May 9, 1944. E. HEDENSKOOG 2,348,540

AUTOMATIC BOWLING ALLEY

Filed June 19, 1942 4 Sheets-Sheet 1

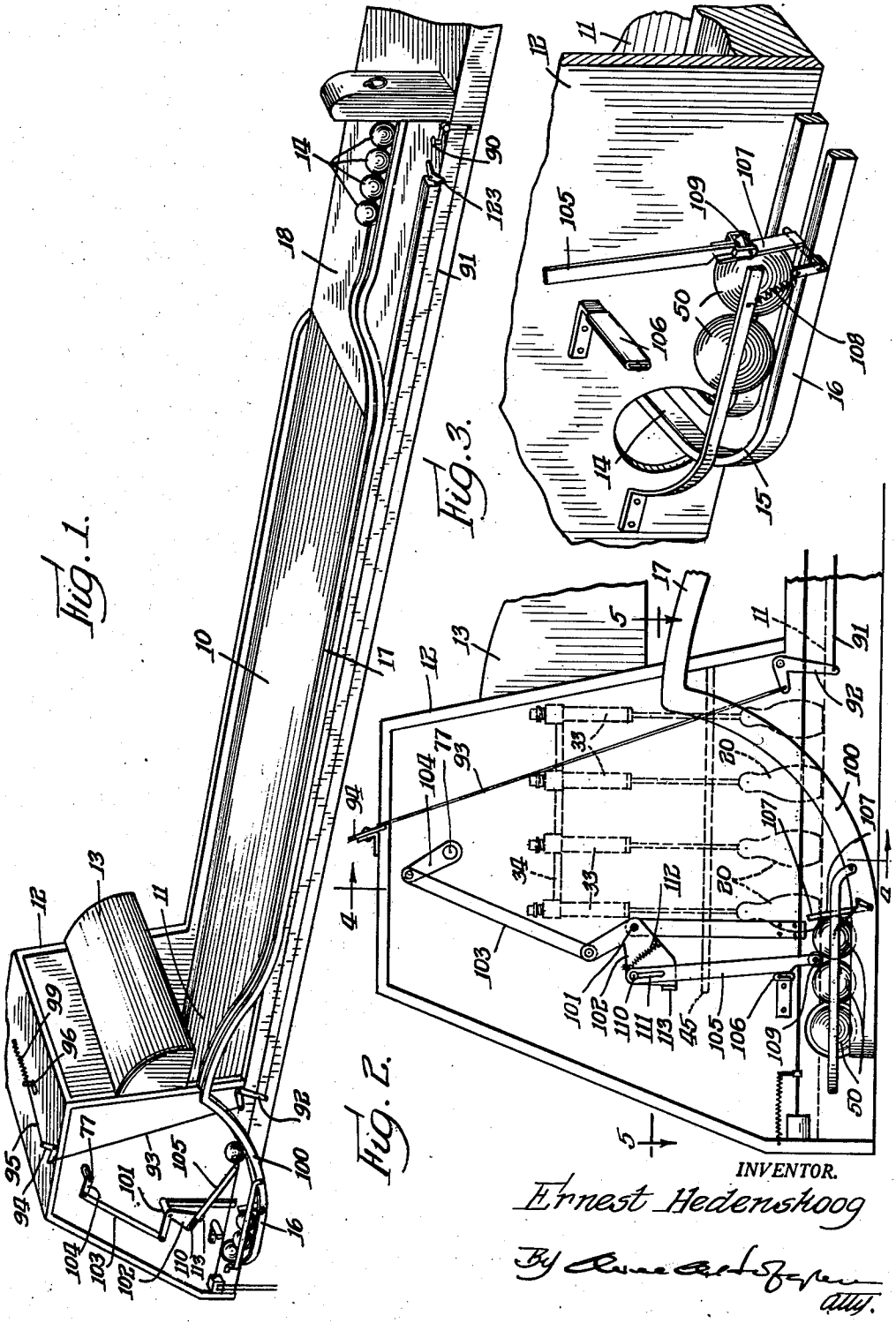


Fig. 1.

Fig. 3.

Fig. 2.

INVENTOR.

Ernest Hedenskoog

By Atty.

May 9, 1944. E. HEDENSKOOG 2,348,540

AUTOMATIC BOWLING ALLEY

Filed June 19, 1942 4 Sheets-Sheet 2

Fig. 4.

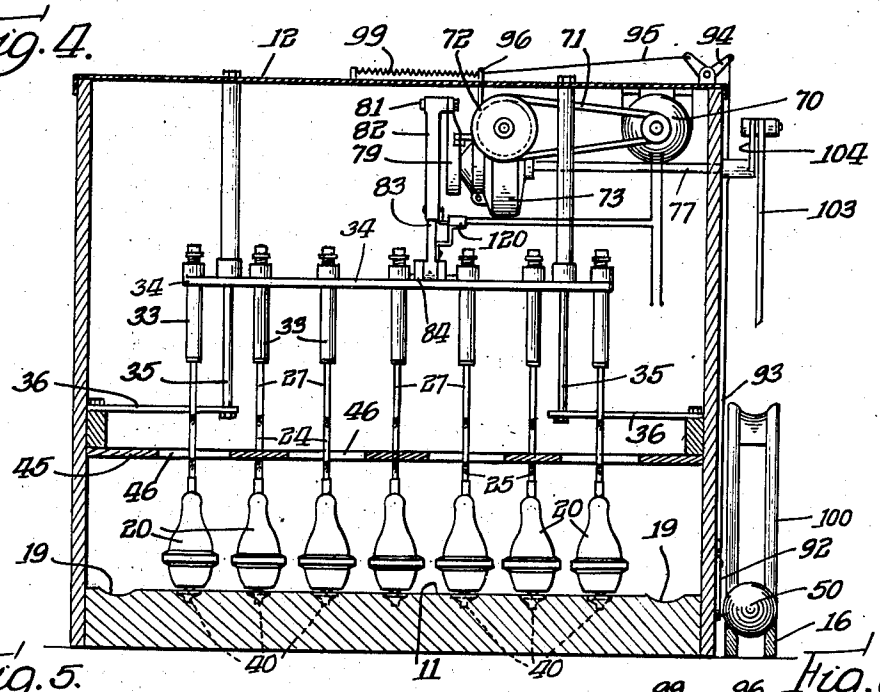


Fig. 5.

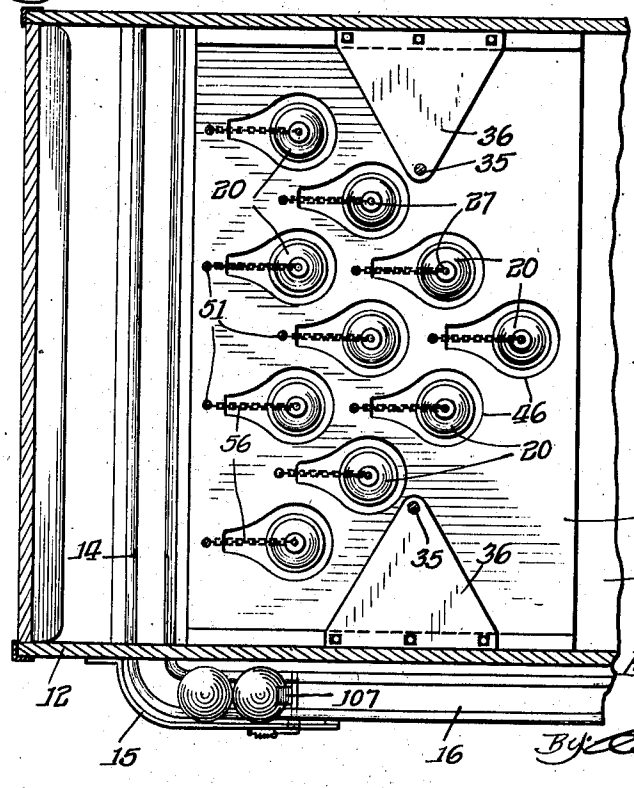
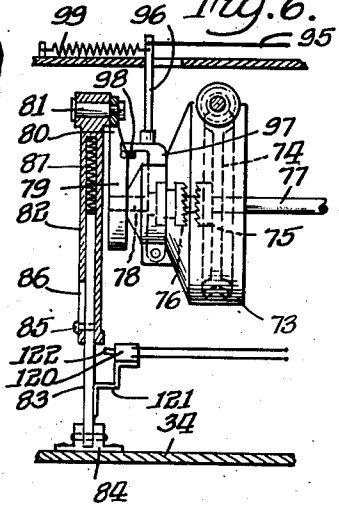


Fig. 6.



INVENTOR.
Ernest Hedenskoog
By [illegible]
atty.

May 9, 1944. E. HEDENSKOOG 2,348,540

AUTOMATIC BOWLING ALLEY

Filed June 19, 1942 4 Sheets-Sheet 3

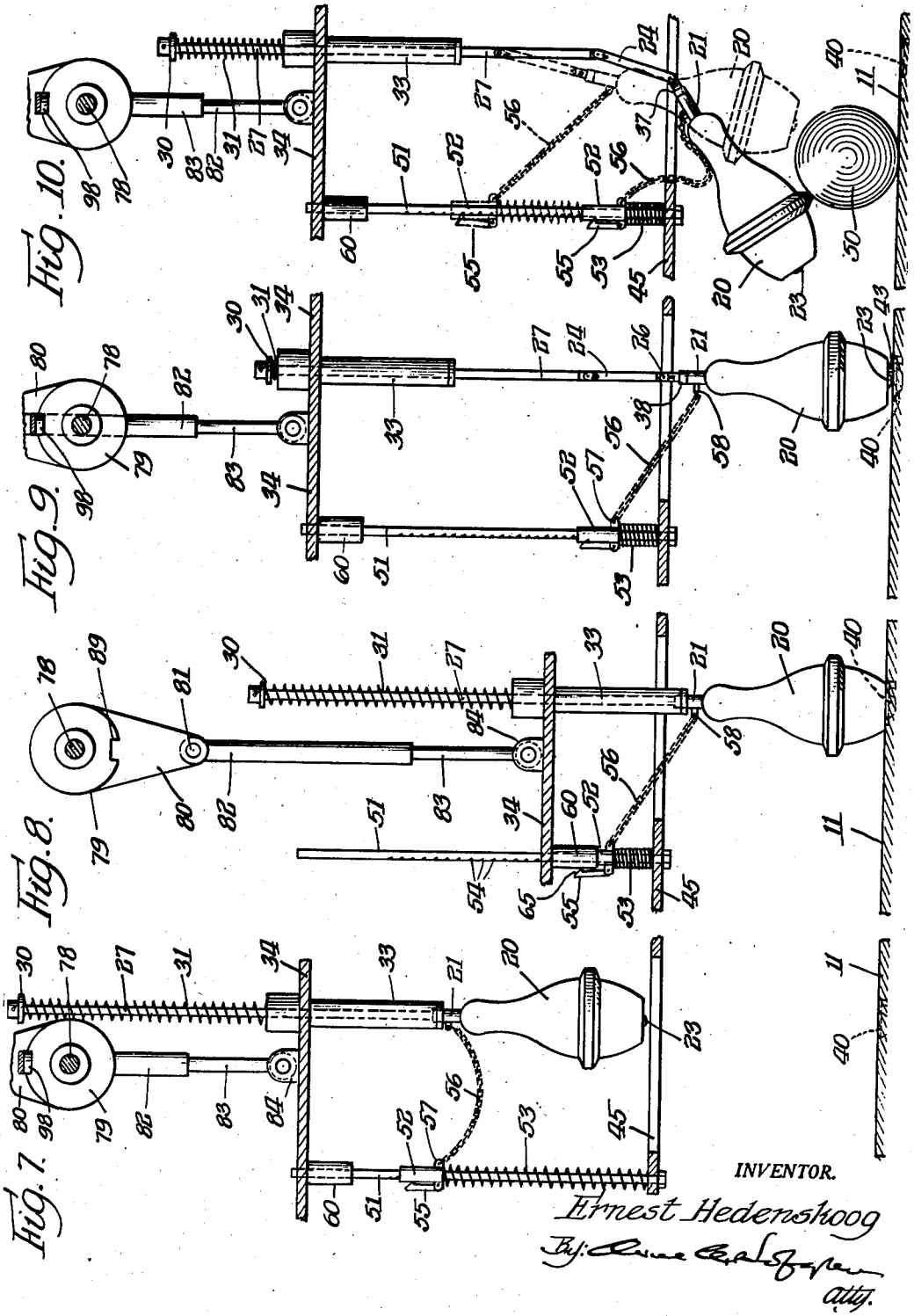


Fig. 10.

Fig. 9.

Fig. 8.

Fig. 7.

INVENTOR.

Ernest Hedenskoog

By: [signature]

Atty.

May 9, 1944. E. HEDENSKOOG 2,348,540

AUTOMATIC BOWLING ALLEY

Filed June 19, 1942 4 Sheets-Sheet 4

Fig. 11.

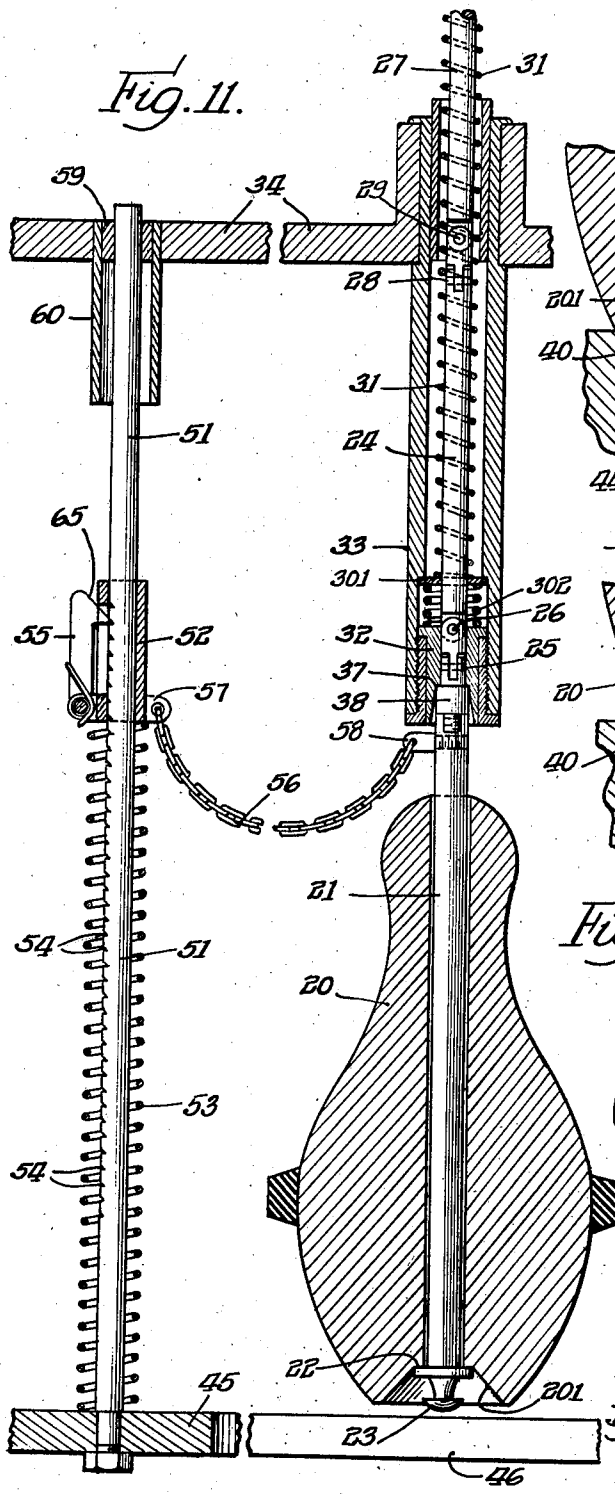


Fig. 12.

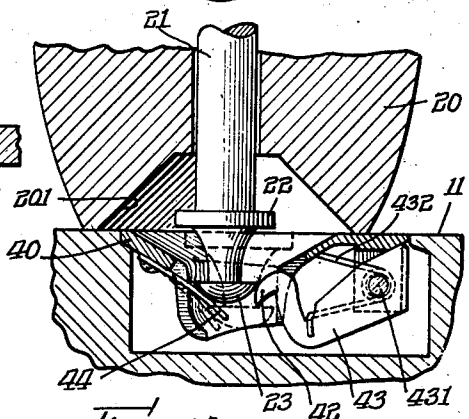


Fig. 13.

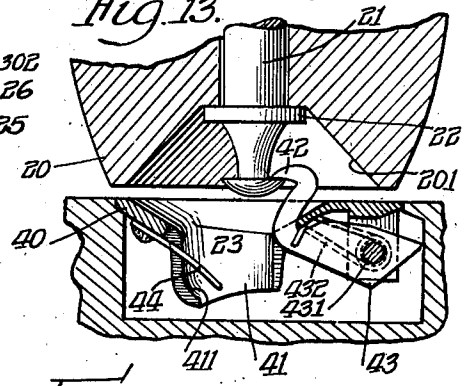
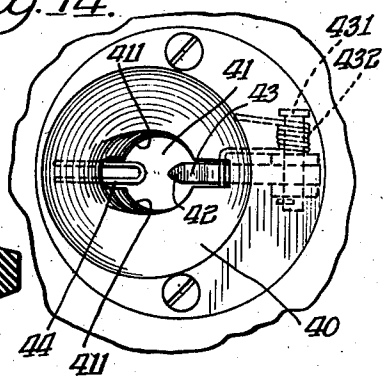


Fig. 14.



INVENTOR.

Ernest Hedenskoog

By Clarence A. O'Brien

Atty.

Patented May 9, 1944 2,348,540

UNITED STATES PATENT OFFICE

2,348,540

AUTOMATIC BOWLING ALLEY

Ernest Hedenskoog, Muskegon, Mich., assignor to The Brunswick-Balke-Collender Company, Chicago, Ill., a corporation of Delaware

Application June 19, 1942, Serial No. 447,621

20 Claims. (Cl. 273—44)

This invention relates to an improved automatic bowling alley of the type in which the pins are placed and retained in a desired position for bowling purposes and when knocked from said positions on the playing surface are automatically removed by a mechanism which draws them upwardly and out of the way so that play on any remaining pins may proceed.

One object of the invention is to provide new and improved means for thus removing the pins from the field of play when they are struck by a ball.

Another object of the invention is to provide improved means for re-setting the pins in correct position on the field of play.

A further object of the invention is to provide means for controlling each pin during its upward removal from the field of play in a manner which prevents the pin from swinging pendulously and striking other pins remaining on the field.

It is also an object of the invention to provide an automatic bowling alley with improved means for retaining the pins in their respective positions on the playing surface adapted to engage and secure the pins automatically when they are lowered onto the surface in proper position.

More specifically it is an object of the invention to provide an automatic pin controlling mechanism for a bowling alley which includes yielding means stressed for elevating the pin when it is struck by the ball and released from the playing surface of the alley, a control member guided for vertical movement adjacent the path of upward travel of the pin and having yielding means stressed for driving the control member upwardly when the pin is released, and a link or connection between the pin and the control member, through which the control member prevents the pin from swinging pendulously during its upward travel.

Other objects and advantages of the invention will appear from the following description, taken in connection with the drawings, in which:

Figure 1 is a perspective view of an automatic bowling alley embodying this invention;

Figure 2 is a side elevation of the alley at the end which includes the playing field or surface, and the housing over the pin setting mechanism, a portion of the side wall of the housing being broken away to disclose said mechanism;

Figure 3 is a detail perspective view showing the ball return runway and ball returning arm;

Figure 4 is a transverse vertical section taken substantially as indicated at line 4—4 on Figure 2;

Figure 5 is a sectional plan view taken as indicated at line 5—5 on Figure 2;

Figure 6 is a detail elevational view showing driving connections for the pin setting mechanism;

Figure 7 is a detail section showing a fragment of the pin setting mechanism with a pin at elevated position;

Figure 8 is a detail view of the parts shown in Figure 7 but with the pin lowered onto the playing surface;

Figure 9 is a view of the parts shown in Figure 8 with the pin setting frame at elevated position;

Figure 10 is a detail view showing the pin as it is struck by the ball and indicating in dotted outline the operation of the control device;

Figure 11 is a vertical sectional view on a large scale showing a bowling pin mounted on a rod and connected to other portions of the setting and control devices;

Figure 12 is an enlarged vertical sectional detail view of the pin retaining means as positioned in the process of spotting the pin on the playing field;

Figure 13 is a sectional detail similar to Figure 12 but showing the parts in pin securing position;

Figure 14 is a plan view of the pin retaining means set in the floor of the playing field.

While the invention is susceptible of various modifications and alternative constructions, the embodiments shown in the drawings and described hereinafter are by way of preferred illustration only and it is not intended that the invention be limited thereto or thereby; but it is the intention to cover all modifications and alternative constructions falling within the spirit and scope of the invention as defined by the appended claims.

In the drawings the reference numeral 10 designates generally the bed or playing surface of a bowling alley or the like having an area 11 at one end, which is herein referred to as the playing surface or playing field and upon which the bowling pins are set up or "spotted" at predetermined positions from which they are dislodged by means of a bowling ball rolled along the alley 10. A housing 12 is mounted over the playing field 11 to enclose certain mechanisms with which this invention is concerned, and the housing may include a hood 13 to accommodate illuminating means and reflectors for brightly lighting the field of play. When a ball has traversed the playing field 11 it drops into a receiving trough 14 beyond said field and rolls along the trough around a bend at 15 so as to arrive at the starting

portion 16 of the return track or runway 17 along which the ball is delivered to the player at the approach 18 of the alley. The mechanism for transferring the ball from the starting section 16 of the track to the return section 17 is largely similar to that shown and described in my previous patents, No. 1,953,227, dated April 3, 1934, and No. 2,019,607, dated November 5, 1935, but will be hereinafter briefly described.

Within the housing 12, each of the bowling pins 20 is mounted upon a rod 21, as seen in Figure 11, having a shoulder 22 near its lower end and a head 23 at the extreme lower end; and the lower end of the pin has a cavity 201 which accommodates the shoulder 22 and a portion of the head 23, when the pin is supported on the shoulder. The rod 21 has limited vertical play through the pin 20 and at its upper end the rod is coupled to a second rod or link 24 by means of a universal coupling which includes a transverse pivot 25 and a second transverse pivot 26 at right angles to the first. Similarly the rod or link 24 is coupled at its upper end to a rod 27 by means of a universal coupling having transverse pivots 28 and 29 at right angles to each other.

As seen in Figure 7, the upper end of the rod 27 carries a head or collar 30 and a spring 31 is coiled about the rod 27 to react between the head 30 and a washer 301 which rests on a cushion spring 302 seated upon a bushing 32 which is carried in the lower end of a guide tube 33, through which the rods or links 24 and 27 are slidable (see Figure 11).

Guide tubes 33, one for each of the bowling pins, are rigidly secured in a horizontal frame or platform 34 which is guided for reciprocation on vertically extending guide rods 35 secured in the top wall of the housing 12, as seen in Figure 4, and is steadied by brace members 36 extending from the side walls of the housing.

When the pins 20 are in elevated positions, with the links 24 drawn up into the guide tubes 33, each pin rests on the shoulder 22 of its rod 21; but, as seen in Figure 12, as soon as the pin 20 is lowered into contact with the spotting surface of the playing field 11, the rod 21 moves downwardly through the pin into an upwardly flared socket 40 set in the surface of the area 11. The flared portion of the socket leads to a well 41 which is slightly wider than the head 23 on the rod 21 but which has downwardly converging side walls 411 to confine the head 23 as it moves downward below the flared portion of the socket 40. By the flaring surface the rounded head 23 is first cammed toward and into the well 41; then it encounters the sloping nose 42 of a latchdog 43, as shown in Figure 12, and as it continues downward, after this encounter, the head 23 depresses a spring arm 44 which projects across the well 41 in oblique position and which finally reacts to shift the head 23 laterally into position under the latch 43, as indicated in dotted lines in Figure 12. From the extreme lower limit of its movement, the rod 21 rises to the position shown in Figure 13, swings the latchdog upwardly about its pivot 431 and in opposition to its spring 432. In final position, portions of the head 23 and of the latch 43 are accommodated in the cavity 201 at the lower end of the pin 20; but instantly, upon release of the pin (when it is struck by a bowling ball) the latch is withdrawn below the plane of the playing surface by its spring 432.

From a comparison of Figure 7 and Figure 8 it will be understood that the lowering of the pins 20 onto the playing field 11 is accomplished by the lowering of the frame or platform 34 which carries the guide means 33. This movement of the platform 34 is accomplished by suitable power operated means which will be presently described. Both at its elevated position as shown in Figure 7 and during its descent toward the position shown in Figure 8 the weight of the pin 20 is sustained by the coil spring 31 reacting upwardly against the head 30 at the upper end of the rod 27; but when the head 23 of the rod 21 has been engaged by the latchdog 43 the frame or platform 34 is moved upwardly while the connected rods 21, 24 and 27 are anchored to the floor of the playing field 11; accordingly the spring 31 is compressed as the bushing 32 in the sleeve 33 moves toward the head 30 on the rod 27. This spring 31 thus stores energy for elevating the pin from the playing field 11 instantly upon its release from the latchdog 43. It may be understood that all the latches in the field 11 engage the heads 23 at the forward sides, that is, the sides toward the portion of the alley bed along which the ball is rolled. Therefore, when a pin 20 is struck by a ball, it is knocked rearwardly and the head 23 is thus dislodged from under the latchdog 43, whereupon the tension of the spring 31 jerks the pin upwardly, while the continued motion of the ball 50, as seen in Figure 10, tends to swing the pin rearwardly during the initial portion of its upward travel. The universal joint connections between the rods 21 and 24, at 25 and 26, and the additional universal connections between the rod 24 and the rod 27, at 28 and 29, permit the pin to swing in a comparatively natural manner in response to the impact of the ball 50. But as the spring 31 continues to expand upwardly the rod 24 is steered into the guide sleeve 33 through the flared lower end of the bushing 32 (see Figure 11); and finally a shoulder 37 in the bushing 32 arrests the shouldered terminal 38 of the universally jointed connection attached to the upper end of the rod 21.

At an intermediate position between the floor surface of the playing field 11 and the range of movement of the frame 34 there is a stationary deck 45 provided with a plurality of openings 46, one for each of the pins 20, and as each pin is lifted by the force of its spring 31 it is drawn upwardly through the opening 46 in the deck 45.

During its upward movement, however, and after the ball 50 has passed under the pin or has been deflected to one side of it, the pin should be prevented from swinging forward in such a way as to knock down other pins disposed forwardly of its original position; this could not occur if the bowling pins were not of the tethered type but were free to move in response to the impact of the ball alone, as in the standard bowling game, and it is desirable to duplicate conditions of the standard game as accurately as possible notwithstanding the provision of the automatic devices to which this invention relates. Therefore a vertically extending guide rod 51 is secured in the deck 45 and extends upwardly therefrom at a short distance behind each of the vertical axes of the pins 20, and a control member 52 is slidably mounted on the rod 51 with a coil spring 53 reacting upwardly between the member 52 and the deck 45. The rod 51 is formed with notches or indentations 54 in the nature of ratchet teeth spaced at frequent intervals, and the control member 52 carries a spring pressed dog 55 adapted to engage in the

notches 54. A check chain 56 connects a lug 57 on the control member 52 with a lug 58 on the rod 21 and as the pin 20 is forced down and spotted on the field 11, as shown in Figure 8, the chain 56 draws the control member 52 downwardly along the guide rod 51, compressing the spring 53. The spring 53 is held in compressed condition and the chain 56 is maintained under tension by the engagement of the head 23 at the lower end of the rod 21 with the latchdog 43 in the floor of the field 11. The tension of the spring 53 is relatively light, so that the slight lateral pull which it exerts through the chain 56 does not tend to tip or dislodge the pin from its spotted position. But when the pin is struck by the ball 50 so that the upper end of the rod 21 swings rearwardly and at the same time begins to travel upwardly in response to the stored energy of the spring 31, the slackening of the chain 56 permits the spring 53 to push the control member 52 upwardly along the guide rod 51. After the ball 50 has passed and the pin 20 begins to swing back forwardly, it will be checked by the chain 56 but the resulting tension in the chain will not pull the member 52 downwardly because the spring pressed dog 55 automatically engages in the ratchet notches 54 as it rides over them and acts as a detent to prevent downward movement of the member 52. This does not interfere with the continued upward movement of the rods 27, 24 and 21 and the pin 20 carried thereby which continues until the member 38 engages the shoulder 37 in the bushing 32 at the lower end of the guide sleeve 33. But as fast as the upward travel of these parts proceeds it is accompanied by a corresponding upward movement of the control member 52, so that said member, being restrained against return movement by its detent dog 55, acts through the chain 56 to check any excessive forward swing of the pin 20, as indicated in dotted lines in Figure 10.

As shown in Figure 11, each of the guide rods 51 extends through the frame 34, being suitably guided therein by a bushing 59. Associated with the bushing 59 there is a depending sleeve 60 which travels downwardly with the frame or platform 34 as the latter descends in the operation of spotting or re-setting the pins on the playing field 11. As indicated in Figures 7 and 11, the chain 56 is slack at the beginning of this movement. Before the descent of the pin 20 and its rod 21 has proceeded far enough to take up this slack, the sleeve 60 descends to a position at which it encounters the sloping upper edge 65 of the dog 55 and cams the dog out of engagement with the notched surface of the rod 51. Thus, as the platform 34 continues to descend, the chain 56 is tensioned and operates to draw the control member 52 along the rod 51 to its lower limit at which the spring 53 is compressed, as shown in Figure 8. The return of the platform 34 to its upper limit withdraws the sleeve 60 from engagement with the detent dog 55 leaving the dog ready to cooperate with the notches 54 when the pin 20 is struck and released in the process of play. The return of the platform 34 to its upper limit also serves to compress the springs 31 associated with each of the pins 20 so that these springs shall be ready to retract each pin upwardly as it is struck by the ball or otherwise released from its latchdog 43.

The actuation of the frame 34 is effected by means of an electric motor 70 connected by a belt 71 to a pulley 72 which is an element in a speed reducing train enclosed in a housing 73, as seen in Figure 4. The slow speed gear 74 of this train carries one member 75 of a clutch, while the cooperating member 76 is slidably mounted on the shaft 77 of the gear 74. Engagement of the clutch members 75 and 76 transmits rotation to a shaft 78 which carries a wheel 79 and a crank arm 80 integral therewith. The crank arm 80 is pivotally connected at 81 to a two-part pitman consisting of an upper, tubular member 82 and a rod 83 slidably engaged therein and pivotally connected at its lower end to a lug 84 on the frame or platform 34. A pin 85 extending through a slot 86 in the tubular member 82 transmits upward movement from the crank arm 80 and tube 82 to the rod 83 and to the platform 34 for elevating the latter. The pin 85 also supports the platform 34 in its downward movement until the pins 20 have arrived in contact with the playing surface 11, whereupon any excess of downward stroke of the member 82 and crank arm 80 will be absorbed by a cushion spring 87 pocketed in the upper end of the tube 82 to react against the end of the rod 83 therein.

It may be understood that preferably the motor 70 and the speed reducing train and shaft 77 connected thereto will run continuously. When a bowler has completed his play and wishes to have the pins re-set, he will depress a foot pedal 90 at one side of the approach area 13 of the alley and this pedal, acting through a rod or cable 91, bell crank 92, link 93, bell crank 94, and link 95, as seen at Figure 1, will swing the arm 96 and the clutch shifter 97 in a direction to engage the clutch member 76 with the clutch member 75. This movement of the shifter 97 about its pivot will withdraw a locking roller 98 from a notch 89 in the wheel 79, but a spring 99 acting upon the arm 96 in a direction to separate the clutch members 75 and 76 will cause roller 98 to bear against the face of the wheel 79 and to enter the notch 89 immediately upon completion of one revolution of the wheel 79 and its crank arm 80. Thus, actuation of the foot pedal 90 by the player causes a single reciprocation of the frame or platform 34 which serves to lower the pins 20 from the position shown in Figure 7 to the position shown in Figure 8 and then to return the platform 34 to its upper limit, as shown in Figure 9, with the springs 31 in compressed condition, ready for action when a bowling ball again strikes the pins 20.

As already noted, the ball 50, after striking the pins on the playing surface 11,—or if it misses the pins and passes into one of the gutters 19,—drops into a trough 14 extending transversely at the rear of the playing surface 11, and this trough, being inclined toward one side of the alley, guides the ball around the curved portion 15 and into the starting section 16 of the ball return track 17. Connecting the section 16 and the main portion of the ball return 17 is an upwardly curved track section 100 which is substantially arcuate about the axis of a fulcrum pin 101 projecting through the side wall of the housing 12. A rocker plate 102 fulcrumed on the pin 101 has one arm pivotally connected to a link 103 which extends to a crank arm 104 on the end of the shaft 77, which rotates continuously whenever the motor 70 is running. The rotation of the crank arm 104 causes oscillation of the link 103, which rocks the plate 102 upon

its fulcrum and causes an arm 105, carried by the plate 102, to sweep upwardly adjacent the arcuate track section 100 and then return to an initial position against a stop 106. In this position the lower end of the arm 105 is disposed just behind the ball 50, so that as the arm sweeps upwardly over the track 100, it carries the ball to the upper end of the section 100 and starts it along the ball return track 17. When the ball is again played and rolls from the trough 14 onto the starting section 16 of the track, it arrives at an upstanding stop-arm 107 which is held yieldingly in upstanding position by a spring 108 (see Figure 3). Thereafter, upon the next downward sweep of the arm 105, the roller 109 carried at its lower end, will encounter the outer face of the stop-arm 107 and will ride up over this face as the upward movement of the crank pin 110 on the plate 102 draws the arm 105 upwardly and rearwardly. The pin 110 is engaged by a slot 111 in the upper end of the arm 105, while a spring 112 reacting between the plate 102 and the upper end of the arm 105 forces the arm yieldingly downward to insure its proper positioning back of the ball 50 before the commencement of its upward sweep over the curved track 100. A driving lug 113 on the plate 102 engages the rear edge of the arm 105 to carry it through this upwardly sweeping movement but allows the arm to trail in its return movement in passing over the stop member 107 if a ball 50 is present in the section 16. When the arm 105 again sweeps forwardly to carry the ball up the curved track 100, the spring 108 allows the stop 107 to yield and swing down between the rails of the track to permit the ball to pass. With the shaft 77 and crank arm 104 operating continuously, the ball is thus returned promptly to the bowler without any action on his part; if desired, however, several balls may be employed in rotation, in which event the continuous operation of the ball return mechanism will maintain a reserve supply at the end of the ball return track, as seen at 114 in Figure 1.

To safeguard the mechanism against damage, the operating circuit for the motor 70 may include a switch 120 mounted on a bracket 121 secured to the driving rod 83 for the platform 34. The actuating arm 122 of the switch 120 extends under the end of the tubular section 82 so that if any obstruction should block the normal descent of the platform 34, the excessive telescopic action of the member 82 upon the rod 83 would trip the switch arm 122 to its "off" position and stop the motor 70. The regular control switch for the motor is provided with a manually operable lever at 123 adjacent the approach area 18 where it may be operated when the alley is put in service and again when the players have finished.

The cushion spring 302 in the sleeve 33 is also in the nature of a safeguard to the mechanism. It transmits the final thrust to the rod 21 which effects the latching of the pin 20 in spotted position by means of the latchdog 43. If, through slight inaccuracies in manufacture or adjustment, the heads 23 of the several rods 21 should not all arrive in latching position simultaneously, or if some should encounter more resistance than others at the springs 44, the inequalities are taken up by the individual cushion springs 302 in the sleeve 33, and the platform 34 can be given a slight over-stroke downward to insure that all the bowling pins shall be latched in position.

I claim:

1. In a bowling alley, a bowling pin, a latch device in the alley operative to hold the pin in position for play, a platform above the pin, a shouldered rod connected to the pin and extending through said platform, and a spring on said rod compressed against the shoulder thereof and reacting against the platform when the pin is latched to the alley, said spring expanding to lift the pin when it is released from the latch.

2. In a bowling alley, a bowling pin, a latch device in the alley operative to hold the pin in position for play, a platform above the pin, a guide tube extending vertically from the platform, a rod reciprocable in said tube, a second rod connected by a universal joint at one end to the first rod and connected by a universal joint at the other end to the pin, and a spring coiled about the first rod and compressed between a shoulder on said rod and a shoulder in the guide tube when the pin is latched to the alley, said spring expanding to lift the rod and elevate the pin when the pin is released from the latch.

3. In a bowling alley, a bowling pin, a rod extending axially through the pin and slidable therein, said rod having a head at its lower end and a shoulder spaced from the head to engage the lower end of the pin, a latchdog mounted in a recess in the alley, said recess having converging walls to guide the head of the pin into latched position under the dog, means operable to lower the pin and depress the rod through it to effect such latching engagement, and spring means connected to the rod in stressed condition when the pin is thus latched, said spring means acting to lift the pin upon release thereof from the latch.

4. In a bowling alley, a bowling pin, a latch device in the alley operative to hold the pin in position for play, a spring and means by which said spring is connected to the pin in stressed condition when the pin is latched to the alley, said spring acting to lift the pin when the pin is released from its latch, and control means operating automatically to check pendulous movement of the pin as it is carried upward by said spring.

5. In the combination defined in claim 4, said control means comprising a control member guided for vertical movement adjacent the path of the pin when thus released, a second spring urging said member upwardly, and a link connecting said pin to the control member.

6. In the combination defined in claim 4, said control means comprising a control member and means for moving it upwardly in a path adjacent the path of the pin when said pin is thus released, together with means extending laterally from said control member to the pin.

7. In the combination defined in claim 4, said control means comprising a vertical guide rod adjacent the path of the pin when thus released, a control member slidable on said rod, a spring urging said member upwardly, and a link connecting said pin to the control member.

8. In the combination defined in claim 4, said control means comprising a vertical guide rod adjacent the path of the pin when thus released, a control member slidable on said rod, a spring urging said member upwardly, a link connecting said pin to the control member, and a one-way clutch device carried by the control member operative to engage the rod and prevent reverse movement of said member during upward travel of the pin.

9. In the combination defined in claim 4, said

control means comprising a vertical guide rod adjacent the path of the pin when thus released, a control member slidable on said rod, a spring urging said member upwardly along the rod, a link connecting said pin to the control member, said rod having a series of notches at intervals in its length, and a spring pressed detent engageable with said notches successively as the control member rises and operative to prevent reverse movement thereof whereby the link is kept tensioned during the upward travel of the pin.

10. In a bowling alley, a bowling pin, a latch device in the alley operative to hold the pin in position for play, a vertically reciprocable platform above the pin, means for lowering the platform to set the pin in latched position and then returning the platform to elevated position, a spring connecting the pin to the platform, said spring being stressed by the return of the platform to elevated position and acting to lift the pin when said pin is released from its latch, and control means operating automatically to check pendulus movement of the pin as it is carried upward by said spring.

11. In the combination defined in claim 10, said control means including a vertical guide fixed adjacent the path of the pin when thus released, a control member slidable along said guide, said platform engaging said member to lower it while setting the pin, a spring engaged with the control member and stressed by the lowering thereof, and a link connecting said pin to the control member, whereby the control member is urged upwardly along the guide by its spring when the pin is released and maintains tension in the link.

12. In the combination defined in claim 10, said control means including a vertical guide fixed adjacent the path of the pin when thus released, a control member slidable along said guide, said platform engaging said member to lower it while setting the pin, a spring engaged with the control member and stressed by the lowering thereof, and a link connecting said pin to the control member, together with a one-way clutch device carried by the control member operative to engage the guide and prevent reverse movement of said member during upward travel of the pin.

13. In the combination defined in claim 10, said control means including a vertical guide fixed adjacent the path of the pin when thus released, a control member slidable along said guide, said platform engaging said member to lower it while setting the pin, a spring engaged with the control member and stressed by the lowering thereof, and a link connecting said pin to the control member, together with a one-way clutch device carried by the control member operative to engage the guide and prevent reverse movement of said member during upward travel of the pin, and means on said platform which releases said clutch device during the lowering of the control member by the platform.

14. In the combination defined in claim 2, a control member guided for vertical movement adjacent the path of the pin when thus released, a second spring urging said member upwardly, and a flexible link connected to said pin near the upper end thereof and extending laterally to said control member to check pendulous movement of the pin during its upward travel.

15. In the combination defined in claim 10, a fixed deck positioned above the alley and below said platform, said deck having an opening through which the pin is withdrawn upwardly by its spring, and said control means including a vertical guide rod fixed in the deck adjacent said opening and extending through the platform, a control member slidable on said rod, a link connecting said control member to the pin near its upper end, and a spring coiled about said rod between the deck and said control member, said member being lowered and its spring being compressed by the lowering of the platform in setting the pin, whereby the link is stressed and the control member is urged upwardly by its said spring when the pin is released.

16. In the combination defined in claim 10, a fixed deck positioned above the alley and below said platform, said deck having an opening through which the pin is withdrawn upwardly by its spring, and said control means including a vertical guide rod fixed in the deck adjacent said opening and extending through the platform, a control member slidable on said rod, a link connecting said control member to the pin near its upper end, and a spring coiled about said rod between the deck and said control member, said member being lowered and its spring being compressed by the lowering of the platform in setting the pin, whereby the link is stressed and the control member is urged upwardly by its said spring when the pin is released, said guide rod having a series of notches at intervals in its length, a spring-pressed detent dog engageable with said notches as the control member rises and operative to prevent reverse movement thereof, and a member depending from the platform adjacent the guide rod, said member being interposed between the detent dog and the rod by the lowering of the platform to hold the dog out of said notches while the control member is being re-set.

17. In a bowling alley, a bowling pin, means in the alley operative to hold the pin in position for play, a vertically reciprocable platform, a yielding connection by which the pin is upheld by the platform when the latter is elevated and means on the platform engaging the pin and operative to place it forcibly on the alley when the platform is lowered, together with a driving motor with means connecting it to the platform including a telescopic link yieldably operable in the direction for lowering the platform, and a switch controlling the motor circuit, said switch being mounted upon one part of said telescopic link with its actuating member positioned to open the circuit upon engagement by the other part of the link in the event of telescopic action caused by obstruction to the pin lowering operation.

18. In a bowling alley, a bowling pin, a rod extending axially through the pin and having an upwardly facing shoulder to support the pin, said rod having a head at its lower end, an upwardly flaring socket in the alley below the playing surface thereof, a latchdog at one side of the socket and a yielding arm projecting obliquely into the socket from the opposite side, said arm yielding in response to downward pressure of the head as said head is forced past the latchdog and then reacting to shift the head laterally into latching engagement with the dog.

19. In a bowling alley, a bowling pin, a rod extending axially through the pin and having an upwardly facing shoulder to support the pin, said rod having a head at its lower end, an upwardly flaring socket in the alley below the playing surface thereof, a latchdog engageable with said head, the rod being axially slidable in the pin, and the pin having a cavity in its lower

end, means sliding the rod downwardly through the pin to effect engagement of its head with the latch, means sliding the rod upwardly in the pin with portions of said latch and said head accommodated in said cavity, and a spring stressed to withdraw the latch from said cavity upon release of the head of said rod from the latch.

20. In a bowling alley, a bowling pin, means in the alley operative to hold the pin in position for play, a vertically reciprocable platform, a yielding connection by which the pin is upheld by the platform when the latter is elevated, and means on the platform engaging the pin and operative to place it forcibly on the alley when the platform is lowered, together with a driving motor with means operatively connecting said motor to the platform including a connection collapsible in response to resistance encountered in the lowering movement, and means operable by the collapse of said connection to render the motor ineffective for further lowering of the platform when such resistance is encountered.

ERNEST HEDENSKOOG.