Dec. 23, 1952 S. A. FRYE 2,622,879

PIT DISCHARGING APPARATUS FOR BOWLING ALLEYS

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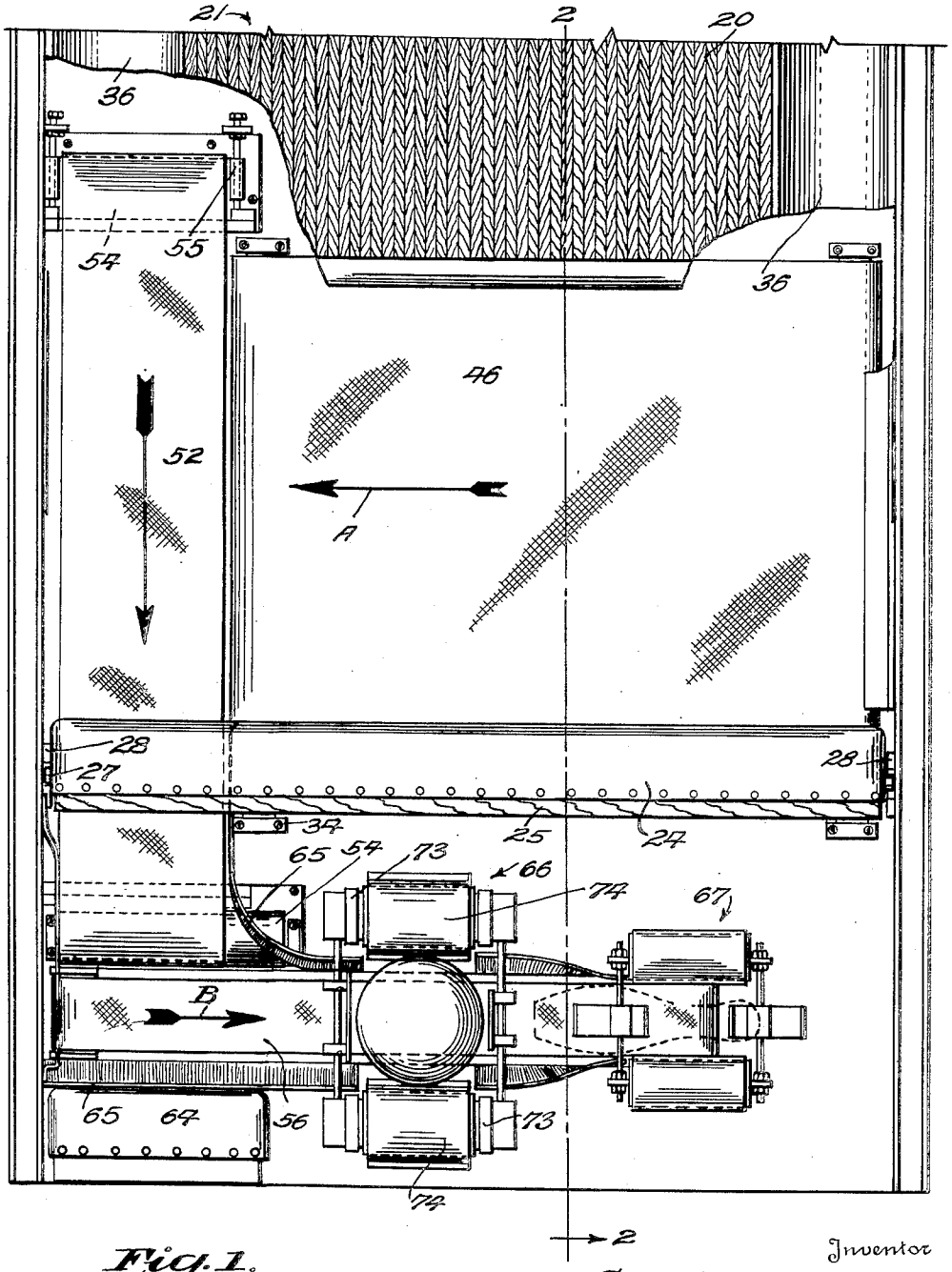


Fig. 1.

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PIT DISCHARGING APPARATUS FOR BOWLING ALLEYS

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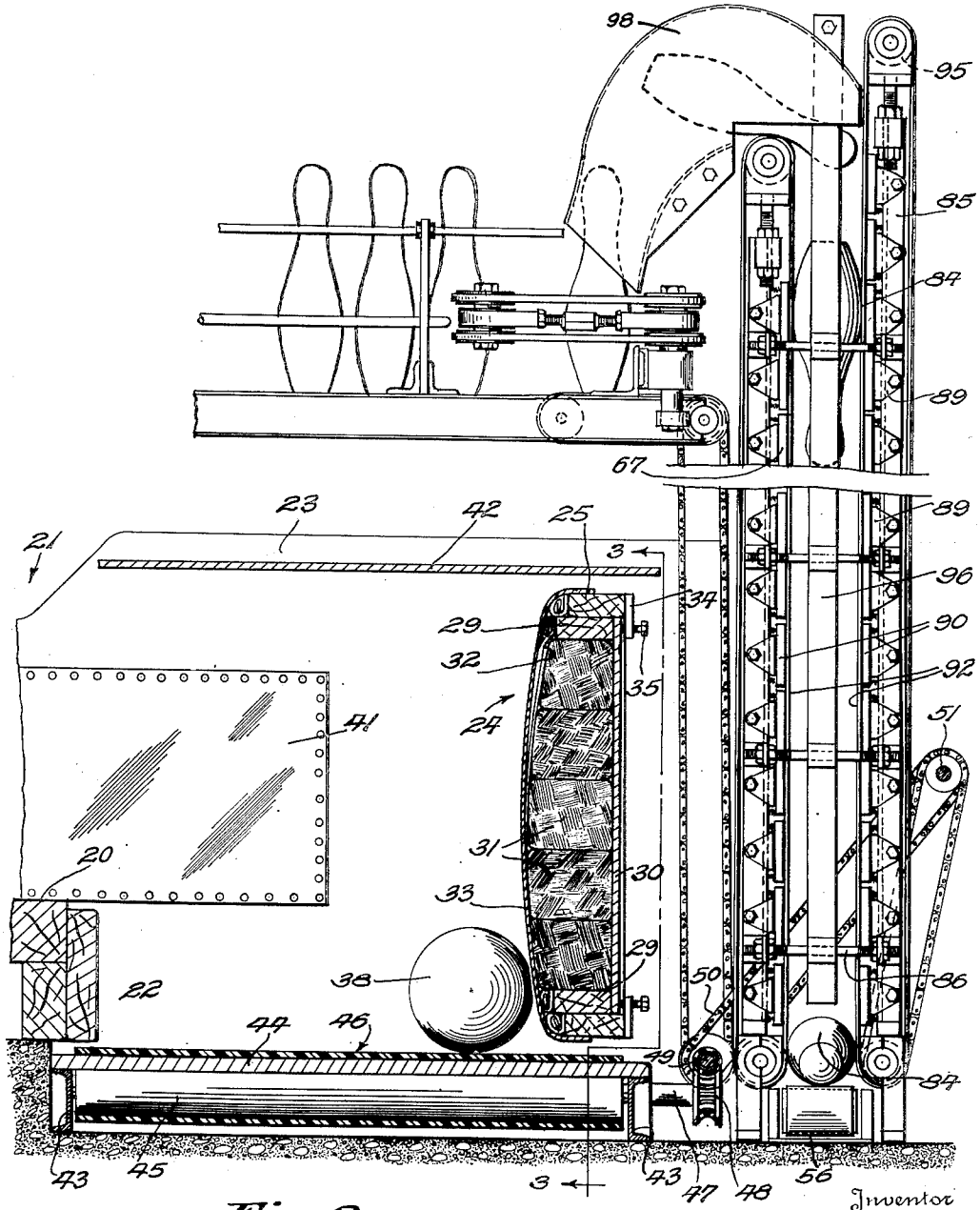


Fig. 2.

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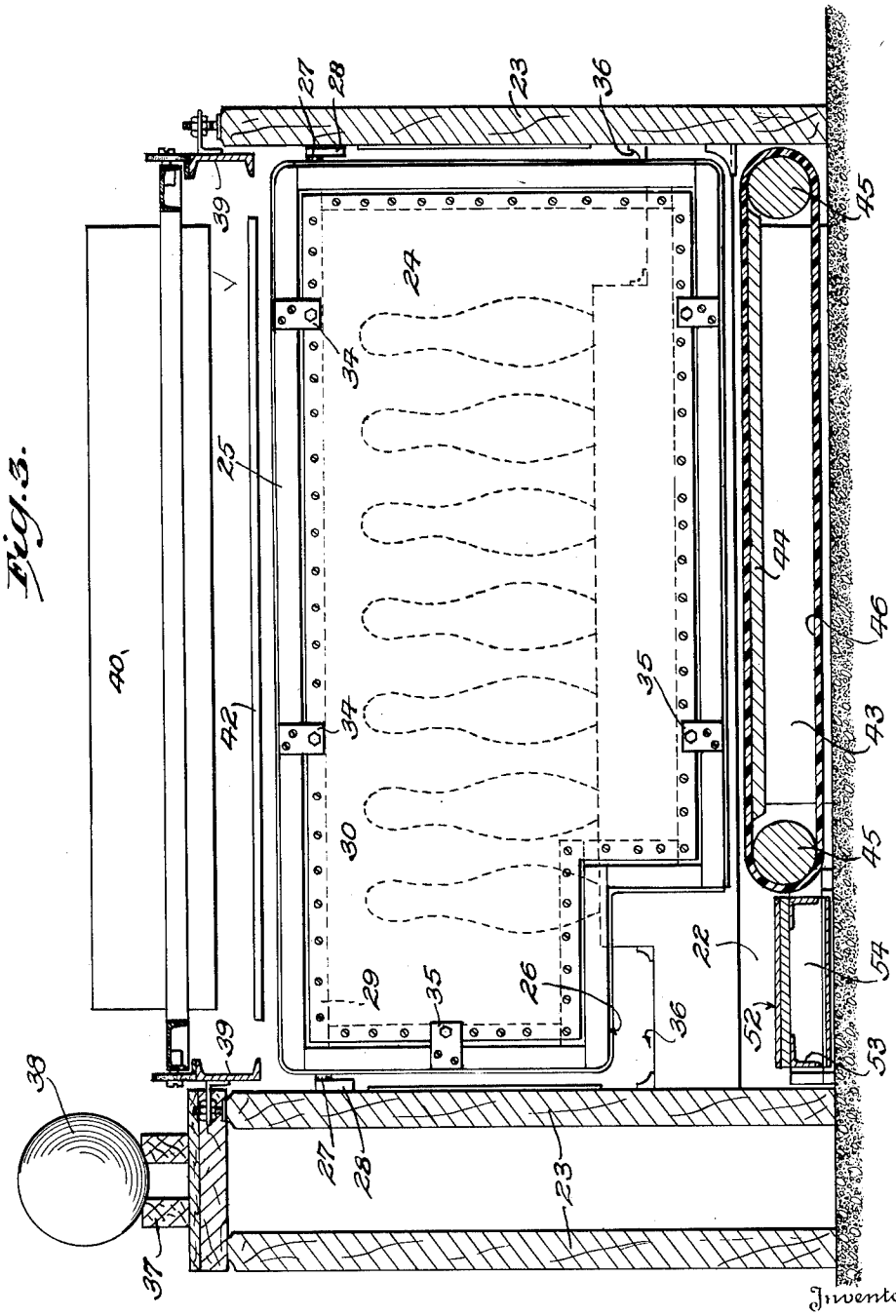
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PIT DISCHARGING APPARATUS FOR BOWLING ALLEYS

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Fig. 3.



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PIT DISCHARGING APPARATUS FOR BOWLING ALLEYS

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Fig. 4.

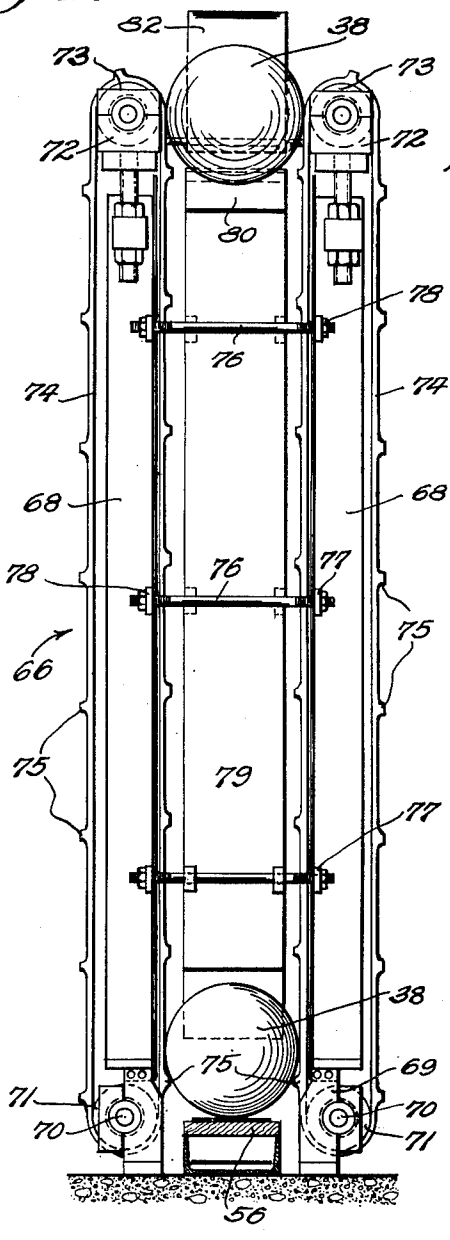
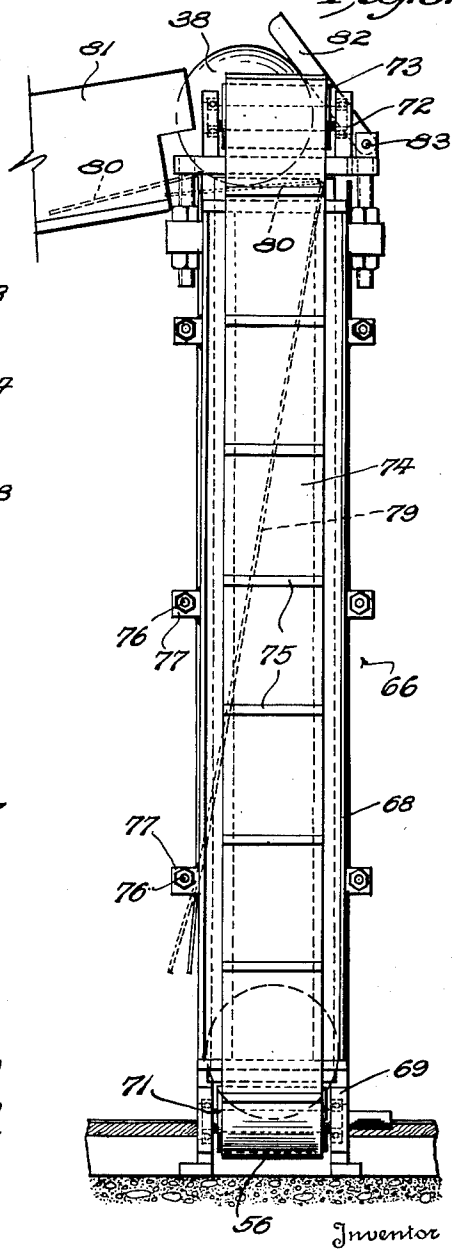


Fig. 5.



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PIT DISCHARGING APPARATUS FOR BOWLING ALLEYS

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Fig. 6.

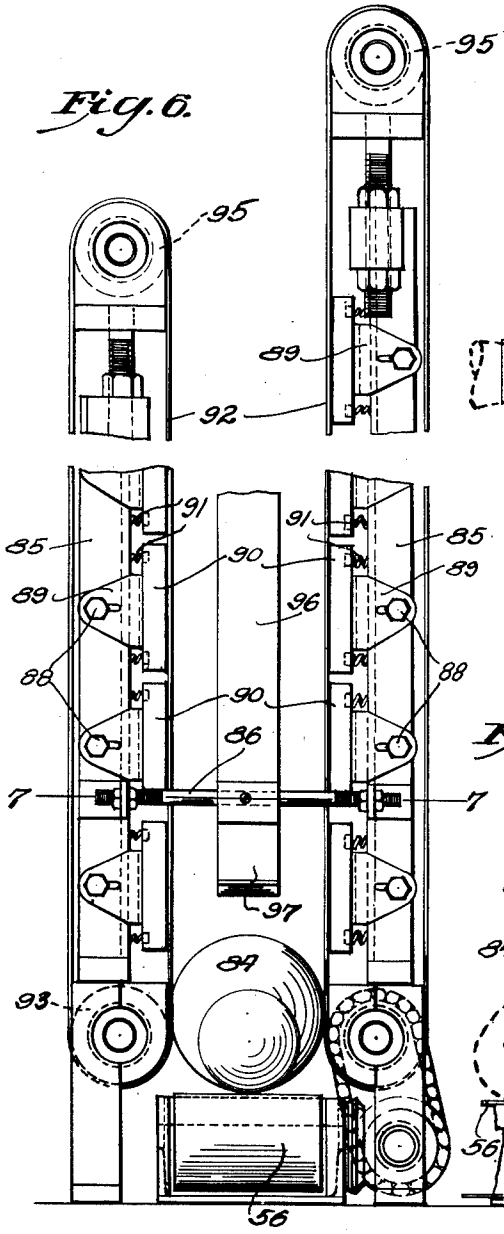


Fig. 7.

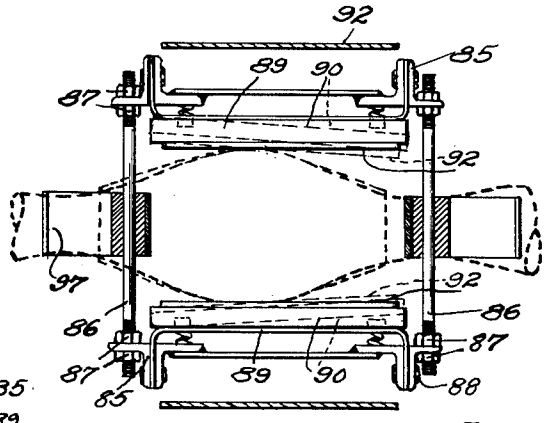
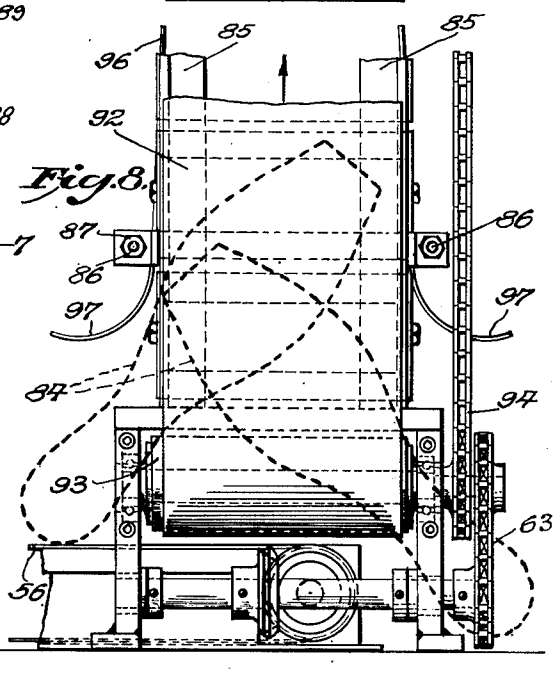


Fig. 8.



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2,622,879

UNITED STATES PATENT OFFICE

2,622,879

PIT DISCHARGING APPARATUS FOR BOWLING ALLEYS

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Application November 13, 1945, Serial No. 628,040

8 Claims. (Cl. 273—43)

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This invention has reference to automatic pit-discharging apparatus for bowling alleys, an object thereof being to provide improved mechanical means whereby bowling pins and balls, deposited in the pit of a bowling alley, are automatically gathered and separated, the balls being elevated and deposited on a runway for their return to the players and the pins separately elevated for transfer to the pin-receiving section of the associated alley, the operations being executed without manual aid and in an automatic manner.

While attempts have been made in the prior art to solve the problems of automatically separating the balls and pins deposited in the alley pit and delivering the same to return apparatus for the balls and a setting mechanism for the pins, such attempts have not proven wholly satisfactory for various reasons; chiefly, however, because of the failure of the art to develop reliably operating devices for handling the awkwardly shaped bowling pins which are scattered in various positions in the pit, and for gathering and orderly arranging such pins so that they will be delivered in a common order at all times to the pin-setting mechanism.

Accordingly, it is another object of the invention to provide positive and reliable means for automatically gathering bowling pins deposited in a disorderly manner in the pit of a bowling alley and elevating the same from the pit so that the pins may be subsequently deposited on the pin-receiving section of a bowling alley.

It is another object of the invention to provide improved means for elevating the pins from the alley pit to a superposed pin-setting mechanism.

In connection with the foregoing, I have developed a number of novel structural details and part arrangements, all of which may be thoroughly understood by reference to the following description and the accompanying drawings, wherein:

Fig. 1 is a plan view of the rear portion of a bowling alley disclosing the improved pin-handling mechanism employed in carrying out the present invention;

Fig. 2 is a vertical longitudinal sectional view taken through said alley and the pin-handling mechanism on the plane indicated by the line 2—2 of Fig. 1, the pin elevator being shown in side elevation;

Fig. 3 is a vertical transverse sectional view on the plane indicated by the line 3—3 of Fig. 2;

Fig. 4 is a side elevational view of the ball elevator;

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Fig. 5 is a front elevational view thereof;

Fig. 6 is a side elevational view of the pin elevator;

Fig. 7 is a horizontal sectional view on the line 7—7 of Fig. 6;

Fig. 8 is a detail front elevational view of the lower portion of the pin elevator.

The automatic bowling alley apparatus disclosed in the accompanying drawings is concerned particularly with mechanism for collecting the pins and balls forced into the pit at the rear end of the bowling alley. In my prior application, Serial No. 544,381, filed July 11, 1944, now U. S. Patent No. 2,530,385, issued November 21, 1950, I have disclosed associated mechanism for raising and lowering bowling pins standing on the pin-receiving section at the back of the bowling alley, and, in a companion application, Serial No. 577,367, filed February 12, 1945, now U. S. Patent No. 2,550,919, issued May 1, 1951, I have disclosed the correlated pin-setting mechanism, by which the fallen pins are removed from the pit of the alley and restored in proper relative order to the alley for bowling play, the present application constituting, therefore, a continuation-in-part of my aforesaid pending applications.

Referring more particularly to the drawings, the numeral 20 designates the pin-receiving area at the rear of a bowling alley 21. At the rear of the alley is a pit 22, which is adapted to receive the toppled pins or balls thrown, knocked and otherwise removed from the area 20. The pit at its sides is provided with upright side walls 23 and between these walls a swinging backstop 24 is mounted to arrest rearward movement of the balls and pins received by the pit.

The backstop may be of any suitable form, but in this instance, the same comprises an outer frame 25, which is generally rectangular in configuration, except that one of the lower corners thereof is recessed as at 26. Adjacent to its upper portion, the frame 25 is formed with trunnions 27 which are received in brackets 28 carried by the side walls 23, and by which the backstop is fulcrumed for swinging movement about a substantially horizontal axis. Within the outer frame 25, the backstop includes an inner slidably adjustable frame 29, the latter carrying a back panel 30. Also positioned in the frame 29 is a plurality of cushions 31, formed from any suitable yieldable material. Each of these cushions has attached to the forward portion thereof a flexible apron 32, and the upper edges of these aprons are fastened to the upper horizontal member of the frame 29, whereby the individual cush-

ions are maintained in their desired vertical positions and are prevented from sinking or being compacted downwardly within the limits of the frame 29.

The outer frame 25 carries at the front thereof a heavy covering 33 of leather or the like, which receives the impact of the balls or pins delivered to the pit, the upper and lower edges of the covering 33 being suitably secured to the top and bottom horizontal members of the frame 25. The outer frame also carries brackets 34 having threaded openings for the reception of adjusting screws 35, the inner ends of said screws engaging the back panel 30 whereby to effect sliding adjustment of the inner frame 29 so that the cushions 31 may be held in desired engagement with the outer covering 33, thus producing an efficient cushioning means for arresting movement of the balls and pins.

The sides of the alley 21 are provided with the usual parallel gutters 36, and mounted on one or more of the side walls 23 is a runway 37 by which the bowling balls, shown at 38, may be returned from the pit to the forward or player's end of the alley. The side walls 23 also carry at their upper edges a pair of guide tracks 39 in the form of channel members, and movable longitudinally along these tracks is the pin-setting mechanism indicated generally by the numeral 40.

In the present application, this pin-setting mechanism has not been shown in detail, but the same is preferably of the type disclosed in my before-mentioned Patent No. 2,550,919. The surfaces of the walls 23 facing the alley 21 in the pit 22 may be provided with a wear-resisting or reenforcing material 41, and above the backstop 24, the walls 23 may be united by a horizontally disposed top panel 42, which latter, in connection with the backstop, conceals the pit-discharging apparatus hereinafter more fully described, from the view of the players.

Disposed on the floor or base of the pit 22, and below the horizontal plane of the alley area 21, is a pair of transversely extending, parallel channel members 43, the upper flanges of the latter carrying a horizontally disposed conveyor floor 44. Rotatably supported at the ends of the channel members 43 are rolls 45 around which pass an endless conveyor belt 46 of rubber or rubberized fabric. One of the rolls 45 is provided with a shaft 47 carrying at its end a worm gear 48, the teeth of the latter meshing with a worm 49, which is driven by the sprocket and chain construction 50 from a motor-actuated drive shaft 51, thus imparting movement to the belt 46 so that its upper run advances laterally or transversely of the pit in the direction indicated by the arrow A in Fig. 1. The balls or pins engaging the backstop are thus positioned on the upper run of the belt 46 and are advanced thereby laterally of the pit in order that when discharged from the belt 46, the same will be deposited on the upper run of a longitudinally positioned conveyor belt 52 arranged at one side of the pit 22, as shown more particularly in Figs. 1 and 3.

The belt 52 is supported by a frame 53 supported on the floor surface of the pit 22. The frame 53 carries at its ends rolls 54 around which the belt 52 passes, one of the rolls being driven by any suitable means (not shown) from the drive shaft 51. The upper run of the belt 52 is disposed in a horizontal plane somewhat below that of the upper run of the belt 46, in order to facilitate transfer of the balls or pins from the transverse belt to the longitudinally movable belt. The roll 54 at the forward end of the pit is longitudinally adjustable in frame bearings, as indicated at 55, so that the belt 52 may be maintained in a taut operating condition. A similar adjustment may be provided for one of the rolls of the belt 46. The longitudinal belt 52 is disposed in registration with and below the recessed portion 26 of the backstop 24, said recess being provided in order that ample clearance will be present to permit of the passage of the balls carried by the upper run of the belt 52 beneath the backstop.

Another horizontally and transversely positioned carrier belt 56 is located at the rear of the pit behind the backstop. This belt, as shown in Fig. 4, is supported by a channel member. The vertical flanges of this channel member support a belt floor over the upper surface of which the upper run of the belt 56 advances in the direction indicated by the arrow B of Fig. 1.

At the end of the channel member in registration with the belt 52, a longitudinally adjustable belt-tightening bearing is provided for the reception of a roll around which the belt 56 travels. The opposite end of this belt passes over a roll which is driven by a chain and sprocket construction from the drive shaft 51. Adjacent to the rear longitudinal edge of the belt 56, and in registration with the discharge end of the belt 52, the pit is provided with a cushion 64, the latter serving to arrest rearward movement of the pins and balls when the same are discharged from the belt 52 and insure their proper deposit on the upper run of the belt 56.

The discharge end of the belt 52 and the sides of the belt 56 may be provided with stationary guide bars 65 for confining the pins and balls to the upper surfaces of said belts for longitudinal movement in unison therewith.

The belt 56 advances the bowling balls 38 to a ball elevator 66, shown in detail in Figs. 4 and 5. By this elevator, the balls are removed from the belt 56 and separated from the bowling pins, the latter, by the operation of the belt 56, being carried through the elevator 66 without engaging the same and being in turn elevated by a pin elevator 67, disclosed in detail in Figs. 6 to 8.

The ball elevator 66 comprises a pair of upright metallic frame members 68, suitably supported in spaced parallel relationship from the floor of the pit 22, the frame members being disposed on opposite sides of the belt 56. At their lower ends, the frame members 68 are equipped with bearings 69 for the rotatable support of the shaft extensions 70 of a pair of driving rolls 71, suitably driven by power derived from the shaft 51. At their upper ends, the frame members 68 carry vertically and horizontally adjustable bearings 72 for the rotatable support of the shaft extensions of a pair of adjustable rolls 73. Elevator belts 74 pass around each pair of vertically aligned rolls 71 and 73, said belts having their outer surfaces formed at spaced intervals with projections or ridges 75. The spacing of the upwardly traveling runs of the belts 74 is such as to receive between them (see Fig. 4) a bowling ball 38 of standard diameter, the projections or ridges 75 being arranged to engage the ball beneath the horizontal plane intersecting its center to cause positive elevation of the ball or balls, lifting the same from the upper surface of the belt 56 and advancing them upwardly throughout the full height of the elevator 66.

The frame members 68 are united at intervals

by horizontally disposed tie bolts 76 which have their threaded ends positioned in openings formed in bracket extensions 77 carried by the edges of the frame members 68, the threaded ends of said tie bolts being equipped with nuts 78 holding the frame members 68 in fixed relationship with respect to each other.

Pivotally mounted on one of the tie bolts is the lower end of a ball supporter 79. As the balls move upwardly of the elevator, the same engage the supporter 79, pivotally deflecting the latter so that the angularly directed upper end 80 is positioned in a trough 81 leading to the ball return runway 37. Also, the adjustable bearings 72 at the upper ends of the frame members carry a weighted plate 82 having its lower edge pivotally mounted as at 83, the function of the plate 82 being such as to apply a laterally directed force to each ball when the same reaches the upper end of the elevator, causing the ball to be positively ejected and forced into the trough 81. Usually, in the operation of the elevator, and due to the fact that but one ball is thrown down the alley at a time, the elevator in its operation is called upon to elevate at any one time but a single ball. As shown in Fig. 5, when the balls reach the tops of the elevator belts 74, the same clear the supporter 79, allowing the latter to swing rearwardly, either by gravitation or spring force, so that the angular end 80 at the top of the supporter will be positioned beneath the ball as it reaches its maximum point of elevation and immediately prior to the disengagement of the elevator belts with the same, thus providing a positive support for the ball while the plate 82 is functioning to force the ball into the trough 81. Upon being so deposited, the ball gravitates to the return runway 37 and is thence conducted to the forward or player's position on the alley.

By the operation of the belt 56 and its associated guide bars 65, the bowling pins are positioned longitudinally on the upper surface of the belt 56. Because of the smaller diameter of the bodies of the pins, indicated at 84, the spacing of the ball elevator belts is such that the same will not engage the pins to elevate the same, but on the contrary the pins pass between the ball-elevating belts and are delivered to the pin elevator 67. The pin elevator comprises a pair of spaced upright, parallel frame members 85, stationarily supported on the floor of the pit 22 on opposite sides of the belt 56. The frame members 85 are united at intervals by transversely extending and horizontally disposed tie bolts 86, the threaded ends of the latter being received within openings provided in the flanges of said frame members and equipped with securing nuts 87, holding the frame members, which may be in the form of angle members, in rigidly united relationship.

Pivotally connected with the frame members 85, as at 88, are brackets 89 which carry spaced belt-engaging bars 90. Positioned between the frame members 85 and the bars 90 are coil springs 91 which yieldably retain the bars in engagement with the upwardly advancing runs of a pair of pin-elevating belts 92, the pivotally mounted brackets 89 and their associated springs 91 maintaining the belts in such frictional contact with the pins 84 as to positively effect their upward movement in unison with said belts.

The lower ends of the belts 92 pass around drive rolls 93 rotatably supported in the lower end of the pin elevator frame, the rolls 93 being driven by the chain and sprocket connections 94 from the drive shaft 51. As indicated by dotted

lines in Fig. 8, it is immaterial whether the butt or head end of the pin first engages with the belts 92, since the latter are spaced so that they will engage with the enlarged body portions of the pins, and since the belts travel upwardly, the pins automatically assume vertical positions between said belts with their normally upper or head ends disposed downwardly. The upper ends of the frame members 85 carry adjustable belt-tensioning rolls 95 around which the belts 92 travel, as shown in Fig. 6. Also, the tie bolts 86 carry guide strips 96 which confine the pins between the belts 92 and prevent lateral displacement thereof. The lower ends of the strips 96 may be outwardly curved as at 97 to provide for the tilted positions of the bowling pins when the latter occupy the dotted line positions illustrated in Fig. 8.

Preferably, the bars 90 are set relatively to each other so that the same slightly converge in a rearward direction, enabling the pins to readily enter the space between the belts 92 but progressively increasing the grip on the same as the belt 56 advances, thus preventing the pins from being carried past the belts 92 by movement of the conveyor 56.

As shown in Figs. 2 and 6, the frame member 85 at the front of the pin elevator is somewhat lower in height than the companion frame member at the rear of the pin elevator. By this difference in height, the upper end of the pin elevator receives the pin-receiving end of a curved pin-deflecting hood 98. As the pins travel upwardly between the belts 92 with their floor-engaging or base ends disposed upwardly, the same are received in the hood 98 and during their travel through the hood are turned so that the base ends thereof are disposed downwardly.

Upon their discharge from the outlet of the hood in upright vertical order, the pins are received on a grouping mechanism disclosed generally in Fig. 2. Since this grouping mechanism does not enter directly into the present invention, the same may be described generally as providing a means for assembling the pins and transferring the same from an elevated position above the pit toward the pin-spotting bed of the alley.

In view of the foregoing, it will be seen that the present invention provides automatic apparatus for discharging both pins and balls from the pit of a bowling alley and dipenses with the services of manual attendants. The apparatus is characterized by its structural simplicity and its positive and reliable operation.

While I have described what I consider to be certain preferred structural forms of my improved mechanism, nevertheless it will be understood that the mechanisms illustrated and described are subject to certain modification or variation without departing from the spirit of the invention and scope of the following claims.

I claim:

1. Pin and ball-handling mechanism for bowling alleys, a pit, a belt movable transversely of the pit to conduct pins and balls discharged from an associated alley to one side of said pit, endless horizontally arranged conveyor means having a receiving section disposed parallel with the discharge end of said belt and operable to conduct intermingled pins and balls rearwardly of the pit in a confined linear course of travel, means for gripping the balls only during their movement along the intermediate portion of said conveyor means and elevating the same to positions adapted for their gravitational release and

return to the associated alley, separate means for engaging the pins following the removal of the balls from said conveyor means and during the travel of the pins along said conveyor means and elevating the pins to a plane of gravitational release and discharge.

2. Pin and ball-handling apparatus for bowling alleys having a pit arranged at the rear of the pin-receiving region of the alley, said apparatus embodying an endless belt movable horizontally and laterally over the bottom of the pit, horizontal conveyor means arranged to receive pins and balls discharged from said belt, a vertically disposed ball elevator positioned over said conveyor means, said elevator including a frame having spaced vertically traveling ball-gripping devices carried thereby, said devices being arranged at the sides of said conveying means and having opposed surfaces thereof formed with spaced ball-supporting ridges the spacing of said devices and ridges being such as to cause the same to engage and grip a ball moving along said conveyor means and elevate the ball vertically without preventing the continued travel of bowling pins advancing with said conveyor means, means cooperative with the upper end of said elevator for receiving balls discharged from the elevator and returning the same to the alley, and a vertically disposed pin elevator positioned over said conveyor means at a location beyond the ball elevator, said pin elevator including a frame supporting spaced vertically traveling pin-gripping devices, the latter being engageable with the sides of the pins on the conveyor means to lift the same from said means and raise the pins to the top of the pin elevator.

3. Pin and ball-handling mechanism for bowling alleys, a pit, horizontally arranged movable conveyor means for receiving pins and balls deposited in the pit and collecting the same in intermingled order for removal in a confined linear path of travel from the pit, means for gripping the balls only during their movement on said conveyor means, said ball-gripping means being disposed in a vertical position intermediate the length of said conveyor means for engaging and elevating said balls from said conveyor means to a position adapted for their gravitational return to the associated alley, separate pin-elevating means engaging the pins during their longitudinal travel in unison with said conveyor means and following removal of the balls and elevating the same to a discharge plane.

4. Pin and ball-handling apparatus for bowling alleys having a pit arranged at the rear of the pin-receiving region of the alley, said apparatus embodying an endless belt movable horizontally and laterally over the bottom of the pit, a horizontal conveyor means arranged to receive pins and balls discharged from said belt, a vertically disposed ball elevator positioned over said conveyor means, said elevator including a frame having a pair of transversely spaced vertically traveling ball-gripping devices carried thereby, said devices being arranged at the sides of said conveying means and formed with vertically spaced transversely extending ridges, the spacing of said devices and the ridges thereon being such as to cause the same to engage and grip a ball moving along said conveyor means and elevate the ball vertically without preventing the continued travel of bowling pins advancing with said conveyor means.

5. Pin and ball-handling apparatus for bowling alleys having a pit arranged at the rear of the pin-receiving region of the alley, said apparatus embodying an endless belt movable horizontally and laterally over the bottom of the pit, horizontal conveyor means arranged to receive pins and balls discharged from said belt, a vertically disposed ball elevator positioned over said conveyor means, said elevator including a frame having a pair of transversely spaced vertically traveling ball-gripping devices carried thereby, said devices being arranged at the sides of said conveyor means and formed with spaced ridges, the spacing of said devices and the ridges thereon being such as to cause the same to engage and grip a ball moving along said conveyor means and elevate the ball vertically without preventing the continued travel of bowling pins advancing with said conveyor means, and a vertically disposed pin elevator positioned over said conveyor means at a location beyond the ball elevator, said pin elevator including a frame supporting spaced vertically traveling pin-gripping devices, the latter being positioned on opposite sides of the conveyor means for engagement with the sides of the pins on the conveyor means to lift the same from said means and raise the pins to the top of the pin elevator.

6. Pin and ball-handling apparatus for bowling alleys having a pit arranged at the rear of the pin-receiving region of the alley, said pit being provided with a backstop, said apparatus embodying an endless belt movable horizontally and laterally over the bottom of the pit, conveyor means arranged to receive pins and balls discharged from said belt, a vertically disposed ball elevator positioned over said conveyor means, said elevator including a frame having spaced, vertically traveling, ball-gripping devices carried thereby, the spacing of said devices being such as to cause the same to engage and grip a ball moving along said conveyor means, elevate the ball vertically, and discharge the same at the upper end of said frame without engaging or interfering with the continued travel of bowling pins advancing with said conveyor means, and ball return means positioned adjacent to the upper end of said elevator for receiving balls discharged from the elevator and returning the same to the alley.

7. The apparatus defined in claim 6, including a ball supporter located between the upper end of said frame and said ball return means, means mounting said supporter for movement by a ball out of the path of travel of said ball as it is being elevated, and means operative, in response to the arrival of said ball adjacent the top of said frame, for positioning said supporter to support a ball, whereby said ball may roll along said supporter onto said ball return means.

8. Pin and ball-handling apparatus for bowling alleys having a pit arranged at the rear of the pin-receiving region of the alley, said pit being provided with a backstop, said apparatus comprising a belt movable horizontally and laterally over the bottom of the pit, conveyor means arranged to receive pins and balls discharged from said belt, means for separating balls from the pins received on said conveyor means, including a vertically disposed ball elevator positioned over said conveyor means, said elevator embodying a frame having spaced, vertically traveling, ball-gripping devices carried thereby, the spacing of said devices being such as to cause the same to engage and grip a ball moving along said conveyor means, elevate the ball vertically, and discharge the ball at the upper end of said frame without engaging or interfering with the continued travel of bowling pins advancing with said

conveyor means, and ball return means co-operative with the upper end of said elevator for receiving balls discharged from the elevator and returning the same to the alley.

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