

Dec. 2, 1941.

C. T. BREITENSTEIN

2,264,432

BOWLING APPARATUS

Filed April 19, 1940

3 Sheets-Sheet 1

Fig. 1.

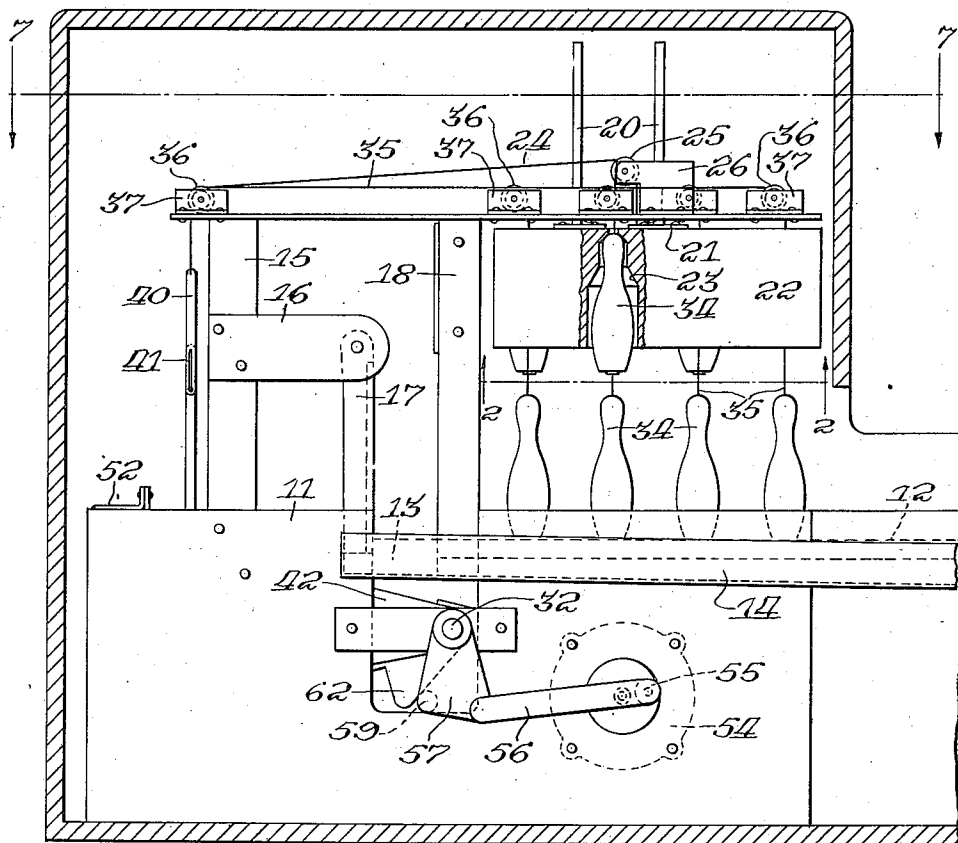


Fig. 2.

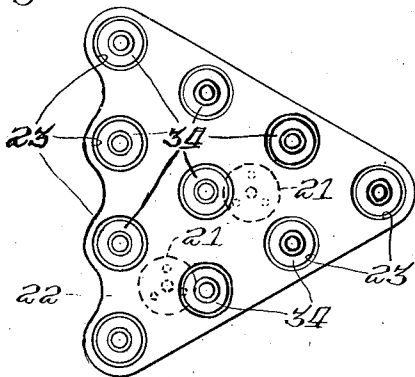
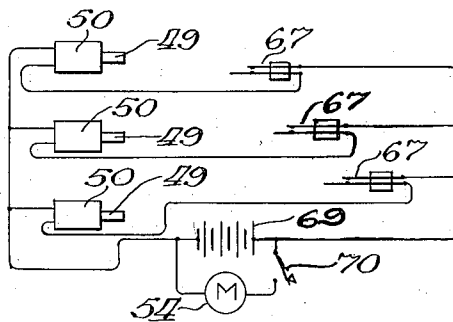


Fig. 3.



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3 Sheets-Sheet 2

Fig. 4

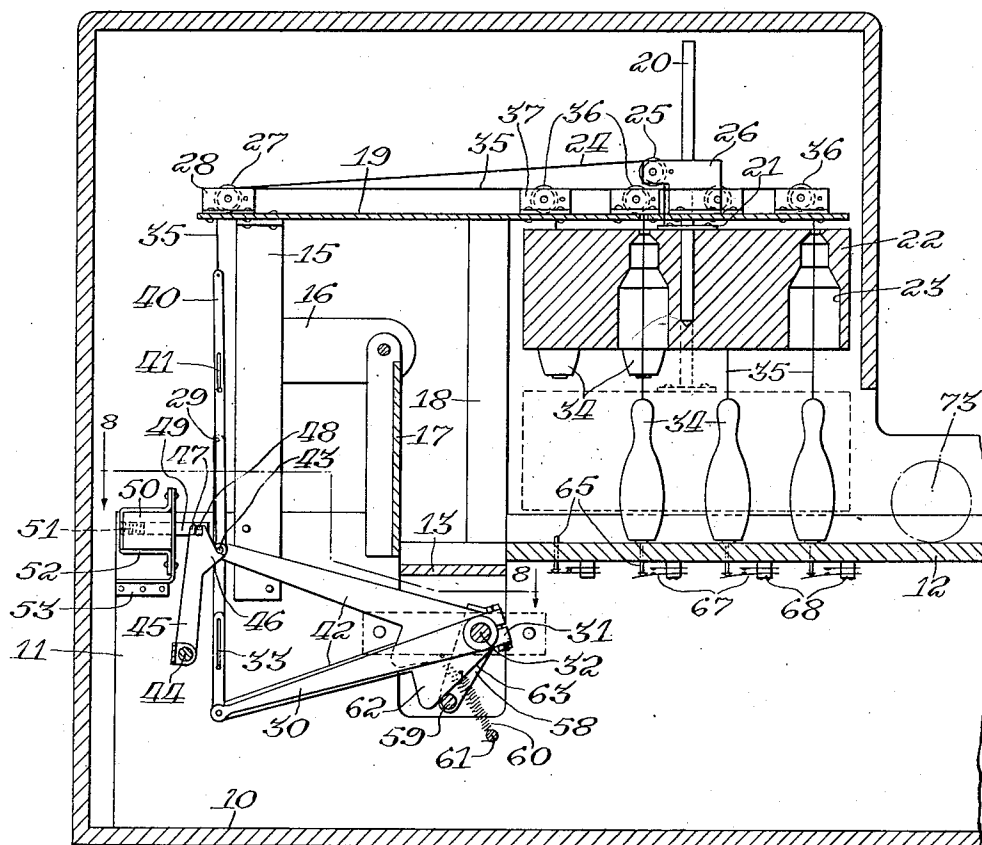


Fig. 5.

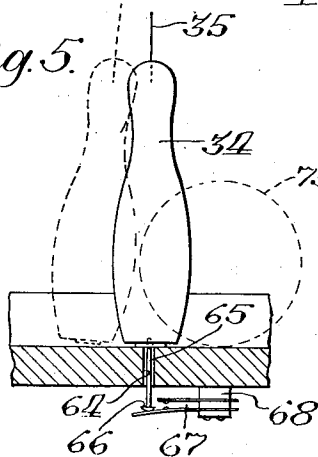
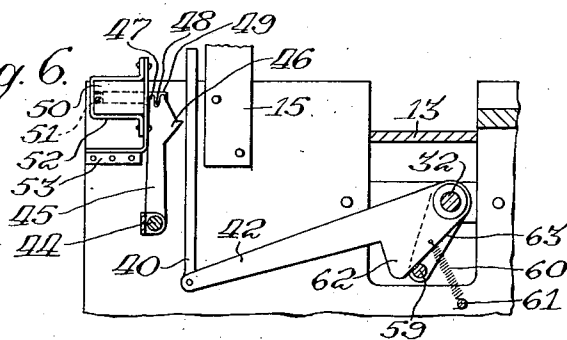


Fig. 6.



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3 Sheets-Sheet 3

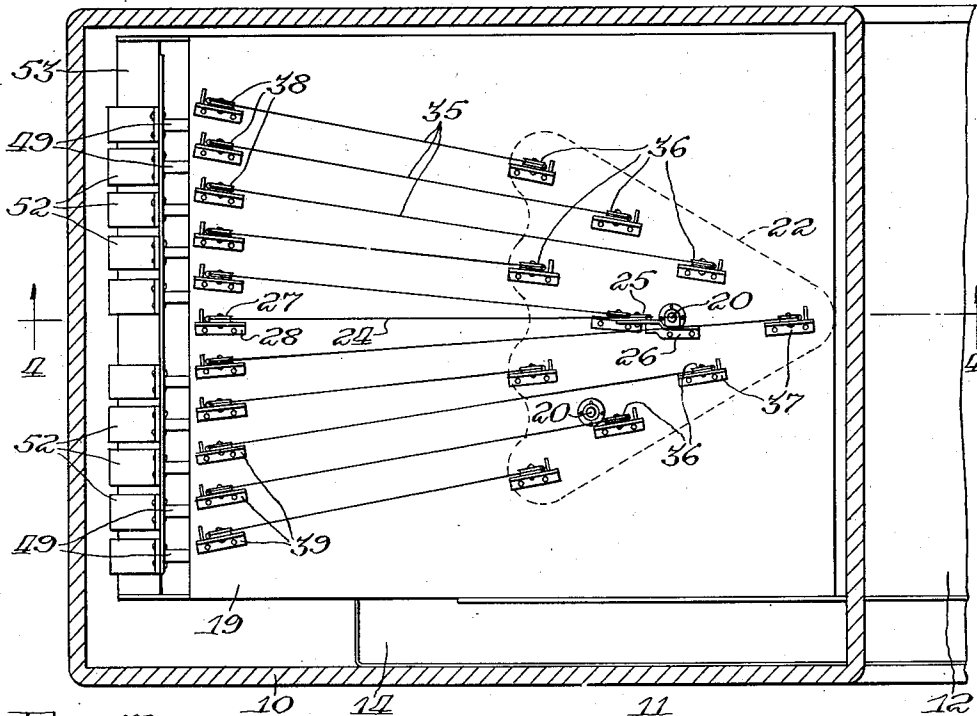


Fig. 7.

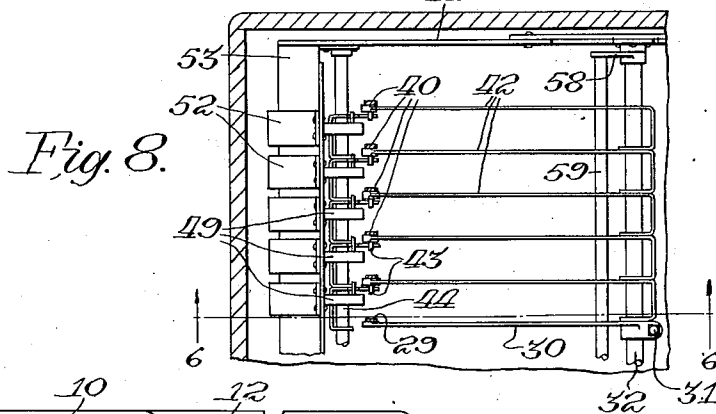


Fig. 8.

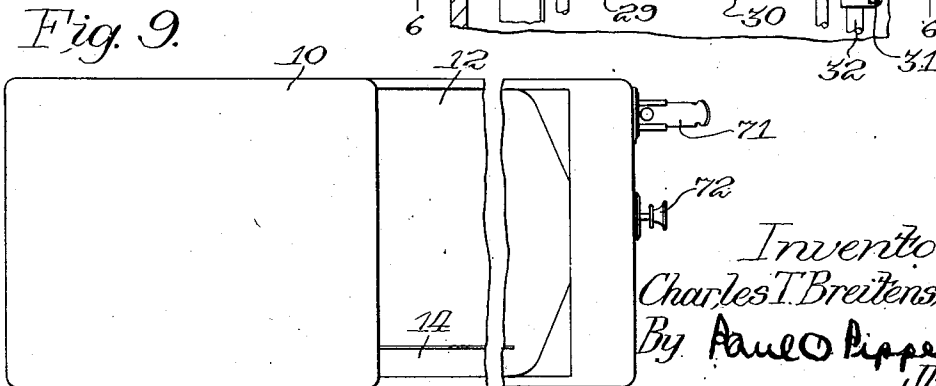


Fig. 9.

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UNITED STATES PATENT OFFICE

2,264,432

BOWLING APPARATUS

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Application April 19, 1940, Serial No. 330,576

12 Claims. (Cl. 273—44)

The invention relates to bowling apparatus usable either in miniature form or in the standard regulation size. More particularly the invention relates to an automatic pin setter or spotter.

The main object of the invention is to provide an improved bowling apparatus.

Another object is to provide an improved pin setter or spotter.

Still another object is to provide such structure which will be positive and foolproof in operation.

Other important objects will become apparent as the disclosure is more fully made.

Briefly, these desirable objects are achieved in one practicable form by providing an alley with spots upon which the usual ten pins are set, each spot including means to hold open a switch when a pin rests on the spot. Each pin has a cord tied to its top end, the cords for all ten pins passing upwardly through specially shaped bores formed in a setter block supported for movement toward and from the alley over the pin spots. Each cord is trained over pulley systems carried by the setter block and alley frame structure whereby the cords respectively are associated with link and lever mechanisms. The arrangement of parts will be such that when a pin is hit by a bowling ball and knocked off its spot, the spotter block of course, being in raised position, the associated switch closes to cause actuation of a corresponding electromagnetic device and consequent release of a corresponding latch to enable the cord to elevate the knocked off pin and cause it to nestle in the corresponding bore in the setter block. An electric motor device having appropriate connections serves to operate means for moving the setter block to reset the pins on their spots in switch opening positions and to relatch the cords against pulling the pins off the spots. The spotter block is, of course, then elevated to leave the pins free for engagement by a ball bowled along the alley. So much will suffice in presenting a general view of the novel structure specifically shown in one form in the accompanying sheets of drawings, wherein:

Figure 1 is an enlarged side elevational and part sectional view of the improved pin handling mechanism;

Figure 2 is a bottom plan view of the spotter block per se as viewed from line 2—2 of Figure 1;

Figure 3 is a diagram of a typical, but partial

wiring diagram for the electrical parts of the bowling apparatus;

Figure 4 is a view similar to Figure 1, but taken in section along the line 4—4 of Figure 7, looking in the direction of the arrows;

Figure 5 is a detail, elevational view, partly in section of a pin and switch assembly;

Figure 6 is a detail side view partly in section of the latch means taken along line 6—6 of Figure 8, looking in the indicated direction;

Figure 7 is a plan view of the assembly, partly in section, taken along the line 7—7 of Figure 1, looking in the indicated direction;

Figure 8 is a detail plan view of a part of the assembly and partly in section, taken along the line 8—8 of Figure 4 and looking in the direction of the arrows; and,

Figure 9 is a plan view of a typical cabinet for housing the bowling apparatus when used as a miniature table type bowling alley.

The game either in miniature or regulation size comprises a suitable housing 10 carrying interior walls 11 and a bowling alley or floor 12, the rear end of which may terminate in a transverse, inclined trough 13 for receiving balls rolled off the alley and to direct them into a ball return chute 14 disposed lengthwise along one side of the alley as desired. A rear frame structure 15 by means of a bracket 16 carries a hinged back board 17, acting as a cushion to spend the force of balls rolled off the rear end of the alley and also serving to direct such balls into the trough 13 in an obvious manner.

Other upright supports 18 are carried by the housing and with the support 15 serve to carry a horizontal plate 19. A pair of spaced vertical guide rods 20 are slidably passed through said plate 19 and have below the plate flange portions 21 for rigid securement to a spotter block 22 of substantial thickness and generally triangular in shape.

This block has ten vertical bores 23 formed therein, shaped to have the major portion of bowling pins to nest therein and spaced in the usual arrangement to conform to the spotting of the ten pins used in bowling. The top side of said block 22 has a cord 24 secured thereto and passed upwardly through a hole in the plate 19 to be trained over a pulley 25 carried in a block 26 mounted on the top side of the plate 19. Said cord 24 is then run rearwardly over a pulley 27 carried in a block 28 mounted on the plate 19 at its rear edge. This cord 24 then is trained downwardly and secured to an upright link 29 pivotally connected at its lower end to

an arm 30 made fast by a clamp 31 to a transverse rock shaft 32 journaled at its ends in the opposite side walls 11 at a convenient location, as shown. The link 29 is adjustable in length by any suitable means 33 interposed therein.

Each bowling pin is of standard shape and the ten of them are respectively designated by numeral 34. Each pin has a cord 35 connected to its top end, with the respective cords 35 passed upwardly through respective and corresponding bores 23 in the block 22. Each cord 35 is also passed up through the top plate 19, the said cords thence being trained over respective pulleys 36 carried in brackets 37 mounted on the top plate 19. These cords 35 then are directed rearwardly in a widening fan flare as shown best in Figure 7 and are respectively trained over other pulleys 38 carried in brackets 39 mounted along the rear edge of the plate 19. These cords thence are passed downwardly through holes in the plate 19 and are connected to respective, vertically disposed links 40, having length adjusters 41 therein. These links 40 are pivotally connected to respective lever arms 42 which as shown in Figure 8 are loosely pivoted on the cross shaft 32. It will now be clear that the arms 42 are loosely connected with the shaft 32, while the single arm 30 is made fast to said shaft.

Each lever arm 42 at its rear end carries a transverse latch pin 43. Adjacent these pins 43 the side plates 11 carry a transverse rod 44 on which are loosely pivoted a number of upright latch levers 45 equal in number and corresponding to the number of cords 35 and their links 40. In other words, there are ten such latch levers 45, one for each pin 34. Each lever 45 as shown in Figure 4 has a forwardly extending shoulder 46 and a fork 47 at its top end to receive a transverse pin 48 carried by the core 49 of an electromagnetic device 50, the core being urged normally out of its coil by a spring 51. There are ten such coils and they are mounted in brackets 52 supported by a cross brace 53 carried by the side plates 11 as shown in Figures 7 and 8.

As appears in Figure 1 an electric motor 54 is suitably mounted in the cabinet beneath the rear end of the alley 12, said motor turning a crank 55 pivotally connected to a rearwardly extending link 56, said link in turn being pivotally connected to one corner of a rocker plate member 57 of generally triangular shape depending below but made fast on the cross shaft 32. A similar rocker plate member 58 is at the other end of the shaft 32. The members 57, 58 carry a cross rod 59 parallel with the rock shaft 32 and in effect the members 57, 58 and 59 constitute a rockable ball. Each lever arm 42 has a pull spring 60 connected between it and a cross rod 61 carried by the side plates 11. Each lever arm 42 also has an enlargement 62 presenting a wedge surface 63 (see Figures 4 and 6) to ride the rod 59 as the springs 60 are effective to pull these wedge surfaces 63 of all of the lever arms 42 against said cross rod 59.

As shown best in Figures 4 and 5 the pin spots on the rear end of the alley 12 below the setter block 22 are provided by forming small vertical bores 64 in the appropriate spaced relationship for the usual ten pins. In each said bore 64 is placed a small plunger pin 65 having at its lower end a suitable head 66. The upper end of each pin 65 normally protrudes up above the top surface of the alley because it is yieldingly held so by one blade of a spring blade contact switch 67 carried in a block 68 on the under side of the

alley 12. It will be understood that ten such blade switches are provided, one for each pin 34. Further, it is plain that when a pin 34 is set down on the alley that by its weight the pin 34 would push its associated plunger 65 downwardly and cause the associated blade switch 67 to be held open. As generally depicted in Figure 3 each switch 67 is in circuit with a source of energy 69 and the respective devices 50. The motor 54 is in a shunt circuit as shown, which includes a starting switch 70 to control the operation of the motor 54. In the event the bowling game is to be in miniature as a table game, then, as shown, in Figure 9, a coin release chute 71 of standard type may be used to operate the motor switch 70, and a manually operable ball shooting plunger 72 may be used to roll a ball 73 over the table or alley 12 to strike the pins 34 set on the alley on the spots or bores 64. This concludes the detail description of the parts and the manner of use and mode of operation will next be given.

In the starting position we will assume some one has played the game, which means that the setter 22 is in its raised position and that the ball has swept some of the pins 34 off the alley so that they are raised and held snugly nested in the respective bores 23 of said setter. The player now coin releases the coin chute 71 which will be held in while it closes the motor switch 70, thereby putting the motor into operation to drive the crank 55 and link 56 to rock the plate 57 and parts 58 and 59 therewith. Assuming the plate 57 rocks to the left as viewed in Figure 1 the rod 59 will engage the heads 62 and especially their edges 63 to raise all lever arms 42 that may have dropped. As such arms 42 are raised their pins 43 will ride over the shoulders 46 of the latch levers 45 and releasably hold these arms 42 in such raised positions. At the same time as the rod 59 swings upwardly, the shaft 32 rocks to raise the central arm 30 so that the cord 24 associated with it becomes slack and the setter block 22 by its own weight with any pins 34 nested therein moves downwardly toward the alley from the full line to the dotted line position shown in Figure 1. As the motor continues to drive the link 56, the arm 30 is again moved positively downwardly to pull on the cord 24 through link 29 and elevate the setter block 22 to its raised position. Since the cords 35 connected to the pins 34 are all latched by the respective parts 46, 43, the pins 34 must remain standing on their spots on the alley. It will be clear then, that all lever arms 42 are releasably latchable, while the arm 30 is not latched and always rocks with the shaft 32, the arm 30 being fast on said shaft 32 and the arms 42 being loose thereon. The player when he sees that all pins are set and the setter block is in raised position may retract the chute 71 and open the switch 70 to stop the motor. In practice an automatically acting motor cut-out can be employed, if desired.

When the pins 34 set on their spots 64 they weight down the corresponding plungers 65 to hold open the respective switches 67 to keep the respective electromagnetic releasers 50 deenergized. When a ball 73 is now bowled along the alley 12 and strikes the standing pins 34, such pins as are hit will be knocked off their spots to permit the corresponding switches 67 to close in an obvious manner. When a switch 67 closes, its corresponding releaser 50 is energized to swing the latch lever 45 and free it from a holding pin

43 on a corresponding lever arm 42, whereupon such freed lever arm falls by gravity and with the aid of its spring 60, to pull downwardly on the associated link 40 and cord 35 to raise its pin 34 upwardly into a nested position in a bore 23 in the setter block 22. All pins 34 so hit by the ball are elevated off the alley and into the block 22. When the game has been completely played the parts are reset in the manner already described.

It can now be seen that the desirable objects heretofore recited are achieved by the structure described.

The intention is to cover herein all changes and modifications which do not in material respects constitute departures from the spirit and scope of the invention as defined in the appended claims.

What is claimed is:

1. In a bowling apparatus, an alley, a spring blade switch located beneath the alley, one blade of the switch carrying a plunger passed up through a bore in the alley, a bowling pin adapted to rest on the plunger and hold the switch open by weight, a support above the alley carrying a pulley system including a cord connected to the bowling pin, a pivoted lever arm positioned adjacent the ball discharge end of the alley and operatively connected at its free end with the cord, means to latch the lever in a position whereby the bowling pin stands on the switch plunger, and electromagnetic means operative when the switch is closed in response to a ball knocking the bowling pin off its plunger to release the latch and lever whereby the bowling pin is pulled by its cord through the lever to a raised position above the alley.

2. In a bowling apparatus, an alley, a spring blade switch located beneath the alley, one blade of the switch carrying a plunger passed up through a bore in the alley, a bowling pin adapted to rest on the plunger and hold the switch open by weight, a support above the alley carrying a pulley system including a cord connected to the bowling pin, a pivoted lever arm positioned adjacent the ball discharge end of the alley, an adjustable link connected between the free end of the lever arm and the free end of the cord, means for releasably latching the lever in a position whereby the bowling pin stands on the switch plunger, and an electromagnetic device carried proximate the latch means and operative when the switch is closed in response to a ball knocking the bowling pin off its plunger to release the latch and lever whereby the bowling pin is pulled by its cord to a raised position above the alley.

3. In a bowling apparatus, an alley, a switch operatively associated with the alley, a bowling pin adapted to stand on the alley, said switch including means responsive to weight of the standing pin to hold the switch open, a support over the alley including a pulley system over which a cord is trained, the latter having one end connected to the pin and its other end operatively connected with a lever arm, a horizontal cross shaft carried adjacent the alley to which shaft the lever arm is pivoted, means releasably to latch the lever arm in a raised position whereby the pin stands on the alley, and electromagnetic means responsive to closing of the switch when the pin is knocked off the alley to release the latch and free the lever and cord to elevate the pin to a position clear of the alley.

4. In a bowling apparatus, an alley, a switch operatively associated with the alley, a bowling pin adapted to stand on the alley, said switch in-

cluding means responsive to weight of the standing pin to hold the switch open, a support over the alley including a pulley system over which a cord is trained, the latter having one end connected to the pin and its other end operatively connected with a lever arm, a horizontal cross shaft carried adjacent the alley to which shaft the lever arm is pivoted, a spring acting to pull said lever arm downwardly, means releasably to latch the lever arm in a raised position whereby the pin stands on the alley, and an electromagnetic device responsive to closing of the switch when the pin is knocked off the alley to release the latch and free the lever so that the lever and cord act to elevate the pin to a position clear of the alley.

5. In a bowling apparatus, an alley, a switch operatively associated with the alley, a bowling pin adapted to stand on the alley, said switch including means responsive to weight of the standing pin to hold the switch open, a support over the alley including a pulley system over which a cord is trained, the latter having one end connected to the pin and its other end operatively connected with a lever arm, a horizontal cross shaft carried adjacent the alley to which shaft the lever arm is pivoted, means releasably to latch the lever arm in a raised position whereby the pin stands on the alley, electromagnetic means responsive to closing of the switch when the pin is knocked off the alley to release the latch and free the lever and cord to elevate the pin to a position clear of the alley, and motor power operated means for restoring the lever arm to latched position and the pin to stand on the alley.

6. In a bowling apparatus having an alley, a switch operatively associated with the alley, a bowling pin adapted to stand on the alley, said switch including means responsive to weight of the standing pin to hold the switch open, a support over the alley including a pulley system over which a cord is trained, the latter having one end connected to the pin and its other end operatively connected with a lever arm, a horizontal cross shaft carried adjacent the alley to which shaft the lever arm is pivoted, means releasably to latch the lever arm in a raised position whereby the pin stands on the alley, electromagnetic means responsive to closing of the switch when the pin is knocked off the alley to release the latch and free the lever and cord to elevate the pin to a position clear of the alley, and a movably positioned setter block carried above the alley to receive the elevated pin and limit its upward movement.

7. In a bowling apparatus having an alley, a switch operatively associated with the alley, a bowling pin adapted to stand on the alley, said switch including means responsive to weight of the standing pin to hold the switch open, a support over the alley including a pulley system over which a cord is trained, the latter having one end connected to the pin and its other end operatively connected with a lever arm, a horizontal cross shaft carried adjacent the alley to which shaft the lever arm is pivoted, means releasably to latch the lever arm in a raised position whereby the pin stands on the alley, electromagnetic means responsive to closing of the switch when the pin is knocked off the alley to release the latch and free the lever and cord to elevate the pin to a position clear of the alley, a movably positioned setter block carried by the support above the alley to receive the elevated

pin and limit its upward movement, a pulley and cord system carried by the support and the cord thereof connected to the setter block, a lever arm fixed to the shaft and the latter cord being operatively connected thereto, and motor operated means to restore the pivoted lever arm to its latched position and move the fixed lever arm by the rocking the shaft to lower the setter block to set the pin back in a standing position on the alley.

8. In a bowling apparatus having an alley, a plurality of pins adapted to be stood on the alley, each pin having a cord attached thereto, a support over the alley, pulley systems carried on the support respectively receiving the cords from the pins, a rock shaft carried adjacent the alley, a plurality of spring pulley lever arms pivotally connected to the rock shaft, the pin cords being respectively operatively connected with the free ends of said lever arms, a lever arm fixed to said rock shaft and having a cord operatively connected thereto, a pulley system on the support for the latter cord, a setter block connected with the latter cord and positioned over the alley and below the support, means for releasably latching the pivoted lever arms in a raised position whereby to cause the pins to stand on the alley, means to release a latched lever arm when its associated pin is knocked from a standing position on the alley to cause the released lever arm to fall and raise the knocked off pin to the elevated setter block, and motor operated means to restore fallen pivoted lever arms to their latch positions and operate the fixed lever arm to lower the setter block and then raise it to spot the pins to a standing position on the alley.

9. In a bowling apparatus having an alley, a plurality of pins adapted to be stood on the alley, each pin having a cord attached thereto, a support over the alley, pulley systems carried on the support respectively receiving the cords from the pins, a rock shaft carried adjacent the alley, a plurality of spring pulled lever arms pivotally connected to the rock shaft, the pin cords being respectively operatively connected with the free ends of said lever arms, a lever arm fixed to said rock shaft and having a cord operatively connected thereto, a pulley system on the support for the latter cord, a setter block connected with the latter cord and positioned over the alley and below the support, means for releasably latching the pivoted lever arms in a raised position whereby to cause the pins to stand on the alley, electromagnetic means to release a latched lever arm when its associated pin is knocked from a standing position on the alley to cause the released lever arm to fall and raise the knocked off pin to the elevated setter block, guide means carried by the support to hold the setter block for translational movement only, and manually initiated electric motor operated means to restore fallen pivoted lever arms to their latched positions and operate the fixed lever arm to lower the setter block and then raise it to spot the raised pins to a standing position on the alley.

10. In a bowling apparatus having an alley, a plurality of switches operatively associated with the alley, a plurality of bowling pins adapted to stand on the alley respectively over each switch,

means to hold said switches open when a pin stands thereover as stated, a support over the alley carrying pulley systems respectively having cords connected to said pins, a setter block for the pins carried by the support over the alley, a pulley system on the support for the setter block including a cord connected to the latter, releasably latchable means connected respectively with the pin cords, movable means connected with the block cord, electro-magnetic means operable to release the latched means and through the pin cords pull any pin knocked off the alley upwardly to the block, and motor operated means to restore the latchable means to latched positions and move the movable means to move the setter block downwardly to set the raised pins on the alley and then raise the setter block to leave the pins in a switch opening standing position on the alley.

11. In a bowling game having an alley, a setter block carried by a support for movement to and from the alley, a cross rock shaft supported proximately to the alley and carrying respective loose lever arms, a lever arm fast on the shaft, bowling pins adapted to be spotted on the alley, pulley systems including cords respectively passed through the block and connected to the pins, a pulley system including a cord connected to the block, said pulley systems carried by the support, the pin cords being operatively and respectively connected with the loose lever arms and the block cord being operatively connected with the fast lever arm, releasable latch means for holding the loose lever arms respectively in raised positions to hold the pins in standing positions on the alley, means to release the latch means and loose lever arms when the corresponding pin is knocked from a standing position and raised to the block, and means to move all released loose lever arms to latched position and move the fixed lever arm to move the block to restore the pins therein to standing position on the alley.

12. In a bowling game having an alley, a setter block carried by a support for movement to and from the alley, a cross rock shaft supported proximately to the alley and carrying respective loose lever arms, a lever arm fast on the shaft, bowling pins adapted to be spotted on the alley, pulley systems including cords respectively passed through the block and connected to the pins, a pulley system including a cord connected to the block, said pulley systems carried by the support, the pin cords being operatively and respectively connected with the loose lever arms and the block cord being operatively connected with the fast lever arm, releasable latch means for holding the loose lever arms respectively in raised positions to hold the pins in standing positions on the alley, means to release the latch means and loose lever arms when the corresponding pin is knocked from a standing position and raised to the block, and a motor operated bail structure moved by the rock shaft and engageable with the respective loose lever arms to raise same to latched position and the rock shaft moving the fixed lever arm to move the block to restore the raised pins to standing position on the alley.

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