

July 20, 1948.

J. PARRA ET AL

2,445,688

PIN SPOTTER CARRIAGE FOR PIN SETTING APPARATUS

Filed April 15, 1944

5 Sheets-Sheet 1

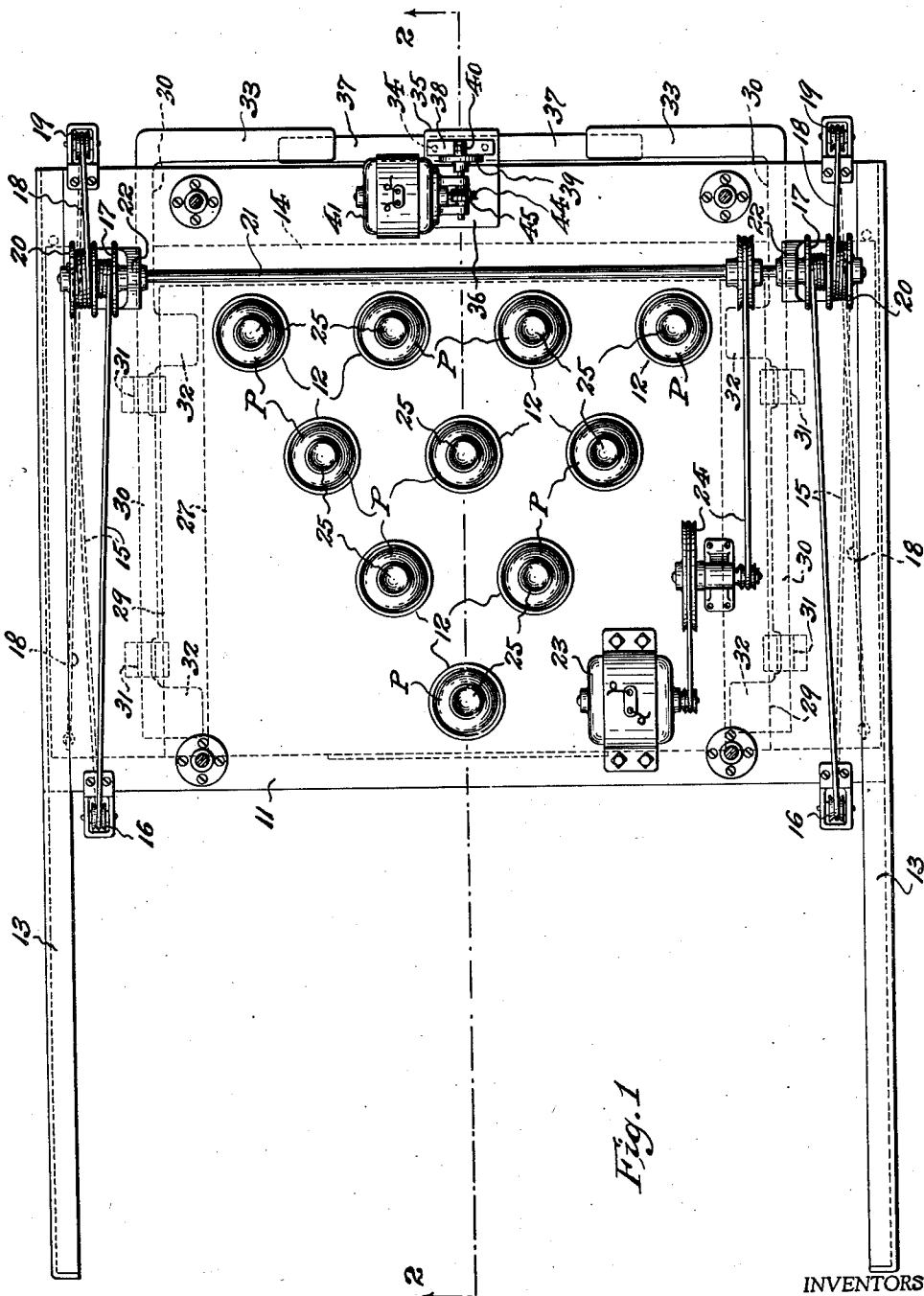


Fig. 1

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5 Sheets-Sheet 2

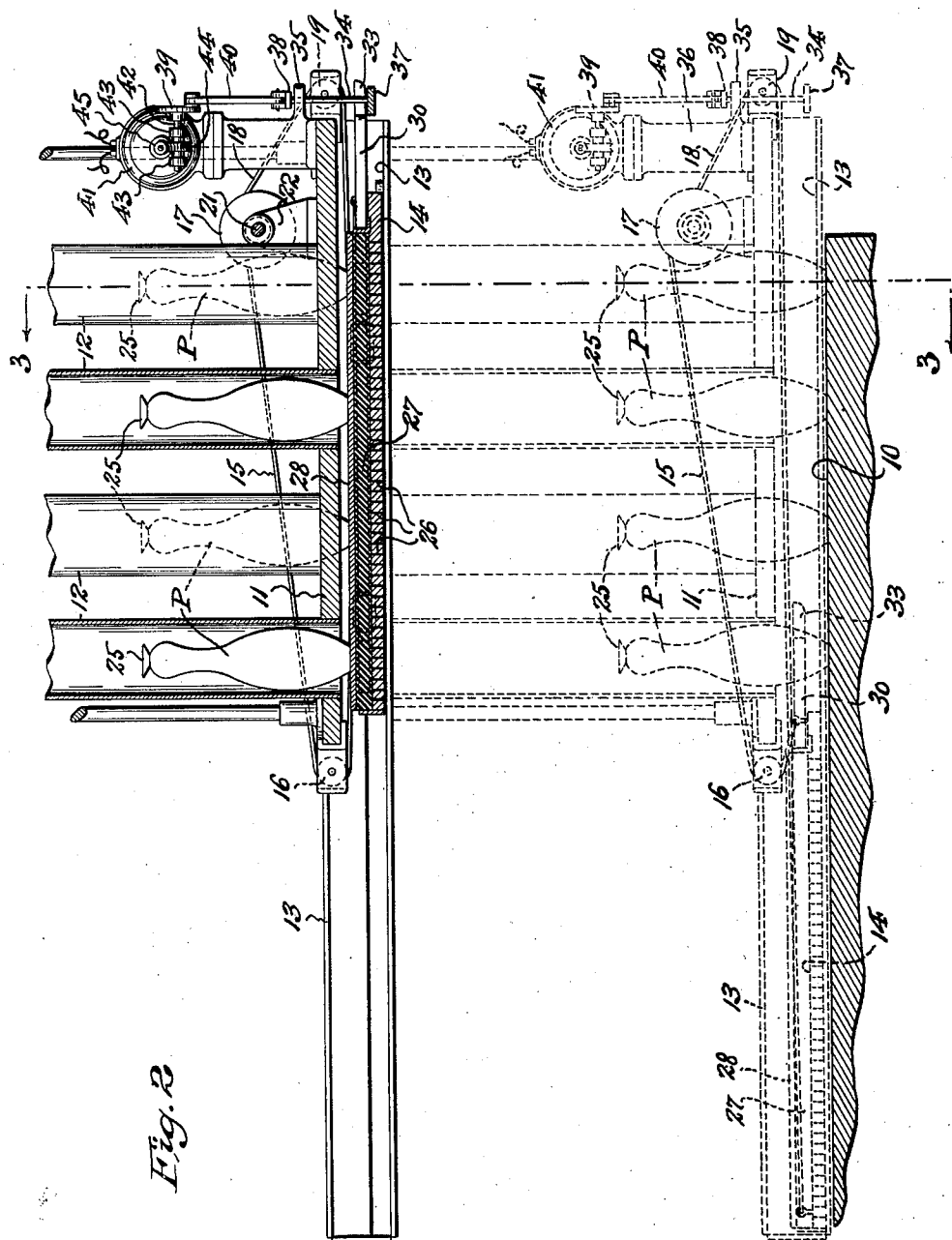


Fig. 2

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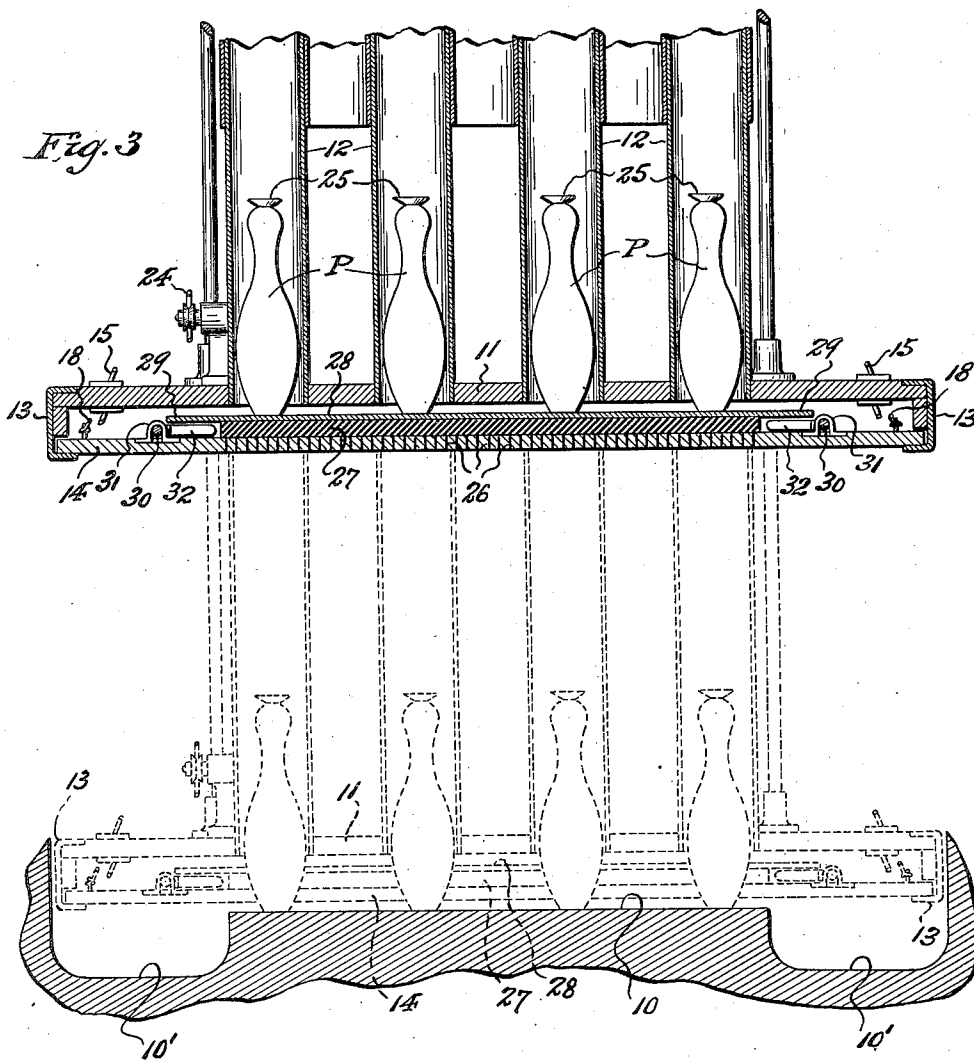
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PIN SPOTTER CARRIAGE FOR PIN SETTING APPARATUS

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5 Sheets-Sheet 3



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PIN SPOTTER CARRIAGE FOR PIN SETTING APPARATUS

Filed April 15, 1944

5 Sheets-Sheet 4

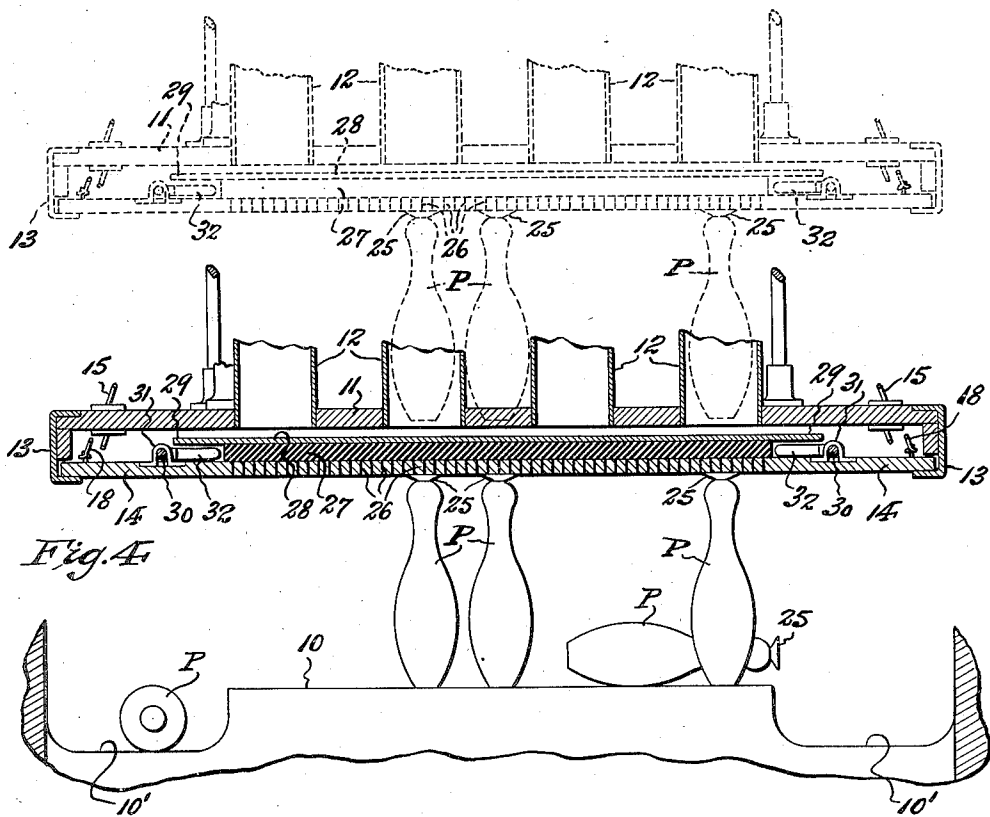


Fig. 4

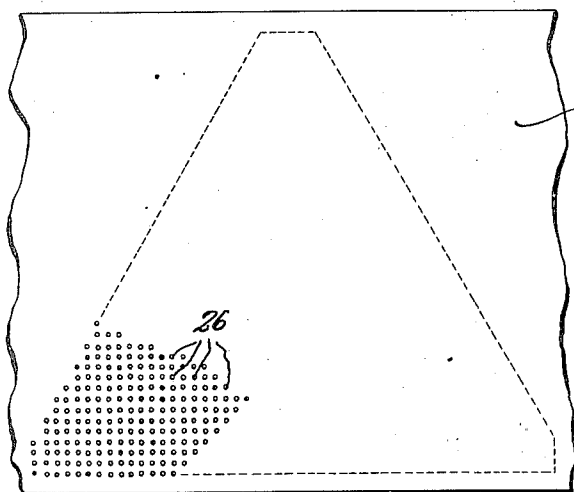


Fig. 6

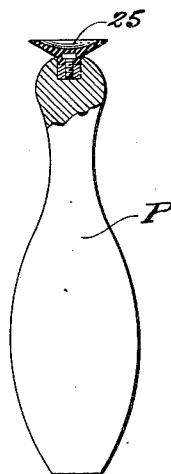


Fig. 7

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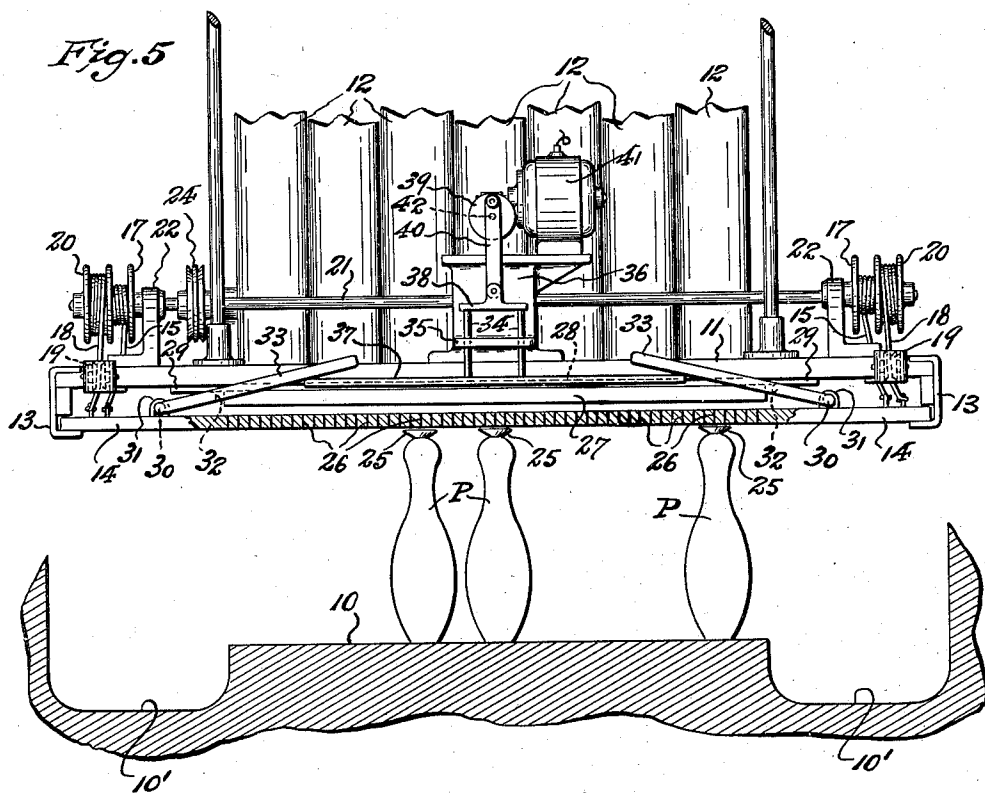
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PIN SPOTTER CARRIAGE FOR PIN SETTING APPARATUS

Filed April 15, 1944

5 Sheets-Sheet 5.



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UNITED STATES PATENT OFFICE

2,445,688

PIN SPOTTER CARRIAGE FOR PIN
SETTING APPARATUS

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Application April 15, 1944, Serial No. 531,164

12 Claims. (Cl. 273—42)

1

This invention relates to improvements in pin setting apparatus for bowling alleys; and the invention has reference, more particularly, to improvements in the pin spotter carriage of pin setting apparatus.

This invention has for an object to provide an improved construction of pin spotter carriage adapted to receive and assemble a complement of pins ready for setting, and thereupon lower the assembled pins and then release the same for deposit upon the alley in upstanding positions thereon and accurately spotted in properly grouped and mutually spaced relation ready for play, and to this end said spotter carriage is provided with means to receive the pins delivered thereto, together with cooperative normally closed movable means to support the received pins until a full complement thereof has been assembled in properly grouped relation, means being provided to open and close said movable supporting means relative to said receiving means, whereby, when the spotter carriage is lowered to pin spotting position and said supporting means is moved to opened position, the accumulated pins are released for deposit upon the alley; said supporting means and the pins being further provided with novel cooperative means for picking up standing pins remaining on the alley after a first ball has been bowled, whereby such pins may be lifted by the carriage and suspended above the alley while "dead wood" is being swept from the alley, and thereupon being operative to release such lifted pins when the carriage is again lowered to reset the same upon the alley ready for the bowling of a second ball in an attempt to knock them down and thus obtain a "spare" score.

In bowling a first ball against a full complement of standing pins, if the player fails to knock down all the pins to obtain a "strike," thus leaving one or more thereof standing so as to require a second ball to be bowled in an attempt to score a "spare," the pins left standing are sometimes shifted out of their initially spotted positions, in which shifted positions they should remain, rather than to be accurately respotted, thereby adding to the hazards of the game and requiring greater exercise of skill by the bowler for "covering" and knocking down the same by the second ball bowled, whereby to obtain the "spare" score. Having this in view, it is a further object of this invention to provide the top ends of the pins with vacuum or suction cups and to provide the movable pin supporting means of the carriage with novel means to engage said

2

cups with suction effect whereby to temporarily lift and suspend standing pins, said latter means including normally sealed or closed vacuum breaker means and means operable to open said vacuum breaker means to release the suction attached pins upon return of the same to upstanding position upon the alley; said vacuum or suction cup engaging portions of the pin supporting means and the cooperating vacuum breaker means being of such form and construction as to operatively engage the vacuum or suction cups of standing pins whatever may be the positions of said pins, that is regardless of whether the latter remain spotted or have shifted out of normal spotted position, and thereupon lift and thereafter return and release the same to stand in the identical positions in which they stood after the first ball was bowled.

Other objects of this invention, not at this time more particularly enumerated, will be understood from the following detailed description of the same.

An illustrative embodiment of this invention is shown in the accompanying drawings, in which—

Fig. 1 is a top plan view of a pin spotter carriage according to this invention; Fig. 2 is a vertical longitudinal sectional view thereof, taken on line 2—2 in Fig. 1, showing the same by full line representation in raised pin receiving position and by dotted line representation in lowered pin depositing and spotting position; and Fig. 3 is a transverse sectional view, taken on line 3—3 in Fig. 2.

Fig. 4 is a transverse sectional view, similar to that of Fig. 3, but showing the carriage by full line representation in lowered position for engaging standing pins remaining after a first bowled ball and by dotted line representation in raised position for lifting and suspending said standing pins to permit removal of "dead wood" from the alley.

Fig. 5 is a rear end elevational view of the carriage, in part section, showing the same lowered to return temporarily removed standing pins to the alley, and showing the vacuum breaker means as operated to release said returned pins.

Fig. 6 is a plan view of the pin suction cup engaging portions of the movable pin supporting means of the carriage.

Fig. 7 is an elevational view in part section of a pin equipped at its top end with a vacuum or suction cup according to this invention.

Similar characters of reference are employed in the above described views, to indicate corresponding parts.

In the drawings, the reference character 10 indicates the pin stand section of a bowling alley surface.

The pin spotter carriage, in an illustrative form thereof as shown, comprises a main platform 11 having pin drop openings therethrough, the grouping and spaced relation of which correspond to the normal grouped positions of pins P when deposited and spotted on the pin stand section 10 of a bowling alley ready for play. Communicating with said pin drop openings, and leading upwardly therefrom to pin delivery and distributing means (not shown), are tubular pin guide members 12.

Connected with the opposite sides of the main platform 11 of the carriage, to extend along the underside thereof, and so as to extend longitudinally beyond an end, preferably the forward end, of said platform, are trackway members 13. Movably mounted in and between said trackway members 13, so as to normally lie in a spaced plane parallel to and beneath the underside of said main platform 11, is a traveling pin supporting means comprising a traveling platform 14.

The main platform 11 is provided with means for producing suitably timed operative traveling movements of the traveling platform 14, said means comprising a pull cable system and actuating means therefor. Suitably attached to the respective marginal side portions of the traveling platform 14, at points adjacent to the rear end of the latter, are propulsive cables 15. These cables 15 extend forwardly beneath the main platform 11 and pass over guide pulleys 16 which are mounted on the forward end of said main platform 11, passing thence rearwardly above said main platform 11 to winding drum members 17 to which they are operatively attached. Suitably attached to the respective marginal side portions of the traveling platform 14, at points adjacent to the forward end of the same, are retractive cables 18. Said cables 18 extend rearwardly beneath the main platform 11 and pass over guide pulleys 19 which are mounted on the rearward end of said main platform 11, passing thence forwardly above the latter to winding drum members 20 to which they are operatively attached. Said winding drum members 17 and 20 are affixed upon a suitably located transverse drum shaft 21 by which said drum members are rotated; said shaft being journaled in and between bearing standards 22 carried by the main platform 11, so as to extend above and across the latter. The relation of the propulsive cables 15 and retractive cables 18 to their respective winding drum members is such that, when said drum members are rotated in one direction, e. g., in clockwise direction as shown, the propulsive cables 15 will be reeled up on their drum members 17, while the retractive cables 18 will be proportionately paid off from their drum members 20, and, conversely, when the winding drum members are rotated in the opposite direction, e. g., in anticlockwise direction as shown, the propulsive cables 15 will be paid off from their drum members 17, while the retractive cables will be reeled up on their drum members 20.

Suitable means is provided for reversibly driving the drum shaft 21 and the winding drums rotated thereby. An illustrative means for this purpose, as shown, comprises a reversible electric motor 23 which is mounted in a suitable location upon the main platform 11 of the spotter carriage. Suitable transmission means 24 of belt and pulley or equivalent type or of any other

suitable type, and preferably designed to effect a desired speed reduction, transmits the power of said motor 23 to the drum shaft 21.

The pin spotter carriage is supported and actuated in any convenient manner for vertical up and down movements from and toward the alley pin stand section 10. Initially the spotter carriage is disposed in uplifted position to receive pins P (see full line representations in Figs. 2 and 3), in which position the traveling platform 14 underlies the main platform 11 so as to close its pin drop openings and thus support the pins P as delivered to the spotter carriage from suitable means, such, e. g., as that disclosed in our United States Letters Patent No. 2,341,475. After a full complement of pins P have been delivered to and accumulated in the spotter carriage, the latter, by suitably timed controlling and actuating means, is caused to descend toward the alley pin stand section 10 so as to be disposed over the latter in position to deposit the pins P thereupon. The spotter carriage having arrived in such pin depositing position, the means for controlling and operating the traveling platform 14 is timed to move the latter forwardly along the trackway members 13 and thus outwardly and away from its initial pin supporting position as aligned beneath the main platform 11. To this end, electric current is delivered to the motor 23 to operate the same in direction to transmit clockwise rotation to the drum shaft 21 and its cable drums 17 and 20, whereby the traveling platform is slid forwardly and outwardly from beneath the main platform 11, thus removing the same from supporting relation to the pins P, and thereby allowing the latter to drop through the pin drop openings of the main platform 11 so as to be deposited upon and stand on the alley pin stand section 10 (see dotted line representations in Figs. 2 and 3).

The pins having been thus deposited and spotted on the alley pin stand section 10, the spotter carriage controlling and operating means functions to return the carriage to initial uplifted position, and, when the standing pins are cleared, the motor 23 is reversed to transmit anticlockwise rotation to the drum shaft 21 and its cable drums 17 and 20, whereby to retract the traveling platform 14 to normal initial pin supporting position beneath the main platform 11.

If after the first ball is bowled, some pins are knocked over and other pins left standing, the alley must be cleared of fallen pins or "dead wood," leaving the standing pins for attack by a second bowled ball. To permit clearing away of the "dead wood," the standing pins must be lifted out of the way, and after the alley is cleared, returned to standing position so as to occupy the same positions, either spotted or shifted, in which they were left when missed by the first ball bowled. The novel means according to this invention, for so temporarily lifting and removing the standing pins from the alley while "dead wood" is removed from the latter, and then returning said pins to standing position on the alley, comprises the following cooperating agencies:

Each pin P is provided at its top end, and in axial alignment therewith, with an upwardly presented vacuum or suction cup 25, which may be securely affixed to the pin end in any suitable manner. The suction cups 25 of standing pins to be temporarily removed from the alley pin stand section 10 are adapted to be adherently engaged by the under or exterior face of the traveling platform 14, when the latter is brought

5

into pressure contact therewith. Means is provided in association with the traveling platform 14 for breaking, at proper times, the vacuum or suction adherence of the pin suction cups 25 to the traveling platform 14, whereby to release the engaged pins. To this end, that portion of the area of the traveling platform 14 which, when said traveling platform occupies its normal retracted position beneath the main platform 11 of the spotter carriage, overlies the area of alley pin stand section 10 occupied by a full complement of standing pins P, is provided with a multiplicity of closely spaced air admission passages 26 extending therethrough from the upper to the under face of said traveling platform. Mounted on the upper face of said traveling platform 14, to overlie the entire perforate section or area thereof formed by the multiplicity of air admission passages 26, is a sealing blanket 27. This sealing blanket 27 comprises a sheet of resilient air impervious material, such, e. g., as a gelatiniferous material, soft rubber or compound thereof, or rubbery material. Said sealing blanket 27 is adhesively affixed to the underside of a rigid carrier plate 28, such, e. g., as a plate or sheet of metallic or other rigid material. Said carrier plate 28 is of a width exceeding the width of said sealing blanket 27, so as to provide along opposite side margins of the latter, freely projecting marginal portions of said carrier plate which constitute lift portions 29 which overhang areas of the traveling platform 14 outwardly of the perforate section of the latter. This carrier plate 28 also provides a smooth upper surface for opposition to the pins disposed in the drop out openings of the main platform 11 whereby to support said pins, and yet so as to be withdrawable therefrom by forward movement of the traveling platform 14, whereby to release said pins for initial deposit upon the alley pin stand section 10.

Gravitation of said sealing blanket 27 and its carrier plate 28 toward the traveling platform 14 normally holds said sealing blanket in sealing relation to the air admission passages 26 whereby to close the latter against the passage of air there-through.

After a first ball has been bowled against a full complement of pins P and has left standing pins, the spotter carriage is again lowered, while the traveling platform 14 is retained in normal retracted position. As the spotter carriage thus descends, said traveling platform 14 is brought into engagement with the vacuum or suction cups 25 of the standing pins, and by pressure upon the same drives out the air trapped therein, so as to create a vacuum therein and thereby cause external atmospheric pressure to effect adherence of the cups to the underface of said traveling platform 14 (see full line representation in Fig. 4). The standing pins P being thus engaged, the spotter carriage is again caused to return to normal uplifted position, carrying said adhering standing pins therewith, so as to suspend the same above the alley pin section 10 and bordering alley gutters 10', while suitable "dead wood" sweep means (not shown) is actuated to remove therefrom any fallen pins remaining thereon (see dotted line representation in Fig. 4).

After the "dead wood" has been removed, the spotter carriage is again caused to descend, whereby to return the temporarily removed standing pins for redeposit upon the alley pin stand section 10, in exactly the same positions from which they were temporarily removed. Upon such redeposit of said standing pins P,

6

means is provided to break the vacuum within their vacuum or suction cups 25, so as to release the same from adhered relation to the traveling platform 14, and thus to leave them standing on the alley pin section when, thereafter, the spotter carriage is again returned to normal uplifted position. Such breaking of the vacuum within the suction cups 25 is effected by lifting the sealing blanket 27 away from the perforate section of the traveling platform so that air may pass through air admission passages 26 which communicate with said suction cup interiors. Suitable means is provided for lifting the sealing blanket at the proper time. One illustrative form thereof as shown comprises rock bars 30 bordering opposite sides of the sealing blanket 27 and its carrier plate 28, the same being journaled in bearings 31 affixed to the upper side of the traveling platform 14. Said rock bars 30 are provided with lifting lever portions 32 which extend beneath and so as to normally flatly underlie the lift portions 29 of the sealing blanket carrier plate 28. Said rock bars 30 extend rearwardly beyond the rear ends of the traveling platform 14 and main platform 11, and terminate in angular actuating lever members 33, which extend inwardly one toward the other. Mounted on the rear end portion of the main platform 11 is means for effecting suitably timed upswinging movements of said rock bar actuating lever members 33. An illustrative form of such means includes a vertically reciprocable frame 34 slidable in a guide means 35 provided in connection with a bracket or standard 36 affixed to the rear end portion of the main platform 11 of the spotter carriage. Said frame 34 is provided at its lower end with a bottom cross-head 37, the respective opposite free end portions of which underlie the respective free end portions of the actuating lever members 33. Said frame 34 is provided at its upper end with a top cross-head 38. Located above said frame 34 is a rotatable crank member or wheel 39, the arm of which is connected with said top cross-head 38 of the frame 34 by a link 40. Suitable means is provided for effecting rotation of the crank member or wheel, under properly timed control. As shown, this means comprises an electric motor 41 as a power source; said motor being supported by the aforesaid bracket or standard 36. The shaft 42 which carries the crank member or wheel 39 is journaled in suitably supported bearing means 43, and affixed on said shaft 42 is a worm wheel 44 with which meshes a driving worm 45 carried by the motor armature shaft, thus providing transmission means of speed reduction type for transmitting the power of the motor to said crank member or wheel 39. Under suitably arranged motor circuit control and timing means, the motor is energized and operated to produce one complete revolution of the crank member or wheel 39 after the spotter carriage is lowered to redeposit the temporarily removed standing pins upon the alley pin stand section 10. Said rotation of the crank member or wheel 39 first operates to draw upward the frame 34 whereby to upwardly move its bottom cross-head 37 and thereby cause upswinging movement of the lever members 33 which operate to simultaneously rotate the respective rock bars 30 and thus upswing the lifting lever portions 32. The upswinging movement of said lifting lever portions 32 engages the same with the lift portions 29 of the sealing blanket carrier plate 28, thus raising the sealing blanket 27 away from the air admission passages 26, and allowing

air to gain access to the interior of said standing pin vacuum or suction cups 25, whereby the vacuum thereof is broken and the suctional adherence thereof to the underside of the traveling platform 14 released (see Fig. 5). As this occurs, and before the crank member or wheel 39 completes its revolution, the spotter carriage is started back for return to normal initial uplifted position, whereafter upon completion of the revolution of the crank member or wheel 39, the frame 34 and its bottom cross-head 37 are lowered to normal initial position, to disengage the lever members 33, and thereby to permit the rock-bars 30 and their lifting lever portions 32 to swing down to normal position, thus returning the sealing blanket 27 to its closed relation to the air admission openings 26. Thereafter, when the spotter carriage regains its uplifted position, the apparatus is again ready for repetition of the cycle of operations whereby a full complement of pins collected in the spotter carriage may be again deposited on the alley pin section 10, then bowled against by a first ball, any standing pins remaining thereafter being temporarily removed while "dead wood" is swept away, and then redeposited ready for bowling of a second ball.

It will be obvious that should pins left standing on the alley pin stand section 10 after a first ball has been bowled be shifted out of initial spotted positions, the traveling platform 14, when lowered to engage their suction cups 25, will do so whatever their shifted position may be, and the thus engaged pins will be lifted from and returned exactly to such shifted positions. Since the area of closely spaced air admission openings 26 is coextensive with the alley pin stand section 10, when such shifted pins are engaged there will always be some said air admission openings 26 in communication with their suction cup interiors, so that, when the pins are returned to the shifted positions from which they were lifted, and the sealing blanket 27 removed to open said communicating air passages, air may flow into the suction cup interiors to releasably break the vacuum under which they are adhered to the traveling platform 14.

Having now described our invention, we claim:

1. In pin setting apparatus, a vertically reciprocable pin spotter carriage having pin receiving means and means to release said pins for deposit in standing position upon an alley pin stand section when said carriage is lowered to pin spotting position, a set of pins, each pin having an upwardly presented suction cup at its top end, said carriage having means to adherently engage the suction cups of standing pins when the carriage is lowered toward said pins whereby, upon a succeeding upward movement of said carriage, to suspend said standing pins above the alley pin stand section while "dead wood" is swept from the alley, suction cup vacuum breaker means operative to release said engaged suction cups, and means to operate said vacuum breaker means when a succeeding downward movement of said carriage redeposits said standing pins upon the alley pin stand section.

2. In a pin setting apparatus, a vertically reciprocable pin spotter carriage having pin receiving means provided with pin drop openings, trackway means along the sides of said carriage, a traveling platform supported by said trackway means to normally underlie and close said pin drop openings against passage of pins there-through but movable to open said openings to per-

mit passage of pins therethrough for deposit in standing position upon an alley pin stand section when the carriage is lowered to pin spotting position, means to operate said traveling platform, a set of pins, each pin having an upwardly presented suction cup at its top end, the suction cups of standing pins being adapted to be adherently engaged by said traveling platform when said spotter carriage is lowered toward said standing pins whereby, upon a succeeding upward movement of said carriage, to suspend said standing pins above the alley pin stand section while "dead wood" is swept from the alley, suction cup vacuum breaker means operative to release said cups from adherent attachment to said traveling platform, and means to operate said vacuum breaker means when a succeeding downward movement of said carriage redeposits said standing pins upon the alley pin stand section.

3. In a pin setting apparatus, a vertically reciprocable pin spotter carriage having pin receiving means provided with pin drop openings, trackway means along the sides of said carriage, a traveling platform supported by said trackway means to normally underlie and close said pin drop openings against passage of pins therethrough but movable to open said openings to permit passage of pins therethrough for deposit in standing position upon an alley pin stand section when the carriage is lowered to pin spotting position, means to operate said traveling platform, a set of pins, each pin having an upwardly presented suction cup at its top end, the suction cups of standing pins being adapted to be adherently engaged by said traveling platform when said spotter carriage is lowered toward said standing pins whereby, upon a succeeding upward movement of said carriage, to suspend said standing pins above the alley pin stand section while "dead wood" is swept from the alley, suction cup vacuum breaker means operative to release said cups from adherent attachment to said traveling platform, and means to operate said vacuum breaker means when a succeeding downward movement of said carriage redeposits said standing pins upon the alley pin stand section, said vacuum breaker means and operating means therefor comprising the provision of a multiplicity of closely spaced air passages through said traveling platform in an area thereof opposed to and substantially coextensive with the alley pin stand section, a sealing blanket of resilient air impervious material superposed on said traveling platform to normally close said air passages, and means to lift said sealing blanket whereby to open said air passages.

4. In a pin setting apparatus, a vertically reciprocable pin spotter carriage having pin receiving means provided with pin drop openings, trackway means along the sides of said carriage, a traveling platform supported by said trackway means to normally underlie and close said pin drop openings against passage of pins therethrough but movable to open said openings to permit passage of pins therethrough for deposit in standing position upon an alley pin stand section when the carriage is lowered to pin spotting position, means to operate said traveling platform, a set of pins, each pin having an upwardly presented suction cup at its top end, the suction cups of standing pins being adapted to be adherently engaged by said traveling platform when said spotter carriage is lowered toward said standing pins whereby, upon a succeeding upward movement of said carriage, to suspend said

standing pins above the alley pin stand section while "dead wood" is swept from the alley, suction cup vacuum breaker means operative to release said cups from adherent attachment to said traveling platform, and means to operate said vacuum breaker means when a succeeding downward movement of said carriage redeposits said standing pins upon the alley pin stand section, said vacuum breaker means and operating means therefor comprising the provision of a multiplicity of closely spaced air passages through said traveling platform in an area thereof opposed to and substantially co-extensive with the alley pin stand section, a sealing blanket of resilient air impervious material superposed on said traveling platform to normally close said air passages, a carrier plate superposed on and affixed to said sealing blanket, said carrier plate having free marginal lifting portions, oscillatable lever means to engage said lifting portions, and means supported on said spotter carriage for actuating said lever means.

5. In a pin setting apparatus, a vertically reciprocable pin spotter carriage comprising a main platform having pin receiving means provided with pin drop openings, trackway members affixed to opposite sides of said main platform to extend therealong and to project beyond an end thereof, a traveling platform slidably supported by and between said trackway members to normally underlie said main platform whereby to close the pin drop openings thereof, means to move said traveling platform back and forth along the trackway members, a set of pins, each pin having an upwardly presented suction cup at its top end, the suction cups of standing pins being adapted to be adherently engaged by the underside of said traveling platform when the latter occupies an interposed position between said pins and said main platform and said carriage is lowered toward said pins whereby, upon succeeding upward movement of said carriage, to suspend said standing pins above the alley pin stand section while "dead wood" is swept from the alley, and means to release said suction cups from adherent engagement with said traveling platform when a succeeding downward movement of said carriage redeposits said standing pins upon the alley pin stand section.

6. In a pin setting apparatus, a vertically reciprocable pin spotter carriage comprising a main platform having pin receiving means provided with pin drop openings, trackway members affixed to opposite sides of said main platform to extend therealong and to project beyond an end thereof, a traveling platform slidably supported by and between said trackway members to normally underlie said main platform whereby to close the pin drop openings thereof, means to move said traveling platform back and forth along the trackway members, a set of pins, each pin having an upwardly presented suction cup at its top end, the suction cups of standing pins being adapted to be adherently engaged by the underside of said traveling platform when the latter occupies an interposed position between said pins and said main platform and said carriage is lowered toward said pins whereby, upon succeeding upward movement of said carriage, to suspend said standing pins above the alley pin stand section while "dead wood" is swept from the alley, and means to release said suction cups from adherent engagement with said traveling platform when a succeeding downward movement of said carriage redeposits said standing

pins upon the alley pin stand section, said latter means comprising the provision of a multiplicity of closely spaced air passages through said traveling platform in an area thereof opposed to and substantially coextensive with the alley pin stand section, a sealing blanket of resilient air impervious material superposed on said traveling platform to normally close said air passages, and means to lift said sealing blanket whereby to open said air passages.

7. In a pin setting apparatus, a vertically reciprocable pin spotter carriage comprising a main platform having pin receiving means provided with pin drop openings, trackway members affixed to opposite sides of said main platform to extend therealong and to project beyond an end thereof, a traveling platform slidably supported by and between said trackway members to normally underlie said main platform whereby to close the pin drop openings thereof, means to move said traveling platform back and forth along the trackway members, a set of pins, each pin having an upwardly presented suction cup at its top end, the suction cups of standing pins being adapted to be adherently engaged by the underside of said traveling platform when the latter occupies an interposed position between said pins and said main platform and said carriage is lowered toward said pins whereby, upon succeeding upward movement of said carriage, to suspend said standing pins above the alley pin stand section while "dead wood" is swept from the alley, and means to release said suction cups from adherent engagement with said traveling platform when a succeeding downward movement of said carriage redeposits said standing pins upon the alley pin stand section, said latter means comprising the provision of a multiplicity of closely spaced air passages through said traveling platform in an area thereof opposed to and substantially coextensive with the alley pin stand section, a sealing blanket of resilient air impervious material superposed on said traveling platform to normally close said air passages, a carrier plate superposed on and affixed to said sealing blanket, said carrier plate having free marginal lifting portions, oscillatable lever means to engage said lifting portions, means to pivotally support said lever means on said traveling platform, and means supported on said main platform for actuating said lever means.

8. In a pin setting apparatus having pin spotter carriage means as defined in claim 5 wherein the means for moving the traveling platform thereof comprises propulsive cable means attached to said traveling platform to extend in one direction therefrom, retractive cable means attached to said traveling platform to extend in the opposite direction therefrom, and winding drum means for said cable means mounted on the main platform of the spotter carriage, the relation of said cable means to said winding drum means being such that when said propulsive cable means is taken up by said drum means the retractive cable means will be simultaneously paid off therefrom and vice versa.

9. In a pin setting apparatus having pin spotter carriage means as defined in claim 5 wherein the means for moving the traveling platform thereof comprises propulsive cable means attached to said traveling platform to extend in one direction therefrom, retractive cable means attached to said traveling platform to extend in the opposite direction therefrom, winding drum means for said cable means mounted on the main platform

11

of the spotter carriage, the relation of said cable means to said winding drum means being such that when said propulsive cable means is taken up by said drum means the retractive cable means will be simultaneously paid off therefrom and vice versa, and means for rotating said drum means including a reversible power drive therefor.

10. In a pin setting apparatus having a pin spotter carriage means as defined in claim 7 wherein the means for moving the traveling platform thereof comprises propulsive cable means attached to said traveling platform to extend in one direction therefrom, retractive cable means attached to said traveling platform to extend in the opposite direction therefrom, winding drum means for said cable means mounted on the main platform of the spotter carriage, the relation of said cable means to said winding drum means being such that when said propulsive cable means is taken up by said drum means the retractive cable means will be simultaneously paid off therefrom and vice versa, and means for rotating said drum means including a reversible power drive, therefor.

11. In a pin setting apparatus, a vertically reciprocable pin spotter carriage and a set of pins to be handled thereby, each pin of said set having a suction cup affixed to its top end, said carriage having means to adherently engage suction cups of standing pins so that the latter may be lifted and suspended above the alley pin stand section while "dead wood" is swept from the alley

12

and thereafter returned by said carriage to the standing positions upon the alley from which they were thus temporarily removed.

12. In a pin setting apparatus, a vertically reciprocable pin spotter carriage and a set of pins to be handled thereby, each pin of said set having a suction cup affixed to its top end, said carriage having means to adherently engage suction cups of standing pins so that the latter may be lifted and suspended above the alley pin stand section while "dead wood" is swept from the alley and thereafter returned by said carriage to the standing positions upon the alley from which they were thus temporarily removed, and means operative to release the suction cups of the thus returned standing pins from adhered relation to said latter means, whereby the carriage free of such pins may be returned to normal uplifted position.

JOSEPH PARRA.
WILLIAM WHITE.

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