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1,584,030

W. H. GRAY

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4 Sheets-Sheet 2

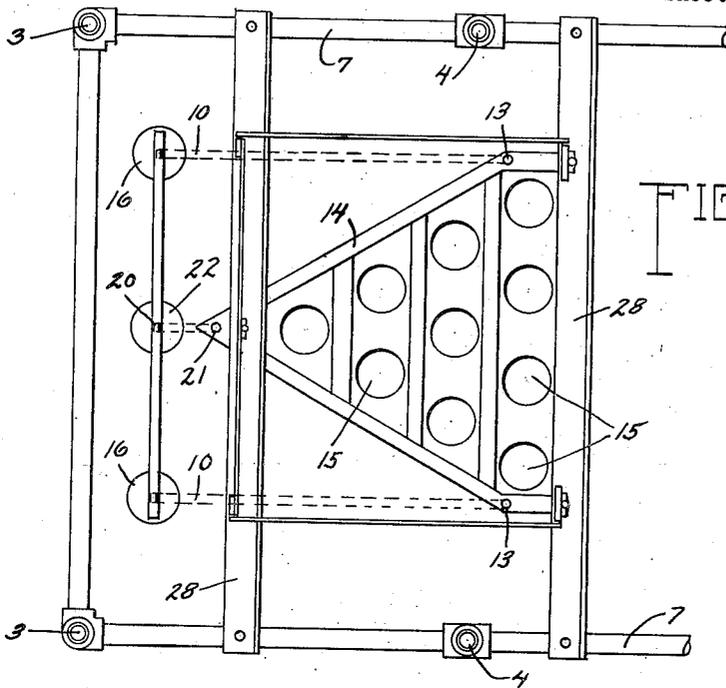


FIG. 2

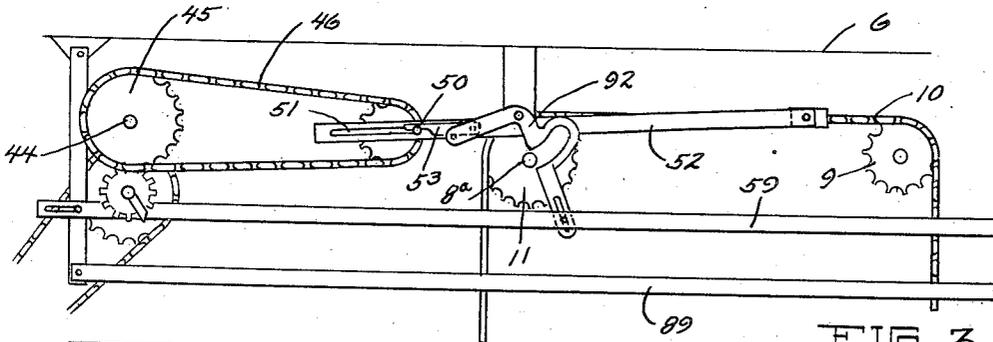


FIG. 3

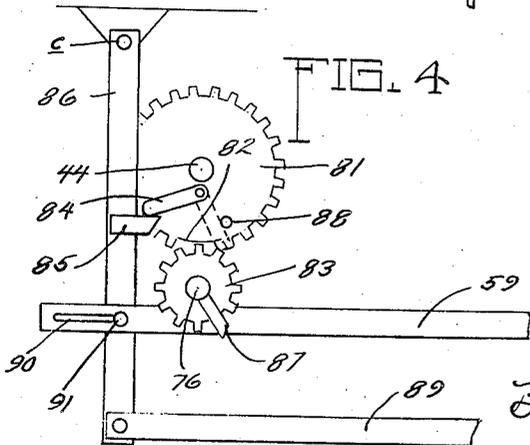


FIG. 4

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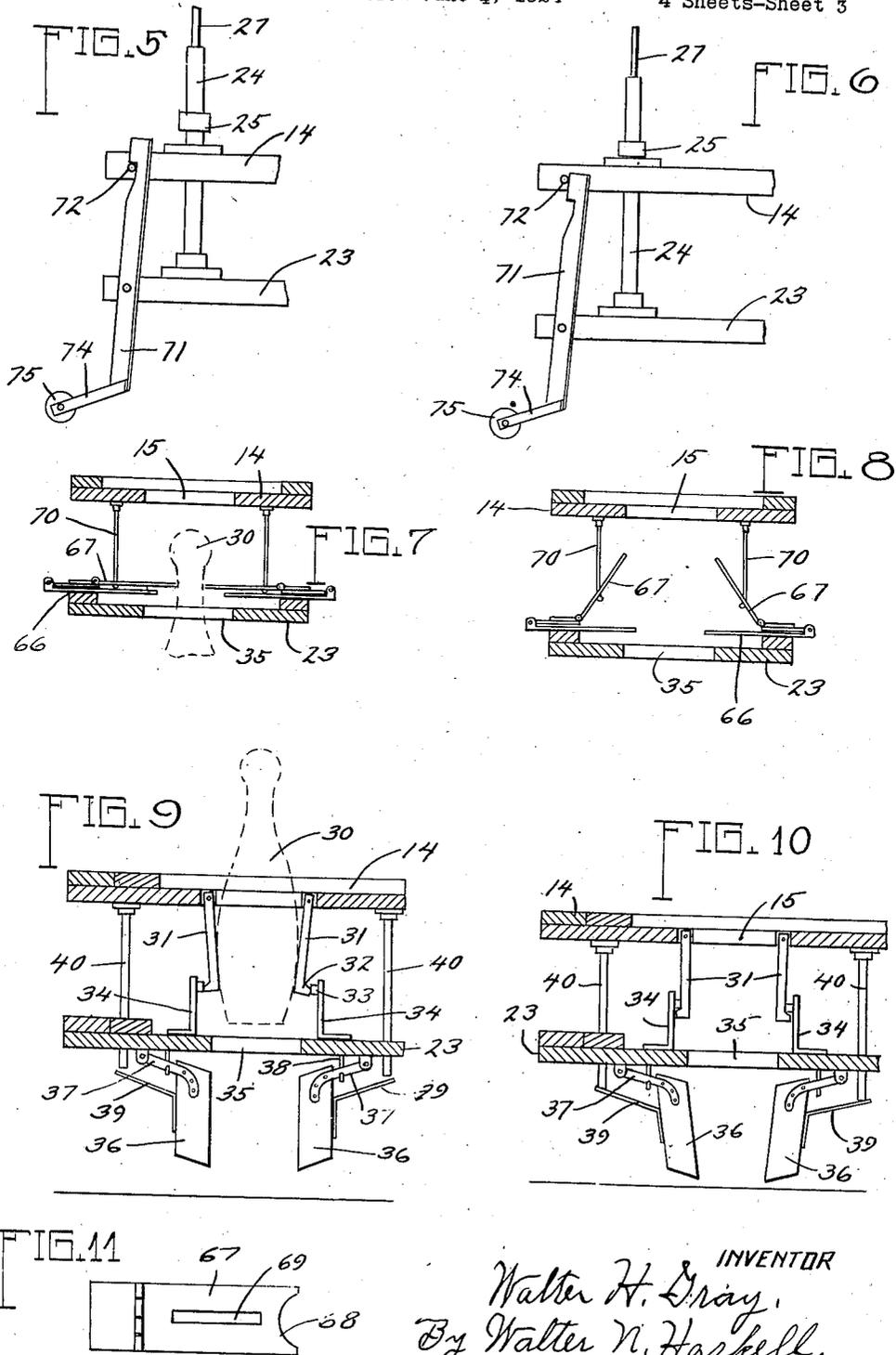
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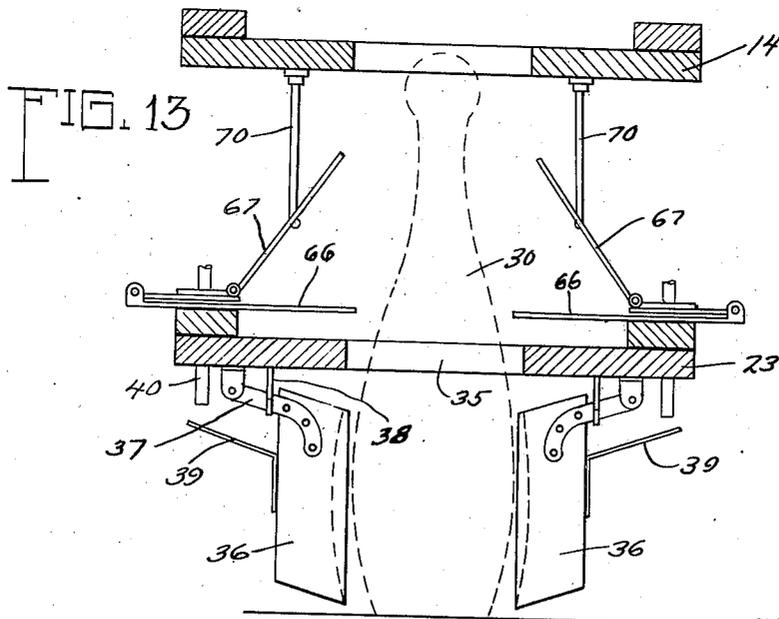
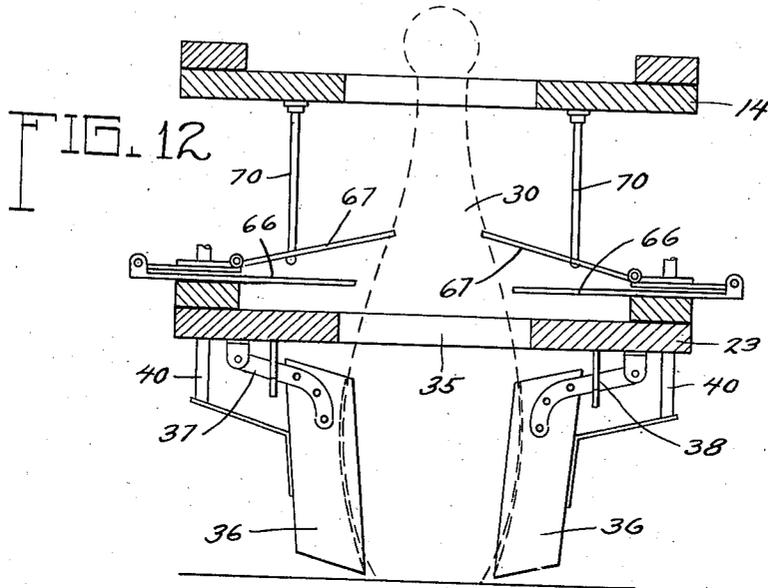
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# UNITED STATES PATENT OFFICE.

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## PIN-SETTING MECHANISM FOR BOWLING ALLEYS.

Application filed June 4, 1924. Serial No. 717,838.

My invention pertains to a pin-setting mechanism for bowling-alleys, and has for its purpose to automatically place in position the set of pins which is to be used in playing the game. It is more specially designed for use with machines whose function it is to remove the pins from the end of the alley, after having been used, and elevate them to a point for delivery to a pin-setting machine, such as is set forth in my former application for Letters Patent of the United States filed January 24, 1924, Serial No. 688,316. It is also designed to use the same with automatic ball return mechanism, and pin sweeping devices, such as are known in the art.

The chief purpose of the device is to provide a pair of spaced-apart setting frames which will convey a set of pins to a desired distance from the floor of alley, and deliver the same upon their several spots, the release of the pins from the frames, and proper spotting thereof being accomplished by a change in the spacing of the frames.

Another purpose thereof is the provision of auxiliary mechanism, by means of which the pins which remain standing, if any, after the first ball has been rolled, may be temporarily removed, while the dead wood is being swept from the alley, and then replaced on their proper spots, ready for the next ball.

Another object thereof is the provision of means for steadying the pins, when they are positioned on the alley, which will prevent their toppling over after the removal of the frames therefrom.

Another feature thereof is the provision of mechanical structures, by the use of which the various movements of the machine may be controlled, and the frames lowered to a greater or less distance from the floor of the alley, as desired.

The particular construction, arrangement, and operation of the various parts of the device will more fully appear in the following specification taken in connection with the accompanying drawings, in which:

Fig. 1 shows the machine in side elevation.

Fig. 2 is a horizontal section on the broken line 2—2 of Fig. 1.

Fig. 3 is a detail of a part of the driving mechanism, in side elevation.

Fig. 4 is a detail of the shift mechanism for operating devices, to start or stop the same.

Figs. 5 and 6 show one of the frame locking devices, in locking and released positions, respectively.

Figs. 7 and 8 are details, in section, of the pin grappling mechanism.

Figs. 9 and 10 are details, in section, of the pin receiving and setting devices.

Fig. 11 is a plan view of the plate 67, detached.

Figs. 12 and 13 are enlarged details of the pin spotting and steadying devices.

Similar parts are indicated by corresponding reference numbers throughout the several figures.

Referring first to Fig. 1, the reference number 1 indicates the floor line, and 2 one of the alley partitions, upon which is supported a frame-work, comprised of standards 3, 4, and 5, at the upper ends of which is a plate 6, which in some cases might constitute the ceiling of the room. Said standards are united by braces 7. It will be understood that the frame-work just described will be duplicated on the next adjacent partition, and that the invention is installed between said sets of frame-work, above the end of the alley. Supported from the plates 6 are hangers 8, in which is rotatably mounted a shaft 8<sup>a</sup>, upon which is fixed a pair of sprocket-wheels 9, over which pass sprocket-chains 10, said chains also passing over sprocket-wheels 11 on a shaft 12, rotatably supported in the supports 4. The rear ends of said chains are connected by rods 13 with a frame 14, provided with pin openings 15, (Fig. 2) and the forward ends of said chains have weights 16 attached thereto.

Beneath the frame 14 is supported a frame 23, of similar shape and size, and provided with pin openings coinciding in position with those in the frame 14. Said lower frame is suspended by means of rods 24, slidable in openings in the frame 14, and provided with collars 25, which limit the downward movement of the frame 23, with relation to the frame 14, and determines the normal spacing of said frames.

Attached to the upper ends of the rods 24 are smaller rods 27, passing upwardly through openings in cross-plates 28 supported on the braces 7. The rods 24 are preferably three in number, one thereof being provided near each corner of the triangular frames, and the rods 27 are similarly disposed, one of said rods being in the center

near the front of the machine, and the other two spaced apart, and further to the rear. Each of the rods 27 is provided at its upper end with a button 29, which buttons come in contact with the cross-plates 28, and arrest the movement of the lower frame 23, within a desired distance from the floor of the alley. The frame 14, which is assumed to be loaded with pins at this time, continues to move downwardly, reducing the space between the two frames, and operating the mechanism by means of which the pins are released and placed on their proper spots.

A set of the pins is delivered to the frame 14 when the frames are in elevated position, as shown in Fig. 1, the delivery of the pins being such that one each thereof is introduced into one of the openings 15, with its large end downwardly, as indicated at 30 in Fig. 9. The downward movement of the pin is arrested, however, by means of arms 31, pivoted to the frame 14 at the sides of opening, and provided at their lower ends with lugs 32 which are normally in engagement with projections 33 on supports 34 fixed on the frame 23. As the frame 23 stops and the frame 14 continues to move downwardly, the lugs 32 slip past the projections 33, permitting the arms 31 to swing outwardly, and releasing the pin, which drops downwardly to the floor. As the frames 14 and 23 are moved upwardly again the upper frames precedes the lower one until such frames regain their normal spacing, the upper inclined edges of the lugs 32 causing them to move automatically inward, returning the arms 31 to a position for interrupting the pin. While the arms 31 are shown as being diametrically opposed to one another, they are preferably three in number, and spaced so as to permit of the installation of a pair of pin grappling devices hereinafter set forth.

As the pins 30 drop downwardly they pass through openings 35 in the frame 23, at the sides of which are swingingly mounted spotting devices 36, by means of arms 37, pivotally attached to the lower face of the frame. The downward movement of said arms is limited by stops 38 fixed to the frame 23, and permitting the spotters to swing outwardly so as to permit free passage of the pin, as shown in Fig. 9. Fixed to each of said spotters is a resilient plate 39, adapted for engagement by the lower ends of rods 40, fixed to the frame 14, and vertically movable in openings in the frame 23. As the spacing between the frames is reduced the rods 40 come in contact with the plates 39, operating to swing the spotters inwardly, adjusting the position of the pin, if it is not squarely in place on its proper spot, until it is so positioned. As the frames are elevated again, the upward movement of the frame 14, preceding that of the frame 23,

releases the rods 40 from engagement with the plates 39, and the spotters swing outwardly away from the pin 30.

The spotters 36 also are shown as being diametrically opposed, but three of such devices are also made use of, preferably stationed just below the arms 31. The inner faces of said spotters are also recessed to conform to the shape of the pin 30, as shown in broken lines in Figs. 12 and 13.

Supported in rear of the pin-setting mechanism is a frame-work 42, from which depends a hanger 43, in which is journaled a shaft 44, on which is fixed a sprocket-wheel 45, connected by a sprocket-chain 46 with a similar wheel 47 fixed on a shaft 48, rotatably mounted in a hanger 49. (Fig. 1.) On the inner face of the chain 46 is fixed a pin 50, slidable in a slot 51 in one end of a bar 52, the other end of which is pivoted to the inner face of one of the chains 10. The pin 50 is held normally in the rear end of the slot, as shown in Fig. 3, by means of a latch 53, pivoted to the bar 52. Each cycle of movement of the chain 46 carries the bar 52 rearwardly, moving the chain 10 and parts associated therewith, including the opposite chain 10 and chain 20, serving to lower the pin-setting frames and their load to the desired point near the floor, and return said frames to their elevated position, ready to be filled again.

It frequently occurs that only a part of the bowling pins are upset upon the delivery of the first ball, but it is desired to sweep the same from the alley before another shot is fired, by mechanical or other means. I make it possible to do this by providing auxiliary devices, also carried by the frames 14 and 23, and actuated thereby, which grapple the necks of any pin or pins left standing upon the alley, and raise them to a sufficient height to permit the alley to be swept of the dead-wood. In this operation it is desired that the frames stop at a greater distance from the floor than when the pins are being set, and this is accomplished with the frame 23 by arresting the downward movement of the rods 27 at a greater height from the floor than has been hereinbefore described therefor. The movement of the rear pair of rods 27 is interrupted by means of a frame 54, rockingly mounted on the cross-plate 28, and carrying catches 55, adapted to be brought into the path of the heads 29 on said rods, and support the same. On the forward plate 28 is rockingly mounted on arm 57, carrying a catch 58 for engagement with the button on the end of the adjacent rod 27. Fixed to the frame-work 6 above the forward cross-plate 28 is a hanger 60, in which is supported a shaft 61, to which is secured an arm 62. Connected with said arm is an operator's rod 59 extending lengthwise of the machine, and said

arm is also connected by a link 63 with a rod 64 attached to the arm 57. By shifting the rod 59 the arm 57 is rocked to bring the catch 58 into operative position. The frame 54 is simultaneously rocked by means of a bar 65 connecting the arm 57 with such frame, so as to also throw the catches 55 into engaging position.

Supported on cross-pieces on the frame 23, on opposite sides of the openings 35, are plates 66, to which are hinged plates 67, having recesses 68 in their ends, and provided with slots 69 in which travel pins 70, fixed to the lower face of the frame 14. The lower ends of said pins are headed, so as to prevent the release of the pins from the slots. The ends of the plates 66 are also recessed, so as to permit the passage of the pins 30 downwardly therethrough. When the frames 14 and 23 are at their normal spacing the plates 67 are held in an inclined position by the pins 70, as shown in Fig. 8, but upon such space being reduced, as shown in Fig. 7, the inner ends of the plates move downwardly, as shown in said last-named figure, and if a pin is in the opening 35 the plates 67 partially encircle the same, so that upon the frames being raised such plates will engage the head of the pin, and raise it from the floor. To hold the frames during this operation in the spaced position shown in Fig. 7 catches 71 are pivoted to the frames 14, and adapted for engagement with pins 72 on the frame 14, in which position they are held by springs 73. The lower ends of the latches 71 are provided with arms 74, carrying rollers 75 which come in contact with the floor when the frames are lowered to a position for setting the pins, and prevent the latches from engaging the pins 72.

After the frames are lowered to a distance to permit of the plates 67 grappling the heads of the bowling pins, and the frames have been elevated to their normal position the alley beneath such pins can be swept. The catches 55 and 58 are then thrown out of engaging position and the frames again lowered, this time to setting position, and the pins replaced on the alley in their proper positions. The rollers 75 come in contact with the floor, releasing the latches 71, and the frame 14 moves upwardly in advance of the frame 23. The frame 14 is then supplied with a fresh set of pins, ready for lowering to the floor.

It is essential that when the movement of the frame 23 is arrested at such a height from the floor as will permit of the grappling of the pins by the plates 67, the movement of the frame 14 should be proportionately reduced, and this is accomplished by raising the latch 53, Fig. 3, permitting the pin 50 to move the length of the slot 51 before it begins to move the bar 52. This is

preferably done in connection with shifting devices hereinafter set forth.

In the pin-setting operation at the same time as the spotter 36 close in upon the pins 30, the plates 67 are lowered until they rest on the shoulders of the pins, as shown in Fig. 12. All tendency of the pin to wobble in its position and topple over when the frames are raised, is thereby prevented.

Beneath the shaft 44 is journaled a shaft 76, on which is fixed a sprocket-wheel 77, connected by a chain 77<sup>a</sup> with a sprocket pinion 78 on a shaft 79, rotatably mounted on the support 5. Power is applied to said shaft in any desired manner, and it may be used to operate several of the machines in close proximity.

In Fig. 4 is shown a gearing by which the movement of the shaft 76 may be applied to the shaft 44 in an intermitten manner. Fixed on the shaft 44 is a gear-wheel 81, having a blank space 82, which is normally in position at the lower side of the wheel, so as to permit the free rotation therein of a gear-pinion 83. Pivoted to the face of the wheel 81 is a trip-arm 84, supported in a normally elevated position by a lug 85 on a lever 86, fulcrumed to the frame as at *c*. By movement of said lever outwardly the arm 84 is released, permitting it to drop downwardly into the path of a dog 87, fixed to the pinion 83. The movement of the arm 84 is limited by a pin 88, fixed in the wheel 81, and the engagement of the dog with said arm gives an initial movement to the wheel 81, causing some of the teeth thereon to engage with the teeth of the pinion 83, causing a rotation of the shaft 44 and wheel 45 thereon. This causes the movement of the chain 46 hereinbefore referred to for lowering the pin-setting frames and raising them again, the lever 86 being returned to its position to interrupt the movement of the wheel 81 when the chain has completed its cycle. The proportionate circumference of the wheel and length of the chain is such that when the pin 50 is returned to a locking position with the latch 53 the blank 82 will be at the point to cause a disengagement of such wheel with the pinion 83.

The shift-bar 59 is also connected with the lever 86, so that upon said bar being operated to rock the arms 54 and 57 the same movement will release the trip-arm 84 and set the mechanism in operation. The connection of said bar and lever is by means of a slot 90 in the bar 59 and pin 91 in the lever 86, so that the lever can be actuated independently of said arm. The movement of the bar 59 can also be imparted to the latch 53 to raise the same, by means of a bell-crank lever 92, fulcrumed on the frame, connected with the bar 59 at one end and with the latch 53 at the other. This latter is a loose connection, so that the latch is free

to travel with the bar 52 to which it is attached. Upon being released the pin 50 travels rearwardly with the chain 46, and upon its return to its former position is automatically engaged with the latch once more.

It will be understood that in the operation of the machine for purely pin-setting purposes after the pins are delivered to the frame 14, the frames are lowered to a point near the alley, the pins released, and the frames returned to their former positions. In this operation all that is necessary is to operate the lever 86. When it is desired to sweep the alley, however, and there are pins standing thereon, the shift-car 59 is actuated, rocking the catches 55 and 58 into engaging positions with the rods 27, and raising the latch 53. The same movement shifts the lever 86, and the movement of the shaft 76, which is in continuous operation, is imparted to the shaft 44, upon which the movement of the chain 46 causes a lowering of the frames 14 and 23 to a point where the standing pins are grappled and raised from the floor. This is accomplished when the chain 46 has completed its cycle and the pin 50 is again engaged by the latch 53. The alley is then swept, and the lever 86 alone operated, which results in the frames being again lowered, this time to the floor, re-setting the pins which were temporarily elevated. The frames are then returned to their filling position again.

The shift-bars 59 and 89 may be extended to the forward end of the alley, so that the player can operate the various mechanisms, without being dependent upon assistants. In this arrangement the pin-sweeping and pin elevating devices would also have to be under his control.

What I claim as my invention, and desire to secure by Letters Patent, is:

1. A pin setting device, comprising a pair of spaced frames, pin arresting mechanism carried by said frames; pin-spotting devices, carried on the lower face of the lower of said frames; and means for lowering said frames to within a predetermined distance from the floor of a bowling alley; the spacing of said frames being automatically reduced at the end of the downward movement causing the release of said pin-arresting mechanism, and subsequent operation of the pin-spotting devices.
2. A pin setting device, comprising a pair of spaced frames, pin-arresting mechanism carried by said frames; pin-spotting devices carried by the lower frame; operating mechanism for carrying said frames downwardly to a point near the floor of a bowling alley and back to their original position, the approach of said frames to the floor operating to compress the same, so as to release said pin-arresting mechanism, and set said pin-spotting devices; and means for interrupting the movement of said operating mechanism at the end of the cycle of movement of said frames.
3. A pin setting device, comprising a pair of spaced frames, and provided with counterbalancing means; pin-arresting mechanism carried by said frames; pin spotting devices carried by the lower of said frames; pin grappling devices carried by said frames; means for selective movement of said frames to either a pin setting position or a pin grappling position, said pin-arresting mechanism, pin spotting devices, and pin grappling devices all being automatically operated by the reduced spacing of said frames; and means for locking said frames together in their reduced spacing, said locking means being automatically releasable upon the approach of said frames to a pin-setting position.
4. In a pin-setting device, a pair of frames having suitable pin openings, and in spaced relation with each other; pin grappling devices carried by said frames, normally out of engaging positions, and adapted to be brought into operative positions by a reduction in the spacing of said frames; and pin spotting devices carried by the lower frame, said grappling devices assisting in steadying the pins that are being positioned by said spotting devices.
5. In a pin setting device, formed of a pair of spaced frames having suitable pin openings, pin-spotting devices hinged to the lower face of the lower frame at the sides of said openings, and operating members carried by the upper frame, passing through the lower frame into engagement with the pin-setting devices, so as to cause a pin-engaging movement of said devices upon the spacing of said frames being reduced, and releasing the same upon said frames being again separated.
6. In a pin-setting device, formed of a pair of spaced frames, having suitable pin openings, pin spotting devices hinged to the lower face of the lower frame, and provided with resilient setting arms; and pins carried by said upper frame for engagement with said setting arms, upon the spacing between said frames being reduced, to move said spotting devices in the direction of the pin being positioned thereby.

In testimony whereof I affix my signature.

WALTER H. GRAY.