Sept. 23, 1952 M. PATTERSON 2,611,611

BOWLING PIN RESPOTTER

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FIG. 1

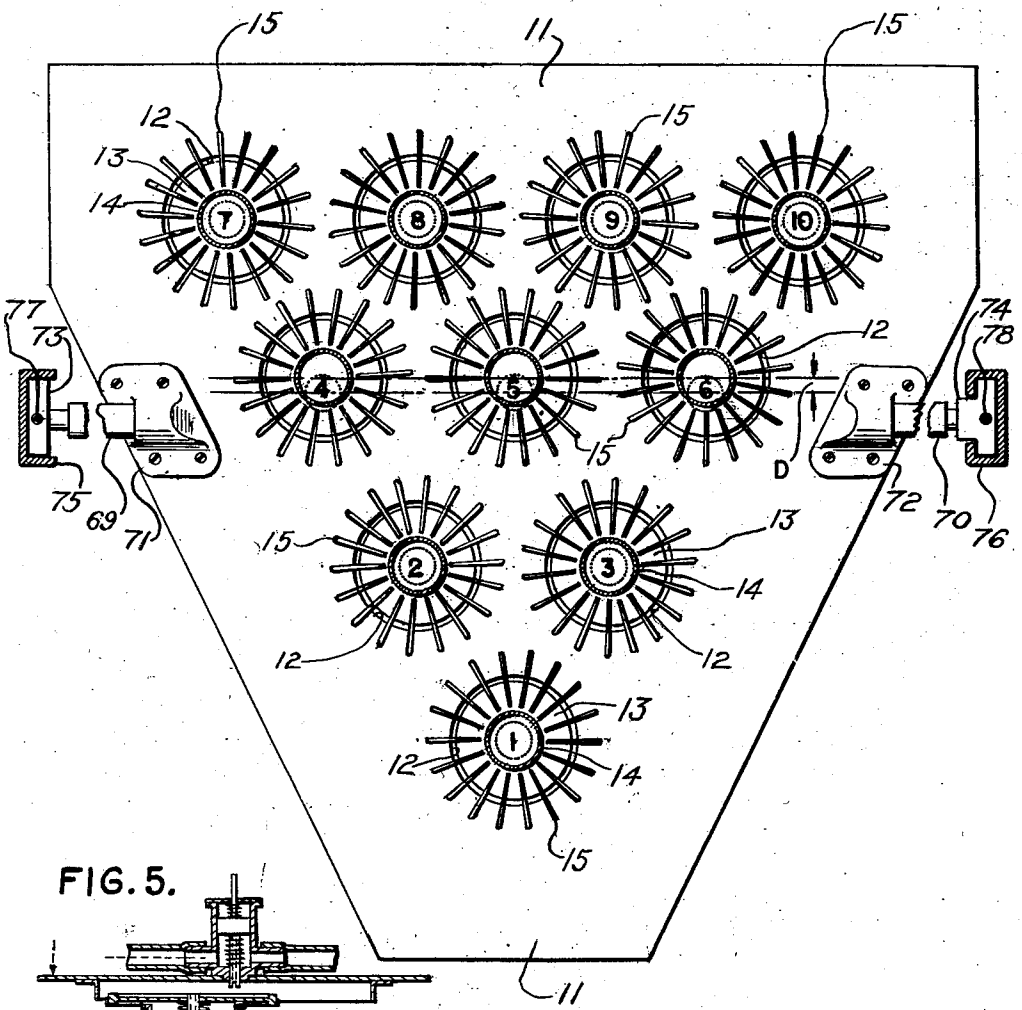
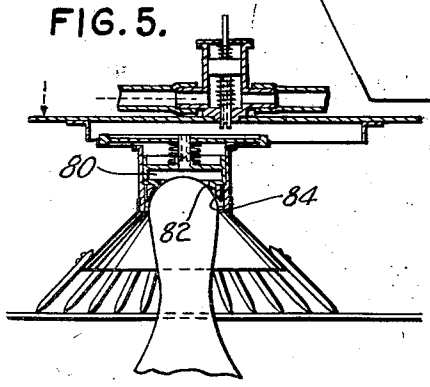


FIG. 5.



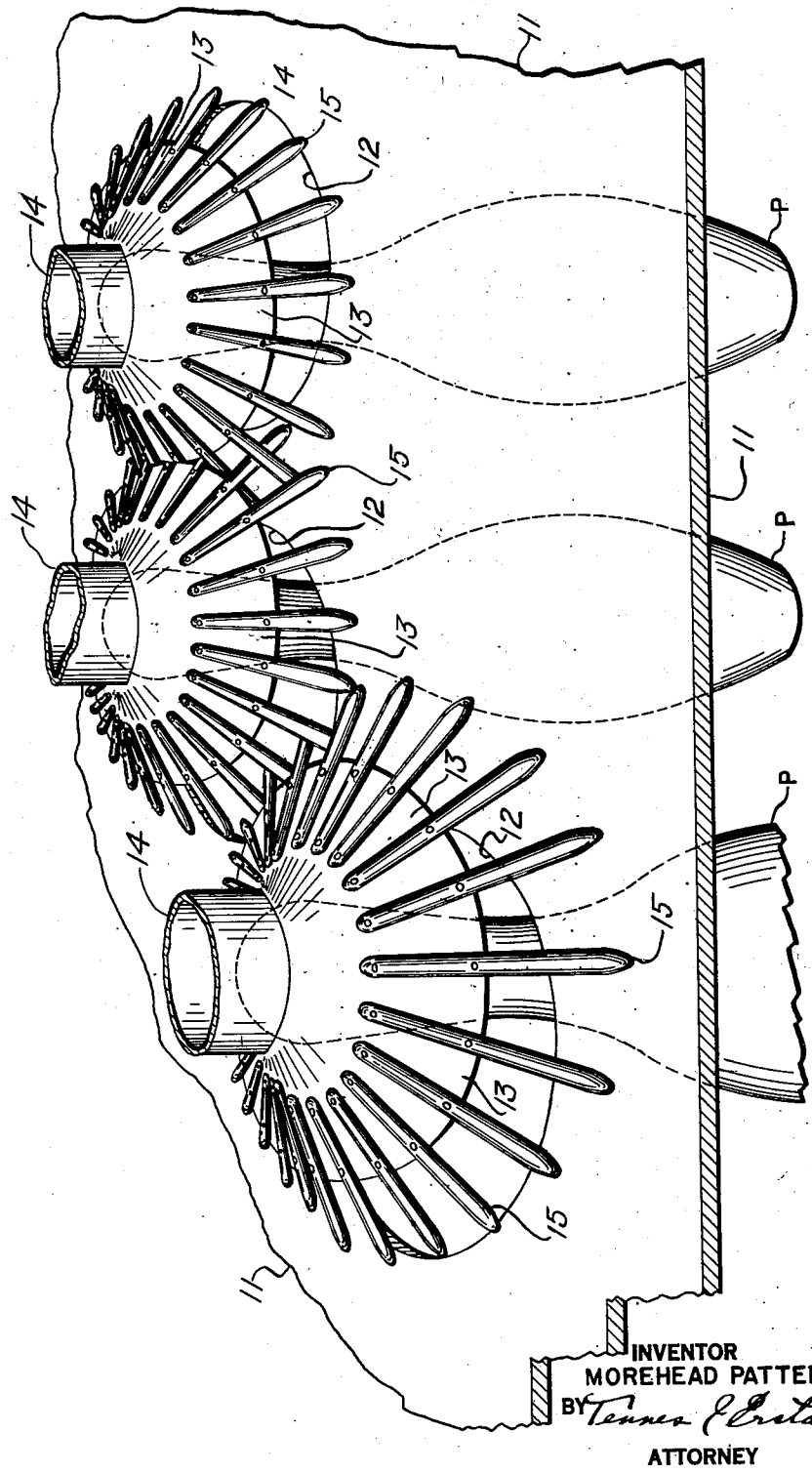
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BOWLING PIN RESPOTTER

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FIG. 2



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BOWLING PIN RESPOTTER

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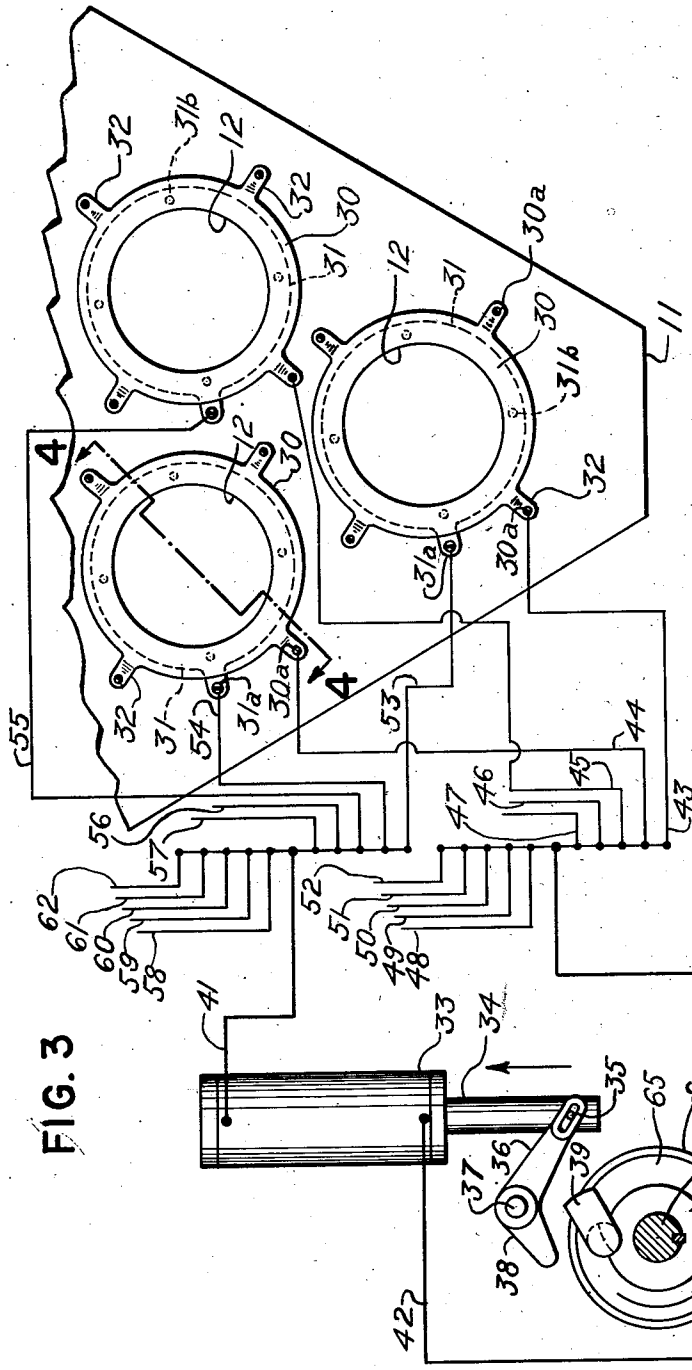


FIG. 3

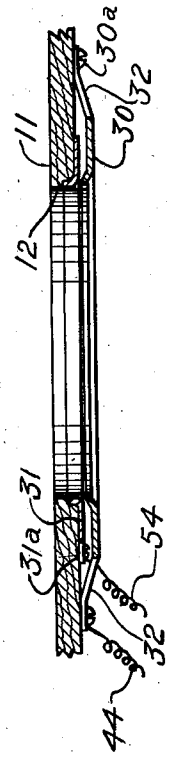


FIG. 4

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2,611,611

BOWLING PIN RESPOTTER

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Application September 10, 1946, Serial No. 696,062

13 Claims. (Cl. 273—42)

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This invention relates to improvements in automatic pin setting apparatus for bowling alleys and, more particularly, to apparatus which increases the range and reliability of the respotting mechanism.

My invention is particularly well adapted for use with automatic bowling pin spotting apparatus of the type utilizing conical members for guiding gripping devices into centered relation with respect to off spot bowling pins. Apparatus of this general type is shown in U. S. Patent No. 2,283,613 issued to Mr. G. J. Schmidt on May 19, 1942. It is not intended, however, that its use be restricted to apparatus of this general type inasmuch as other types of bowling pin mechanism can also advantageously employ the invention hereinafter described and claimed.

In apparatus of the type referred to, the conical respotting members have to operate over the area on a bowling alley on which bowling pins are spotted. The diameter of the conical members, therefore, has to be limited so that they do not interfere with adjoining cones when picking up off spot pins which are relatively close together.

It is an object of the present invention to increase the effective pin engaging range of the conical members by providing them with fingers which are adapted and arranged to interfinger with the fingers of an adjoining member when off spot pins are relatively close together.

A further object is to provide legs on the cone-shaped members which will support the cones above the circular openings over which they operate and which will not prevent the edges of adjoining cones coming close together to pick up off spot pins which are relatively close together.

I have found that certain bowling pins have a greater tendency to be displaced or "walk" to the rear and, under certain conditions, toward the sides of the alley than in any other direction as a result of the action of the ball on the pins. It is, therefore, an object of my invention to arrange asymmetrically the circular openings of the bottom platform with respect to each other to conform more closely to the direction in which pins are usually displaced, while conforming with the general pattern of positioning pins on a bowling alley. In this way, the pin engaging members will have a more practical operating range.

Another object is to provide a sensitive means for stopping automatically the operation of a bowling pin spotting machine whenever a standing pin fails to pass freely through the openings

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formed in the bottom platform to thereby prevent a bowling pin from being toppled.

Other objects and features of the invention will appear as the description of the particular physical embodiment selected to illustrate the invention progresses. In the accompanying drawings, which form a part of this specification, like characters of reference have been applied to corresponding parts throughout the several views which make up the drawings, in which

Fig. 1 is a plan view of the bowling pin respotting platform supporting the conical pin engaging members, showing the circular openings for the 4, 5 and 6 pins moved to the rear;

Fig. 2 is a perspective view illustrating interfingering of adjoining members;

Fig. 3 is a partial bottom view of the respotter platform, illustrating a few circular openings in the same and their sensitive edges as well as a schematic electrical hook-up of the latter with the driving mechanism of the pinspotter; and

Fig. 4 is a partial sectional side elevation of the respotter platform, taken on line 4—4 of Fig. 3, illustrating a circular opening and its sensitive edge in detail;

Fig. 5 is a cross sectional side elevation of the pin gripping mechanism.

Reference is made to Figures 1 and 2 of the accompanying drawings, showing one embodiment of my invention, wherein a lower lifting platform 11 is provided with ten circular openings 12 corresponding to the arrangement or pattern in which bowling pins are positioned on a bowling alley.

As a result of study and experimentation, I have found in a triangular pin arrangement wherein the Number 1 pin position represents the apex of the triangle and the 7, 8, 9 and 10 pin positions represent the base of the triangle as shown in Fig. 1, that the 4, 5 and 6 pins are more often displaced by the bowling ball toward the rear of the bowling alley than in any other direction. I have, therefore, located the holes 12 over the 4, 5 and 6 pin spot positions a short distance toward the rear, as indicated by the letter "D", to increase the practical operating range of the pin engaging members hereinafter described. While my invention permits the amount of displacement D to be varied, I have found that by asymmetrically arranging the holes over the 4, 5 and 6 pin spot positions approximately 1" to the rear as shown in Fig. 1 the practical operating range of the pin engaging members operating over the 4, 5 and 6 pin spot positions may be satisfactorily increased.

Slidably supported over each of these openings or holes 12 are pin engaging members, consisting of a cone 13 and fingers 15 which project from the cone 13 and the far ends of which act as supporting legs. The center portion 14 of the cone (Figure 2) is provided with a suitable pin gripping mechanism (Fig. 5) which is similar to that shown in U. S. Patent No. 2,283,613.

The gripping mechanism consists of a suction piston 80 which is movably mounted within the center portion 14 of each cone. The suction piston may have a beveled rim or stop portion 82 arranged to engage with and fit closely about the head of the standing bowling pin. A gasket 84 which may be formed of rubber or other suitable material having like qualities, may be placed around the exterior or rim 82 of suction piston 80 and assists in securely holding the pin to the suction piston when a vacuum is created within the piston in that part surrounding the head of the pin to be gripped. Since this pin gripping mechanism is already fully described and shown in U. S. Patent 2,283,613 referred to above, a further description herein of this structure is omitted for the sake of brevity.

Surrounding the bottom edge of each circular opening 12 is a metallic flange 31 having a wire connecting lug 31*a* projecting therefrom. The flanges 31 are fastened to the bottom portion of the platform 11 by suitable screws 31*b*.

Spaced from each of the flanges 31 are metallic rings 30. Each ring 30 has a number of flexible lugs 32 projecting from its periphery. Each of the lugs 32, which resiliently space the rings 30 from flanges 31, is secured to the platform 11 by a suitable screw 30*a*. The flanges 31 and the rings 30 are wired in parallel. Wires 43 to 52 connect the lugs 32 to a source of electrical current by means of wire 40. Wires 53 to 62 connect the lugs 31*a* by means of wire 41 to a solenoid 33 which, in turn, is connected to the source of electrical current by means of wire 42. The solenoid 33 forms part of a conventional one-revolution clutch C which controls the operation of the pin setting machine. Whenever a bowling pin is moved off spot to the extent that it engages with one of the rings 30, the flange 31 and the ring 30 will be brought into contact with each other. When a flange 31 and a ring 30 are brought into contact with each other in this manner they close a circuit which presents further movement of the lifter table which might cause damage to the machine or topple over the pin.

Solenoid 33, when energized, actuates a plunger 34 in the direction indicated by the arrow (Fig. 3). The end of the plunger 34 carries a pin 35 which engages with a suitable slot in a bell crank lever arm 36, pivotally mounted on stationary stud 37. When the lever arm 36 is actuated by the solenoid plunger 34, it moves the other arm 38 of the bell crank into the path of travel of lug 39 which is also a part of and projects from the one-revolution clutch C.

When the clutch C is in engagement, the lug 39 travels with the same in the direction indicated by the arrow. When the arm 38 is depressed by the energization of the solenoid 33, it moves into the path of travel of the lug 39, causing lug 39 to be depressed which, in turn, effects a disengagement of clutch member 65 from member 66, thus stopping the operation of the bowling machine. The member 66 is secured to the continuously rotating main drive shaft of the bowling machine.

In bowling pin setting machines of this type,

the respotting table or platform is raised or lowered in proper time relation with the operation of the bowling pin setting machine in a manner similar to that disclosed in U. S. Patent No. 2,283,613. The raising and lowering of said platform is effected through a pair of cables 77 and 78 which are connected to a pair of guide shoes 73 and 74, in which lugs 69 and 70 are pivotally supported to permit the table 11 to be turned 180° in a manner similar to that shown in U. S. Patent 2,283,613. Shoes 73 and 74 are slidably supported in vertical guide channels 75 and 76. The lugs 69 and 70 are secured in brackets 71 and 72 respectively, both of which are mounted to the lower platform 11.

The bowling pin engaging mechanism, just described, operates as follows:

After the first ball has been thrown, some of the pins, as a rule, are knocked down while others, although they remain standing, have been moved off their original spotted position and become what is commonly referred to as "off spot" pins. Before the second ball is thrown, it is necessary to first remove from the bowling alley, the pins that were knocked down, sometimes referred to as "dead wood," and the bowling ball. This is accomplished by lowering the table platform 11 in a manner similar to that shown in U. S. Patent No. 2,283,613. The continued downward movement of the table platform 11 causes the tops of the standing bowling pins, which have passed through the circular openings 12, to engage with the pin engaging members consisting of cones 13 and fingers 15. When the off spot pins P engage with the fingers 15 or the cones 13, they cause the cones in which they engage to move sidewise until the center portions 14 of the cones 13 are moved over the tops of their respective bowling pins. The top of the standing bowling pin is then gripped by the gripper mounted in member 14 described heretofore. As soon as the bowling pins have been gripped, the platform 11 is elevated by means of cables 77 and 78 to lift the standing gripped bowling pins off the alley and to permit the bowling ball and fallen pins to be removed by suitable sweeping mechanism from the bowling alley. After this operation, the table platform 11 is lowered to replace the lifted pins on the bowling alley in exactly the same position they were in before being engaged and elevated from the alley.

Heretofore, in apparatus such as shown in U. S. Patent No. 2,283,613, it has been the practice to use a solid cone, the diameter of which, because of the restricted area in which it operated, had to be limited to avoid having its periphery interfere with those of adjoining cones especially when picking up off spot pins which are relatively close together. The holes in the lower table, therefore, had to be limited in diameter inasmuch as the cones, coacting with each circular opening, were of limited diameter.

The structure I have disclosed in my invention solves this problem in that the diameter of the holes 12, in the lower platform 11, can be made larger than was heretofore possible with cones having a continuous periphery because the pin engaging members have radially extending fingers 15 which support the cones 13 above the platform. In view of this fact, whenever several pins are located relatively close together, fingers 15 of the pin engaging members will interfinger as shown in Figure 2. In this way, the cones 13 do not interfere with one another due to the interfingering mentioned, and the operating

range of the pin engaging members is, therefore, materially increased. Thus, the applicant has overcome the dilemma due to the fact that if a solid cone is made small enough so that it does not interfere with the other cones when off spot pins are close together, it will fall through the openings. If the openings are made smaller, then the range is decreased. With the present construction, larger openings may be used, the cones do not fall through the openings, and the cones do not interfere with each other despite their large effective diameter.

In case a bowling pin walks off so far from its original spot that the head of the pin touches the edge of the circular opening **12**, it will push the ring **30** against the flange **31**. As soon as this happens, electrical current will flow from the source of supply through wire **40**, through one of the wires **43** to **52**, through the wire connected to the ring **30**, through the flange **31**, through one of the wires **53** to **62** connecting the flange **31** to the solenoid **33** and, after passing through the solenoid **33**, back to the source of supply through wire **42**. The current, in passing through the solenoid **33**, energizes the same which, in turn, causes the one-revolution clutch C to become disengaged. This feature is found particularly desirable in that it not only avoids toppling over a standing bowling pin, but it also avoids causing any damage either to the pin or to the bowling machine.

The invention above described may be varied in construction within the scope of the claims, for the particular device selected to illustrate the invention is but one of many possible embodiments of the same. The invention, therefore, is not to be restricted to the precise details of the structure shown and described.

What is claimed is:

1. In a pin spotter mechanism, a horizontal member positioned above the bed of a bowling alley; holes formed in said member above each of the positions on which bowling pins are spotted; conical devices positioned above said holes; legs formed at the lower end of said conical devices for slidably supporting the devices over said holes to permit the devices to center themselves over the heads of standing off spot pins when they engage with the standing pins, the legs on each device being sufficiently spaced from each other and so arranged to permit them to pass between the legs on adjoining devices; and pin gripping means connected to said conical devices for gripping the head ends of pins over which said conical devices are centered.

2. In a bowling pin setting apparatus, mechanism for lifting bowling pins consisting of, a platform adapted and arranged to travel toward and away from the bed of a bowling alley, said platform having circular holes formed in the platform above each of the positions on which bowling pins are spotted on a bowling alley; conical members located above said holes; lugs projecting from said conical members for slidably supporting each of the cones on said platform above one of said holes, said lugs being spaced from each other to permit the lugs to interfinger with the projecting lugs of adjoining cones when off spot pins which are relatively close together are engaged; and pin grippers mounted on said conical members for gripping the head ends of pins over which said conical members are centered.

3. In mechanism for engaging, lifting and replacing spot and off spot pins standing on a bowling alley, the combination of a device having formed therein a plurality of openings, corresponding in number to the bowling pins used on a bowling alley; conical members having fingers projecting outwardly from said members for slideably supporting said members on said device above said openings, said fingers being spaced from each other to permit them to interfinger with the fingers of adjoining conical members; pin grippers connected to each of said conical members for gripping the head ends of pins over which said conical members are centered; and means for moving said device toward and away from the bed of a bowling alley to bring said conical members into and out of engagement with standing bowling pins.

4. In mechanism for engaging, removing and replacing spot and off spot pins standing on a bowling alley, the combination of a platform having holes formed therein corresponding to the triangular arrangement of tenpins on a bowling alley and through which the upper ends of standing bowling pins can pass, at least one of the holes over the 4, 5 and 6 pin positions being asymmetrically arranged with respect to the positions on a bowling alley on which bowling pins are spotted to correspond to the positions displaced bowling pins usually occupy after being displaced; inverted funnel-like members slideably located above each of said holes; arms associated with each of said funnel-like members for supporting the same above each of said holes, said arms being spaced and arranged to interpass the arms on adjacent funnels when the funnels engage with displaced pins that are relatively close together and pin grippers connected to each of said funnel-like members for gripping the head ends of pins over which said conical members are centered.

5. In mechanism for engaging, removing and replacing standing spot and off spot pins on a bowling alley, the combination of, a support; pin engaging members; fingers extending from each of said pin engaging members for slidably mounting said members on said support, the fingers of adjoining pin engaging members being adapted and arranged to interfinger; pin grippers connected to each of said pin engaging members for gripping the head ends of pins over which said pin engaging members are centered; and means for bringing said pin engaging members into and out of engagement with standing bowling pins to grip, remove and replace said standing pins on the bowling alley.

6. In a bowling pin spotting machine for bowling alleys, the combination of, a table movable to and from the alley bed; and shiftable devices on the table for gripping off spot pins and lifting them from the alley bed by the table and releasing gripped pins replaced on the same off spot position from which they were lifted, said devices having their normal centered positions arranged in the usual playing arrangement of ten bowling pins on an alley with the exception that the devices coacting with the Number 4, 5 and 6 pins have their centered positions to the rear of normal initial spotting position in order to more effectively handle pins which have been moved backwardly by the first ball.

7. A pin lifting mechanism for use with a conventional bowling alley where ten pins are spotted in a triangular symmetrical arrangement on positions commonly referred to by the numbers 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10, where position 1 represents the apex of the triangle and positions 7, 8, 9, 10 represent the base of the triangle, said mechanism comprising a platform having ten

triangularly arranged openings formed therein through which standing bowling pins extend when the platform is moved toward the alley, said openings corresponding in arrangement to said positions on a bowling alley on which bowling pins are spotted, and wherein the openings in the platform over positions 4, 5 and 6 are arranged rearwardly with respect to their normal triangular arrangement in order to be centered over the area into which the pins 4, 5 and 6 are most frequently displaced; pin gripping devices above each of said ten openings for gripping standing bowling pins, and means for moving said platform toward and away from a bowling alley to grip, lift and replace standing bowling pins on the bowling alley by means of said pin gripping devices.

8. Mechanism for engaging, lifting and replacing bowling pins on an alley comprising, a table platform having a plurality of openings formed therein, said openings being located approximately over the positions on a bowling alley where bowling pins are spotted; conical members positioned above each of said openings; the bases of said conical members being of a diameter approximating the width of said openings; pin gripping means associated with the upper ends of said conical members for gripping the head ends of pins over which said conical members are centered, lugs projecting outwardly from said conical members for slidably supporting said conical members in a raised position over the openings formed in said table platform a distance sufficient to allow the lugs of one conical member to move under an adjoining conical member, and means for moving said platform toward and away from a bowling alley to lift and replace bowling pins on the bowling alley.

9. Mechanism for engaging bowling pins standing in both spot and off spot positions comprising, a table having formed therein a circular opening above each of the spots on a bowling alley where pins are spotted, inverted funnel-shaped members located above each of said openings, pin gripping mechanism associated with each of said funnel-shaped members for gripping the head ends of pins over which said funnel-shaped members are centered, and elongated members connected to said inverted funnel-shaped members for slidably supporting said funnel-shaped members on said table, said elongated members being constructed and arranged to interfinger with the elongated members of adjoining inverted funnel-shaped members to allow the gripping mechanisms of adjoining funnel-shaped members to come close together to pick up off spot pins that are close together.

10. In mechanism for engaging, lifting and replacing spot and off spot pins standing on a bowling alley, the combination of a platform having holes formed therein through which the upper ends of standing bowling pins can pass, inverted funnel-like pin gripping members slidably supported on said platform above each of said holes for gripping the head ends of pins over which said funnel-like members are centered, mechanism for moving said platform toward and away from a bowling alley to bring said members into gripping engagement with said standing bowling pins, and means for stopping the mechanism moving the platform when

an off spot bowling pin comes in contact with the circumference of one of said holes, said means comprising a switch device surrounding the circumference of each of said holes.

11. In a bowling pin spotting machine for bowling alleys on which ten pins are arranged in triangular playing arrangement, the combination of, a table movable to and from the alley bed, and shiftable devices on the table for gripping off spot pins and lifting them from the alley bed by means of the table and returning them to the same off spot position from which they were lifted, said devices having their normal centered positions arranged in the usual playing arrangement of bowling pins on an alley with the exception that at least one of the devices coacting with the 4th, 5th, and 6th pins have their centered positions to the rear of normal initial spotting position in order to more effectively handle pins which have been moved backwardly by the first ball.

12. In a bowling pin spotting machine, the combination with, a support movable to and from the alley bed, devices on the support for gripping off spot pins to be lifted from the alley bed by the table and returned to the same off spot position from which they were lifted, said devices having a limited gripping range so that there is an area beyond their gripping range where they cannot grip standing pins, individually movable pin sensing means substantially surrounding each of said devices in the area beyond their gripping range for detecting abnormally off spot pins in said area; and means responsive to said sensing means for preventing further movement of said support in the direction of the alley bed when said abnormally off spot pins are sensed.

13. In a bowling pin spotter mechanism, an elevator having a plurality of holes corresponding in arrangement to the arrangement of pins used on a bowling alley through which the heads of standing bowling pins pass when the elevator is lowered, bowling pin gripping devices associated with said elevator for gripping bowling pins, mechanism for lowering and lifting said elevator, individual annular obstruction detecting members mounted on the underside of said elevator and surrounding each of said holes, additional individually operated annular members mounted on the underside of said elevator and spaced from said first named members, said spaced members being constructed and arranged for movement into contact with each other on engagement with an obstruction, and electrical means associated with said members for stopping the mechanism that lowers and lifts said elevator when an obstruction brings said opposed members into contact.

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