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G. A. MONTTOOTH

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BOWLING PIN PICKUP APPARATUS

Filed June 6, 1947

3 Sheets-Sheet 1

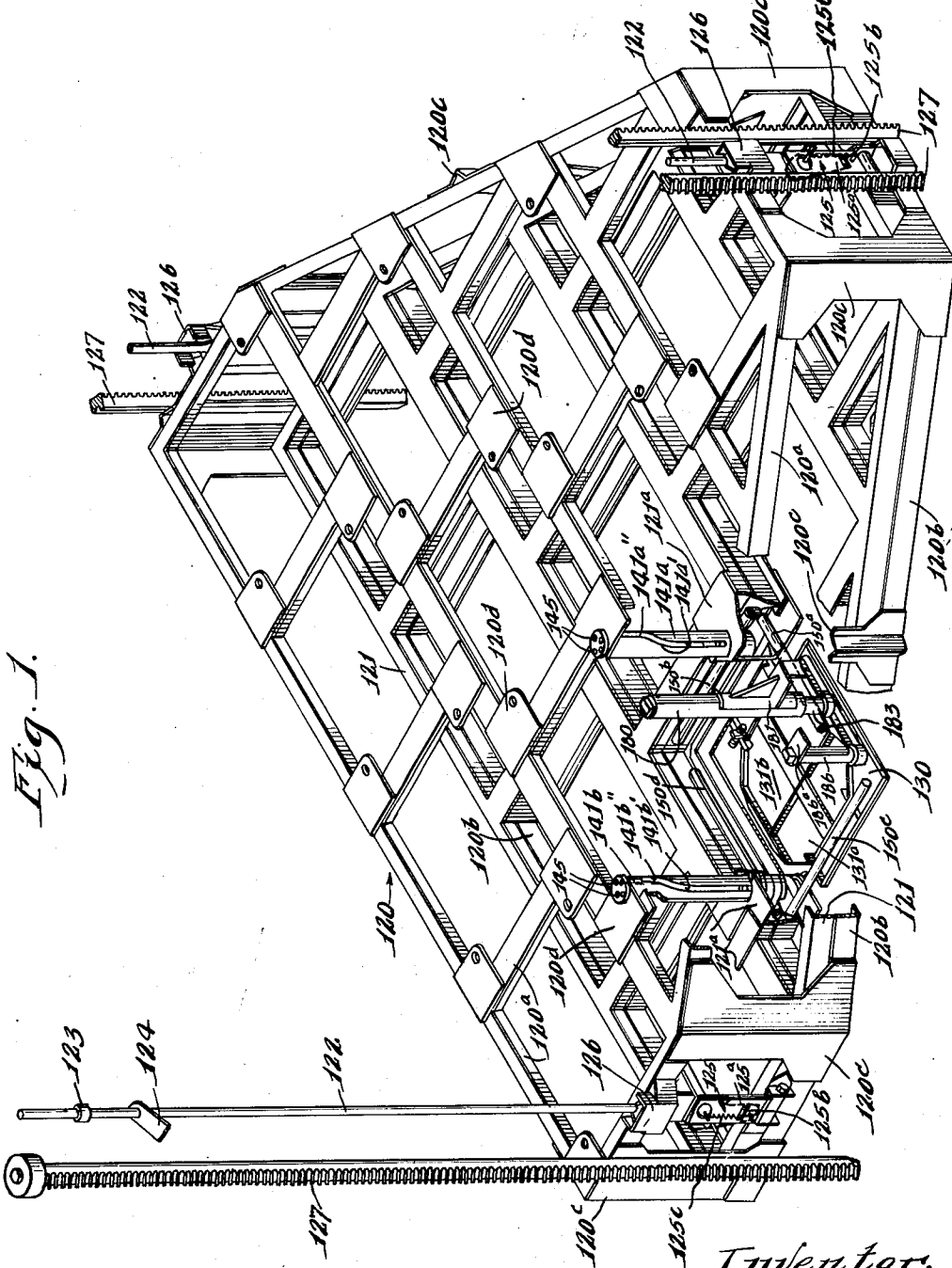


Fig. 1.

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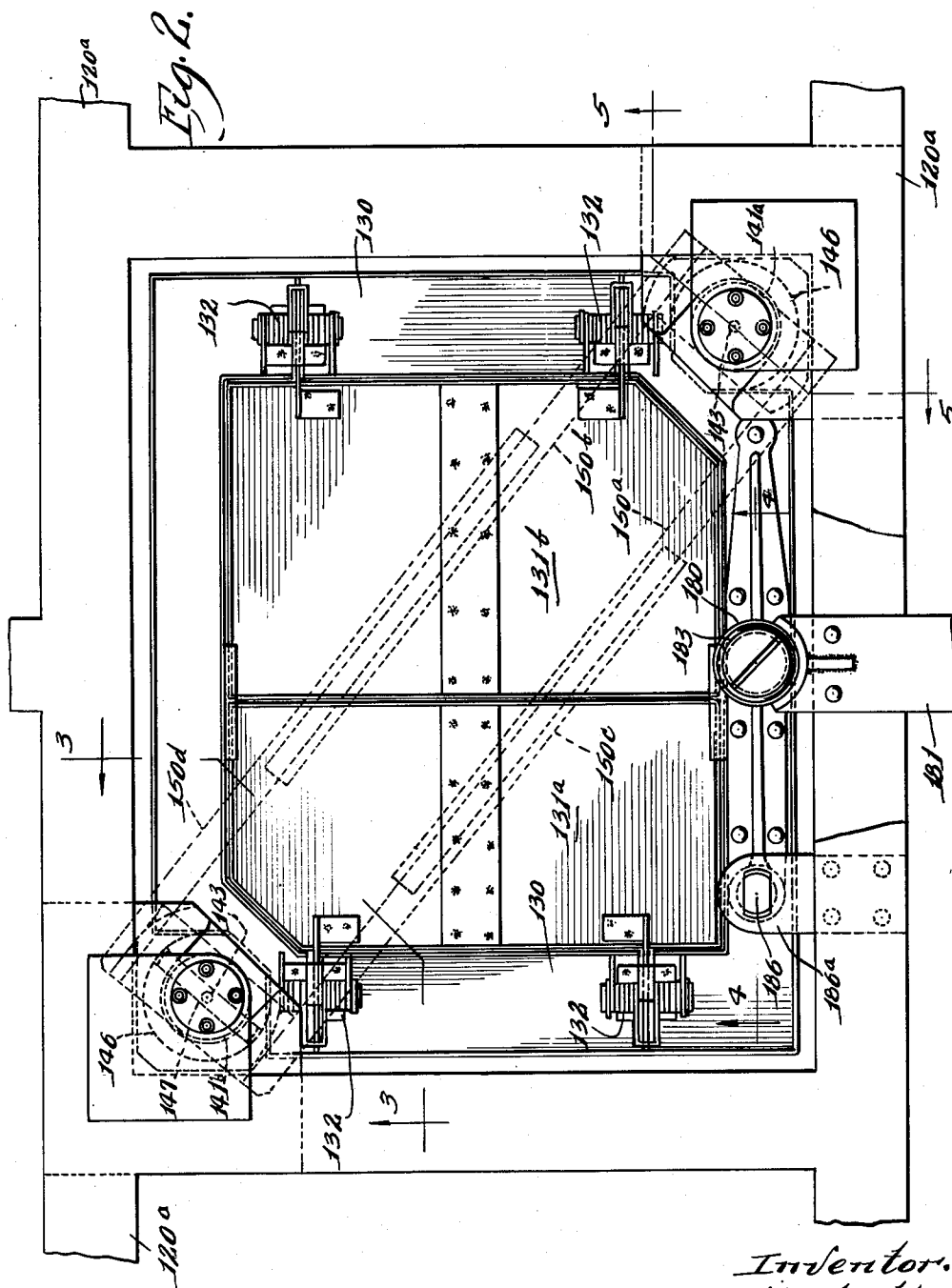
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3 Sheets-Sheet 2



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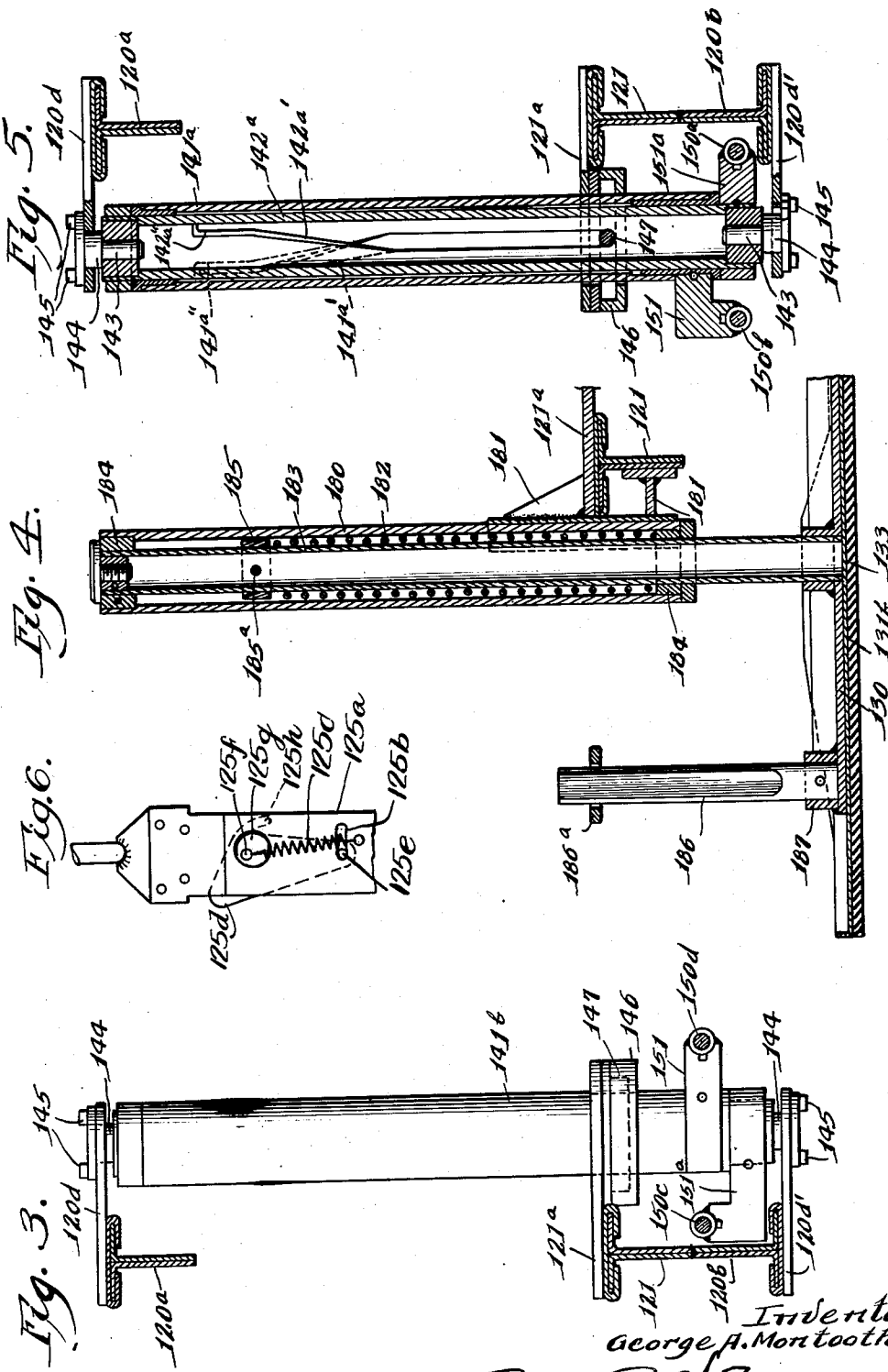
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

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BOWLING PIN PICKUP APPARATUS

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Application June 6, 1947, Serial No. 752,897

10 Claims. (Cl. 273-42)

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This invention relates to bowling pin pickup apparatus, and more particularly to self-actuated bowling pin pickup apparatus particularly adapted for use in a pin setting machine, wherein the actuation of the pickup apparatus does not depend upon the presence of a bowling pin.

The general object of the invention is to provide new and improved bowling pin pickup apparatus.

An object of the invention is to provide improved apparatus for lifting standing pins from a bowling alley bed and for replacing said pins on said bed in exactly the same spots they previously occupied.

Another object is to provide a mechanism for picking up standing pins, such mechanism comprising a vertically movable frame having a plurality of vertical openings therethrough, through which pins may be set on the alley bed; an actuating grid associated with said frame and movable relative thereto, said grid having a plurality of vertical openings in registry with the openings in said frame, means for causing relative movement between said grid and frame upon predetermined movement of said frame, and a pair of horizontal pickup bars pivotally mounted on said frame for movement about a common axis, said bars moving from an inoperative position to an operative position wherein they straddle the neck of a standing pin upon relative movement of said grid and frame.

Another object is to provide in such a pickup device a closure in each of said openings in said grid, said closures normally being operable to clamp standing pins to the alley bed and being movable to an out of the way position to permit pins to be set through said openings, and a novel means for suspending each of said closures within said respective openings.

Another object of this invention is to provide a one-point suspension of each of said closures from said grid for movement of said closures relative to said grid, together with means for preventing said closures from binding when they encounter the head of a standing pin.

Other objects and advantages will be apparent from the following detailed description taken in connection with the accompanying drawings, in which:

Fig. 1 is a perspective view of my improved apparatus, with parts broken away to more clearly show underlying structure;

Fig. 2 is a plan view of one of the cells of the apparatus shown in Fig. 1, parts being broken away to show underlying parts;

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Fig. 3 is a fractional section through the apparatus of Fig. 2 along the line 3-3 of such figure;

Fig. 4 is a fractional section through the apparatus of Fig. 2 along the line 4-4 of such figure;

Fig. 5 is a fractional section through the apparatus of Fig. 2 along the line 5-5 of such figure; and

Fig. 6 is an enlarged detail view of a portion of the apparatus of Fig. 1.

While my invention is susceptible of embodiment in many different forms, I have shown in the drawings and will herein describe in detail one specific embodiment, with the understanding that the present disclosure is to be considered as an exemplification of the principles of the invention and is not intended to limit the invention to the embodiment illustrated. The scope of the invention will be pointed out in the appended claims.

I have heretofore made solely or contributed to several inventions pertaining to automatic pin setting machines, among them being the copending application of George A. Montooth and Albert M. Bowen for a Pin Setting Machine, filed March 26, 1946, as Serial No. 657,238; my copending application for Pin Setting Machines filed March 24, 1947, as Serial No. 736,643; and my application for Bowling Pin Pickup Apparatus filed June 6, 1947 as Serial No. 752,896, and reference may be had to these copending applications for a complete disclosure of the type of machine with which the present invention is particularly adapted to be used. The present invention comprises a modification of the type of apparatus illustrated and described in my copending application Serial No. 752,896 filed June 6, 1947 last mentioned above.

Referring now to the drawings, my improved pin pickup apparatus comprises a generally triangular frame designated generally in Fig. 1 at 120. This frame is normally mounted in a bowling machine directly above the pin spots on the alley bed, and is adapted to be raised and lowered during the operation of such bowling machine, as is more fully explained in application Serial No. 736,643 mentioned above. For example, during a game of bowling if after the first ball of a frame has been rolled some of the pins have been knocked down, but one or more of the pins have been left standing on the alley bed, it is necessary to remove these standing pins from the alley so that the fallen pins or dead wood may be swept from the alley. For this purpose the frame 120 is lowered, standing pins

are grasped by the pickup mechanism carried by said frame and to be hereafter described, the pins are picked up from the alley bed, and after the alley has been swept the pins are reset on the alley bed, and preferably in the same spots from which they are picked up. To permit this vertical movement the frame 120 carries vertical racks 127 adjacent each of its corners. The racks 127 may be operated by pinions (not shown) which may be inter-connected by shaftings (not shown) to provide for the vertical movement of the frame 120 while maintaining said frame in a horizontal position. A means for mounting a somewhat similar triangular frame in a bowling machine for vertical movement above the alley bed is shown and described in the Montooth and Bowen application Serial No. 657,238 above referred to.

The frame 120 comprises spaced upper and lower portions, the upper portion being designated at 120a and the lower portion being designated at 120b, and these upper and lower portions are rigidly held in fixed spaced relation to each other by means of a plurality of spacing plates 120c. The frame 120 has ten rectangular vertical openings therethrough, these openings corresponding to the conventional pin spots on a bowling alley.

Inside of this frame structure and between the upper and lower portions 120a and 120b is carried an actuating grid 121. This grid is of similar generally triangular shape and has ten vertical openings therethrough in registry with the ten openings in the frame 120. The grid 121 is loosely fitted into the space between the upper and lower portions of the frame 120 so that it is movable relative to said frame and is free to move from its bottom position adjacent the lower portion 120b of the frame, as shown in Fig. 1, to a top position adjacent the upper portion 120a of said frame.

Stop rods 122 are carried by the grid 121 adjacent each of its three corners. These rods extend vertically above the frame 120 and are each provided with a stop collar, as the collar 123. Fixed stop members, as the member 124, which may be rigidly secured to the bowling machine main frame, are provided to engage the stop collars 123. Latches 125 are also fixed to the grid 121 adjacent each of its three corners, and are adapted to cooperate with latching brackets 126 which are mounted on the upper portion 120a of the frame 120. These latching devices are identical with the latches shown and described in the Montooth and Bowen copending application Serial No. 657,238 above mentioned. Each latch comprises a latch member 125d which is attached to a bracket 125a, said bracket being mounted on the grid 121. The latch member has a latching portion 125h. The latch member is slidably retained on said bracket by a pin 125e in a slot 125b and a pin 125f in a circular opening 125g and is movable between a latching position and an unlatching position, this movement being aided by an overcenter spring 125c which is attached at one end to the latch member pin 125f and is attached at the other end to the bracket 125a. As described in the above mentioned application, the latch is adapted to become engaged and disengaged alternately.

As the frame 120 is moved downwardly to engage and lift pins from the alley, the grid 121 remains in its bottom position until stop collars 123 engage stop members 124. The stop collars 123 are preferably adjustable on the stop rods 122 and are adjusted so that all the stop collars

engage the respective cooperating stop members simultaneously and at a point when the grid 121 is a desired distance above the alley bed. Upon this engagement the grid 121 stops its downward travel while the frame 120 continues down, thus causing relative movement between the frame and the grid until said grid engages the upper portion 120a of the frame and the latches 125 move above latching brackets 126. At this point the downward motion of the frame is stopped, and the actuating mechanism in the bowling machine causes the frame to move up. After the frame moves upwardly a short distance with respect to the grid 121, latches 125 engage latching brackets 126 so that the grid 121 is held in an intermediate position and moves upwardly with the frame. The engagement of latch portion 125h with bracket 126 causes a shifting of pin 125e in slot 125b.

After the alley is swept the frame is lowered to reset the pins on the alley. Stop collars 123 again engage stop members 124, thus stopping the descent of grid 121, but frame 120 over-travels a sufficient distance to allow the latching devices 125 to become unlatched from the latching brackets 126. Since over-center spring 125c, due to the shifting of pin 125e, now acts to swing latch portion 125h away from bracket 126. Upon reversal of movement of the frame, the grid 121 remains stationary until it comes to rest in its bottom position against the bottom portion 120b of the frame, after which the entire frame structure continues upwardly to its dwell position above the alley. This movement of frame 120 upwardly relative to grid 121 causes brackets 126 to engage the latches at a point opposite portion 125h and thus shift pin 125e in its slot and also as a result shift spring 125c to a position wherein latch lug 125h again is urged to a bracket-engaging position.

A pin pickup assembly is mounted within each of the vertical openings in the frame, only one of these assemblies being shown in place in Fig. 1, and this pickup assembly being shown in more detail in Figs. 2, 3, 4 and 5.

Comprising each pickup assembly is a pair of outer tubes 141a and 141b which are mounted between the upper and lower portions of the frame 120 adjacent diagonally opposite corners of each of the openings through the frame. Within each of these outer tubes is an inner tube as the tube 142a (Fig. 5). Both inner and outer tubes are rotatably carried between the upper and lower portions of the frame, each inner tube carrying at its ends peg bearings 143 and the upper of these peg bearings on each tube being journaled into a bearing collar 144 carried by an upper plate 120d, and the lower of said peg bearings being journaled into a similar bearing collar carried by a similar lower plate 122d' as shown in Fig. 5. The outer tubes are rotatably carried on the inner tubes. If it is desired to remove any of the tubes with their associated apparatus, it is merely necessary to remove these bearings by means of the screws 145 provided for this purpose.

Thus, it will be seen that the outer and inner tubes 141 and 142 are rotatable with respect to the frame 120 and with respect to each other. The outer tubes 141a and 141b each have a longitudinally extending slot therein, said slots having respective angular portions 141a' and 141b' and each of the inner tubes has a longitudinally extending slot with a reverse angular portion as the portion 142a' (Fig. 5). As shown in Fig. 1, the slots in the outer tubes have a straight or

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vertical upper portion 141a" and 141b" respectively and the slot in each of the inner tubes has a straight or vertical upper portion as the portion 142a" shown in Fig. 5.

Two pairs of pickup bars 150a, 150b and 150c, 150d are provided, one of said bars being carried by each of the inner and outer tubes. These pickup bars extend horizontally in the vertical central opening in the frame and are mounted on the respective tubes as shown best in Figs. 3 and 5. Each of the outer tubes 141 carries a pickup bar 150 on a bracket 151, and each of the inner tubes 142 carries another pickup bar mounted on another bracket 151a, the bars on one pair of tubes being below the bars on the other pair as shown in Figs. 3 and 5, the pickup bars of each pair being rotatable about a common axis and being so arranged that they normally are in a withdrawn position and extend substantially at a right angle to one another along the edges of one of the openings in the frame 120 as shown in Fig. 1 and in a position wherein they will not interfere with vertical movement of the pressure plate 130. The structure of the tubes 141 and 142 and of the pickup bars is identical with that described in my copending application filed June 6, 1947, Serial Number 752,896.

A cup-shaped collar 146 is loosely fitted around each of the outer tubes 141, these collars being rigidly attached to the actuating grid 121 by means of plates 121a. Within the enclosure between each collar 146 and the cooperating plate 121a an actuating member 147 is movably enclosed, each of these actuating members comprising a pin, one of which extends through the slots in each pair of tubes 141a, 142a and 141b, 142b. It will be obvious that as the grid 121 moves relative to the frame 120 the collars 146 will slide upwardly on the tubes 141, and the actuating pins 147 will cause the inner and outer tubes of each pair to rotate in opposite directions, since the angular portion of the slot on each of the outer tubes 141a and 141b turns in one direction while the angular portion of the slot on each of the inner tubes turns in the opposite direction. The angular portions of the slots are so arranged that each of the tubes rotates through an angle of 45 degrees, or a total of 90 degrees relative movement between the tubes of each pair of tubes, and the straight or vertical upper portion of each of said slots allows for over-travel without any of the tubes rotating through more than a 45-degree angle. This over-travel is necessary to latch and unlatch the latch 125 and also to provide compensation for varying heights of pins which may be found on the alley bed.

When the tubes 141 and 142 rotate as above described the pickup bars of each pair pivot with a scissors-like movement from their withdrawn or right angle position to an operative or parallel position as shown in dotted lines in Fig. 2, and since the pickup bars of each pair are spaced apart at their mounting end a distance slightly greater than the width of the neck of a bowling pin, as the bars pivot they will straddle the neck of a pin which is standing beneath the opening through the frame 120. The term "straddle" is being used herein to indicate the operative position of each pair of pickup bars adjacent the neck of a standing pin and on opposite sides thereof regardless of whether one or both of said pickup bars contact the neck of the pin. Since the inner and outer tubes 141 and 142 are rotatably mounted on the frame, and since the actuating pins 147 are movably held in recesses in the

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respective collars 146, a differential action is provided and the pickup bars of each pair will swing into any position required to straddle the neck of a pin regardless of whether or not the pin is on its normal spot on the alley bed. For example, referring to Fig. 2, if a bowling pin were standing so far off its normal pin spot that its neck would be engaged by the bar 150a after this bar had turned through an arc of only 10° from withdrawn position, the cooperating bar 150b would move through an arc of 80° until parallel with the bar 150a. In accomplishing this operation each bar moves toward the pin at an angle of 10° without the actuating pin 147 turning. Thereafter, the actuating pin 147 turns through an angle of 35° while the bar 150b turns through an angle of 70°. Thus, the movement of the actuating pin 147 in the angular portion of the slots causes an angular movement of the bars of 45° each when the actuating pin does not move and then the bars end up in a parallel position bisecting their original 90° angle. When one bar is stopped before reaching such bisecting angle, the other bar must be moved an additional distance so that the bars end up in parallel position. The movement of the pin 147 about the vertical axis of the tubes 141 and 142 permits this. This pivoting action of the pickup bars in each of the openings in the frame will occur each time there is relative movement between the grid 121 and the frame 120 regardless of whether or not there is a pin standing in any or all of the openings. By providing a self-actuating structure of this type rather than ten individual units which are individually actuated, I am able to simplify the apparatus to a considerable degree.

Each of the ten openings in the grid and frame structure is provided with a closure comprising a substantially rectangular pressure plate 130 which is similar to the pressure plate shown and described in my copending application Serial No. 752,896.

The construction of the pressure plate is shown in Fig. 2, such plate having a vertical central cutout portion within which is mounted a pair of trap doors 131a and 131b. Spring loaded hinges 132 normally retain said doors in the closed or horizontal position of Figs. 1 and 2, but the doors may swing downwardly to permit the passage of a pin through the opening in the grid and frame during a pin setting operation. Such doors are prevented from swinging upwardly beyond the horizontal position shown by contact with the bottom surface of the pressure plate 130. Said doors act to clamp a standing pin upon the alley bed and a cushion of rubber or other resilient material is affixed to the bottom of each of the doors as shown in Fig. 4 at 133.

I prefer to provide doors of unequal size as illustrated in Fig. 2. Since it most often happens that bowling pins encountered by the doors as the structure descends are on their normal pin spots, this unequal construction insures that the doors will normally contact the heads of the pins away from the dividing line between the doors, which is the weakest part of the structure.

I have provided a novel and simplified means for mounting the pressure plates within the respective openings, such mounting means providing for relative movement between the pressure plate and the grid 121 on which it is mounted while using a minimum of parts. Each pressure plate is supported and held in a horizontal plane by a vertical guide post 133 which is carried by the pressure plate and is slidably mounted in a

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sleeve 180 by bushings 184 (Fig. 4). The sleeve 180 is rigidly attached to the actuating grid 121 by means of a bracket 181. In order to prevent the pressure plate from rotating around the axis of the guide post 183, a second guide post 186 is provided as shown in Figs. 1 and 4, this guide post being mounted in a bracket 187 on the member 130 and being journaled through a bracket 186a which extends from the grid 121.

This single point mounting of the pressure plate on the grid 121 also includes means for allowing vertical movement of the pressure plate relative to the grid 121 in order to compensate for variations in the heights of pins standing on the alley and to permit over-travel after the pressure plate clamps standing pins in order that the latch device 125 may be operated. The structure is so designed that in the event a pin of maximum height is encountered, the doors in the pressure plate 130 will contact the top of the pin about one inch before stop collars 123 engage stops 124, and therefore the pressure plate 130 will move upward relative to the grid 121 to its maximum top position. In the event a shorter pin is contacted by the doors, the pressure plate will move only a portion of the maximum distance allowed.

As shown in Figs. 1 and 2, the pressure plate 130 is mounted on the grid 121 adjacent the edge of one of the openings in said grid. Obviously, a pin contacting the doors in the pressure plate would tend to cause the guide post 183 to bind in the bushings 184 which would prevent the sliding action required for the pressure plate to move relative to the grid 121. To prevent this binding, a compression spring 182 surrounds the guide post 183 within the sleeve 180. As shown in Fig. 4, the bottom of this spring rests against the lower bushing 184 and the top of the spring abuts a collar 185 which is mounted on the guide post 183 by a pin 185a. The reaction of the spring 182 against the collar 185 urges the guide post up into the sleeve 180. However, the weight of the pressure plate structure over-balances the spring, and the pressure plate normally remains in its bottom position shown in Fig. 4. When the doors of the pressure plate contact the top of a standing pin, the pin lifts the pressure plate at the point of contact and the upward pressure of the spring 182 lifts the unbalanced weight at the point of mounting, thus avoiding any tendency of the guide post 183 to bind in the bushings 184.

I claim:

1. Bowling pin pickup apparatus comprising, in combination, a vertically movable frame adapted for installation above the pin end of a bowling alley, an actuating grid associated with said frame and movable therewith and relative thereto, a pair of pickup bars carried by said frame for pivotal movement in a horizontal plane between withdrawn positions and operative positions wherein they may pick up a standing pin, coaxial members rotatably carried on said frame to which said bars are fixed, means effective during only a portion of the movement of the frame to move the grid relative to the frame, said means comprising a fixed stop supported in stationary relation to the alley, and means operated in response to said relative movement and operative upon said coaxial members to cause said bars to pivot between said positions.

2. Bowling pin pickup apparatus comprising, in combination, a frame which is vertically movable from a position above an alley bed to a position adjacent said alley bed, an actuating grid

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associated with said frame and movable relative thereto, a pair of pickup bars pivotally carried by said frame for movement about a common vertical axis between withdrawn positions wherein said bars extend from each other at substantially right angles to positions wherein said bars are substantially parallel and may pick up a standing bowling pin, coaxial members rotatably carried on said frame to which said bars are fixed, means effective during only that portion of the movement of the frame when it is closest adjacent to the alley bed to move the grid relative to the frame, said means comprising a fixed stop supported in stationary relation to the alley, and means on said grid operative on said coaxial members in response to said relative movement to cause said bars to pivot about said axis.

3. Bowling pin pickup apparatus comprising, in combination, a vertically movable frame adapted for installation above the pin end of a bowling alley, an actuating grid associated with said frame and movable therewith and relative thereto, a pair of pickup bars pivotally carried by said frame for movement about a common vertical axis between withdrawn positions and positions wherein they may pick up a standing bowling pin, coaxial members rotatably carried on said frame to which said bars are fixed, means effective during only a portion of the movement of the frame to move the grid relative to the frame, said means comprising a fixed stop supported in stationary relation to the alley, and an actuating member carried by said grid for pivoting said coaxial members, said actuating member being rotatably mounted on said grid for movement with respect thereto in a plane perpendicular to the plane of said relative movement between said grid and said frame, said member being operative upon said coaxial members to cause said bars to pivot about said axis in response to said relative movement between said grid and said frame.

4. Bowling pin pickup apparatus comprising, in combination, a generally triangular vertically movable frame adapted for installation above the pin supporting end of a bowling alley and having spaced upper and lower portions provided with a plurality of vertical pin openings therethrough, an actuating grid carried by the lower portion of said frame and movable vertically therewith and also movable upwardly relative thereto, means effective during final downward movement of said frame for arresting the movement of the grid and thereby elevating it relative to the frame, said means comprising a fixed stop supported in stationary relation to the alley, a pair of pickup bars pivotally mounted on said frame adjacent each opening, the bars of each pair being supported on rotary members on the frame movable about a common vertical axis to swing the bars from a spread substantially right angle inoperative position to a parallel pin engaging position, means carried by said grid adjacent each said axis and operated in response to said relative movement of the grid upwardly of the frame for causing said rotary members to pivot the bars of each pair about their axis to pin pickup position, and latch means operable after said relative movement of the grid upwardly of the frame for retaining said grid and frame in their adjusted position whereby said bars are held in pin pickup position.

5. Bowling pin pickup apparatus as defined in claim 4, wherein the means carried by said grid

comprise actuating members which are movably mounted on the grid.

6. Bowling pin pickup apparatus as defined in claim 4, having a substantially duplicate pair of pickup bars and actuating mechanism therefor mounted on said frame adjacent each of said openings and with their common axis diametrically opposite to the common axis of the other pair of pickup bars at each opening.

7. Bowling pin pickup apparatus as defined in claim 4 wherein the openings in the frame and grid are ten in number, and which has a closure for each opening movably mounted on the grid for limited vertical movement relative thereto, said closures being moved upwardly of the grid by engagement with standing pins and operating to clamp the pins to the alley during the pin pickup operation.

8. Bowling pin pickup apparatus comprising, in combination, a vertically movable frame adapted for installation above the pin end of a bowling alley and having a plurality of vertical openings therethrough, an actuating grid carried by said frame and movable vertically therewith and relative thereto, said grid having a plurality of vertical openings in registry with the openings in said frame, a closure in each of said openings in said grid, said closures normally being operable to clamp standing pins to hold said pins against movement and being movable to an out of the way position, means for mounting said closures on said grid for vertical movement relative thereto when clamping pins, such mounting means comprising a guide rod carried by each of said closures adjacent an edge thereof, a sleeve carried by said grid adjacent each of said openings, each of said sleeves slidably receiving one of said guide rods, means acting on each closure adjacent the rod thereon to urge that portion of the closure upwardly when a pin engages another portion for preventing said guide rods from binding in said respective sleeves, means

actuated in response to predetermined movement of said frame for causing relative vertical movement of said grid and said frame, a pair of pickup bars pivotally mounted on said frame adjacent each of said openings, the bars of each pair being movable about a common axis, and means operated in response to said relative movement of said grid and frame for causing the bars of each pair to pivot about their axis and engage pins held down by the closures.

9. Bowling pin pickup apparatus as defined in claim 8 wherein the means acting on each closure for preventing the guide rods from binding comprises a spring surrounding each guide rod and within the associated sleeve and operating to urge the guide rod upwardly in the sleeve, and a second guide rod carried by each closure for preventing rotation of the closure relative to the grid.

10. Bowling pin pickup apparatus as defined in claim 9 in which the means actuated in response to predetermined movement of said frame for causing relative vertical movement of the grid and the frame, comprises a stop rod carried by said grid and having a stop collar thereon, and a fixed stop supported in stationary relation to the alley adapted to engage said collar before the frame reaches the end of its downward movement.

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