May 13, 1941. W. HEINIGER 2,242,069

BALL RETURN DEVICE FOR BOWLING GAMES

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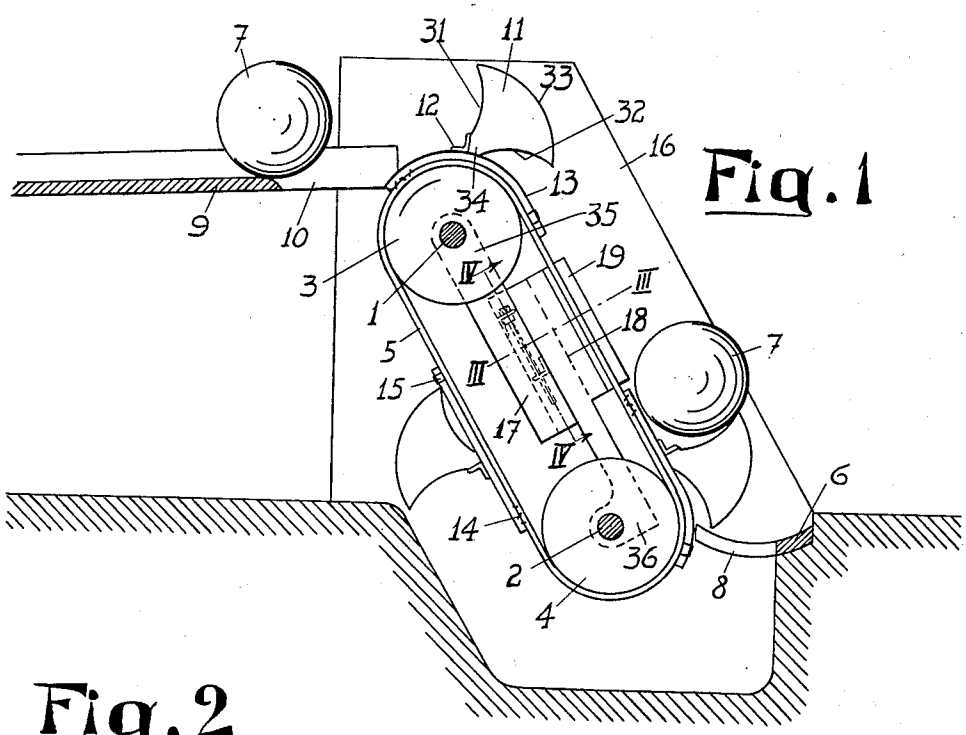
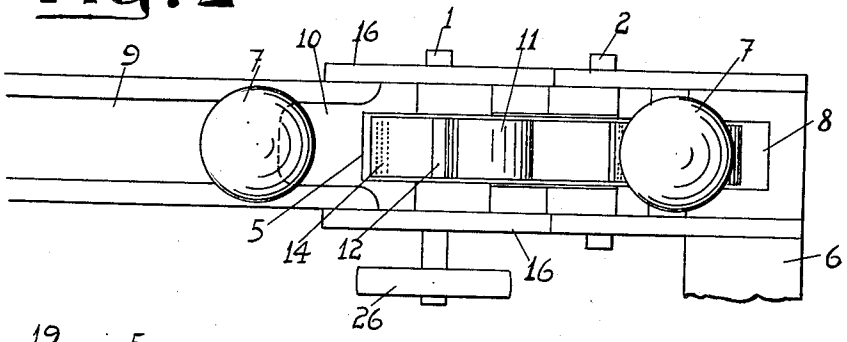



Fig. 1

Fig. 2



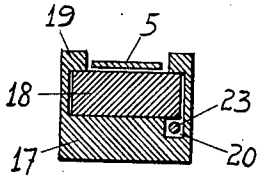




Fig. 3

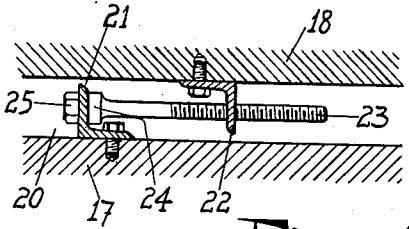



Fig. 4

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## BALL RETURN DEVICE FOR BOWLING GAMES

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In Switzerland March 9, 1937

1 Claim. (Cl. 273—49)

This invention relates to a mechanically operable ball return device used in connection with bowling games and other similar games.

The present application is a continuation-in-part of my co-pending application, Serial No. 191,152, filed February 18, 1938, for a Device for the self-service at the bowling game with motor drive.

An object of the present invention is the provision of a device through the use of which balls thrust at pins in the course of a bowling game, or similar articles used in the course of various other games, may be quickly and automatically returned to their original position without requiring any aid or effort on the part of the participants in the game or their attendants.

Other objects of the present invention will become apparent in the course of the following specification.

The objects of the present invention may be realized through the provision of a ball-returning device extending from a groove receiving the balls thrust at the pins to an inclined runway or run-off channel extending from a position substantially above the groove toward the position where the player or players receiving the balls are located in the course of the game.

The ball-returning device preferably has the form of an endless band or belt rotatably mounted upon two drums and extending obliquely from the ball groove to the run-way, said band carrying ball-supporting devices which grasp the balls situated in the groove and transport them to the runway.

The invention will appear more clearly from the following detailed description when taken in connection with the accompanying drawing showing by way of examples a preferred embodiment of the inventive idea.

In the drawing:

Figure 1 is a diagrammatic view showing partly in side elevation and partly in section a ball return device constructed in accordance with the principles of the present invention;

Figure 2 is a plan view of the device shown in Figure 1;

Figure 3 is a section along the line III—III of Figure 1; and

Figure 4 is a section along the line IV—IV of Figure 1.

The ball return device illustrated in the drawing comprises two shafts 1 and 2 which extend horizontally. The shaft 2 is situated substantially closely to the end of a ball groove 6 extending behind the bowling plate (not shown) and receiving the balls 7. The shaft 1 is situated higher than the shaft 2 and close to an opening 10 provided in a runway or run-off channel 9 through the use of which the balls 7 are returned to the players.

A drum or cylinder 3 is firmly mounted on the shaft 1 and is rotatable therewith. A drum or cylinder 4 is mounted on the shaft 2.

An endless band or belt 5, consisting, for example, of leather, passes over the cylinders 3 and 4 and carries ball-transporting elements 11.

Due to the illustrated position of the shafts 1 and 2, whereby one of these shafts is advanced in relation to the other, the endless belt 5 extends obliquely from the end of the groove 6 to the runway 9, and the balls are transported upwardly by the belt 5 upon that side of the endless belt transmission which is further removed from the runway 9.

The groove 6 is provided with an opening 8 for the passage of the endless belt 5 and the ball-transporting elements 11. The opening 10 of the runway 9 is also provided to facilitate the movements of the belt 5 and of the elements 11.

The ball-transporting elements 11 consist of blocks which may be made of wood or the like and which have the shape of cylindrical segments constituting quarters of a cylinder. Each of the transporting elements 11 has a curved concave ball-engaging surface 31, an opposite concave surface 32, an outer cylindrical surface 33, and a tapered end portion 34 which is limited by the surfaces 31 and 32 and is connected to an angle-iron 12. Due to the provision of the tapered end portion 34 the ball 7 supported by the surface 31 is easily dropped upon the run-off channel 9. The curved ball-engaging surfaces 31 of the transporting elements 11 extend substantially perpendicularly to the adjacent surface of the belt 5. Each of the angle-irons 12 is firmly connected to the separate leather strap or strip 13 having a front edge portion which is sewn at 14 to the endless band 5. The rear end portion of each of the strips 13 is attached to the band 5 solely by loops or running nooses 15, so that the strip 13 may move slightly relatively to the endless band 5 when its direction changes from a straight to a curved one and vice versa in the course of its movement over the drums 3 and 4.

Due to the slight curvature of the ball-carrying surface 31, each of the balls 7, is firmly held by a transporting element 11 while it is being raised toward the runway 9. The opposite surface 32 of each transporting element 11 is also

concave in order to adapt it somewhat to the curvature of the cylinders 3 and 4.

Plates 16 are situated on opposite sides of the transporting device to prevent the balls from falling sidewise off the transporting elements 11 in the course of the transportation.

The shaft 1 is driven by means of any suitable motor, not shown in the drawing, and actuating a pulley 26 (Figure 2) which is firmly mounted upon the shaft 1.

The endless belt 5 is stretched and held taut between the cylinders 3 and 4 by an adjusting device comprising a support 17, the upper end 35 of which constitutes a support for the shaft 1 and the drum 3 carried thereby. The support 17 extends in a direction from the shaft 1 toward the shaft 2 and may be carried by any suitable means not shown in the drawing.

A second support 18 comprises a lower portion 36 serving as a support for the shaft 2 and the drum 4 carried thereby. The support 18 extends in a direction from the shaft 2 toward the shaft 1 and is maintained in that position by any suitable means not shown in the drawing. The supports 17 and 18 are movable relatively to each other. The support 18 is provided with a portion 19 which also serves as a guide for the endless band 5.

The support 17 is provided with a longitudinal groove 20. An angle-iron 21 (Fig. 4) is situated within the groove 20 and is firmly attached to the support 17. Another angle-iron 22, which is also situated within the groove 20 is firmly attached to the support 18. The angle-iron 22 is provided with a threaded opening, and a bolt 23 extending through an opening formed in the angle-iron 21 and having a head 25 and a stop 24 situated on both sides of the angle-iron 21, is threaded through the opening of the angle iron 22.

The support 18 carrying the shaft 2 is also used as a bearing surface for that part of the endless belt 5 which moves upwardly raising the balls 7. Due to the provision of this bearing surface an inward bending of the belt is avoided so that it is not subjected to any excessive stresses.

The belt 5 is stretched taut between the cylinders 3 and 4 by adjusting the distance between the shafts 1 and 2 carrying these cylinders. This adjustment is carried out by turning the bolt 23. Since the angle-iron 22 is in threaded engagement with the bolt 23, a rotation of the bolt 23 will cause a relative movement of the supports 17 and 18 to stretch taut the belt 5 or to loosen it.

The device operates as follows:

The pulley 26 driven by a motor not shown in the drawing will turn the shaft 1 and the disc 3 thus causing a rotation of the endless band 5 in the direction of the arrow shown in Figure 1. The groove 6 and the parts connected therewith are so constructed that any ball thrown by the player will move toward the opening 8 which is smaller than the diameter of the ball. At the opening 8 the ball is engaged by the surface 31 of the one of the transporting elements 11 and is moved upwardly by this transporting element, as shown in Figure 1, until it reaches the opening 10 of the runway 9. Then the ball is deposited on the runway 9 and will roll by gravity to the position wherein the players are located.

It is apparent that the specific illustration shown above has been given by way of illustration and not by way of limitation, and that the structures above described are subject to wide variation and modification without departing from the scope or intent of the invention, all of which variations and modifications are to be included within the scope of the present invention.

What is claimed is:

A ball return device, comprising an endless belt, means connected with said belt for driving the same, at least one ball-supporting element, said ball-supporting element consisting of a block having substantially the form of a quarter of a cylinder, and comprising a curved ball-supporting surface and a concave opposite surface; an angle-iron connected with said transporting element, a strip carrying said angle-iron, means firmly connecting one end of said strip with said belt, and means connecting the other end of said strip with said belt to provide freedom of movement between said other end of the strip and the belt.

WALTER HEINIGER.