

July 31, 1956

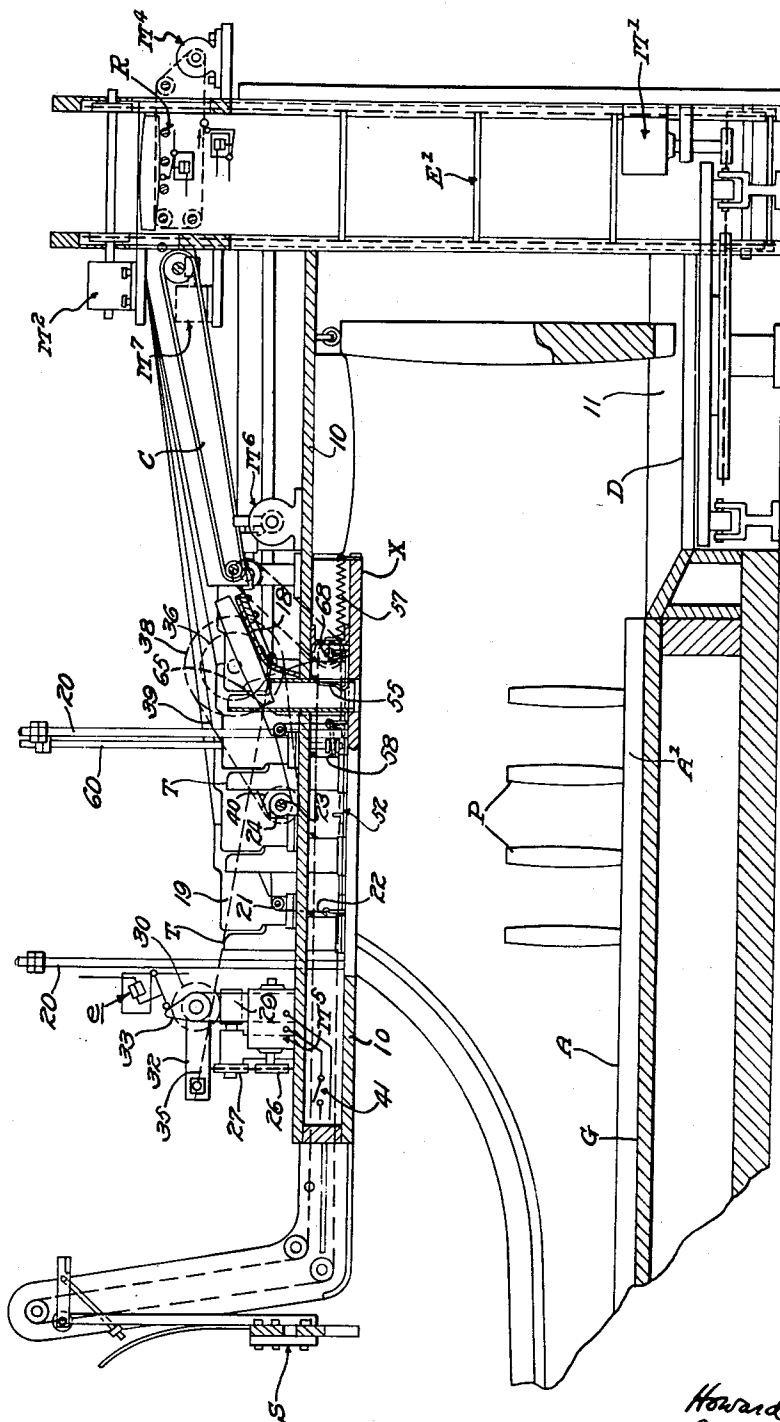
H. M. DOWD ET AL

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BOWLING PIN-SETTING MECHANISM

Filed Feb. 13, 1952

4 Sheets-Sheet 1



Fig

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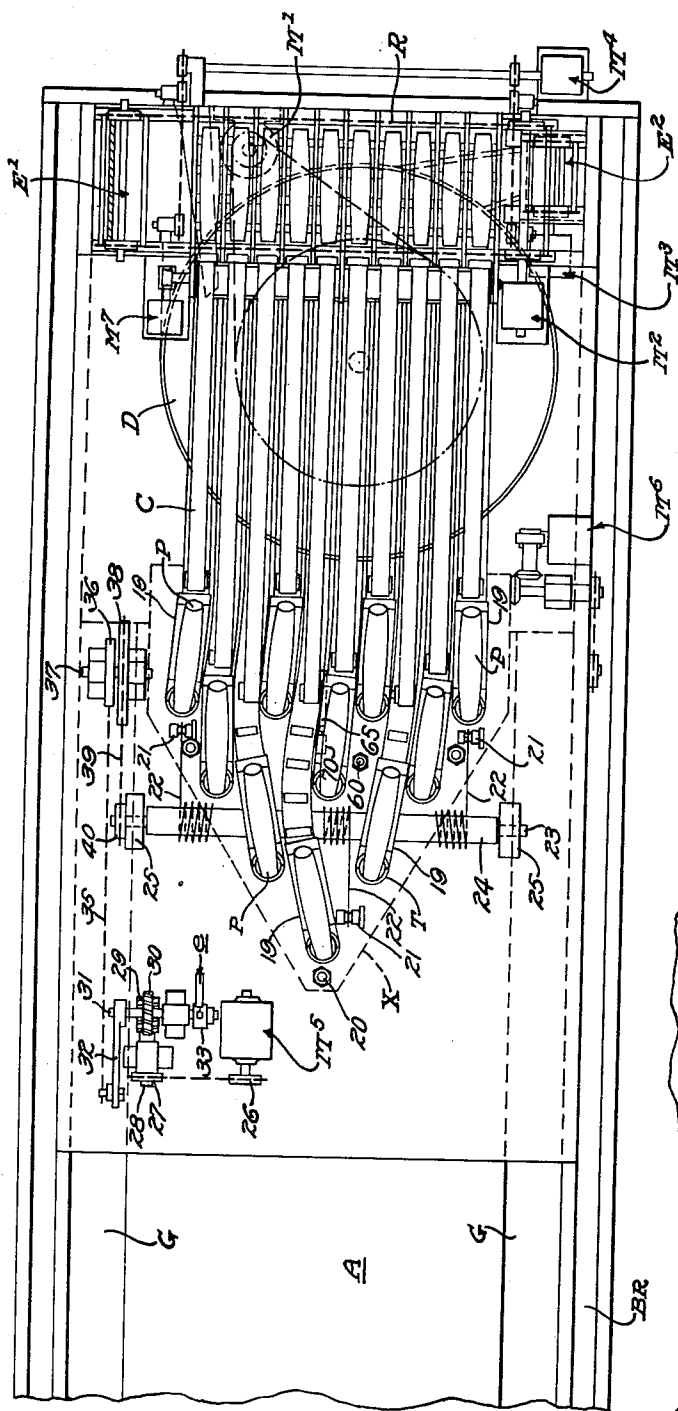
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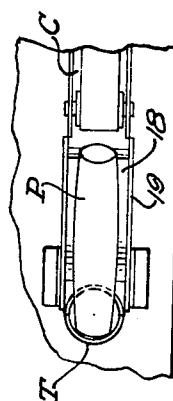
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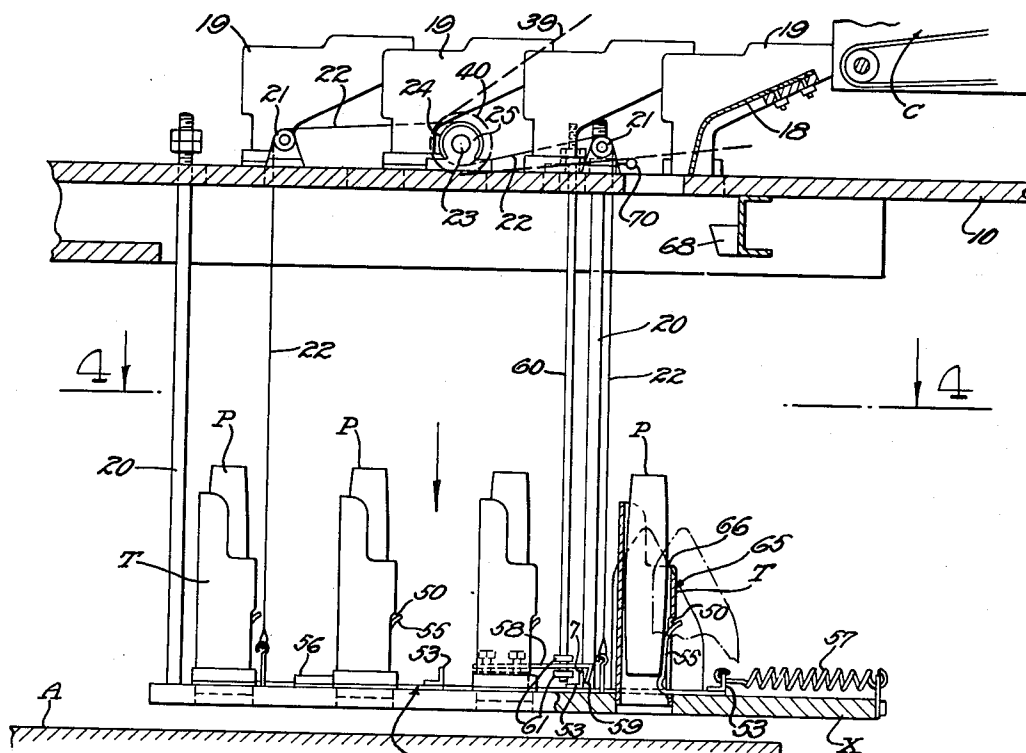
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# BOWLING PIN-SETTING MECHANISM

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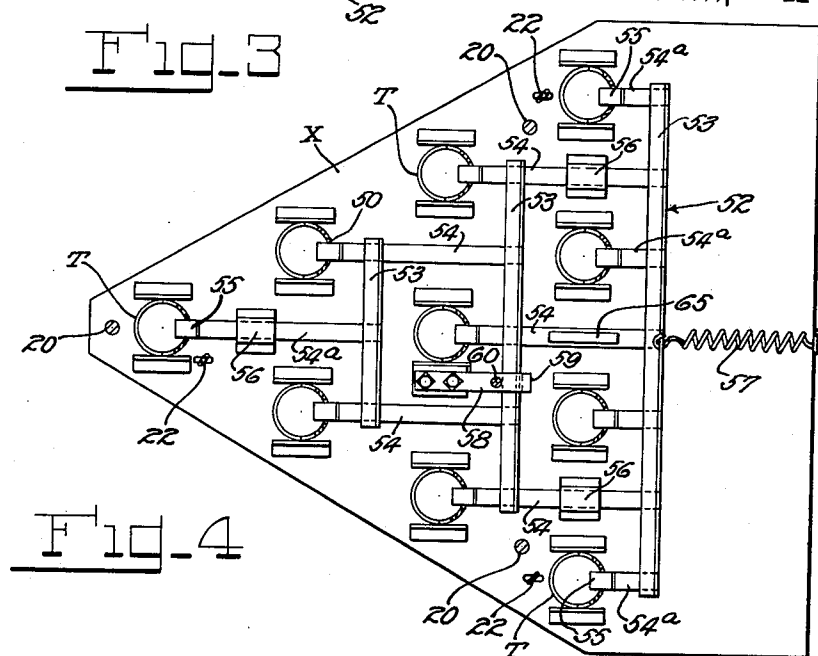


Fig. 4

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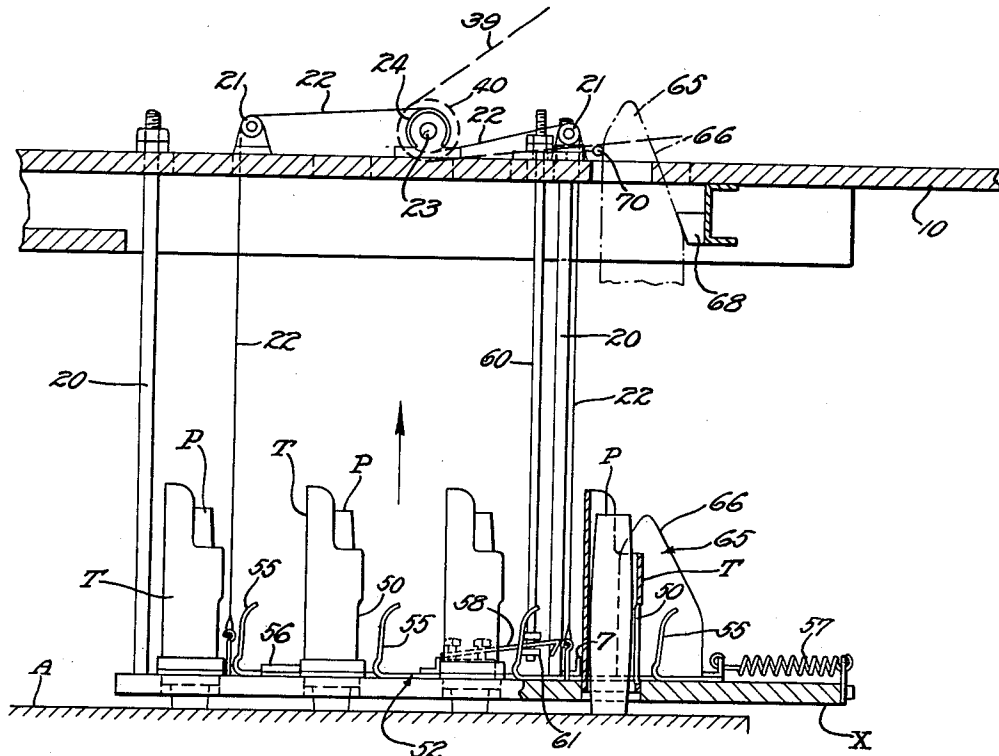
H. M. DOWD ET AL

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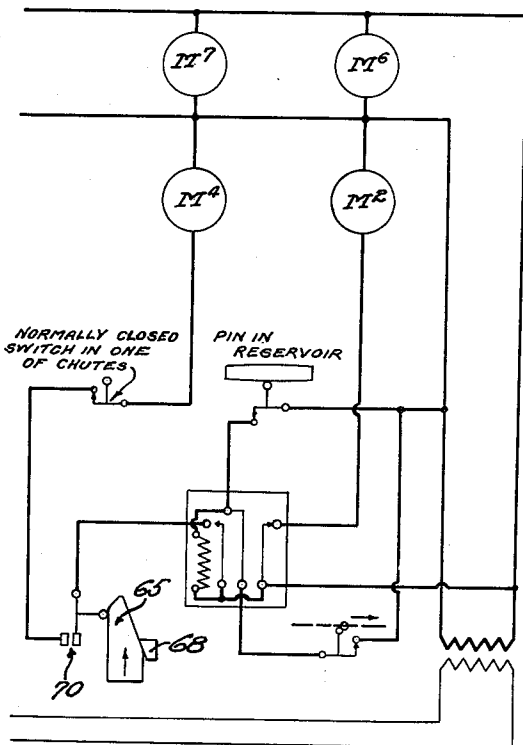
## BOWLING PIN-SETTING MECHANISM

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## BOWLING PIN-SETTING MECHANISM

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Application February 13, 1952, Serial No. 271,392

4 Claims. (Cl. 273—43)

This invention relates to a bowling pin setting machine, and has for its object to provide a pin-setting mechanism which lowers the set of pins to the alley while retaining them in the pin-setting tubes, and then releases them from a short distance above the alley. In this manner the wear and tear and noise of dropping the pins through the tubes from a height of three or four feet above the alley are eliminated, and many other advantages are achieved.

This invention is an improvement upon our basic mechanism disclosed in our application Serial No. 87,646, filed April 15, 1949, now abandoned, Bowling Pin Setting Machine, and is adapted for use in such a machine. But it will be understood that it is capable of use in other bowling pin setting machines as well, and is not limited to use in our own machine. In applicants' type of bowling pin setting machine as shown in their application Serial No. 87,646, it will be understood that after one, two, or three, balls have been bowled, as the case may be, and a new set up of pins is desired, the sweeper operates to sweep all pins or balls onto a rotating turntable or distributor in the pit at the end of the alley. There the pins are distributed to the pin elevator, and the balls are returned by the ball elevator. The pins are delivered to a horizontal pin reservoir or collector, and thence down inclined chutes or conduits to the discharge station, in front of the vertical positioning tubes. The positioning tubes are then lowered to position the pins in proper position on the alley. In applicants' machine thus described, the pins are dropped through the positioning tubes about four feet from the discharge station to the floor of the alley. As the pins weigh about 2 lbs. each and are presently dropped from a height of four feet, the noise and clatter, as well as the wear and tear on the pins and the alley are considerable.

In our present improvement we have sought to eliminate this noise and wear, and have successfully done so by holding the pins in the tubes and lowering them in unison to a position just above the floor of the alley, from which they are released in unison to their proper positions on the alley. Our mechanism further provides more accurate positioning of the pins on the alley, and eliminates the silencer previously provided on the bottom of the tube, an expensive item and one which frequently got out of order. In addition, our device makes substantial savings in materials and parts for the machine, by requiring only three cables to lower and lift the device, instead of ten, by permitting the use of shorter positioning tubes, one-third as long as those previously required.

Briefly, our device comprises a movable horizontal platform on which the vertical pin positioning tubes are mounted. Each tube at its bottom side carries a slot in which a finger is movable horizontally which restricts the diameter of the tube at the bottom, and thus holds the pin in the tube. The platform is vertically movable and when lowered carries the tubes downwardly with the pins therein to a position about an inch above the floor

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of the alley. The supporting fingers are then withdrawn horizontally from the tubes, allowing the pins to drop out in their proper position on the alley. The platform then is lifted and when in its upward position, the series of restricting fingers are again operated from a cam to move into pin intercepting position in the positioning tubes. The platform is guided for vertical movement on three guide rods, and as the positioning tubes are mounted on the platform at their bottom ends, the tubes are thus accurately aligned for accurate positioning of the pins upon the alley.

Before explaining in detail the present invention it is to be understood that the invention is not limited in its application to the details of construction and arrangement of parts illustrated in the accompanying drawings, since the invention is capable of other embodiments and of being practiced or carried out in various ways. Also it is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation.

Additional advantages and objects of our device will be apparent from the following specification and accompanying drawings, in which:

Fig. 1 is a vertical sectional view partly in diagram, of a bowling pin setting machine equipped with the pin setting mechanism embodying our invention;

Fig. 2 is a plan view of a bowling pin setting machine equipped with our device.

Fig. 2a is an enlarged plan view of a portion of Fig. 2 showing a pin in discharge position;

Fig. 3 is a vertical section of our pin setting mechanism showing the platform and tubes in lowered position;

Fig. 4 is a horizontal section on line 4—4 of Fig. 3, showing a plan view of the platform supporting the pin positioning device, the pins being omitted from this view;

Fig. 5 is a view similar to Fig. 3 showing the platform at its lowermost position with the pins deposited on the alley; and

Fig. 6 shows a part of the wiring diagram.

In the drawings a bowling pin setting machine is shown similar to that disclosed in our application Serial No. 87,646, filed April 15, 1949, for purposes of illustrating the type of machine with which our pin setting mechanism is adapted to be used. As shown in Fig. 1 S represents a sweeper mechanism in general, and A represents the floor of the bowling alley, and A1 represents the pin plate section of the alley on which the bowling pins P are positioned. It will be understood that the sweeper mechanism S operates to sweep any standing or fallen pins or balls remaining on the alley or in the gutters G, onto the rotating turntable or distributor D provided in the pit 11 at the end of the alley. The ball return trough is represented at BR. Turntable or distributor D rotated by a suitable motor M1 (Fig. 1) operates to distribute the pins P to a vertical pin elevator E1, and the balls to the vertical ball elevator E2 (Fig. 2), from which the balls are returned through the ball return trough BR. The machine further includes a pin reservoir or collector R at the top of the pin elevator E1. Inclined pin chutes or conduits C lead from the pin reservoir or collector R to carry the pins to vertical positioning tubes T. The pin chutes C are preferably powered by conveyor belts lying in the bottom of the chutes, but it will be understood that rollers may be used if desired. It will be understood that the pins P are positioned on the pin plate section A1 of the alley A, as the tubes T are lowered to a position spaced slightly above the alley A, by mechanism to be described in detail below. The respective operating parts of our pin setting machine are preferably powered by individual motors, of which motor M2 drives the pin elevator E1, motor M3 (Fig. 2) drives the ball elevator E2 (Fig. 2),

motor M4 operates the pin reservoir R to direct the pins into the chutes C, motor M5 lowers and raises the positioning platform X carrying the positioning tubes T, and motor M6 operates the sweeper mechanism S. A separate motor M7 is preferably provided for operating the conveyor belts in pin chutes C (Fig. 1).

Our pin setting mechanism will now be described in detail. It includes a set of ten pin setting tubes T which are mounted at their bases on vertically movable horizontal platform X. Holes of course are provided in platform X under the tubes T to permit the pins to pass through. The tubes T are about the height of a bowling pin P (Figs. 3 and 5) and comprise a cylindrical metal tube open at its top front side to receive the pin P from its inclined discharge position on inclined plates 18, at the foot of each inclined conduit C, as shown in Figs. 1 and 3. Funnels 19 are provided on the sides of plates 18 to guide the pins into the tubes T. The pins are normally retained and held by the tubes in their inclined position as shown in Fig. 1, until the tubes T are lowered with platform X but it will be understood that the pins can be dropped into the tubes T immediately. The angle of inclination of the pin against the tube T is such that ordinarily the pin will not drop into the tube, but will be held in inclined position by the inside of the tube, until the platform carrying the tubes is lowered. But it will be understood that in normal operation some or all of the pins may drop immediately into the tubes T, depending upon such varying factors as the age and condition of the machine and of the pins, and velocity with which a pin travels down the chutes C and into the funnels 19, and the precise point at which the tubes T stop in their upward movement with platform X. The latter point of stoppage of the tubes T in their upward movement again is dependent upon many factors affecting the mechanical efficiency in the platform raising and lowering mechanism. With use and wear the parts of the machine in contact with the pins acquire a polish from friction, and even a coating of wax or oil from the alley, which is picked up by the pins and deposited on parts and surfaces of the machine in contact with the pins. Vertically movable platform X comprises a horizontal board substantially triangular in shape on which the tubes T are mounted at their bases as previously stated, and which is guided for vertical movement on guide rods 20, preferably three in number and provided at the three corners of platform X (Fig. 4). Platform X is raised and lowered by means of cables 22 (Figs. 1, 3 and 5), attached at their bottom ends to the platform X which pass over pulleys 21 and are fixed at their upper ends to transverse rotating roller or drum 24 (Fig. 2). Roller or drum 24 mounted on shaft 23 in bearings 25 is operated to rotate in opposite directions, to wind and unwind the cables 22 thereon and thus raise and lower platform X and the pin positioning tubes T mounted thereon through motor M5. The motor M5 (Figs. 1 and 2) carries a pulley 26 on which a belt is mounted connecting with pulley 27 mounted on a longitudinal shaft 28. Shaft 28 also carries the worm 29, meshing with the worm gear 30 on cross-shaft 31 at the outer end of which is mounted the crank arm 32. At the other end of cross-shaft 31 is a cam 33 which operates to open a switch *e* to shut off the motor M5 at the end of its cycle. The crank arm 32 at its free end carries the chain 35, the other end of which wraps around and is fastened to a sprocket or wheel 36 on a jack shaft 37. Jack shaft 37 carries a sprocket 38 around which passes an endless chain 39, which also passes around a sprocket 40 on the end of the shaft 23 carrying the drum or roller 24. In operation, a switch 41 (Fig. 1) is closed by the sweeper mechanism as it reaches the end of its cycle and motor M5 then operates, through the intervening mechanism just described, to rotate drum 24 so as to unwind the cables 22 wound thereon and thus lower platform X carrying pin setting tubes T thereon. When platform X reaches the bottom of its cycle, slightly above the alley A, the pins P

are released and placed in proper position on the alley. Continued operation of motor M5 moves crank arm 32 until it comes in line with the chain 35, and then after passing the dead center it begins to pull on chain 35, thus reversing the direction of rotation of roller or drum 24 and causing the cables 22 to wind up thereon. This raises platform X and pin setting tubes T carried thereon to their upper position in the cycle, ready to receive another set of pins P from the discharge station on inclined plates 18.

As previously stated pin setting tubes T are mounted at their base on platform X. A vertical slot 50 (Figs. 3 and 4) is provided in the front side of tubes T at their bottom ends, which extends upwardly about one-third of the height of tubes T. A horizontal frame work, generally indicated at 52, carries a series of transverse angle arms 53 which in turn are connected by longitudinal arms 54. Separate longitudinal arms 54a extend directly to pin tubes T without connecting with other transverse arms 53. The free ends of longitudinal arms 54 and 54a carry an upwardly bent finger 55 which extends into the slot 50 provided in the front side of tubes T, and these fingers restrict the diameter of tubes T at the bottom thereof and thus constitute supports for the pins P in the tubes T (Fig. 3), whereby the pins are held in the tubes. The frame work 52 is guided for longitudinal movement on platform X by guides 56 (Fig. 4), and a spring 57 serves to draw the frame 52 rearwardly at all times and hence to open the bottoms of the tubes T and permit release of the pins therein. A latch 58 is mounted at one end to the top surface of platform X and carries a downwardly extending hook 59 on its free end (Figs. 3 and 4) which normally extends over the middle crossarm 53 and serves to hold the frame 52 in its tube restricting and hence pin holding position against the pull of spring 57. A vertical rod 60 is mounted for vertical movement in the top frame of the machine generally indicated at 10, and at its lower end is connected to the latch 58. Collars 61 are mounted on the lower end of rod 60, both above and below latch 58, and are so positioned that as platform X is lowered and reaches the bottom of its cycle as permitted by the length of cables 22, latch 58 is pulled upwardly. This releases the frame 52 and permits it to be pulled rearwardly by the retraction of spring 57, thus opening tubes T and permitting discharge of the pins P from the tubes, and hence to their proper positions on the alley. A vertically extending cam follower 65 having a sloping cam surface 66 on its rearward side is mounted on the middle longitudinal arm 54, and as platform X is raised by cables 22, cam follower 65 engages cam 68, mounted on the underside of frame 10 (Fig. 3), and causes frame 52 to be pushed forwardly against the pull of spring 57, until latch 58 again engages middle crossarm 53. A sloping surface 7 (Fig. 3) is provided on the forward side of middle crossarm 53 to permit hook 59 of latch 58 to slide upwardly and over crossarm 53. It will be understood that rod 60 rises as platform X is raised, along with guides 20, as shown in Fig. 1. Tubes T are, therefore, restricted at their bottom ends by fingers 55 of longitudinal arms 54 and 54a while platform X is in its raised position, as shown in Fig. 1, and hence if a pin P should slide off its discharge station 18 into its tube, it will be held therein, until platform X is lowered to its pin discharging position just above the alley. Normally, however, the pins P recline on inclined plate 18 at the discharge station with their ends abutting the inside of tubes T, as shown in Fig. 1. A switch 70 in the circuit for the motor M4 (Fig. 6) which operates to deliver the pins from the reservoir to the chutes C is provided on the frame 10, in position to be operated by the cam follower 65 on its upward movement. Switch 70 is normally open and is closed on the upward movement of cam follower 65 as platform X nears the top of its upward movement. Switch 70 when open prevents the delivery of pins from the reservoir R (Fig. 1), until the tubes T are in raised position at the foot of conduits C and inclined plates 18 constituting the discharge station of the device.

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In operation, it will be understood that as the bowler desires a new set of pins he pushes a button at the bowling end of the alley which closes the circuit to the motors of the bowling pin setting machine, setting in operation the sweeper S, distributor or turntable D, and pin and ball elevators E1 and E2. When sweeper S has reached the end of its cycle switch 41 starts motor M5 and platform X is lowered to its pin setting position just above the alley. When it reaches the bottom of its cycle, about an inch above the alley, rod 60 lifts latch 58 opening tubes T and permitting the pins to be discharged therefrom into their proper positions on the alley. Platform X is immediately raised to its upper position and remains there until the bowler again desires a new setting of pins. In the meantime the fallen pins are elevated by the pin elevator E1 to the pin reservoir R. As previously explained switch 70 prevents the pins in reservoir R from being delivered to the conduits C and hence to their discharge station abutting the tubes T until the tubes T are in their raised position and ready to receive them.

It will be readily perceived that our pin setting mechanism which lowers a set of pins to a position just above the alley before discharging them overcomes the many objections and disadvantages of dropping them into position through the pin setting tubes from a distance of some four feet above the alley, and constitutes a highly desirable improvement of our basic machine.

We claim:

1. In a bowling pin-setting machine, mechanism for positioning the pins upon the alley comprising, a fixed horizontal top frame member, a horizontally extending platform below said top frame member mounted for reciprocal movement in a vertical direction only, a set of open end pin-setting tubes on the upper side of said platform, said tubes having their bottom ends secured to said platform, each of said tubes having a vertical slot in its side wall at its bottom end, means for lowering said platform and tubes from an elevated pin-loading position adjacent said top frame member to a pin-discharging position adjacent the floor of the alley and for raising said platform and tubes to pin-loading position again, a plurality of upstanding fingers, one for each tube, carried by said platform, said fingers being connected together as a unit, said fingers being slidable horizontally relative to said platform between a first pin-holding position wherein said fingers extend through said slots into said tubes to engage and hold pins therein to a second position outside of said tubes wherein pins are free to fall out of the bottom of said tubes, releasable latch means for locking said fingers in pin-holding position, mechanical means operative only upon downward movement of said platform to release said latch means as said platform reaches pin-discharging position, and means for moving said fingers to said second position upon release of said latch means.

2. The combination of claim 1, further including a cam follower on the upper side of said platform secured to said unit of fingers, and a fixed cam mounted on the underside of said top frame member, said cam being so located as to be engaged by said cam follower as said platform is being raised to pin-loading position and to shift said

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cam follower and fingers horizontally to permit said latch means to automatically lock said fingers in pin-holding position.

3. The combination of claim 1 wherein said latch releasing means comprises a vertical rod mounted for vertical reciprocal movement in said top frame member, the lower end of said rod being attached to said latch so as to be movable with said latch and platform, and means carried by said rod at its top end for engaging said top frame member and terminating downward movement of said rod relative to said frame member as said platform approaches pin-discharging position, whereby to exert a pull on said rod to release said latch.

4. In a bowling pin-setting machine, mechanism for positioning the pins upon the floor of a bowling alley comprising, a vertically movable horizontally extending platform, a set of vertical pin-setting tubes extending upwardly from the top side of said platform, said tubes having their bottom ends secured to said platform, each tube having a slot in its wall at its bottom end, said slots extending above the top side of said platform, means for lowering said platform and tubes in a fixed vertical path from an elevated pin-loading position in said machine to a pin-discharging position adjacent the floor of the alley and for raising said platform to pin-loading position again, a framework mounted on the top side of said platform provided with a plurality of upstanding fingers, one for each tube, said framework being slidable horizontally relative to said platform between a first pin-holding position wherein said fingers extend through said slots into said tubes to engage and hold pins therein to a second pin-releasing position wherein said fingers are completely removed from said tubes so that pins are free to fall out of the bottom of said tubes, releasable latch means for locking said framework in pin-holding position, means for shifting said framework to pin-releasing position upon release of said latch means, and means for releasing said latch means as said platform reaches pin-discharging position.

#### References Cited in the file of this patent

##### UNITED STATES PATENTS

|           |              |               |
|-----------|--------------|---------------|
| 809,890   | Backus       | Jan. 9, 1906  |
| 975,445   | McFarland    | Nov. 15, 1910 |
| 1,122,622 | McFarland    | Dec. 29, 1914 |
| 1,586,831 | Murphy       | June 1, 1926  |
| 1,896,384 | White et al. | Feb. 7, 1933  |
| 2,300,802 | Parra et al. | Nov. 3, 1942  |
| 2,445,688 | Parra et al. | July 20, 1948 |
| 2,531,429 | Hedenskoog   | Nov. 28, 1950 |
| 2,550,835 | MacFarland   | May 1, 1951   |
| 2,550,919 | Frye         | May 1, 1951   |
| 2,591,450 | Luebbert     | Apr. 1, 1952  |
| 2,603,487 | Scheppe      | July 15, 1952 |
| 2,627,408 | Beranek      | Feb. 3, 1953  |
| 2,702,707 | Frye         | Feb. 22, 1955 |

##### FOREIGN PATENTS

|         |        |               |
|---------|--------|---------------|
| 475,026 | France | Jan. 16, 1915 |
|---------|--------|---------------|