will be acquired when the yoke passes through the angular movement. It will be noted that the yoke 7 and its roller are so mounted that they move with the ball and in the direction of the ball at all times.

It will be further noted that the ball 5 when passing along the runway 3 is moving with its periphery advancing toward the roller. The roller in acting as the check engages the periphery and follows the rotation of the ball without retarding this rotation in any way.

In a number of ball checks now in use a fixed device is used instead of the roller of the applicant's device, and this fixed stop tends to check the rotation of the ball instantaneously, and due to the inertia of the ball, there is a reversed rota-

tion actually caused which wears a groove in the track. Applicant's design entirely eliminates the reversed rotation of the ball, and permits a complete absorption of the kinetic energy of the ball without mechanical friction being developed between the ball and any other part of the apparatus.

In order to provide the cushioning effect in the yoke 7 and to absorb the kinetic energy of the ball, an arm 11 is rigidly attached to a hinge pin 8. This arm 11 terminates in a clevis 12 which is attached to a piston rod 13 which in turn operates in a cylinder 19. The cylinder 19 at its lower extremity is mounted on a fulcrum point 15. The piston 13 and cylinder 19 operate through the arm 11 and the yoke 7 to give the roller 6 the desired cushioning action, and to return it to a normal position after the ball has passed.

The construction of the cushioning cylinder or "dashpot" will be better disclosed by referring to Figure 3. In designing the "dashpot," the applicant has had constantly in mind that the absorption of the kinetic energy of the ball requires a steady but positive release, such as is characteristic of a hydraulic type of cylinder. Furthermore, he has realized the importance of an easily accessible adjustment so that the return of the flow of the liquid in the "dashpot" can be regulated to the particular condition of each alley; that is, the amount of kinetic energy which is stored in the ball due to a structural condition in the alleys. In constructing the hydraulic "dashpot" or shock absorber, applicant has used a casting 16 of simple design which is machined at its lower extremity with a cone-shaped pocket 17 which rests upon the cone-shaped fulcrum 15. This point supports the lower extremity of the "dashpot." The casting is of cylindrical form at section 18, and has projecting upward therefrom a cylindrical portion 19. This cylinder 19 is bored out smoothly to receive a piston 20 which is formed on the end of the shaft 13. The cylinder 19 has preferably a cone-shaped bottom 21 with an outlet 22 feeding back into the "dashpot" tank 23. Within the cone-shaped pocket 21 is inserted a ball 24 which acts as a check valve. Below the piston 20 and within the cylinder 19 is inserted a helical coil spring 25 which presses constantly upward against the piston 20, and acts to return the piston to its upper elevation in the cylinder 19 at all times. The tank 23 is filled with oil at a level approximately as shown at 26. In the lower end of the cylinder 19 and near the bottom is an orifice 27 which extending upward, has a conical seat 28 for a needle valve 29. The needle valve 29 has a shaft 30 which extends upward and through a guide bushing 31 mounted in the top of the tank 23. The shaft 30 extending through the guide bushing 31 is accessible for adjusting the needle valve toward and from its seat 28. This is of course accomplished in the usual manner by a screw 32 formed on the needle valve itself and engaging a corresponding threaded hole in the casting 16 at this position.

Referring to the details of the roller mounted in the yoke 7, it is important to note that a spool, preferably of light weight, are provided on which is mounted two soft rubber rings 33. These soft rubber rings are so positioned and spaced as to be the sole contact against the ball when it is engaged by the check. The rings are also positioned apart so as to avoid a possible condition wherein both rubber rings might drop into the finger holes in the same bowling ball at the same

time. Obviously, if this should happen the desired cushioning effect would be destroyed. This spacing of the rings is such that not more than one of the rubber rings can drop into a finger hole at any one time, and the ball is therefore contacted and checked by at least one of the rings. Obviously, many of the details of construction could be modified without departing from the principle and scope of the invention.

In operation, the apparatus being set up as shown in Figure 1, it is desired to check a return ball which has a given amount of kinetic energy due to its motion along the returnway. The yoke 7 carrying the light roller 6 with the soft rubber rings 33 is transposed in the path of the ball, and at such an angle and elevation as to contact the surface of the ball. The ball is rotating upon reaching the apparatus, and upon contact with the rubber rings 33 immediately begins to rotate the roller 6 and the pressure of contact forces the yoke 7 over at an angle, at the same time rotating the shaft 8 and moving the arm 11 through an angle which through the clevis 12 and piston rod 13, forces the piston 20 downward into the cylinder 19. This action of the piston tends to compress the oil 26 within the piston, and inasmuch as the ball valve 24 is closed against the seat 21, the oil cannot escape but must pass through the orifice 27 and by the needle valve 29 into the tank 23. The needle valve 29 is so adjusted as to pass the right amount of oil within a given time suitable to the amount of kinetic energy in the ball's motion. As soon as the yoke 7 has moved over to a position substantially at right angles to the track, the opening through the yoke has become large enough to permit the ball to pass through. The ball thereupon continues into the players' rack designated as 4. The ball, having freed the yoke 7, releases the pressure therefrom and permits the spring 25 within the cylinder 19 to press the piston 20 upward, which in turn moves the yoke back to its original position. In order that this original position may always be acquired, a stop or bumper 34 is mounted in a suitable position to engage the arm 11.

Referring to Figure 3, it is obviously necessary to permit the oil to enter from the tank 23 into the cylinder 19 when the piston is on the upward or return stroke. In order to accomplish this the outlet 22 is provided, and the oil rushes from the tank 23 into the outlet 22, pushing the ball valve 24 away from its seat and immediately refills the cylinder 19.

It is obvious that the position of the pivot shaft 8 with respect to the rails or track may be changed, and the mechanism mounted in any position so long as the same mechanical action is obtained with respect to the handling of the ball; and applicant does not limit himself to a pivoted position below the ball track.

It is also to be noted that the dashpot tank is filled with oil to a level above the cylinder, and that the elements within the dashpot are always submerged in oil and therefore no priming is required.

Having described the invention, what is claimed as new and is desired to be secured to Letters Patent is:

1. In a bowling ball retarder, a retarding member comprising a pair of rotatably mounted soft rubber rings spaced from each other and adapted to engage a ball.

2. A bowling ball retarder comprising a returnway, a movable retarding member, said member carrying a roller provided with two spaced soft

rubber rings and said member being movable from a position in which the rings on said roller lie in the path of an approaching ball and will engage the same at two spaced points, to a position in which said roller is out of the path of the ball.

3. In a bowling ball retarder, a runway, an arm pivoted below the runway, means for normally inclining said arm toward the approaching ball and for yieldingly resisting displacement from said position, and a roller on said arm adapted to engage the upper portions of the ball and so positioned that as the arm rises under the impact of the ball, said roller will reach a position at which it will permit the ball to pass underneath it.

4. In a bowling ball retarder, a runway for balls, a stop for retarding the movement of a ball along said runway, a mounting for said stop whereby it is normally positioned for engagement by the upper portions of an approaching ball, and movable by said ball portions along a resultant path that is directed substantially in the direction of movement of said ball portions into a position in which the space between the stop and the runway is so great that the ball passes between the stop and the runway, and means for yieldably resisting the movement of said stop by said ball, the direction of movement of said stop from the time of initial contact to the time of release of the ball therefrom being in a direction that has a main component in the direction of movement of said ball portions, and a component at right angles to said main component that is never more than slight relatively to said main component.

5. A bowling ball retarder comprising a runway, a stop for retarding the movement of a ball in said runway, a mounting for said stop comprising a pivot positioned at a point below the path of the ball whereby the stop will engage the upper portions of a ball and move substantially in the direction of movement of said ball portions from a position in which the space between the stop and the runway is so small that the ball cannot pass therethrough, to a position in which the space is large enough to permit the ball to pass therethrough and means for yieldably resisting the movement of said stop by the ball, the direction of movement of said stop from the time of initial contact to the time of

release of the ball therefrom being in a direction that has a main component in the direction of movement of said ball portions and a component at right angles to said main component that is never more than slight relatively to said main component.

6. In a bowling ball retarder, a runway, a ball retarding stop adapted to engage the upper portions of the ball, said stop being in the form of a roller having points of contact symmetrically spaced to either side of a vertical plane through the ball center and disposed in the direction of movement of said ball, a mounting for said stop whereby it is movable with the ball in a direction substantially coinciding with the direction of movement of said ball, but diverging slightly from the runway and is adapted to release the ball when a sufficient divergence is reached and means for yieldably resisting the movement of said stop by the ball, the direction of movement of said stop from the time of initial contact to the time of release of the ball therefrom being in a direction that has a main component in the direction of movement of said ball portions, and a component at right angles to said main component that is never more than slight relatively to said main component.

7. In a bowling ball retarder, a runway, and a movable stop for retarding the movement of a ball in the runway approaching said stop, a mounting for said stop whereby it is adapted to initially engage the ball near its uppermost point and to move as the ball strikes it, in a path nearly parallel to the runway but slightly diverging therefrom until the divergence is so great that the ball is released by passing between the stop and the runway and said runway comprising an upwardly inclined portion positioned so as to retard a ball before it reaches said stop.

8. In a bowling ball retarder, a runway, an arm pivoted below the runway, means for normally inclining said arm toward the approaching ball and for yieldably resisting displacement from said position, and a stop on said arm adapted to engage the upper portions of said ball and so positioned that as the arm rises under the impact of the ball said stop will reach a position at which it will permit the ball to pass underneath it.

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