

March 19, 1929.

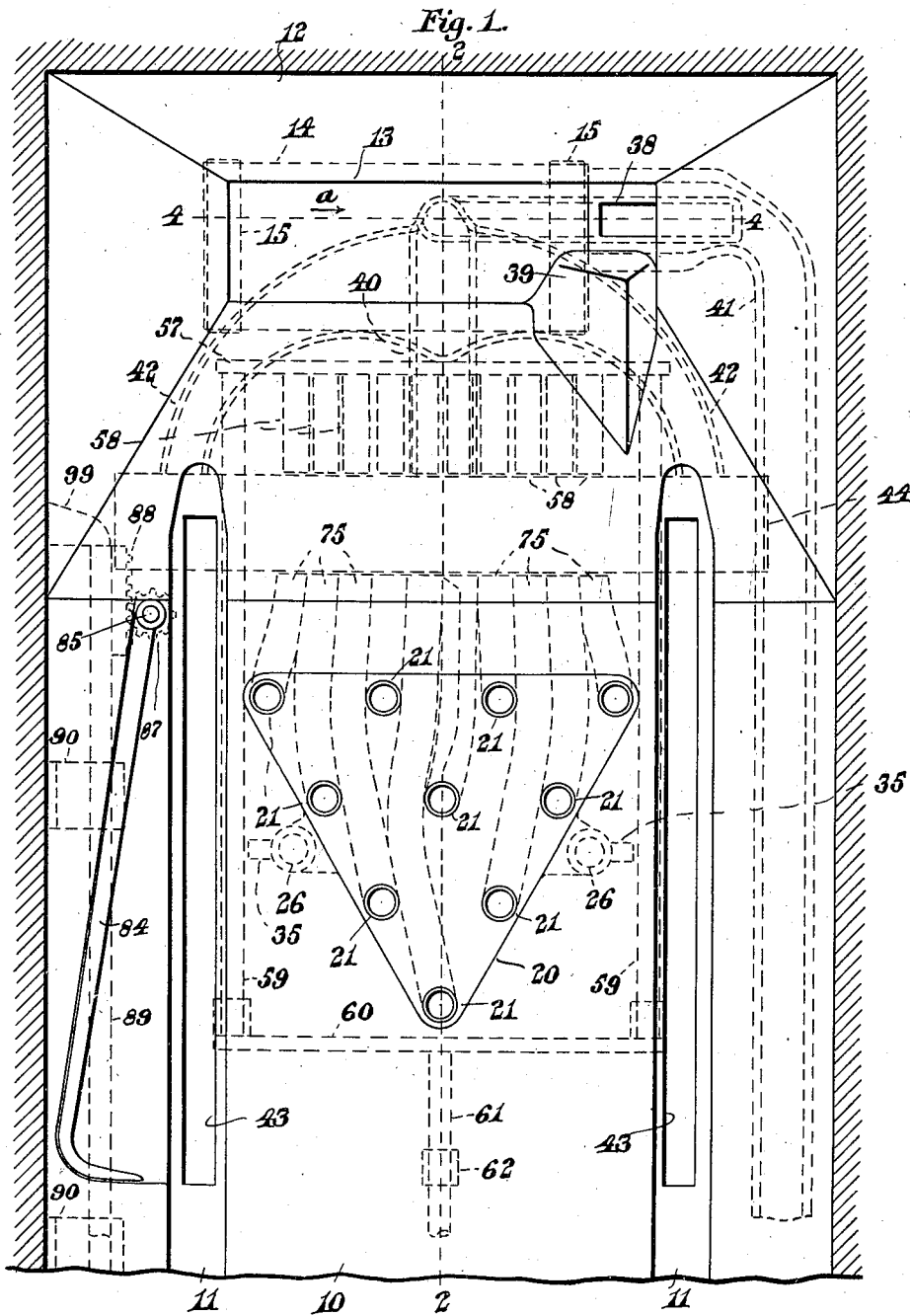
R. A. WILLIAMS

1,706,271

BOWLING ALLEY

Filed Jan. 30, 1928

6 Sheets-Sheet 1



Inventor:
Raymond A. Williams,
by Walter E. Lombard,
Atty.

March 19, 1929.

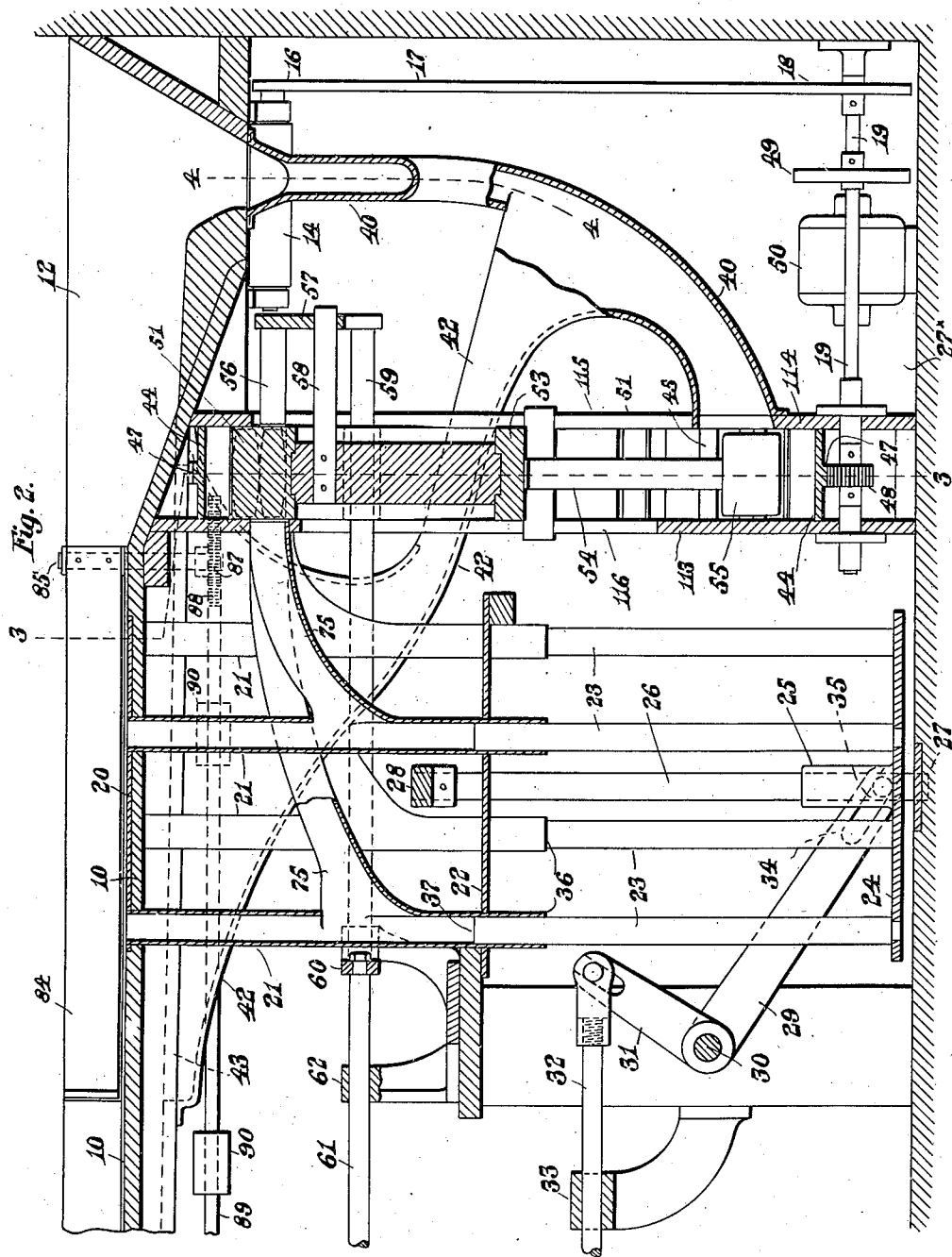
R. A. WILLIAMS

1,706,271

BOWLING ALLEY

Filed Jan. 30, 1928

6 Sheets-Sheet 2



Inventor:
Raymond A. Williams,
by Walter E. Lombard,
Atty.

March 19, 1929.

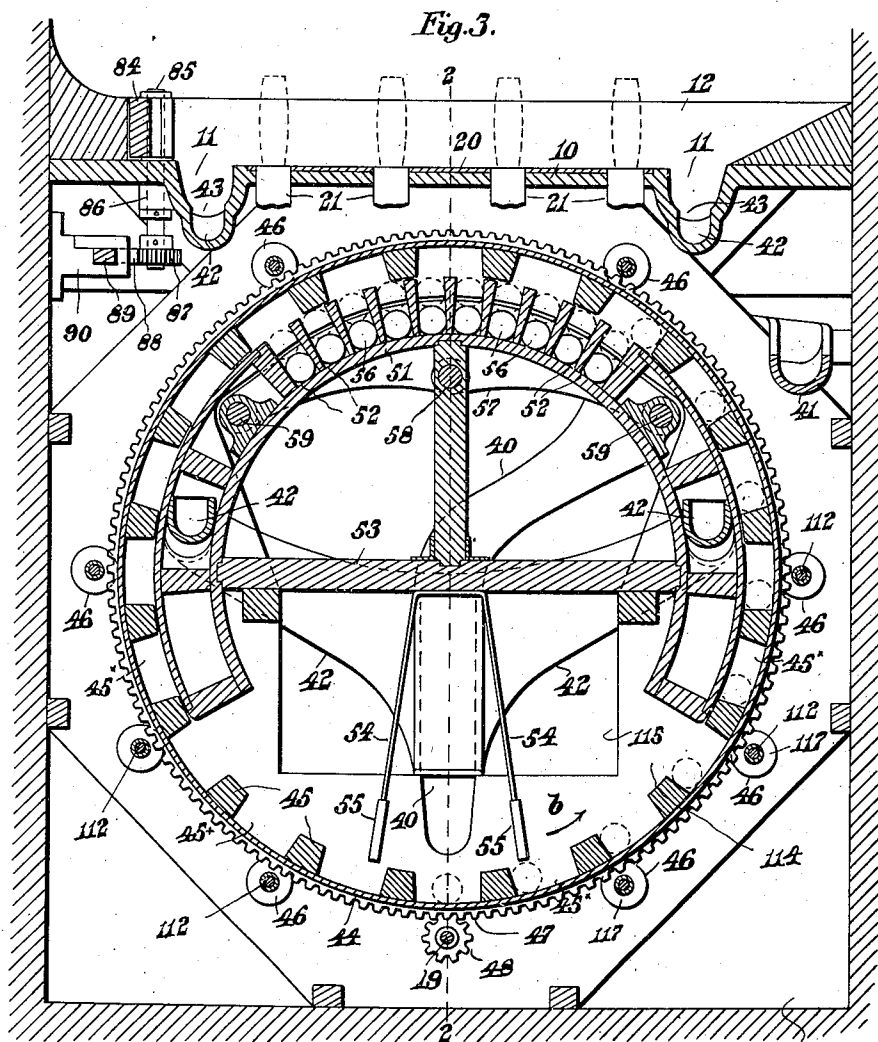
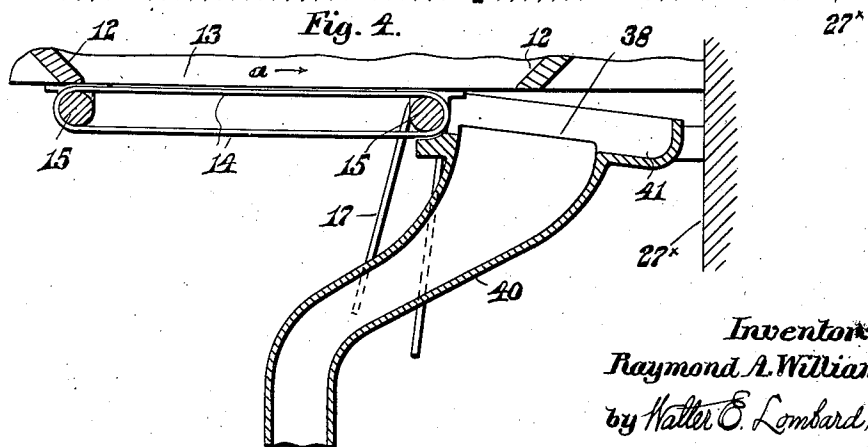
R. A. WILLIAMS

1,706,271

BOWLING ALLEY

Filed Jan. 30, 1928

6 Sheets-Sheet 3



Inventor
Raymond A. Williams,
by Walter E. Lombard, *Atty.*

March 19, 1929.

R. A. WILLIAMS

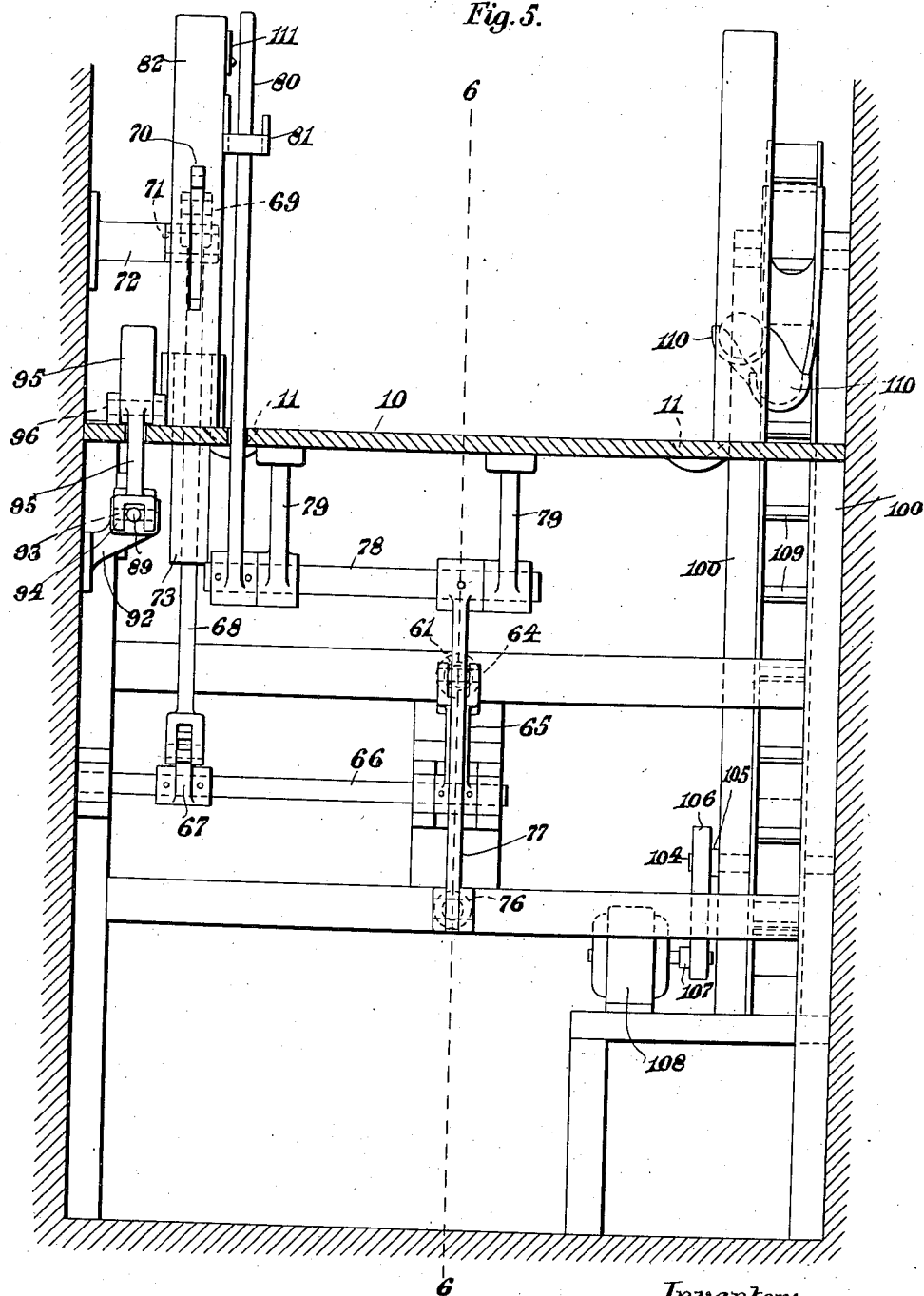
1,706,271

BOWLING ALLEY

Filed Jan. 30, 1928

6 Sheets-Sheet 4

Fig. 5.



Inventor:
Raymond A. Williams,
by Walter E. Lombard,
Atty.

March 19, 1929.

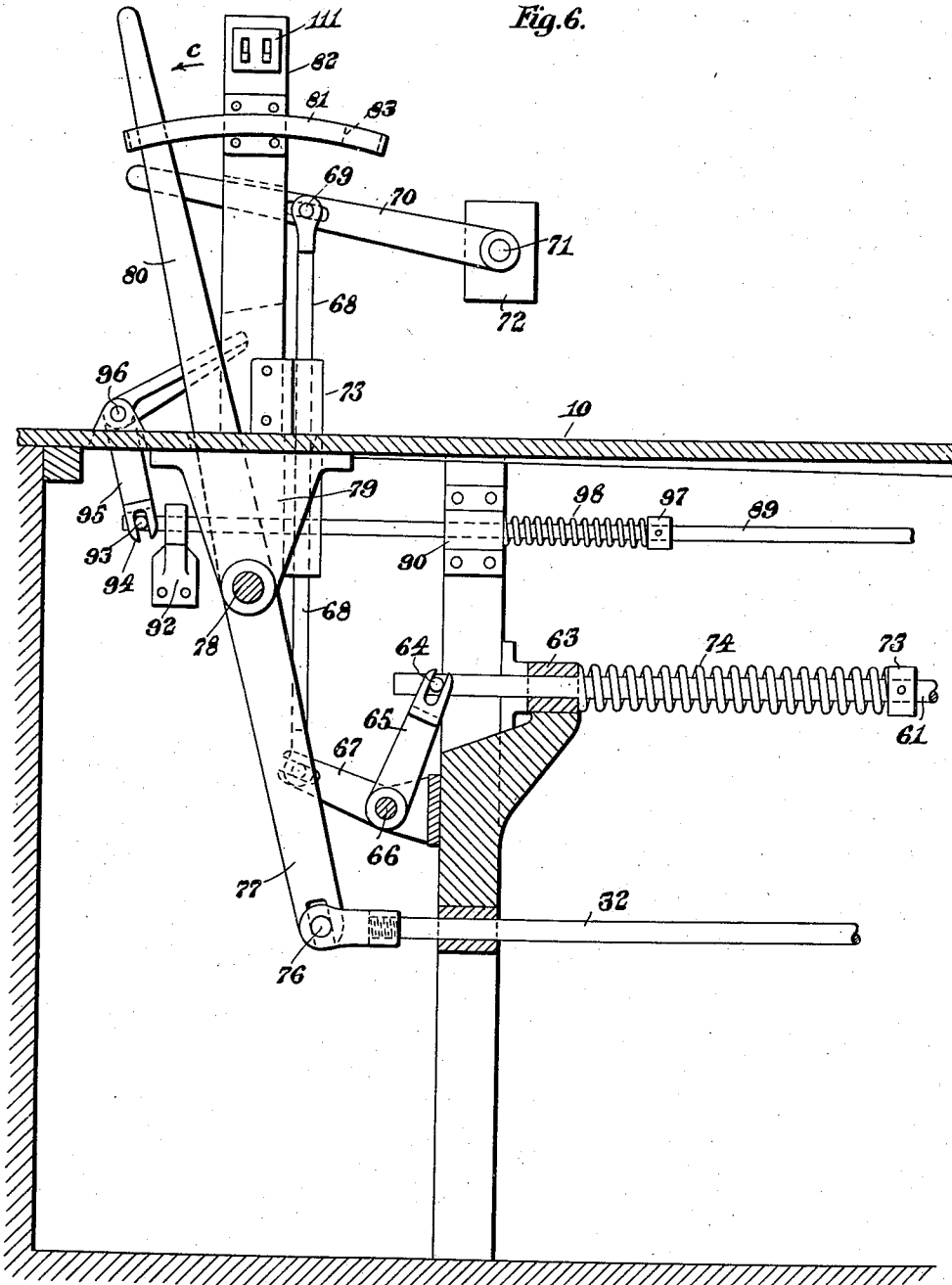
R. A. WILLIAMS

1,706,271

BOWLING ALLEY

Filed Jan. 30, 1928

6 Sheets-Sheet 5



Inventor:
Raymond A. Williams,
by Walter E. Lombard. Atty.

March 19, 1929.

R. A. WILLIAMS

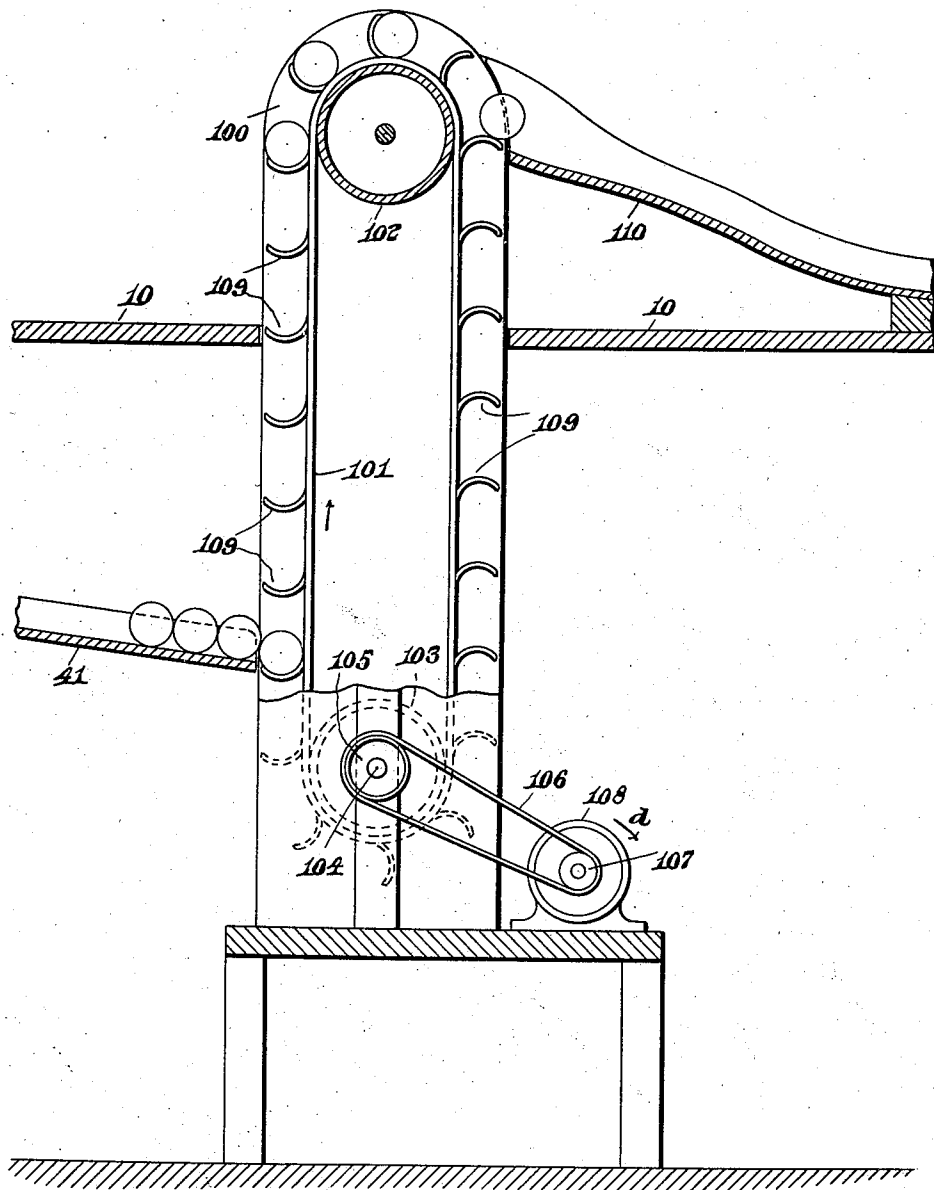
1,706,271

BOWLING ALLEY

Filed Jan. 30, 1928

6 Sheets-Sheet 6

Fig. 7.



Inventor:
Raymond A. Williams.
by Walter E. Lombard,
Atty.

UNITED STATES PATENT OFFICE.

RAYMOND A. WILLIAMS, OF ARLINGTON, MASSACHUSETTS.

BOWLING ALLEY.

Application filed January 30, 1928. Serial No. 250,615.

This invention relates to bowling alleys and has for its object the production of means whereby the pins may be set by mechanism controlled by devices at the head of the alley, thus dispensing with the usual pin boys.

This object is attained by the mechanism illustrated in the accompanying drawings.

For the purpose of illustrating the invention, one preferred form thereof is illustrated in the drawings, this form having been found to give satisfactory and reliable results, although it is to be understood that the various instrumentalities of which the invention consists can be variously arranged and organized, and the invention is not limited to the precise arrangement and organization of these instrumentalities as herein shown and described except as required by the scope of the appended claims.

Of the drawings:

Figure 1 represents a plan of one end of a bowling alley embodying the principles of the present invention.

Figure 2 represents a longitudinal vertical section of same on line 2, 2, on Fig. 1.

Figure 3 represents a transverse vertical section of same, on line 3, 3, on Fig. 2.

Figure 4 represents a vertical section on line 4, 4, on Fig. 1.

Figure 5 represents a transverse vertical section of the head of the alley and showing the devices for actuating the various mechanisms at the other end of the alley.

Figure 6 represents a longitudinal vertical section on line 6, 6, on Fig. 5, and

Figure 7 represents a vertical section of the devices for elevating the used balls and returning them to the head of the alley.

Similar characters indicate like parts throughout the several figures of the drawings.

In the drawings, 10 is a bowling alley having gutters 11 on the opposite sides thereof.

At the rear of the alley is a pit 12 having its sides inclined downwardly toward a central opening 13 beneath which is a movable apron 14 mounted upon rollers 15.

The upper part of the apron 14 is moved in the direction of the arrow *a* on Fig. 1 of the drawings by means of a sprocket wheel 16 connected by means of an endless chain 17 to a sprocket wheel 18 on a revoluble shaft 19, as shown in Fig. 2 of the drawings.

The rear end of the alley 10 has set into its upper face a plate 20 having a plurality of tubular members 21 extending down-

wardly therefrom, the lower end of these tubular members being connected to a fixed bottom plate 22.

In each tubular member 21 is a plunger 23, the lower ends of said plungers being secured to a plate 24 having bearings 25 formed thereon, said bearings 25 being reciprocable vertically upon the guide rods 26.

The lower ends of these guide rods 26 are secured in the concrete foundation 27 of the chamber 27* beneath the rear end of the alley, while the upper ends of these guide rods 26 are secured to a fixed cross bar 28.

The plungers 23 are moved upwardly simultaneously by means of arms 29 secured to an oscillating shaft 30, said shaft also having an arm 31 secured thereto, the upper end of which is articulated to a horizontal rod 32 movable endwise in a fixed bearing 33.

The reciprocation of this rod 32 is effected by means of mechanism at the head of the alley which will be hereinafter described.

The outer end of the lever 29 is bifurcated as at 34 and coacts with a pin 35 extending laterally from each bearing 25.

The upward movement of the plungers 23 is limited by the plate 24 coming in contact with the lower ends 36 of the tubular members 21 and when this plate 24 is in contact with these lower ends 36 the upper ends 37 of the plungers 23 will be in the same plane with the top of the alley 10.

The pins to be used on the alley are delivered to the tubular members 21 and are vertically disposed upon the upper ends 37 of the plungers 23 prior to the upward movement of the plate 24 and when the plungers are moved upwardly after the pins have been disposed thereon, said pins will be accurately positioned upon the spots of the alley so that a perfect game may be played.

In other words, there will be no chance for the pins to be carelessly placed a little one side of the spots as is often true when the pins are manually set by pin boys.

In the bottom of the pit 12 and at one side of the apron 14 is an elongated opening 38 of sufficient size to permit the passage of a pin when resting on one side thereof.

Adjacent to and at one side of this opening 38 is an abutment 39 which serves to change the position of any pins upon the apron 14 as they are moved to the right of Fig. 1.

This change of position is such that the pins are carried endwise to the opening 38

so that they may drop into the conduit in which said opening 38 is formed.

The abutment 39 prevents any pin reaching the opening 38 and extending crosswise thereof, as each pin that reaches the abutment is moved into such position that it may pass through said opening 38.

This opening 38 is just wide enough to permit of the passage of a pin but is too narrow to permit any used ball passing therethrough.

As a consequence, as the upset pins and used balls in the pit 12 are moved by the apron 14 in the direction of the arrow *a*, the pins will pass through the opening 38 into the conduit 40 while the balls will move over the opening 38 into the ball conduit 41.

From the conduit 40 branch two chutes 42, the upper ends of these chutes 42 communicating with elongated slots 43 in the bottoms of the gutters 11, the width of the openings being slightly in excess of the diameter of a pin but less than the diameter of the balls being used.

Consequently, any pins that are upset and roll into the gutter 11 pass downwardly through the slots 43 and then down the chutes 42 into the conduit 41 to be delivered into an annular member or pin carrier 44 provided with a plurality of inwardly extending ribs 45, these ribs 45 being separated forming spaces 45*, so that the pins delivered to the carrier 44 will enter these spaces 45* between said ribs 45, each rib having a length slightly in excess of the length of the pin.

This annular member 44 is rotatable about its axis on the rollers 46 contacting with the periphery thereof.

The periphery of the annular member 44 is provided with gear teeth 47 meshing with a pinion 48 upon the revoluble shaft 19.

This shaft 19 has secured thereto a driving member 49 which may be connected in any suitable manner to the rotatable shaft of an electric motor 50.

It will be seen, therefore, that the annular member 44 and the movable apron 14 in the bottom of the pit 12 are actuated simultaneously from the rotatable shaft 19.

Within the upper portion of the annular member or pin carrier 44 is a fixed frame 51 which has at the top thereof a plurality of pockets 52, each pocket having a depth sufficient to receive two pins, as shown in Fig. 3 of the drawings.

The number of pockets 52 in this frame 51 depends on whether the bowling alley is of full size or whether it is made upon a small scale to be used as a toy.

When the full sized bowling alley is made the number of pockets is ten, but when the toy bowling alley is constructed a lesser number of pockets and pins may be used.

As the pins shoot down through the chutes 42 and conduit 40 they will be delivered endwise into the spaces 45* between the ribs 45.

The annular member or pin carrier 44 rotates in the direction of the arrow *b*, as shown in Fig. 3 of the drawings.

Extending downwardly from the cross bar 53 of the frame 51 are two spring members 54 having secured to their lower ends wide blades 55, as indicated in Figs. 2 and 3 of the drawings.

Should any of the pins enter the annular member or pin carrier 44 above the ribs 45, or at an angle thereto, they will come in contact with one of the wide blades 55 and as the annular member 44 rotates in the direction of arrow *b* this contact will insure the changing of the position of each pin so that it will extend transversely of said annular member and drop into one of the spaces 45* between adjacent ribs 45.

As the pins are carried by these ribs 45 upwardly in the rotation of the annular member 44, they will drop into the pockets 52 when they reach said pockets, and by the continuous rotation of the annular member 44 all of these pockets will be kept filled with pins.

Opposite the axis of the lower row of pins in the pockets 52 are a plurality of pushing members 56 secured to a plate 57.

This plate 57 is movable endwise of a guide member 58 extending horizontally from the fixed frame 51 and is secured to two rods 59, the opposite ends of which are secured to a cross member 60.

To this cross member 60 is secured a rod 61 reciprocable in a fixed bearing 62, the opposite end of the rod 61 extending through a bearing 63 beneath the head of the alley.

This rod 61 has a pin 64 extending laterally therefrom into a slot in a lever 65 secured to an oscillating shaft 66 having another arm or lever 67 secured thereto.

The other end of this arm 67 is articulated to a vertical rod 68, the upper end of which is pivotally connected thereto at 69 to an actuating lever 70, pivoted at 71 to a fixed member 72.

The rod 68 extends through a guide member 73 as indicated in Fig. 6 of the drawings.

The rod 61 has a collar 73 thereon between which and the bearing 63 is an helical spring 74, this spring normally retaining the pushing members 56 in the position indicated in Fig. 2 of the drawings.

When it is desired to push a plurality of pins from the pockets 52 the operator at the head of the alley moves the lever 70 downwardly and when the operation is completed the spring 74 returns the pushing members 56 to their normal position.

When the pushing members 56 are moved to the left of Fig. 2, the pins will be forced into branch tubes 75, one tube 75 extending from each of the tubular members 21.

When the pins are pushed down the inclined surfaces of these branch tubes they

will be disposed vertically upon the upper ends 37 of the reciprocating plungers 23 before said plungers 23 move upwardly.

When these plungers 23 move upwardly all the pins in the various tubular members 21 will be raised thereby and be accurately set upon the upper face of the alley.

The end of the rod 32 at the head of the alley is articulated at 76 to one end of a lever 77 secured to an oscillating shaft 78 mounted in brackets 79.

A control lever 80 is secured to said shaft 78 and extends through a guide member 81 secured to the post 82.

The guide member 81 has a shoulder 83 with which the lever 80 is adapted to engage when the plungers 23 are in raised position.

When a string has been played the player disengages the lever 80 from the shoulder 83 and moves said lever in the direction of arrow *c* on Fig. 6, thereby moving all of the plungers 23 downwardly into the position shown in Fig. 2 preparatory to having a new set of pins deposited on the top of said plungers.

In order to get rid of the deadwood upon the alley and remove it into the pit 12, a swinging arm 84 is provided which is secured to an oscillating shaft 85 at one side of the alley, said shaft 85 being mounted in a bearing 86.

The lower end of the shaft 85 has secured thereto a pinion 87 meshing with the teeth of a rack 88 secured to one end of a rod 89 reciprocable in brackets 90.

The other end of rod 89 extends through a bearing 91 and a bracket 92 and has a pin 93 thereon disposed in the bifurcated end 94 of a foot lever 95 pivoted at 96, as shown in Fig. 6.

The rod 89 has a collar 97 thereon between which and the bearing 90 is a coiled spring 98 which normally retains the rack end of the rod 89 against the fixed stop 99.

When the deadwood is to be removed from the alley the player actuates the foot lever 95 and thereby causes the arm 84 to swing about its pivot 85 across the upper face of the alley thus forcing all the deadwood into the pit, where it is taken care of in the manner hereinbefore described.

The ball trough 41 in which all of the used balls are collected inclines downwardly toward a ball lifting mechanism as shown in Fig. 7.

This lifting mechanism consists of two sideboards 100 between which is mounted an endless apron 101 passing over revoluble pulleys 102, 103.

The pulley 103 is secured to a shaft 104 having a pulley 105 secured thereto and is driven by a belt 106 passing over a sheave 107 on the shaft of motor 108, said shaft rotating in the direction of arrow *d* on Fig. 7.

On the outer face of the apron 101 are a plurality of pockets 109 and as the balls roll down the trough 41 they successively enter said pockets and are carried thereby over the top of pulley 102 and deposited in the inclined runway 110 and then roll down this runway to the head of the alley.

The motors 50 and 108 are in an electric circuit having a switch 111 therein which may be actuated to start or stop said motors.

This switch 111 is preferably mounted upon the post 82 as indicated in Fig. 6. No electric circuit between the switch and motors is shown as it is obvious that any well known circuit may be used in this connection.

The rollers 46 are mounted on pins 112, the ends of which are positioned in vertical walls 113, 114 on opposite sides of the annular member or pin carrier 44.

The wall 114 has an opening 115 therein through which extends the lower or delivery end of the conduit 40, while the other wall 113 has a smaller opening 116 therein so that as the pins are delivered to the annular member they come in contact with the wall 113 thereby confining the pins in said annular member 44.

Each roller 46 has a central depression 117 therein to receive the gear teeth 47 projecting from the periphery of the annular member 44.

In some cases the movable apron 14 at the bottom of pit 12 may be dispensed with and the bottom of the pit be so inclined that the pins will slide down the inclined bottom into the entrance 38 of chute 40 and the balls will pass over this entrance into the trough 41.

While manually actuated mechanism is shown to raise the plungers 21, it is self evident that hydraulic mechanism may be used, if desired, to effect this result.

It is believed that the operation and many advantages of the invention will be understood without further description.

Having thus described my invention, I claim—

1. A bowling alley provided with a plurality of openings therein; vertical plungers reciprocable in said openings; means for disposing the used pins in a series of pockets; and a plurality of horizontal movable members for pushing the pins from said pockets and simultaneously disposing them upon all of said plungers prior to the upward movement thereof.

2. A bowling alley provided with a plurality of openings therein and a pit to receive the upset pins; vertical plungers reciprocable in said openings; a revoluble pin carrier to which the used pins are delivered; and a plurality of horizontally disposed plungers adapted to remove a predetermined number

of pins from said carrier and dispose one on each plunger prior to the upward movement thereof.

3. A bowling alley provided with a plurality of openings therein and a pit to receive the upset pins; vertical plungers reciprocable in said openings; means for selecting a predetermined number of pins in said pit and disposing one on each plunger prior to the upward movement thereof; and a device pivotally mounted at one side of the alley for moving the deadwood from the alley into said pit.

4. A bowling alley provided with a plurality of openings therein and a pit to receive the upset pins; a conduit from the bottom of said pit; means for delivering said pins to said conduit; gutters at the sides of said alley having slots therein on opposite sides of said set of openings through which pins may pass downwardly into said conduit; vertical plungers reciprocable in said openings; and means for separating the pins delivered from said conduit and disposing one upon each plunger prior to the upward movement thereof.

5. A bowling alley provided with a plurality of tubular members extending downwardly from the upper face thereof and a pit to receive the upset pins; a conduit from said pit; means for delivering the pins in said pit to said conduit; gutters at the sides of said alley having slots therein on opposite sides of said set of openings through which pins may pass downwardly into said conduit; vertical plungers reciprocable in said openings; means for separating the pins delivered from said conduit and disposing one upon each plunger prior to the upward movement thereof; and means for simultaneously raising all of said plungers.

6. A bowling alley provided with a plurality of openings therein and a pit to receive the upset pins; a conduit to which said pins are delivered; gutters at the sides of said alley having slots therein on opposite sides of said set of openings through which pins may pass downwardly into said conduit; vertical plungers reciprocable in said openings; means for separating the pins delivered from said conduit and disposing one upon each plunger prior to the upward movement thereof; and mechanism for collecting the balls played and returning them to the head of the alley.

7. A bowling alley provided with a plurality of openings therein and a pit to receive the upset pins; a conduit to which said pins are delivered endwise; gutters at the sides of said alley having slots therein on opposite sides of said set of openings through which pins may pass downwardly into said conduit; vertical plungers reciprocable in said openings; means for separating the pins delivered from said conduit; means for simultaneously

ejecting a predetermined number of pins from said separating means and disposing one upon each plunger prior to the upward movement thereof; and means for simultaneously raising said plungers.

8. A bowling alley provided with a plurality of openings therein and a pit to receive the upset pins; vertical plungers reciprocable in said openings; means for separating the pins in said pit and disposing one upon each plunger prior to the upward movement thereof; a bed plate supporting all of said plungers; means for raising said bed plate; a single manually actuated device at the head of the alley for actuating said raising means in either direction; and means for limiting the upward movement of said plungers.

9. A bowling alley; a triangular metal plate embedded in its upper face, a plurality of tubular members extending downwardly from said plate; vertical plungers reciprocable in said tubular members; and means for delivering pins to said members and disposing them upon said plungers prior to the upward movement thereof.

10. A bowling alley provided with a plurality of openings therein and a pit to receive the upset pins; means within said pit for moving the pins therein endwise transversely of the alley to the outlet therefrom; means for admitting the used balls into said pit; means for separating the pins from the balls; vertical plungers reciprocable in said openings; means for selecting a predetermined number of pins delivered from said pit and disposing them in a series of pockets; horizontal movable members for simultaneously pushing the pins from said pockets and disposing one on each plunger prior to the upward movement thereof; and means for returning the balls to the head of the alley.

11. A bowling alley provided with a plurality of openings therein and a pit to receive the upset pins; vertical plungers reciprocable in said openings; means for selecting a predetermined number of pins and disposing one on each plunger prior to the upward movement thereof; an arm pivoted to one side of the alley and adapted to swing horizontally over the face of the alley to move the deadwood into said pit; and means at the head of the alley for actuating said swinging arm.

12. A bowling alley provided with a plurality of openings therein and a pit to receive the upset pins; a conduit from the bottom of said pit; a movable member in the bottom of the pit adapted to deliver the pins to said conduit; gutters at the sides of said alley having slots therein on opposite sides of said set of openings through which pins may pass downwardly into said conduit; vertical plungers reciprocable in said openings; and means for separating the pins delivered from said conduit and disposing one upon each

plunger prior to the upward movement thereof.

13. A bowling alley provided with a plurality of openings therein and a pit to receive the upset pins; a conduit to which said pins are delivered endwise; gutters at the sides of said alley having slots therein on opposite sides of said set of openings through which pins may pass downwardly into said conduit; vertical plungers reciprocable in said tubular members; means for separating the pins delivered from said conduit; a pin tube from said separating means to each tubular member; and means for simultaneously raising all of said plungers.

14. A bowling alley provided with a plurality of tubular members extending downwardly from the upper face thereof and a pit to receive the upset pins; a conduit to which said pins are delivered; gutters at the sides of said alley having slots therein on opposite sides of said set of openings through which pins may pass downwardly into said conduit; vertical plungers reciprocable in said tubular members; means for separating the pins delivered from said conduit and collect them in a plurality of pockets adapted to receive more pins than are required for a single setting; and means for simultaneously discharging a predetermined number of pins from said pockets and disposing one upon each plunger prior to the upward movement thereof.

15. A bowling alley provided with a plurality of tubular members extending downwardly from the upper face thereof and a pit to receive the upset pins; a conduit to which said pins are delivered endwise; gutters at the sides of said alley having slots therein on opposite sides of said set of openings through which pins may pass downwardly into said conduit; vertical plungers reciprocable in said tubular members; means for separating the pins delivered from said conduit and disposing one upon each plunger prior to the upward movement thereof; a bed plate supporting said plungers; means for raising said bed plate; and a device at the head of the alley for actuating said raising means.

16. A bowling alley provided with a plurality of tubular members extending downwardly from the upper face thereof and a pit to receive the upset pins; a conduit to which said pins are delivered; means compelling each pin to enter said conduit endwise; gutters at the sides of said alley having slots therein on opposite sides of said set of openings through which pins may pass downwardly into said conduit; vertical plungers reciprocable in said tubular members; means for separating the pins delivered from said conduit and disposing one upon each plunger prior to the upward movement thereof; and means for raising said plungers simultaneously.

17. A bowling alley provided with a plu-

rality of tubular members extending downwardly from the upper face thereof; reciprocable plungers in said tubular members; a fixed frame having a plurality of pockets therein; an annular rotatable carrier surrounding said frame having a plurality of inwardly extending ribs; means for feeding pins to said carrier between said ribs; and a plurality of members adapted to push pins from said pockets into said tubes.

18. A bowling alley provided with a plurality of tubular members extending downwardly from the upper face thereof; reciprocable plungers in said tubular members; a fixed frame having a plurality of pockets therein, each pocket being adapted to hold two pins; an annular rotatable carrier surrounding said frame having a plurality of inwardly extending ribs; means for feeding pins to said carrier between said ribs; and a plurality of members adapted to push the innermost pins from said pockets into said tubes.

19. A bowling alley provided with a plurality of tubular members extending downwardly from the upper face thereof; reciprocable plungers in said tubular members; a fixed frame having a plurality of pockets therein; an annular rotatable carrier surrounding said frame having a plurality of inwardly extending ribs, said carrier having peripheral gear teeth; means for feeding pins to said carrier between said ribs; a plurality of members adapted to push pins from said pockets into said tubes; a pinion meshing with said gear teeth; and means for rotating said pinion.

20. A bowling alley provided with a plurality of tubular members extending downwardly from the upper face thereof; reciprocable plungers in said tubular members; a fixed frame having a plurality of pockets therein; an annular rotatable carrier surrounding said frame having a plurality of inwardly extending ribs; means for feeding pins to said carrier between said ribs; a plurality of members adapted to push pins from said pockets into said tubes; and means at the head of the alley for actuating said pushing members.

21. A bowling alley provided with a plurality of tubular members extending downwardly from the upper face thereof; reciprocable plungers in said tubular members; a fixed frame having a plurality of pockets therein; an annular rotatable carrier surrounding said frame having a plurality of inwardly extending ribs; a conduit from the alley pit and having branches communicating with each alley gutter and adapted to deliver pins to said carrier between said ribs; and a plurality of members adapted to push pins from said pockets into said tubes.

22. A bowling alley provided with a pit to receive the upset pins and used balls;

tubular members extending downwardly from the upper face of the alley; reciprocable plungers in said tubular members; a fixed frame having a plurality of pockets therein; 5 an annular member surrounding said frame and having inwardly extending ribs; a conduit from said pit to receive pins and deliver them to said annular member between said ribs; a bottom to said pit movable toward said conduit; means for simultaneously 10 moving said bottom and rotating said annular member thereby depositing pins in said pockets; and means for moving said pins from said pockets into said tubular members above said plungers prior to the upward 15 movement thereof.

23. A bowling alley provided with a pit to receive the upset pins and used balls; tubular members extending downwardly from the 20 upper face of the alley; reciprocable plungers in said tubular members; a fixed frame having a plurality of pockets therein; an annular member surrounding said frame and having inwardly extending ribs; a conduit from said 25 pit to receive pins and deliver them to said annular member between said ribs; a bottom to said pit movable toward said conduit; means for simultaneously moving said bottom and rotating said annular member there- 30 by depositing pins in said pockets; means for moving said pins from said pockets into said tubular members above said plungers prior to the upward movement thereof; and a yield-

ing member within said annular member preventing pins being carried upwardly by said annular member except in said pockets. 35

24. A bowling alley provided with a pit to receive used balls and upset pins, said pit having an elongated outlet therefrom extending transversely of the alley and through which 40 the pins are delivered endwise; pin separating and setting devices to which said pins are delivered; means for separating the balls from the pins and depositing them in a trough beneath one side of the alley and inclined downwardly toward the head of the alley; a run- 45 way above the alley to return the balls to the head of the alley; and automatic means at one side of said alley and in front of the pin setting devices for lifting the balls in said trough and depositing them in said runway. 50

25. A bowling alley provided with a pit to receive used balls and upset pins; means for separating the balls from the pins and depositing them in a downwardly inclined 55 trough extending from said pit toward the head of the alley and beneath said alley; a runway above the alley to return the balls to the head of the alley; and a movable endless apron in front of said pit provided with 60 pockets to receive the balls in said trough and deposit them in said runway.

Signed by me at 746 Old South Bldg., Boston, Mass., this 27th day of January, 1928.

RAYMOND A. WILLIAMS.