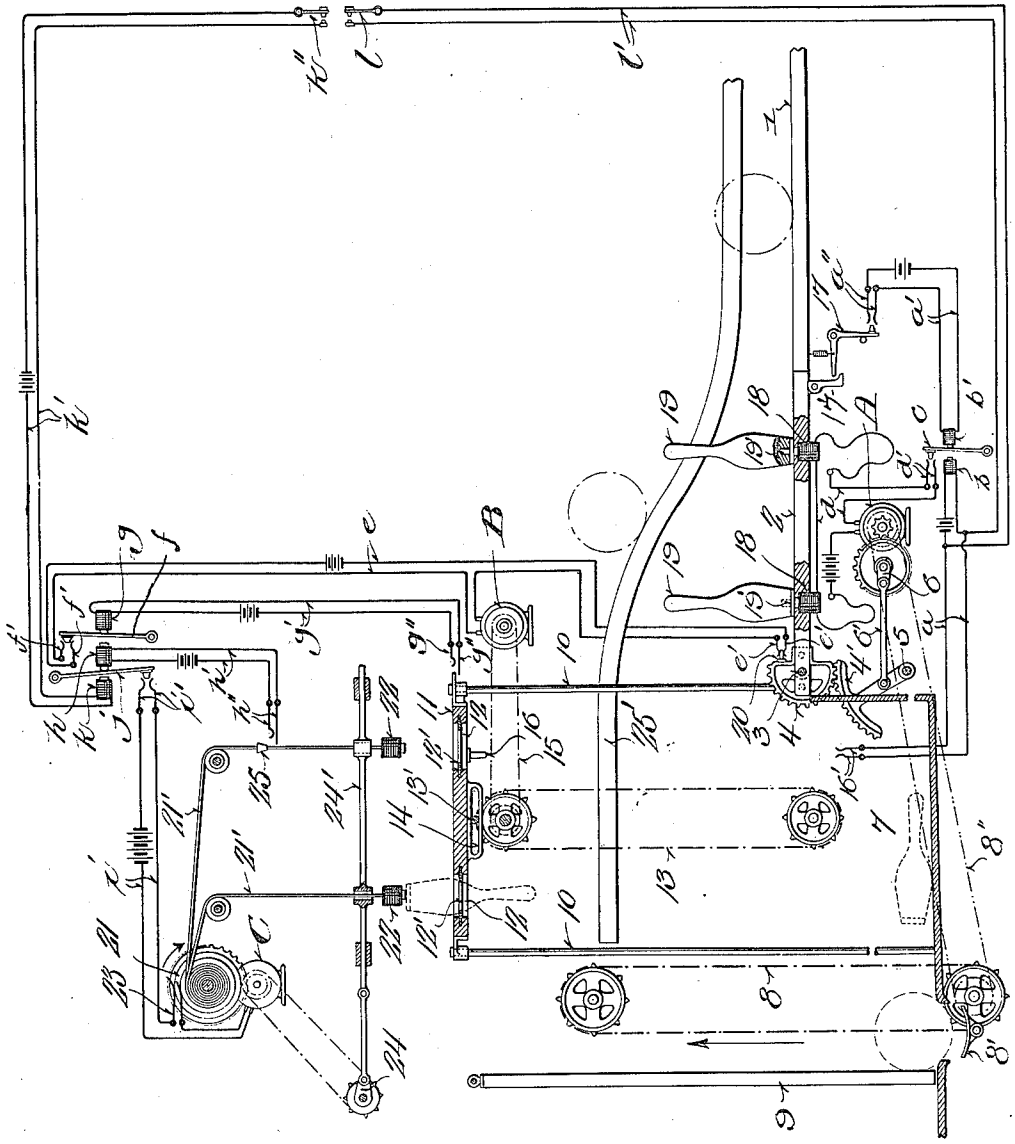
R. F. DOWNEY.

PIN SETTING MECHANISM.

APPLICATION FILED AUG. 24, 1915.

1,181,649. Patented May 2, 1916.



Witnesses:

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PIN-SETTING MECHANISM.

1,181,649. Specification of Letters Patent. Patented May 2, 1916.

Application filed August 24, 1915. Serial No. 47,021.

To all whom it may concern:

Be it known that I, RICHARD F. DOWNEY, a citizen of the United States, and resident of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Pin-Setting Mechanism; and I do hereby declare that the following is a full, clear, and exact description thereof.

My invention has for its primary object to provide simple, economical and positive automatic pin setting mechanism for bowling games.

The arrangement and construction of my invention contemplates the embodiment of pins having metallic base cores which are magnetically controlled, whereby the down pins or "dead wood" are cleared from a swinging setting up table by gravity, to cause the down pins to fall into a pin receiving pit. Coincident to this dumping operation to clear the standing pins, the latter are firmly held in their said positions by energization of a set of magnets carried by the swinging table. The table is then swung back to its normal horizontal play position preparatory to the second ball being rolled.

After completing the play, a second series of flexibly suspended magnets are caused, by some means, to drop into the pit coincident to a girating movement, whereby they act as "feelers," and will each grip an iron shod pin and lift the same head downward, as said magnets return to their normal suspended position.

The suspended group of pins are drawn through diaphragmatic pin receiving openings, in a reciprocative gageholder, whereby said pins are clearly positioned in the usual V-shaped cluster by the arbitrary arrangement of the holder openings. The pins are thus frictionally gripped within the holder openings, to sustain their weight, and at this time, the magnets are automatically deënergized.

The next operation consists in causing the holder to drop into the pin receiving pit, by some means, to a position in approximate alinement with the normal horizontal plane of the swinging table. Thus, the pins are now held in their correct spotted positions, but inverted. The table is then swung, by some means, to come to rest over the holder containing the pins, and the table magnets being energized, they will take hold of said pins. As the table is swung back to its play position, the energized magnets will grip the cores of the pins, and cause them to be withdrawn from their frictionally engaged seats within the holders, whereby said pins are set and ready for play. After each ball is rolled, it will drop into position with relation to a conveyer, which conveyer will catch and lift the balls to a proper elevation, where they are discharged upon a track, and are returned to the player by gravity, in the usual manner. Hence, from the foregoing brief statement of the nature of my invention, it will be understood that said invention, from a broad point of view, contemplates a swinging table with magnets, and arranged to dump the "dead wood" and to select the properly grouped pins from a pin pit, the mechanism for accomplishing these operations being immaterial, as said mechanism can be combined in a variety of ways for accomplishing the desired results.

With the above objects in view, my invention consists in certain peculiarities of construction and combination of parts as hereinafter set forth in the accompanying drawings, and subsequently claimed.

The drawings represent an exemplification of my invention diagrammatically, with parts broken away, and in section to more clearly show certain features.

Referring by characters to the drawings, 1 represents an alley, and 2, a swinging section constituting a table for the pins, the said table being fulcrumed upon a pivot rod 3 at its rear end, about which pivot rod is mounted a tooth sector 4 which meshes with a second sector 4′ that is fulcrumed at 5. This gear connection receives its motion from a motor A that is geared to a crank-shaft 6 which crank-shaft is connected by a link 6′ to the sector 4′. Just rearward of the table 2, is a pin receiving well 7, rearward of the slightly inclined floor of this well is positioned a ball receiving endless conveyer 8, carrying a bucket 8′ which travels up through a suitable opening formed in the floor, and back of the conveyer, there is positioned the usual buffer 9. The conveyer is driven by a suitable belt connection 8″ to the motor A.

Guide rods 10 project above the well 7 for the support of a reciprocative pin holder 11, which holder is in the form of a tray having apertures 12 therein that are positioned in V-shape with relation to each other, to form a templet corresponding to

the ordinary spotting of pins in a bowling game, but only two of such openings are shown. The pin receiving openings 12 are provided with flexible diaphragmatic rings 12′ which rings serve to grip the body of the pins, when the same are thrust therethrough, to the position shown as indicated in dotted lines.

The holder 11 is arranged to be reciprocated upon its guide 10 by an endless belt 13 which belt carries a pin 13′ that engages the horizontally positioned slot 14 of a bracket that is secured to the bottom wall of said holder. Motion is imparted to the table controlling belt 13 by a belt gear connection 15 from a motor B. The holder is shown in its normal position of rest above the wall 7, and when the motor B is energized, movement of the belt 13 will cause the holder to travel downwardly and assume a position with its upper face upon a plane alined with the lower face of the swinging table 2.

When the holder assumes its lower position just described, a plug 16 carried thereby will engage contact springs 16′ to close an electric circuit *a*, having a magnet *b* therein, which circuit is arranged to control one movement of a switch lever *c*. Movement of the lever *c* in the opposite direction is controlled by a magnet *b′* that is in a battery circuit *a′*, the same being normally broken by contact plates *a″*. These contact plates are closed by a bell-crank plug 17 through engagement of one arm of said lever with a shoe 17′ which is pivotally mounted to the lower face of the table 2, it being understood that the bell-crank plug 17 is held in its open position as shown, by a suitable spring. When the circuit *a* is closed, it will cause the lever *c* to engage contact springs *d′* of a combined magnet and motor circuit *d*. The circuit *d* carries the motor A, and a series of magnets 18, which magnets are fast in the lower face of the table 2, and have their cores exposed at the upper face thereof. The cores of these magnets are arbitrarily arranged to correspond with the positions of bowling pins 19, which bowling pins are shod with metallic core pieces 19′ that engages the cores of the magnets 18.

When the table 2 is in its play position, as shown in the drawing, a plug 20 that is carried by the sector 4 engages contact plates *e′*, whereby a motor circuit *e* is closed, said circuit serving as a source of supply to the motor B. This circuit *e* is also opened and closed by a switch lever *f*, which is adapted to engage contact plates *f′*, and the said switch lever *f* is operated in one direction by a magnet *g* of a circuit *g′*, which circuit is normally broken by spaced contact plates *g″*, one of the same being extended for engagement with the reciprocative pin holder 11, whereby said circuit *g′* is closed momentarily, just before the holder comes to its normal position of rest, as it travels upwardly to said position. The switch lever *f′* is operated to close the circuit *e* by a magnet *h* that is in a circuit *h′* which circuit is normally broken by spaced contact plates *h″*. Thus the magnets *g* and *h* serve to make or break the motor circuit *e*, which carries the motor B.

A third motor C is also provided in the mechanism, which motor is in gear connection with a cable drum 21, and said cable drum carries a series of metallic cables 21′, which are guided over suitable sheaves, and have suspended from their lower ends, pin collector magnets 22. The cables carrying said magnets also pass through apertures of a reciprocative grid 24′, whereby the magnets are gyrated for the purpose to be hereinafter mentioned, the movement of the grid being effected through a crank mechanism 24 which is in belt gear connection with the motor C.

The motor C is controlled by an electric circuit *i*, having contact brushes 23 interrupting the same, which contact brushes engage the drum 21, whereby current from the motor circuit *i* is transmitted through the metal parts of the drum and cables to the collector magnets 22. The motor circuit *i* is closed, by a switch lever *j*, which engages contact plates *i′* that form terminals of the circuit *i* the said lever *j* being moved to effect closure of the circuit by energization of a magnet *k* that is in a circuit *k′*, which circuit is manually closed by a switch *k″*. Hence, the motor circuit *i* is closed by the magnet *k*, operating to draw the switch lever *j* in one direction, and said motor circuit *i* is broken by the influence of magnet *h* operating upon the lever *j* in the opposite direction.

The magnet *h* is energized by closing the circuit *h′*, which closure is effected by a wiper 25 that is carried by one of the magnet cables 21′. Hence, just before the magnets come to their normal suspended position, as shown in the drawing, the wiper 24 engages the lower plate *h″*, whereby the circuit *h′* is momentarily closed as the magnets 22 come to rest in their upper position, it being understood that these magnets are alined with the holder openings 12 through which they pass in their travel to the pin pit. After the magnets 22 have each engaged the core of a pin 19, they are returned by the drum which continues to wind in the same direction, but as the cables are unwound therefrom, they are re-wound by this continuous motion until such time as the motor C is cut out.

The secondary circuit *a* which is utilized to energize the magnet *b*, is also arranged to be closed manually by a switch *l* which is connected by branch wires *l′* to the mag-

net *b* and battery in the circuit *a*. Thus the two manually operated circuits *k'* and *l* are positioned conveniently accessible to the player at the forward end of the alley.

When the parts are in the position shown in the diagram view, the pins are spotted and the apparatus is ready for play, attention being directed to the fact that the motor and magnet circuit *d* is now broken, hence, the pins 19 are free to be knocked down when struck by the ball. When the first ball is rolled, the pins struck will fall into the pit, and come to rest in any position, and certain of said pins will under ordinary conditions, drop upon the table 2. The operator now closes the circuit *a* by pressing the switch *l*, whereupon the switch lever *c* is acted upon by the magnet *b* to close the motor and magnet circuit *d*, hence, the motor starts and the magnets 19 will simultaneously firmly grip the pins 19 which have not been disturbed. The motor will impart motion to the gear sectors 4 and 4', whereby the table 2 will be swung upon its axis at an angle sufficient to cause the down pins to drop by gravity into the pit 7, and the standing pins will in this tilting movement of the table be held firmly.

The contact shoe 17' which is carried upward by the table will have no active movement with relation to the bell-crank switch plug 17, as said shoe will swing backward in its movement. The played ball will drop to a position against the buffer 9, whereby the conveyer 8 will engage said ball and elevate the same to a position where it will be discharged upon a return track 25'. This movement of the conveyer 8 is imparted thereto by the driver connection 8'' from the motor A. The table is then swung back to the position shown in the drawing, and the second ball is played and discharged upon the track in the same manner as that just mentioned. However, before the table 2 again comes to rest at the second day, the shoe 17' will contact with the bell-crank plug 17 and close the circuit *a*. This circuit energizes the magnet *b'*, whereby the motor circuit *d* is broken, and the pin magnets will thus be de-energized, preparatory to the second ball being rolled.

The main operation of the mechanism is to collect the pins that have now all accumulated in the pit 7, and it is understood that there may be a surplus of pins in said pit at all times.

If some of the pins remain standing, or remain in a downward position upon the table 2, after the second ball has been played, the dumping operation of said table can be repeated. To collect pins from the well 7, preparatory to spotting the same, the operator closes the circuit *k'* by manipulating the switch *k''*. The magnet *k* being thus energized, the switch lever *j* will close the motor circuit *i*, whereby the motor C is energized, and simultaneously the magnets 22. A portion of the motor circuit current will then travel from the brushes 23 to the drum and from thence through strands of the cables 21' to said magnets 22, whereby they are energized, it being understood that the cables 21' carry insulated strands which connect the magnets and the other ends of said cables connect the metallic drum. The motor C thus starts to rotate the drum 21 in the direction of the arrow, and the cable connecting magnets will thereby be dropped into the bottom of the well 7 through the openings 12 in the holder 11. Simultaneously the motor C imparts a reciprocative motion to the grid 23, whereby the magnets will be gyrated back and forth over the down pins, until such time as they contact with the metal shoes 19' of the same. In the meantime, the winding drum continues in its motion after the cables 21' have been entirely unwound, said cables will start to re-wind in the opposite direction, and thus the magnets will be lifted gradually to the position shown in the drawing, and they will each carry a pin 19 upward in an inverted position, as indicated in dotted lines.

The pins will be partly drawn through the openings 12 in the holder 11, and come to rest in this position, being held by the frictional engagement with the flexible rings 12'. The wiper 25 will at this time close the circuit *h'*, whereby the switch lever *j* will be shifted to break the motor circuit *i'*, and hence the magnets 22 will come to rest. The energization of the magnet *h* will also cause the switch lever *f* to close the motor circuit *e*, whereby the motor B is energized and will thus, through its gear connection impart a downward movement to the holder 11, which now carries a group of pins that are spotted in their correct positions corresponding to the positions desired for them upon the table 2.

The motor C which operates the feeler magnet 22 is provided with automatic means for reversing the same after each complete operation comprising the downward and upward movement of said feeler magnets. This automatic means is of any ordinary type and forms no part of my invention. Hence upon the next movement of the apparatus, the motor will reverse the direction of the drum 21 to permit unwinding of the cables 21' in the same manner as that previously described, which unwinding, however, is in the opposite direction from the first operation so that the motor is alternately reversed to produce the desired result.

When the holder 11 comes to rest within the pit 7 the metallic shod bottom ends of the pins are alined with the normal horizontal plane of the table 2, and co-incident with this alinement, the plug 16 carried by the

holder will engage the spring plates 16′ and close the auxiliary circuit *a*. Closing the circuit *a* will energize the magnet *b*, and hence, by the action of the lever *c*, the circuit *d* will be closed to start the motor A and to energize the magnets 18 carried by the table 2. The table is then swung backward through its gear connection with the motor A, and its magnets 18 are caused to engage the metallic cores 19′ of the inverted pins 19, which are now held in position within the pit. The magnets will thus grip the juxtaposed group of pins, and as the table is swung back to its normal position in alinement with the alley, the pins will be carried therewith.

As the table rises to pick up the group of pins, the motor circuit *e* is broken by disengagement of the plug 20 with the contact plates *e′*. Hence, the holder is held at rest until such time as the table comes to its normal position shown in the diagram, in which position the motor circuit *e* is closed to cause the motor B to lift the holder to the position of rest shown in the diagram, whereby the mechanism completes its cycle of operations, and is again ready for play.

I claim:—

1. In a bowling game having a series of pins provided with metallic base cores; the combination of a pin setting mechanism comprising a swinging table constituting a section of the alley, a well positioned rearward of the table, arbitrarily spotted magnets carried by the table for engagement with the pin cores, means for swinging the table, and for energizing the magnets during such swinging, whereby down pins are discharged by gravity into the well, a second series of flexibly suspended feeler magnets arranged to enter the pit, and engage the cores of the pins collected therein, a shiftable holder positioned over the pit for receiving the collected pins, and means for causing the holder carrying the collected pins to enter the pit in position to be engaged by the swinging table magnets.

2. A pin setting mechanism comprising a pivoted table constituting the rear section of a bowling alley, a well positioned rearward of the table, pins having metal base cores, magnets carried by the table for holding the pins in spotted positions, a second series of flexibly suspended magnets for collecting pins resting in the pit, means associated with the second series of magnets for spotting said pins in an inverted position within the pit, means for causing the table to swing from a position of play to an inverted position over the spotted pins within the pit, and means under control of an operator for energizing and deënergizing each series of magnets at will.

In testimony that I claim the foregoing I have hereunto set my hand at Milwaukee, in the county of Milwaukee, and State of Wisconsin, in the presence of two witnesses.

RICHARD F. DOWNEY.

Witnesses:
GEO. W. YOUNG,
M. E. DOWNEY.