Jan. 13, 1953 S. A. FRYE 2,625,397

APPARATUS FOR DISCHARGING PINS FROM THE PITS OF BOWLING ALLEYS

Original Filed Nov. 13, 1945 4 Sheets-Sheet 1

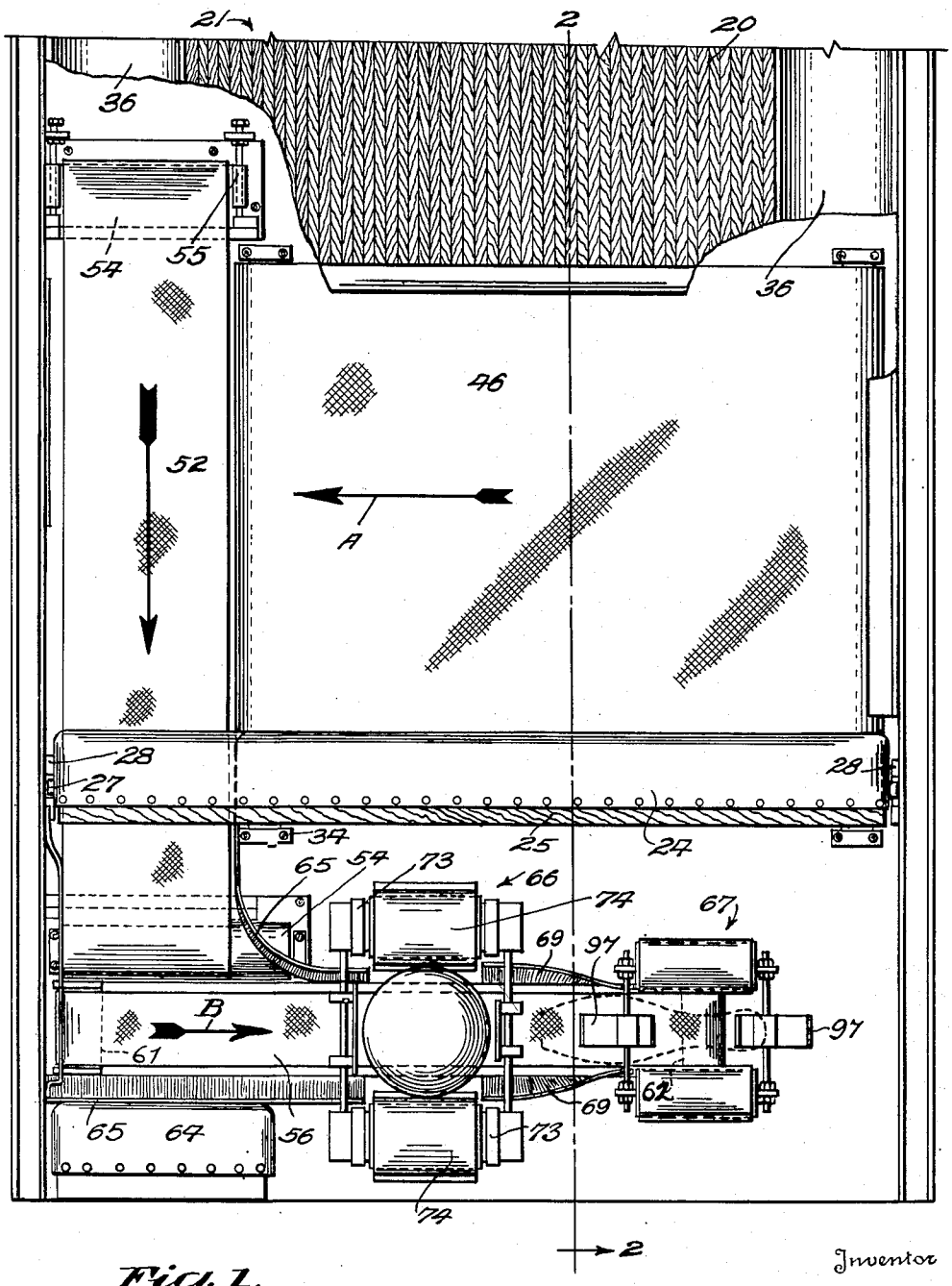


Fig. 1.

Inventor
SANDERS A. FRYE

By Wentworth B. Clapham
Attorney

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Original Filed Nov. 13, 1945 4 Sheets-Sheet 2

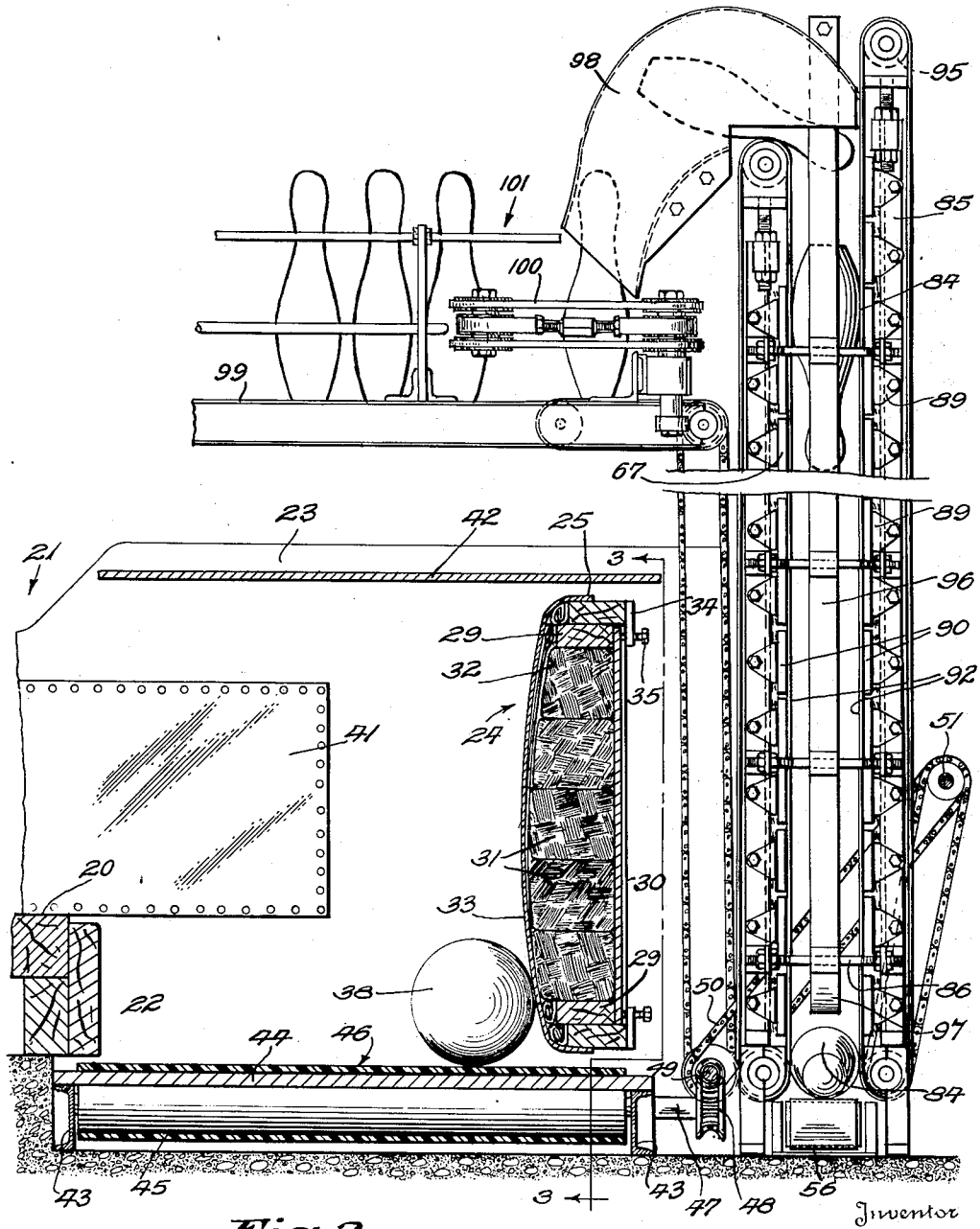


Fig. 2.

Inventor

SANDERS A. FRYE

By Wentworth B. Clapham

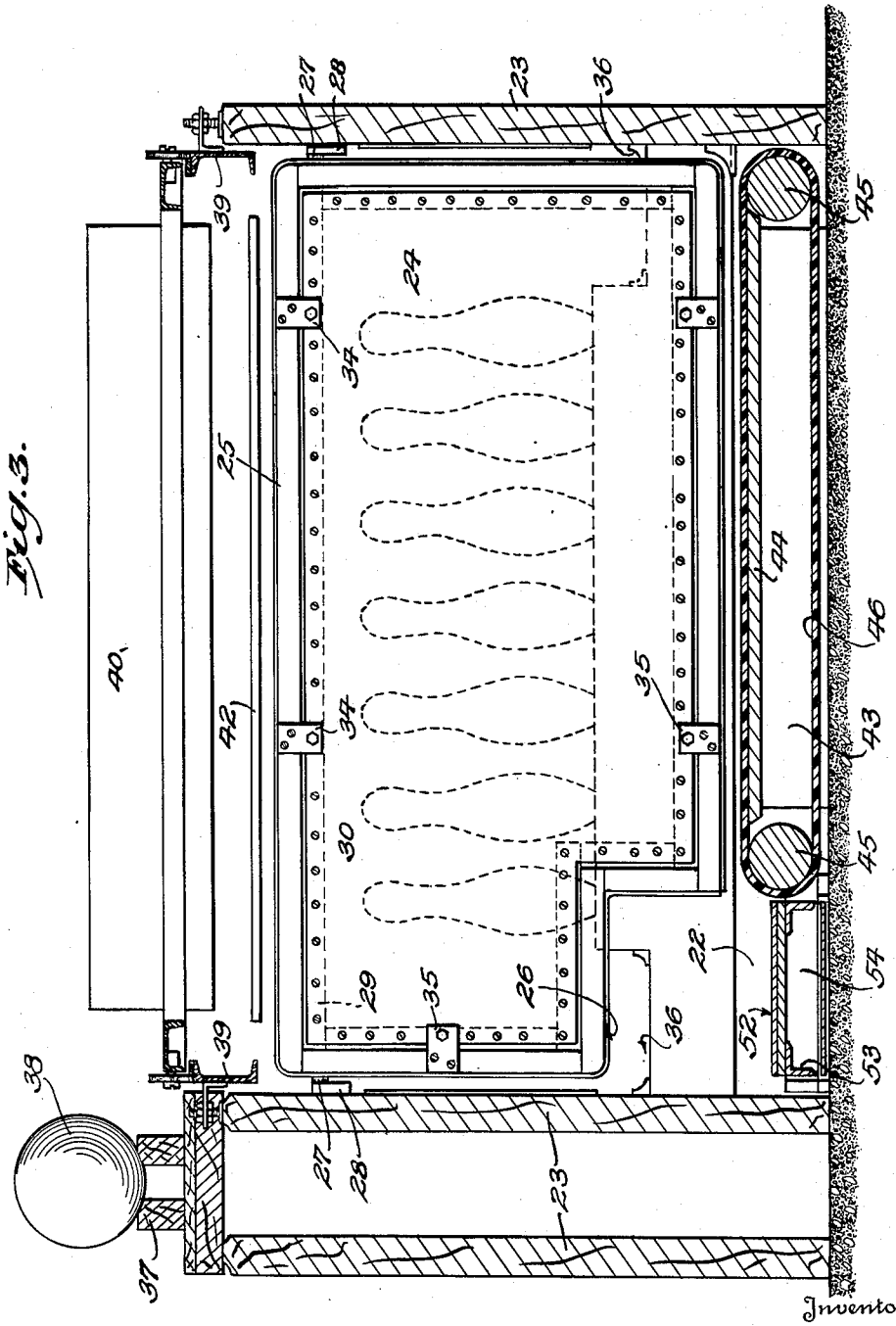
Attorney

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APPARATUS FOR DISCHARGING PINS FROM THE PITS OF BOWLING ALLEYS

Original Filed Nov. 13, 1945 4 Sheets-Sheet 3

Fig. 3.



Inventor

SANDERS A. FRYE

By Wentworth B. Clapham

Attorney

Jan. 13, 1953 S. A. FRYE 2,625,397

APPARATUS FOR DISCHARGING PINS FROM THE PITS OF BOWLING ALLEYS

Original Filed Nov. 13, 1945 4 Sheets-Sheet 4

Fig. 4

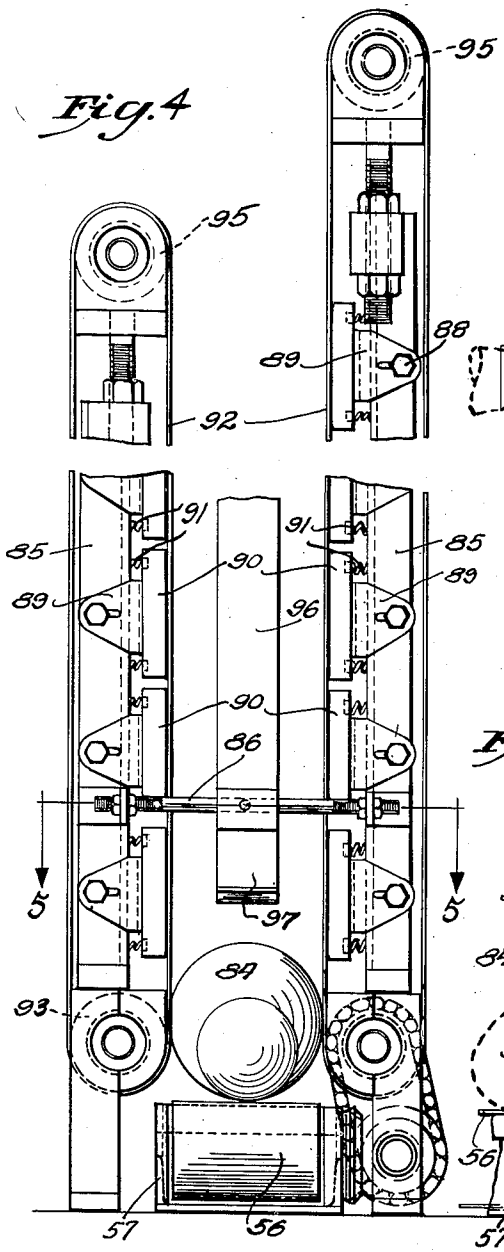


Fig. 5

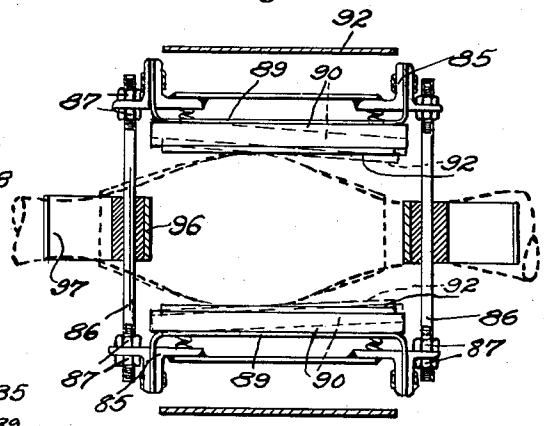
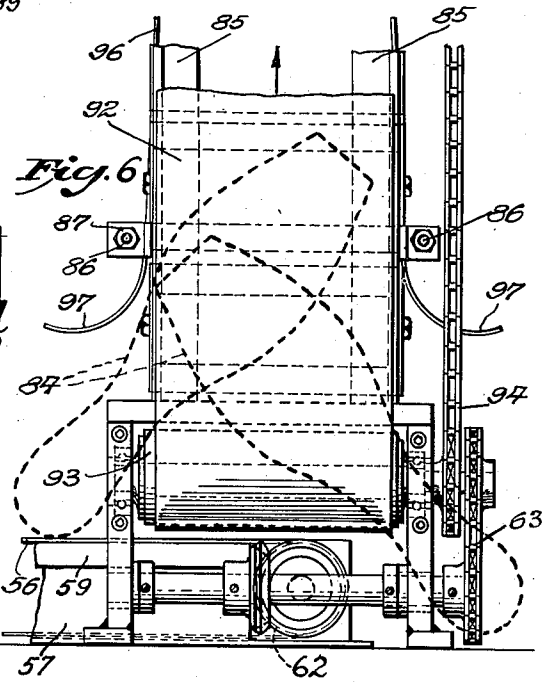


Fig. 6



Inventor

SANDERS A. FRYE

By Kenneth B Clapham

Attorney

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UNITED STATES PATENT OFFICE

2,625,397

APPARATUS FOR DISCHARGING PINS FROM THE PITS OF BOWLING ALLEYS

Sanders A. Frye, Westerville, Ohio, assignor to American Machine & Foundry Company, a corporation of New Jersey

Original application November 13, 1945, Serial No. 628,040. Divided and this application October 4, 1950, Serial No. 188,343

12 Claims. (Cl. 273—43)

1

This invention has reference to automatic pit-discharging apparatus for bowling alleys, an object thereof being to provide improved mechanical means for removing bowling pins from the pit of a bowling alley and delivering them to a position of discharge from which they are subsequently moved to a pin-spotter, 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 removing pins deposited in the alley pit and facilitating their delivery to a pin-spotter, 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.

It is an 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 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 pin elevator;

Fig. 5 is a horizontal sectional view on line 5—5 of Fig. 4; and

Fig. 6 is a detail front elevational view of the lower portion of the pin elevator.

The automatic bowling apparatus disclosed in the accompanying drawings is concerned particularly with mechanism for collecting pins and balls forced into the pit at the rear end of the bowling alley, separating pins from balls and conveying a succession of pins to a suitable pin distributing mechanism for delivery to a suitable pin setting mechanism. The present application constitutes a division of my co-pending application Serial Number 628,040, filed November 13, 1945, for Automatic Apparatus for Discharging Pins and Balls from the Pits of Bowling Alleys.

2

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 balls and toppled pins, knocked and otherwise positively removed from the area 20. The pit at each side is provided with upright side walls or kickbacks 23, and between these walls a swinging backstop 24 is mounted to arrest rearward movement of the balls and pins received in 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 side walls 23, and by which backstop 24 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. Attached to the forward portion of each cushion is 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 cushions are maintained in their desired vertical positions and are prevented from sinking or compacting 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, and 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 side walls 23 is a runway 37 by which 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 a pin-set-

ting 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 co-pending application, Serial No. 577,367, now Patent 2,550,919, granted May 1, 1951. The surfaces of the side 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 passes 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 Figure 1. The balls and 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 Figures 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 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 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 disposed and transversely positioned carrier belt 56 is located at the rear of the pit behind the backstop. This belt, as shown in Figures 1, 2, and 4 to 6 inclusive, is supported by a channel member 57. The vertical flanges of this channel member carry brackets (not shown) which support a belt floor 59 over the upper surface of which the upper run of the belt 56 advances in the direction indicated by the arrow B of Figure 1.

At the end of the channel member 57 in registration with the belt 52, a longitudinally adjustable belt-tightening bearing of conventional design (not shown) is provided for the reception of a roll 61 around which the belt 56 travels. The opposite end of this belt passes over a complemental roll 62 which is driven by the chain and sprocket construction 63 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. Stationary upwardly and inwardly curved plates or guides 69 mounted at opposite sides of belt 56 and extending between ball elevating conveyor 66 and pin elevating conveyor 67 provide means for positioning pins on conveyor 56 and for guiding them between belts 92 of pin elevating conveyor 67. The belt 56 advances the bowling balls 38 to a ball elevator 66, as shown in detail in Figure 1. 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 Figures 4 to 6 inclusive. Since the ball elevator 66 forms no part of the present invention, further description and showing are deemed unnecessary.

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 74 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 74 and are delivered by belt 56 between guides 69 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 united 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. 6, 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 yieldingly gripped by belts 92 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. 4. 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 provided with outwardly and arcuately curved pin tilting or orienting portions 97. These portions insure that each pin held by belts 92, will be oriented and positioned therebetween with its longitudinal axis lying in a substantially vertical plane, as it is conveyed upwardly by belts 92.

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 their 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 Figures 2 and 4, 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 (Fig. 2). 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 (see Fig. 2).

Upon their discharge from the outlet of the hood 98, the pins are deposited on the upper run of an endless belt 99 and between the spaced forwardly advancing laps of a plurality of endless horizontally traveling belts 100, the belts 99 and 100 serving to advance the pins into a suitable holding, grouping, and discharging apparatus, indicated generally at 101, the belts 99 and 100 being suitably driven from the drive shaft 51, or other source of power. The apparatus 101 is disposed above the pit 22 and the pin setting mechanism 40. When pins are discharged from apparatus 101, they are delivered by suitable means (not shown) into pin-setting mechanism 40 ready for placement on the alley floor.

Since the means which effects the delivery of pins from apparatus 101 forms no specific part of the invention, further description and showing thereof is omitted in the interest of brevity.

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 and scope of the following claims.

I claim:

1. Automatic pin-handling apparatus for bowling alleys, comprising movable conveyor means for conducting pins in the pit of a bowling alley, a vertical frame structure arranged over said conveyor means, a pair of spaced endless elevator belts carried by said frame structure, the spacing of said belts being such as to enable the same to receive between them and grip bowling pins positioned on and traveling with said conveyor means, whereby to elevate the pins to the top of said frame structure, said belts serving to move the pins upwardly while the latter are maintained in vertical positions therebetween, a pin guide arranged at the upper end of said frame structure, and means mounting said pin guide adjacent said belts for guiding elevated pins delivered by said belts from between said belts.

2. Automatic pin-handling apparatus for bowling alleys, comprising linearly movable conveyor mechanism upon which pins are advanced in a confined course of travel, a frame structure arranged vertically over said conveyor mechanism, a pair of spaced endless elevator belts carried by said frame structure, the spacing of said belts being such as to enable the adjoining runs thereof to receive between them and grip a bowling pin positioned on said conveyor mechanism and hold said pins in inverted position, means for driving said belts so that the inner runs thereof advance upwardly, whereby to elevate pins engaged with the belts to the top of said frame structure for discharge therefrom while the pins are maintained in inverted vertical order, a pin discharge guide, means mounting said guide adjacent the top of said frame for guiding elevated pins away from said belts, and a pin conveying device for receiving pins delivered by said guide from between said belts.

3. Pin-handling apparatus for bowling alleys comprising linearly movable conveyor means on which bowling pins are positioned and advanced in a linear course of travel from the pin-receiving pit of an associated bowling alley, a frame structure arising vertically over said conveyor, a pair of spaced endless elevator belts carried by said frame structure and substantially coextensive with the height thereof, the spacing of the adjacent runs of said belts being such as to enable the same to grip a bowling pin positioned on said conveyor, drive means for said belts operative to advance the adjacent runs thereof in an upright direction, whereby to elevate pins gripped by the belts to the top of said structure, spaced resiliently mounted pressing bars carried by said frame structure and engageable with the inner runs of said belts to maintain the latter in gripping engagement with the bowling pins during upward movement of the latter through said elevator, and a discharge hood mounted adjacent the top of said frame structure for directing elevated pins away from said belts.

4. Automatic pin-handling apparatus for bowling alleys, comprising linearly movable conveyor means for moving pins in the pit of a bowling alley to a position of delivery, a vertical frame structure located at said position of delivery and arranged over said conveyor means, a pair of spaced endless elevator belts carried by said frame structure, the spacing of said belts being such as to enable the same to receive between them and grip bowling pins positioned on and traveling with said conveyor means, whereby to elevate the pins to the top of said frame structure, said belts serving to move the pins upwardly while the latter are maintained in vertical positions therebetween, a pin receiving and supporting surface, an inverted substantially U-shaped guide located at the top of said frame structure, and means mounting said guide with one leg of said U adjacent one of said belts and the other leg of said U above said surface, whereby bowling pins lifted by said belts

are guided from between said belts through said guide and delivered onto said supporting surface.

5. The apparatus defined in claim 1 wherein one of the belts is shorter than the other, and the longer belt extends beyond the top of the shorter belt at the position of discharge of pins from said belts, a pin receiving surface adjacent said top of said shorter belt, and said pin guide extends from said longer belt and above said shorter belt and surface for guiding pins from said discharge position onto said surface.

6. Automatic pin handling apparatus for bowling alleys, comprising a pin receiving and delivering device in the pit of a bowling alley adapted to receive bowling pins, a conveyor positioned to receive pins delivered from said device, a frame structure in said pit arranged at an angle to and over said conveyor, a pair of spaced endless conveyor belts carried by said frame structure and substantially co-extensive with the height thereof, means for driving said conveyor and belts, means mounting said belts with the adjoining opposed pin engaging laps thereof spaced apart a distance less than the maximum diameter of pins to be lifted, means for guiding pins on said conveyor between said belts whereby said belts grip and lift each pin delivered between said belts.

7. Automatic pin handling apparatus for bowling alleys comprising a pin conveyor located in the pit of a bowling alley, means for delivering pins onto said conveyor, a pin elevator including a pair of spaced endless belts, a frame mounting said belts with the adjoining opposed spaced pin engaging laps thereof positioned on opposite sides of said conveyor in spaced apart relationship less than the maximum diameter of pins lifted thereby, and means for driving said belts at substantially the same speed to lift pins gripped by said laps and thereby deliver said pins out of said pit.

8. The apparatus defined in claim 7 including resilient means for pressing said laps into gripping relationship with pins engaged by said laps, members mounted adjacent the pin receiving portion of said elevator for engaging the handle ends of bowling pins delivered by said conveyor to said belts for swinging said pins handle end downwardly between said belts, and means for ejecting said pins from said belts at the top of said elevator.

9. The apparatus defined in claim 7 including spaced members located between said belts having outwardly curved portions, said portions being arranged to be engaged by the handle ends of bowling pins delivered by said conveyor between said belts to orient said pins handle end downwardly by movement by said belts upwardly through said elevator to a position of discharge therefrom at the top of said elevator.

10. The apparatus defined in claim 7 including spaced members located between said belts having outwardly curved portions, said portions being arranged to be engaged by the handle ends of bowling pins delivered by said conveyor between said belts to orient said pins handle end downwardly for movement by said belts upwardly through said elevator to a position of discharge therefrom at the top of said elevator, and spaced guide means extending longitudinally along said elevator between said belts for guiding pins and maintaining them positioned handle end downwardly during the movement of pins by said belts to said position of discharge at the top of said elevator.

11. The apparatus defined in claim 10 wherein one of said belts extends upwardly beyond the other of said belts, a substantially U-shaped inverted guide chute at the top of said elevator, and means mounting said chute with one leg of said U adjacent said longer of said belts and said inverted U above said shorter of said belts, and a pin receiving surface adapted to receive pins delivered through said chute.

12. Automatic pin handling apparatus for bowling alleys comprising a pin conveyor located in the pit of a bowling alley, means for delivering pins onto said conveyor, a pin elevator including a pair of spaced endless belts, a frame mounting said belts with the adjoining opposed spaced pin engaging laps thereof positioned on opposite sides of said conveyor in spaced apart relationship less than the maximum diameter of pins lifted thereby, guides adjacent said conveyor for positioning and guiding bowling pins between said laps of said belts, and means for driving said belts at substantially the same rate of speed to lift pins gripped by said laps and thereby deliver said pins out of said pit.

SANDERS A. FRYE.

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