Dec. 21, 1965 C. K. VINCENT 3,224,766

BOWLING GAME APPARATUS AND BALL RESETTING AND RETURNING MECHANISM FOR THE SAME

Filed Sept. 28, 1962 4 Sheets-Sheet 1

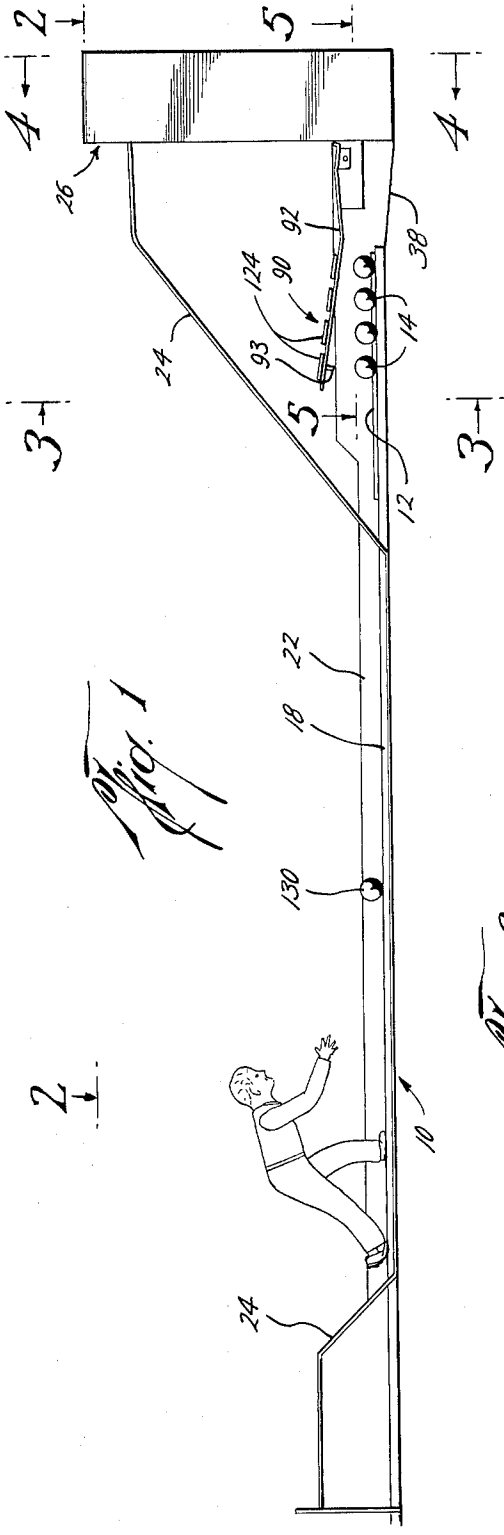


Fig. 1

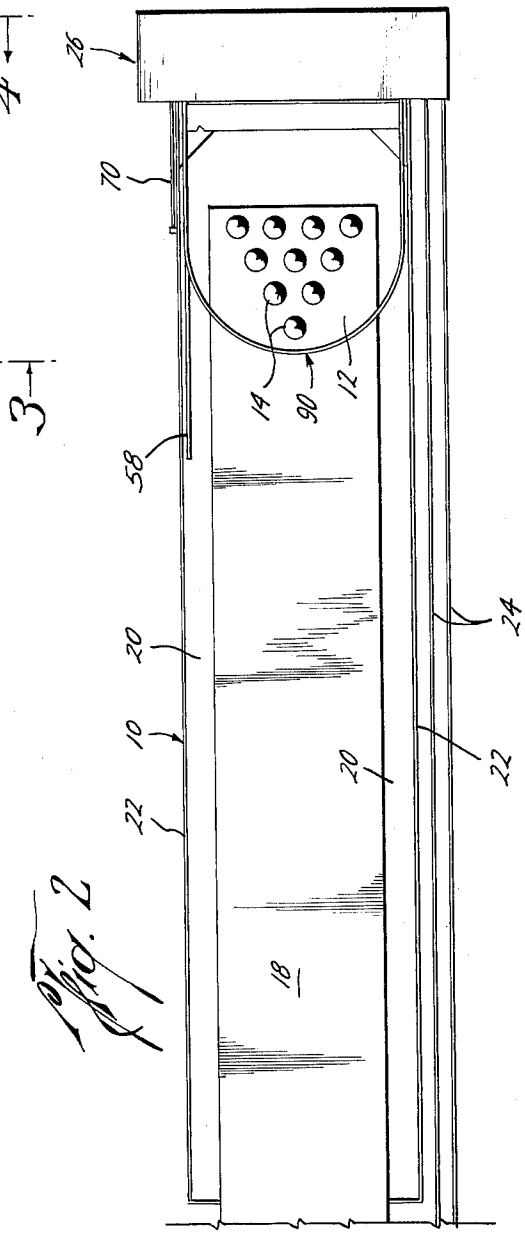


Fig. 2

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Filed Sept. 28, 1962 4 Sheets-Sheet 2

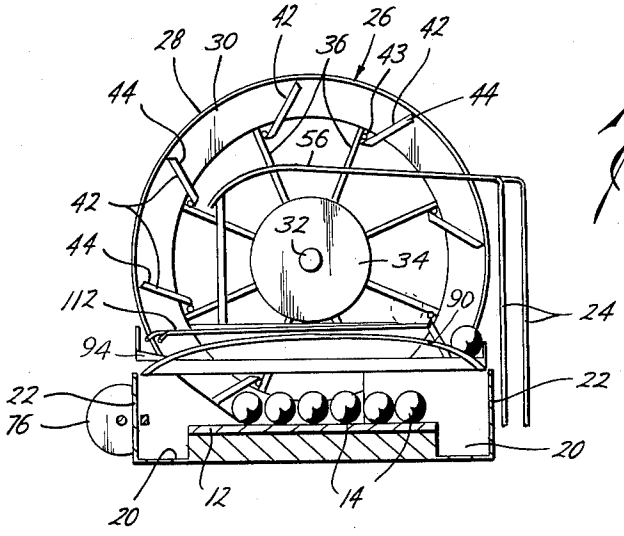
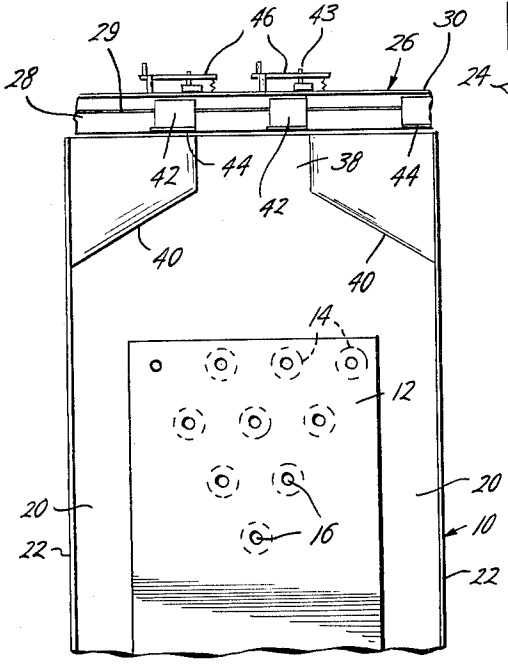
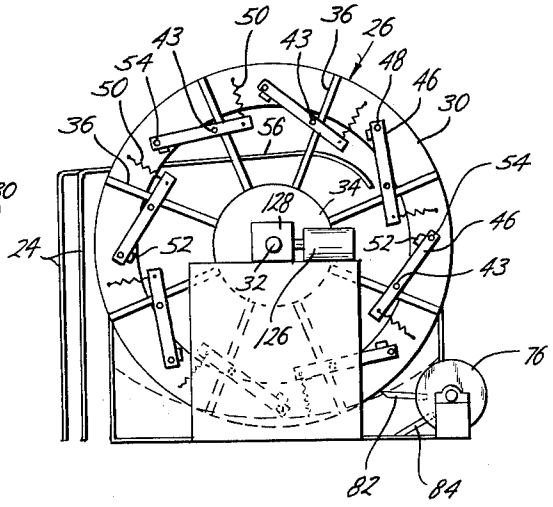


Fig. 3

Fig. 4

Fig. 5





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Fig. 6

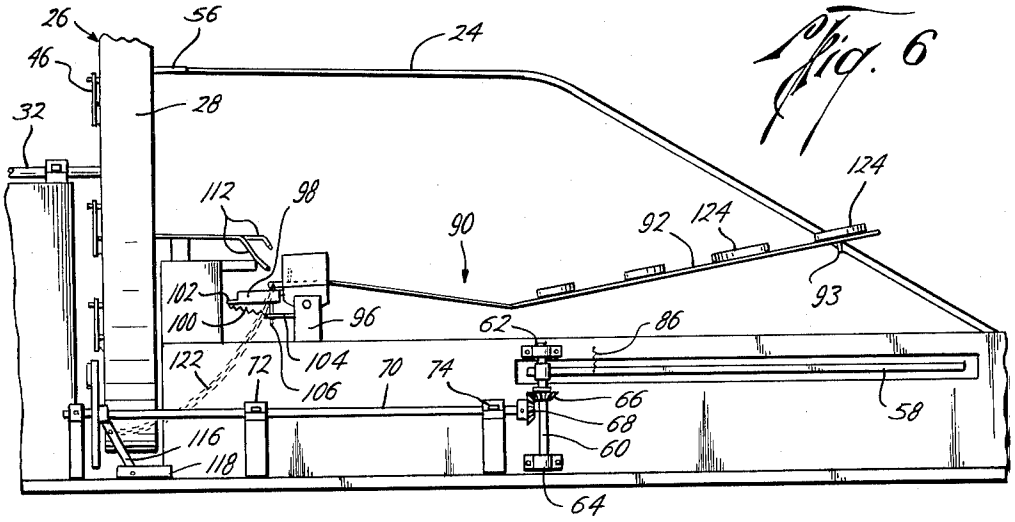


Fig. 7

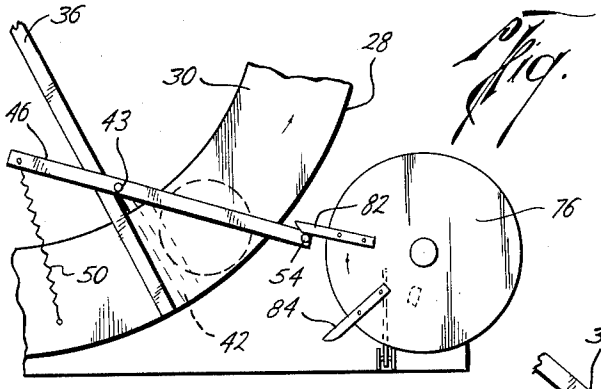


Fig. 8

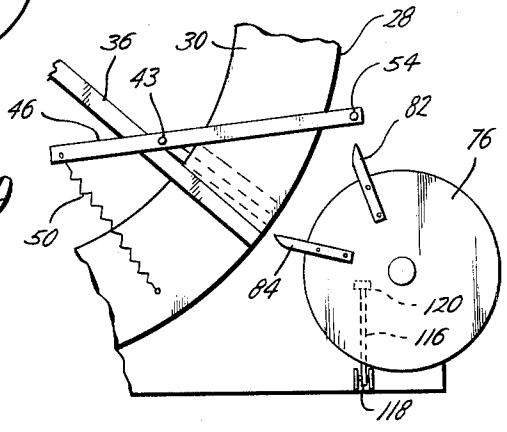
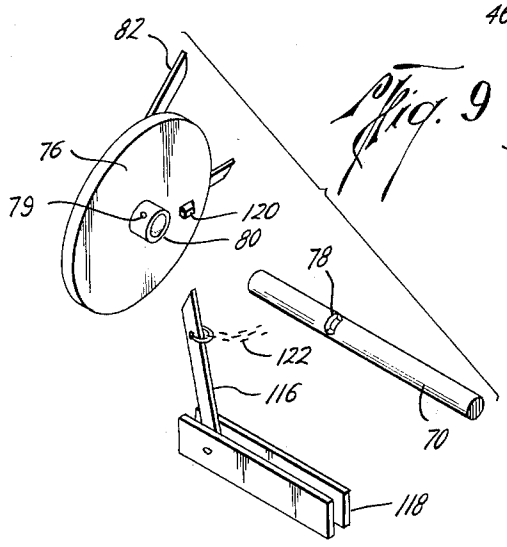


Fig. 9



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BOWLING GAME APPARATUS AND BALL RESETTING AND RETURNING MECHANISM FOR THE SAME

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Fig. 10

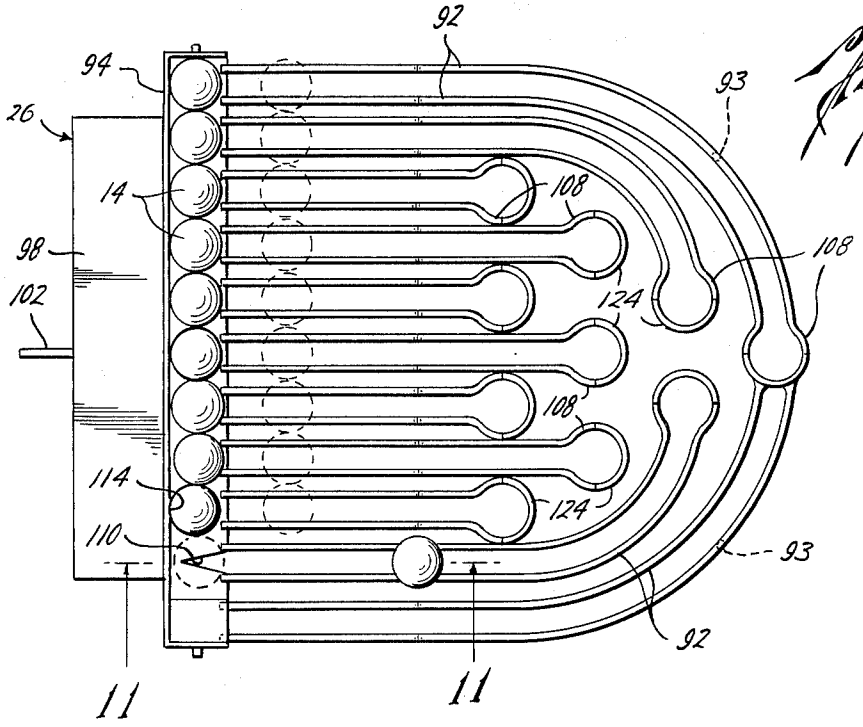
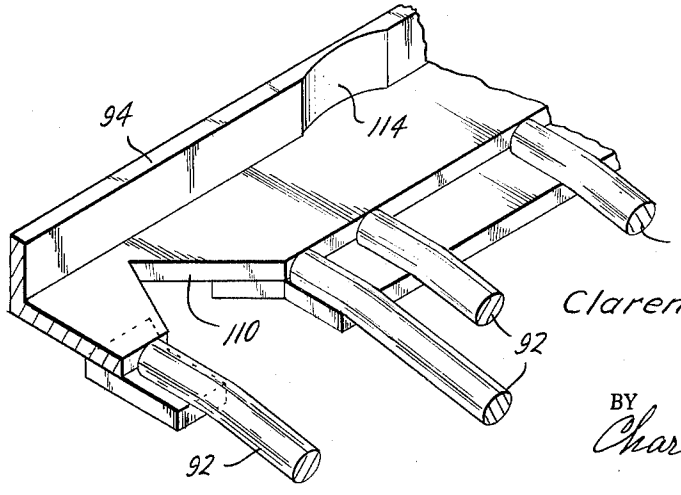


Fig. 11



Fig. 12



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3,224,766

BOWLING GAME APPARATUS AND BALL RESETTING AND RETURNING MECHANISM FOR THE SAME

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Filed Sept. 28, 1962, Ser. No. 226,808
6 Claims. (Cl. 273—41)

This invention relates to game apparatus of the type used in bowling and more particularly to bowling apparatus in which balls are used instead of the conventional pins and wherein mechanism is provided which operates automatically to reset and return the balls during the playing of the game.

The invention has for an important object the provision of bowling game apparatus which may be operated continuously without the presence of attendants and which functions automatically to clear, sort, return and respot the playing pieces.

Another object of the invention is to provide bowling game apparatus embodying mechanism which functions automatically upon the playing of a predetermined number of bowling balls to terminate the play by respotting the spotting balls and returning the bowling balls to reset the apparatus for the next play.

A further object of the invention is the provision in bowling game apparatus of electrically operated ball clearing, sorting and respotting mechanism which functions automatically upon the occurrence of a predetermined event or sequence of play to reset the apparatus preparatory to the next play.

Another object of the invention is to provide bowling game apparatus making use of spotting balls in place of the usual bowling pins and in which the spotting balls and bowling balls are of different weights, the apparatus including mechanism for sorting the balls in accordance with the weight of the balls to return the bowling balls and position the spotting balls for respotting.

A further object of the invention is the provision in bowling game apparatus of the kind referred to of clearing mechanism which is actuated in response to the playing of a predetermined number of bowling balls to clear the spotting balls preparatory to the respotting of the same.

Another object of the invention is to provide in bowling game apparatus of the type mentioned of ball sorting, returning and spotting mechanism including means which functions in response to a predetermined actuation of such mechanism to clear the spotting area.

A further object of the invention is the provision in bowling game apparatus of ball respotting mechanism by which the spotting balls are automatically respotted at the close of a predetermined sequence of play.

Another object of the invention is to provide bowling game apparatus which is of simple design and rugged construction, certain in operation and which is easily maintained.

The above and other important objects and advantages of the invention may best be understood from the following detailed specification of the invention, when considered in conjunction with the annexed drawings, wherein:

FIGURE 1 is a side elevational view of the game apparatus, showing the manner in which the game is played;

FIGURE 2 is a fragmentary top plan view of the invention as illustrated in FIGURE 1;

FIGURE 3 is a cross-sectional view, taken along the line 3—3 of FIGURE 1, looking in the direction indicated by the arrows;

FIGURE 4 is a cross-sectional view, taken along the line 4—4 of FIGURE 1, looking in the direction indicated by the arrows;

FIGURE 5 is a fragmentary cross-sectional view, taken along the line 5—5 of FIGURE 1, looking in the direction indicated by the arrows;

FIGURE 6 is a fragmentary side elevational view, on a somewhat enlarged scale, showing the ball clearing, returning and spotting mechanism of the apparatus;

FIGURE 7 is a fragmentary rear end elevational view of a portion of the ball clearing mechanism of the apparatus in a preliminary stage of its operation;

FIGURE 8 is a view similar to that of FIGURE 7 showing the clearing mechanism in another stage of operation;

FIGURE 9 is a fragmentary perspective view of parts of the ball clearing mechanism in disassembled condition showing details of structure thereof;

FIGURE 10 is a top plan view, on an enlarged scale, of the ball spotting mechanism, showing the manner in which the same operates in resetting the spotting balls;

FIGURE 11 is a fragmentary, cross-sectional view, on a greatly enlarged scale, taken along the line 11—11 of FIGURE 10, looking in the direction indicated by the arrows; and

FIGURE 12 is a fragmentary, perspective view, on a greatly enlarged scale showing a portion of the ball spotting mechanism.

Referring now to the drawings in greater detail, the bowling game apparatus of the invention includes an alley, generally designated **10**, having more or less the same general construction as a conventional bowling alley, provided at one end with a spotting area **12** upon which spotting balls **14** are positioned in any desired arrangement such as that used in conventional bowling games using pins. The spotting area may be provided with slight indentations in its surface, such as those shown at **16** in FIGURE 5, arranged in a desired pattern and by which the spotting balls are prevented from rolling about or becoming dislodged from the desired arrangement when spotted in playing positions on the alley.

The alley may be formed with the usual playing surface **18** including the spotting area **12** and has a gutter **20** along each side, which are defined by external, upright side-walls **22**.

Along one side of the alley there is a bowling ball return track made up of a pair of spaced apart parallel rails **24**.

The ball sorting and return mechanism of the invention is located at the far end of the alley beyond the spotting area **12**, and includes a rotatably mounted, generally circularly shaped elevator, generally designated **26**, positioned to receive the spotting and bowling balls and by which the bowling balls are returned to the player along the return track while the spotting balls are diverted to positions to be respotted on the spotting area.

The ball sorting mechanism comprises a wheel-like elevator of angle shape in cross-section, having an outer peripheral wall **28** and a sidewall **30**, which elevator is suitably mounted for rotation on a central, horizontally extending shaft **32**, as by means of a central disc-like member **34**, attached to the shaft and connected to the wall **30** by means of radially extending spokes **36**.

A longitudinally downwardly inclined chute portion **38** is provided at the far end of the alley beyond the spotting zone, which chute portion has upwardly and outwardly inclined side portions **40**, positioned to divert the balls inwardly and rearwardly along the chute as the balls roll off of the spotting area.

The elevator is positioned so that the inner face of the peripheral wall **28** will extend slightly below the outer end of the downwardly curved central portion **38** of the chute, as best seen in FIGURE 4, so that the balls may readily roll down the chute on to the inner face of the

peripheral wall. Because of this arrangement of the chute and elevator only one ball at a time can enter the elevator.

Within the elevator a number of ball carrying vanes **42** are hingedly connected at their inner ends, as by means of pins **43**, one to each of the spokes **38** for vertical swinging movement toward and away from the outer peripheral wall **28**. The vanes **42** are positioned to engage the balls, as the balls roll off of the spotting area and down the chute into the interior of the elevator, so that each ball will be separately lifted by one of the vanes as the elevator rotates to elevate the balls.

Within the elevator an internal annular rib **29** is provided, as shown in FIGURE 5, on the inner face of the peripheral wall **28**, at a location spaced from the free edge of the wall at a distance somewhat greater than the length of the radius of the bowling and spotting balls, in position to be engaged by the balls as they enter the elevator. Because of the position of the rib **29** and the downwardly curved configuration of the central portion of the chute **38**, the balls will be caused to roll down the chute and into the elevator one at a time, and as each ball enters the elevator it will block the next subsequent ball from entering the elevator, so that only one ball may move into engagement with each of the vanes **42** to be elevated thereby, thus preventing interference between the balls during the sorting and redispensing of the balls by the elevator.

Each of the vanes **42** has an upstanding wall **44** along its edge opposite the side wall **30** of the elevator, so that a ball positioned on the vane will be disposed between the wall **44** of the vane and the sidewall **30** to prevent the ball from rolling off of the vane out of the elevator during elevation of the ball thereby. The pins **43** extend outwardly beyond the sidewall **30** of the elevator and each pin has a lever **46** fixedly mounted thereon, which lever is connected at one end to a coil spring **50**, which is also connected to the sidewall **30**, to yieldably urge the lever in one direction of rotation. The sidewall **30** is also provided with peripherally spaced stop elements **52**, one for each of the levers **46**, positioned for engagement by the levers to limit rotational movement of the levers under the influence of the springs **50**. The free ends of the levers **46** are each provided with a laterally projecting **54**, for a purpose to be hereinafter explained.

By this arrangement as the balls roll down the chute into the elevator each ball will be separately lifted by one of the vanes **42**, and, depending upon the weight of the ball the vane will be more or less rotated to rotate the pin **43**, whereby the corresponding lever **46** will be rotated with the pin **43** against the tension of the spring **50**.

The spotting balls are preferably substantially lighter in weight than the bowling balls, so that when a spotting ball enters the elevator to be lifted by one of the vanes **42**, the spotting ball will not be sufficiently heavy to substantially rotate the vane, but when a bowling ball, which is of heavier construction enters the elevator and is lifted by one of the vanes the bowling ball will cause the vane to rotate about the pin **43**, against the resistance of the spring **50**, to rotate the corresponding lever **46** whereby the lever will be moved to an extended position, as illustrated in FIGURES 7 and 8.

The rails **24** of the return track are bent at the far end of the alley, as illustrated in FIGURES 3, 4 and 6, to position end portions **56** of the rails in a location above the center of the elevator to receive the bowling balls as the bowling balls fall from the vanes **42** when the vanes reach an elevated position and the extended end portions of the track are slightly inclined, so that the bowling balls will roll downwardly along the track to return the balls to a convenient location for reuse by the player.

Ball clearing mechanism is provided for removing any spotting balls from the spotting area after a predetermined number of bowling balls have been played, which clearing mechanism comprises a horizontally extending sweep-arm **58**, mounted for horizontal swinging movement above the spotting area to sweep the spotting balls therefrom. The sweep-arm is mounted at one end on a vertical shaft **60**, mounted for rotation in suitable bearings **62** and **64**, attached to one sidewall of the alley exteriorly thereof, which shaft carries a bevel gear **66**, which meshes with a similar gear **68** carried on the end of a horizontal operated shaft **70**, mounted for rotation in suitable bearings **72** and **74**, positioned exteriorly of the sidewall of the alley. The shaft **70** carries at its other end a disc **76**. The disc **76** is connected to the shaft **70** for limited rotation relative to its shaft as by means of a peripheral elongated recess **78** in the shaft, into which a set screw **79** in a hub **80** on the disc is extended, so that the disc may have limited rotatable movement relative to the shaft and the shaft will be rotated with the disc after such limited relative rotation movement. The disc is also provided with peripherally spaced, radially extending actuator arms **82** and **84**, whose outer ends extend radially beyond the outer periphery of the disc.

By this construction of the clearing mechanism when a bowling ball enters the elevator and is lifted therein by one of the vanes **42**, this vane will be rotated by the relatively heavy bowling ball to rotate the corresponding lever **46**, to extend the outer end of the lever radially outwardlly from the elevator, as illustrated in FIGURE 7, so that the outer end of the lever will engage the actuator arm **82** of the disc **76** to rotate the disc relative to the shaft **70**, throughout the extent of the peripheral recess **78**, thus moving the actuator arm **84** to the position illustrated in FIGURE 8 preparatory to swinging the sweep-arm **58** to clear the spotting area. With the sweep-arm mechanism thus set in position for actuation, when a second bowling ball enters the elevator it will engage one of the vanes **42** to rotate the same as the ball is lifted to rotate the corresponding lever **46** to extend the outer end of the lever to a position for engagement with the actuator arm **84**, whereupon the disc **76** will be rotated as the elevator turns to rotate the shaft **70** with the disc, whereby the sweep-arm **58** will be swung horizontally across the spotting area.

The sweep-arm **58** is connected to a coil spring **86**, connected to the sidewall of the alley, whereby the swing-arm will be returned to its inactive position after a swinging operation has been performed, thus rotating the shaft **70** in a direction to return the disc **76** to the position of FIGURE 7, ready for the next play.

The ball spotting mechanism of the invention comprises a rack, generally designated **90**, formed with trackways or guides, preferably formed of metal rod or tubing **92**, attached at one end to an elongated receiver **94**, of angle shape in cross-section, and which is pivotally mounted at its opposite ends on brackets, such as that indicated at **96** in FIGURE 6, for vertical swinging movement above the spotting area. The rack includes counter bearing means, such as the weight **98**, attached to the receiver **94** and additional means may be provided, such as the coil spring **100**, shown in FIGURE 6, connected to the counterweight **98** by an arm **102** and to a stop support **104**, carried by the brackets **96**, through which stop support an adjusting screw **106** is threadably extended in position for engagement with the counterweight **98** to limit upward swinging movement of the rack.

The trackways **92** of the rack are provided at their outer ends with loops **108**, of enlarged diameter, each of which is located immediately above one of the depressions **16** of the spotting area, the loops being sufficiently large to allow the balls **14** to fall through the loops onto the spotting area when the rack is in its lowered position. The receiver **94** is provided with a V-shaped notch **110** located in axial alignment with the end of the endmost of the trackways, between the rails **92** thereof, to allow the endmost one of the balls **14** to roll off of the receiver

onto the trackway when the receiver is completely loaded with spotting balls, to over-balance the rack, whereby the rack is caused to tilt downwardly to cause the balls to roll down along the trackways and through the loop **108** onto the spotting area at the exact locations in which the balls are positioned for playing. The rack may be provided with downwardly extending lugs **93** whose lower ends are positioned for engagement with the ball spotting area when the rack swings downwardly to limit such downward swinging movement of the rack.

A spotting ball diverting trackway having rails **112**, similar to the trackway **92**, is provided, extending transversely across the alley, forwardly of the elevator, as best seen in FIGURES 3 and 6, in position to receive the spotting balls as the same roll off of the vanes **42** as the elevator rotates, this trackway being curved and sloped to cause the spotting balls to roll along the trackway onto the receiver **94**, when the receiver is in its elevated position, until the receiver is completely loaded with the balls, as illustrated in FIGURE 10. When the last of the balls **14** rolls onto the receiver, it will engage the preceding ball, which will be resting on the receiver within a recess **114** therein, so that the last ball will engage the preceding ball at a location to cause the last ball to roll out of the notch **110** onto the endmost trackway, as illustrated in FIGURE 10, whereupon the rack will be over-balanced, to cause the rack to swing downwardly to allow the balls to roll downwardly along the trackway and onto the spotting area.

A latch lever **116** is pivotally mounted on a bracket **118** adjacent the disc **76**, which latch extends upwardly for engagement at its upper end with a lug **120** on the disc **76**, which is positioned to releasably hold the disc with the actuating arms **82** and **84** in position to be actuated by the elevator, and this latch **116** is connected to the spotting mechanism, as by means of a chain **122**, at a location to release the latch when the spotting mechanism is actuated, to allow the disc **76** to rotate back to its initial position when the sweep-arm **58** returns to its inactive position under the influence of the spring **86**.

The rack **90** may be provided with upwardly extending arcuate flanges **124**, partly supporting the annular enlargements **108**, positioned for engagement by the balls **14** to check the rolling movement of the balls when they reach the enlargements, to cause the balls to fall through the enlargements on to the spotting area.

The elevator **26** is rotated by suitable means, such as an electric motor **126**, as illustrated in FIGURE 4, connected in driving relation to the shaft **32**, as by means of suitable speed reducing mechanism indicated at **128**, whereby the elevator is rotated at a substantially constant speed during the operation of the apparatus.

In using the game apparatus, constructed and arranged as described above, assuming that the spotting balls are all in proper positions on the spotting area and the elevator is being rotated by the motor **126**, the player will roll a bowling ball **130** down the alley to dislodge the spotting balls, in the usual manner. The bowling ball, together with the spotting balls which have been thus dislodged will roll down the chute **38**, and because of the shape of the chute and the fact that the inner surface of the peripheral wall **28** of the elevator passes slightly below the upper surface of the chute at the bottom of the elevator the balls will roll into the elevator one at a time, each to be engaged by one of the vanes **42** to separately lift the balls as the elevator rotates. The spotting balls, being of relatively light weight will not be sufficiently heavy to tilt the vanes **42** so that the levers **46** will not be actuated by the spotting balls to actuate the swing-arm mechanism. When, however, the first bowling ball, which is of greater weight enters the elevator it will depress the vane **42** which it engages, to rotate the corresponding lever **46** to extend the free end **54** of the lever to a position to engage the actuating arm **82** to rotate the disc **76**, preparatory to actuation of the sweep mechanism. When the second bowling ball enters the elevator the vane **42** engaged thereby will likewise actuate the corresponding lever **46** to extend the free end **54** of the lever to a position to engage the second actuator arm **84** as the elevator rotates to rotate the disc **76** to actuate the swing-arm **58** to clear the spotting area of any balls which may still remain thereon.

As the elevator rotates the bowling balls will remain on the tilting vanes **42** until the balls reach a position to fall onto return trackway **24**, whereupon the balls will roll along the return trackway back to the location where the player is standing. The spotting balls, on the other hand, being somewhat lighter than the bowling balls will not tilt the vanes **42** so that the spotting balls will be carried further than the bowling balls and will roll off of the vanes as the elevator rotates at a location to fall on the diverting trackway **112**, along which the spotting balls will roll to the receiver **94**. As best seen in FIGURE 3, the trackway **112** terminates at a location to discharge the spotting balls onto the receiver at the end of the receiver adjacent to the notch **110** thereof and the receiver slopes somewhat in a direction to cause the balls to roll along the receiver past the notch **110** to allow the balls to accumulate on the receiver as shown in FIGURE 10; when the receiver has thus been completely loaded, the last ball to reach the receiver will engage the preceding ball, which is seated in the recess **114** of the receiver, to cause the last ball to roll out of the notch **110** onto the trackway associated therewith, to over-balance the rack which will then swing downwardly to allow the balls to roll down the trackways **92** onto the spotting area. The notch **110** is of a size and shape to allow the spotting balls to roll along the receiver **94** without rolling off of the receiver through the notch, but when the next to the last ball enters the receiver it will move into the recess **114**, so that the last ball to enter the receiver will engage the next to the last ball at a location to cause the last ball to roll off of the receiver through the notch **110** as shown in FIGURE 10 to cause the rack to swing downwardly.

It will be apparent that any convenient number of the spotting balls **14** may be used with the apparatus, by suitably constructing a spotting mechanism, and that the apparatus may also be readily constructed to operate the sweep mechanism after any desired number of bowling balls have been played. It will also be appreciated that the spotting balls and bowling balls may be made of the same size or of different sizes, by forming the same of various materials so that the required difference in weight will be maintained to allow the bowling balls to be returned by the elevator and the spotting balls to be sorted from the bowling balls for respotting by the spotting mechanism.

It will thus be seen that the invention provides bowling game apparatus which is automatic and reliable in operation and which may be easily repaired and maintained in operating condition.

The invention is disclosed herein in connection with a particular embodiment of the same but it will be understood that this is intended by way of example and that various changes can be made in the construction and arrangement of the parts, within the spirit of the invention and the scope of the appended claims.

Having thus clearly shown and described the invention what is new and desired to secure by Letters Patent is:

1. In bowling game apparatus for use with spotting balls and bowling balls of the same size and of different weight than the spotting balls the combination with an alley structure having a horizontally disposed playing surface including a ball spotting area at one end thereof upon which the spotting balls are positioned to be dislodged by rolling the bowling balls along said surface, of means for sorting balls which roll off of said surface and returning the bowling balls to the other end of the alley and replacing the spotting balls on said spotting area, and means responsive to the actuation of said sorting means

after the rolling of a predetermined number of the bowling balls off of said surface for clearing the spotting area of spotting balls.

2. In bowling game apparatus for use with spotting balls and bowling balls of the same size and of different weight than the spotting balls the combination with an alley structure having a horizontally disposed playing surface including a ball spotting area at one end thereof upon which the spotting balls are positioned to be dislodged by rolling the bowling balls along said surface, of elevator means positioned to receive and lift balls which roll off of said surface and including means for discharging the bowling balls and spotting balls at different levels from the elevator means, spotting mechanism positioned to receive spotting balls discharged from the elevator means and deposit the same on said spotting area, means for conveying bowling balls discharged from the elevator means to a location adjacent the other end of the alley, and means responsive to the elevation by the elevator means of a predetermined number of said bowling balls for dislodging all spotting balls remaining on said spotting area.

3. In bowling game apparatus the combination with spotting balls and bowling balls of the same size as and of different weight than the spotting balls and an alley structure having a horizontally disposed playing surface including a ball spotting area at one end thereof upon which the spotting balls are positioned to be dislodged by rolling the bowling balls along said surface, of ball sorting mechanism positioned to receive balls which roll off of said surface including means responsive to the weight differential between the bowling balls and spotting balls for separating the balls and for returning the bowling balls to the other end of the alley and means for replacing the spotting balls at predetermined locations on said spotting area.

4. In bowling game apparatus the combination with spotting balls and bowling balls of the same size as and of different weight than the spotting balls and an alley structure having a horizontally disposed playing surface including a ball spotting area at one end thereof upon which the spotting balls are positioned to be dislodged by rolling the bowling balls along said surface, of ball sorting mechanism positioned to receive balls which roll off of said surface including means responsive to the weight differential between the bowling balls and spotting balls for separating the balls and for returning the bowling balls to the other end of the alley and means for replacing the spotting balls at predetermined locations on said spotting area.

5. In bowling game apparatus the combination with an alley structure having a horizontally disposed playing surface including a ball spotting area at one end thereof and spotting balls adapted to be positioned on the spotting area to be dislodged by bowling balls rolled along said surface, all of the balls being of the same size and the bowling balls being formed of heavier material than the spotting balls, of means responsive to the weight differential between the bowling balls and spotting balls for sorting balls which roll off of said surface and returning the bowling balls to the other end of the alley and for replacing the spotting balls on said spotting area including horizontally extending rack means positioned above said spotting area, means mounting the rack means for vertical swinging movement, and means for moving the spotting balls onto the rack at locations to cause the rack to swing downwardly toward the spotting area in response to the movement onto the rack of a predetermined number of said spotting balls and means for causing the spotting balls to be deposited on the spotting area at predetermined locations thereon when the rack reaches the limit of its downward swinging movement.

6. In bowling game apparatus the combination with spotting balls and bowling balls of the same size and of different weight than the spotting balls the combination with an alley structure having a horizontally disposed playing surface including a ball spotting area at one end thereof upon which the spotting balls are positioned to be dislodged by rolling the bowling balls along said surface, of elevator means positioned to receive and lift balls which roll off of said surface and including means responsive to the weight differential between the bowling balls and spotting balls for discharging the bowling balls and spotting balls at different levels from the elevator means, spotting mechanism positioned to receive spotting balls discharged from the elevator means and deposit the same on said spotting area in response to the discharging of a predetermined number of said spotting balls from said elevator means, and means for conveying bowling balls discharged from the elevator means to a location adjacent the other end of the alley.

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