M. A. DREWS.

BOWLING ALLEY.

APPLICATION FILED NOV. 5, 1917.

1,286,254.

Patented Dec. 3, 1918.

3 SHEETS—SHEET 1.

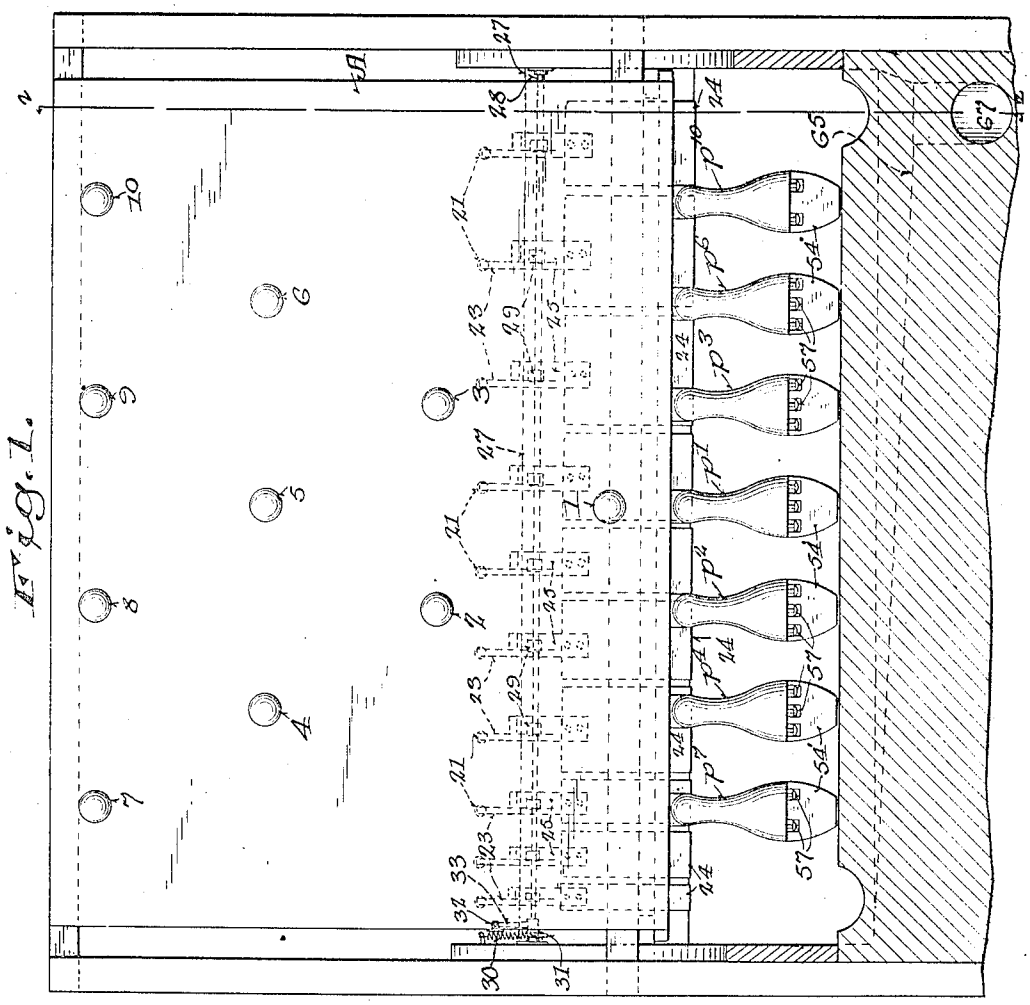


Fig. 1.

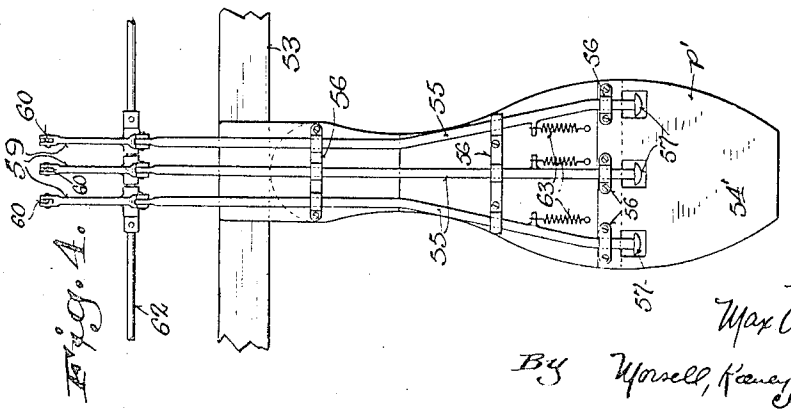


Fig. 4.

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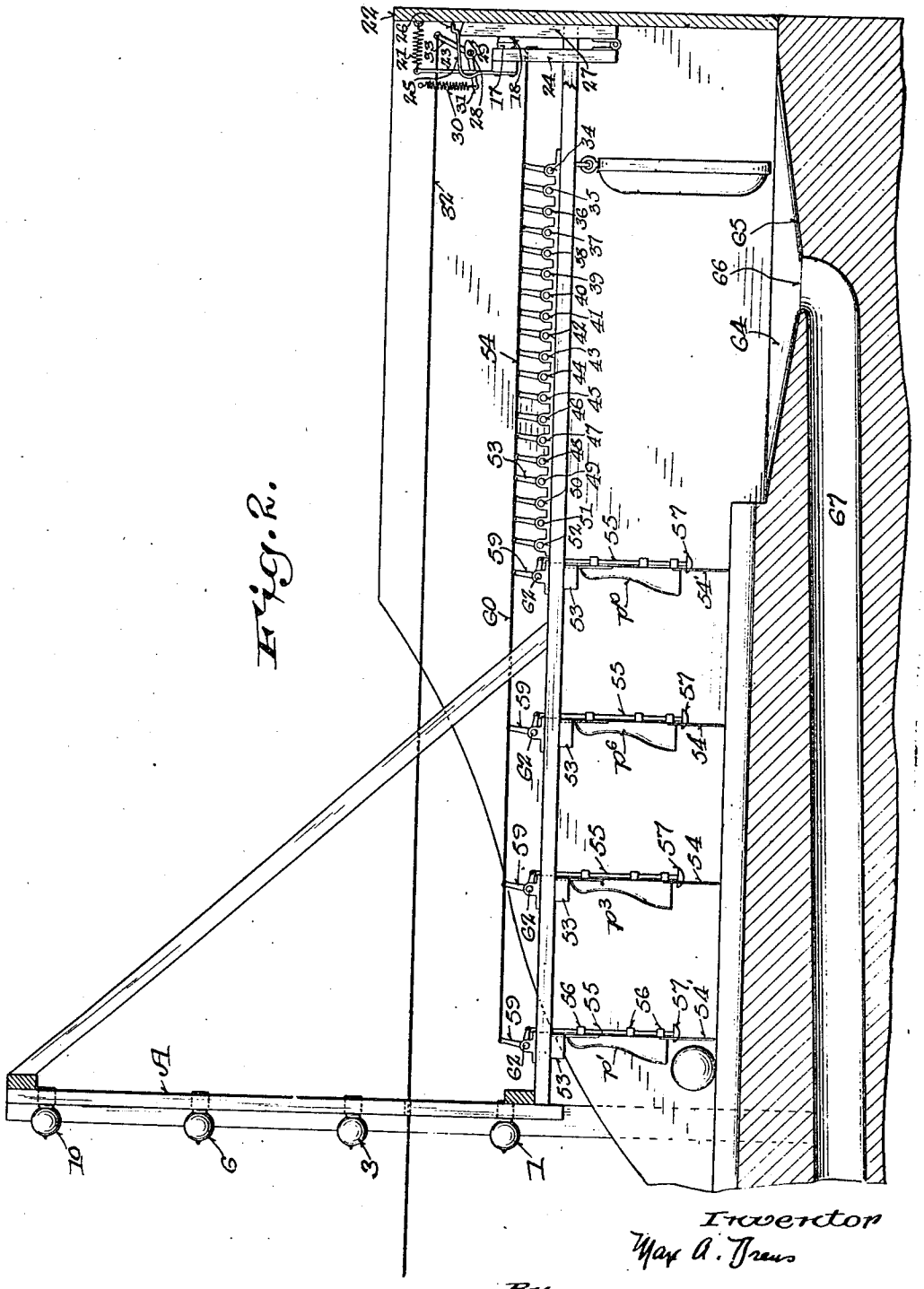


Fig. 2.

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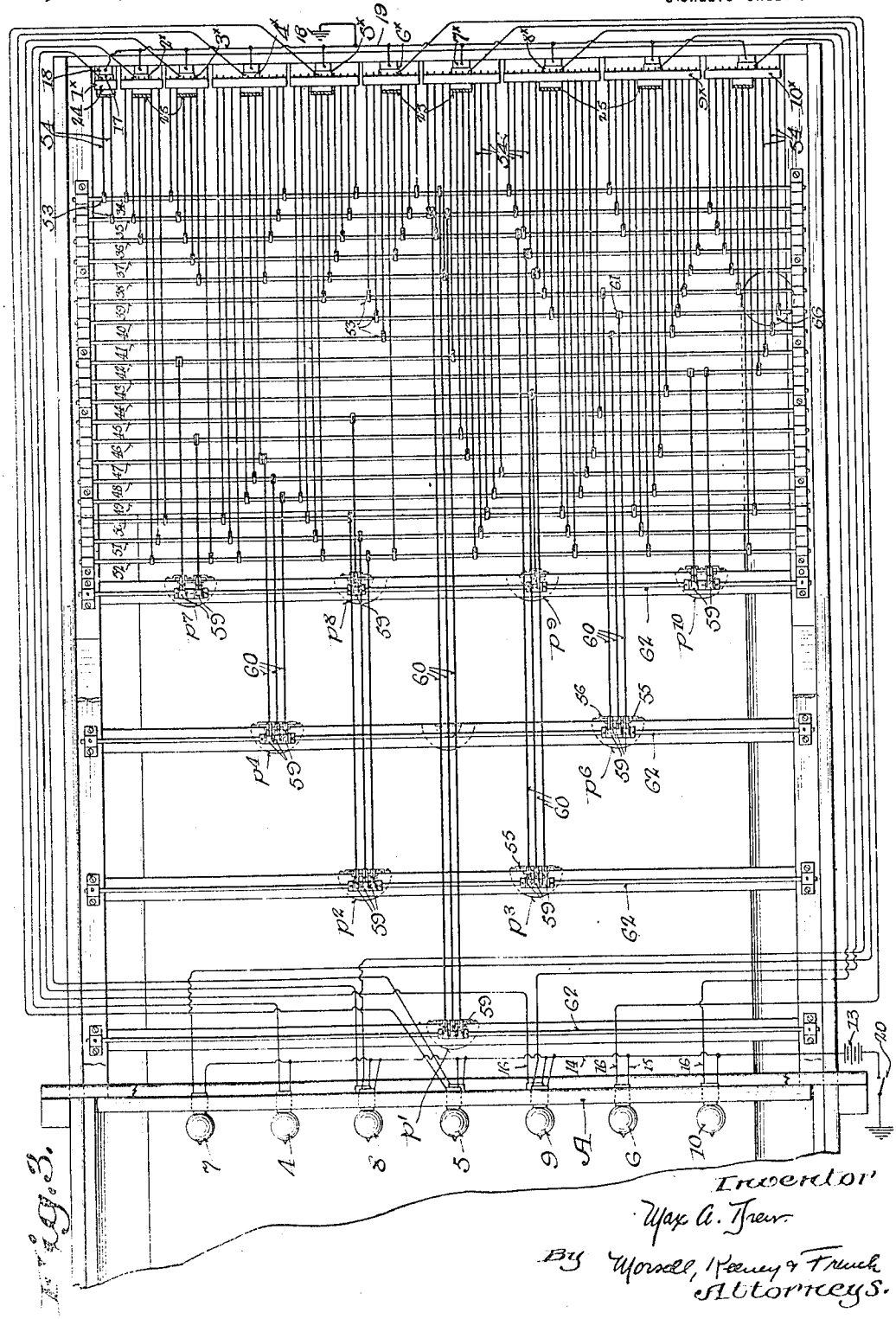


Fig. 3.

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UNITED STATES PATENT OFFICE.

MAX A. DREWS, OF MILWAUKEE, WISCONSIN.

BOWLING-ALLEY.

1,286,254. Specification of Letters Patent. Patented Dec. 3, 1918.

Application filed November 5, 1917. Serial No. 200,307.

To all whom it may concern:

Be it known that I, MAX A. DREWS, a citizen of the United States, and resident of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented new and useful Improvements in Bowling-Alleys, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

The invention relates to bowling alleys.

The invention is more particularly designed to provide a bowling alley in which dummy pins are used with electrical indicating means for showing what pins would be struck by the ball when using actual pins when one of the dummy pins is struck by the ball.

Another object of the invention is to provide a pin indicator board consisting of a plurality of electric lights representing pins arranged in the usual order and normally lighted, which lights are extinguished on the opening of a switch or switches in the circuit in which they are located by the ball hitting a dummy pin or pins and thereby operating certain of the switches.

The invention is further designed to provide an automatic return for the ball.

The invention further consists in the several features hereinafter set forth.

In the drawings:

Figure 1 is a front view of the pin board and pins, part of the alley being shown in section;

Fig. 2 is a section taken on the line 2—2 of Fig. 1;

Fig. 3 is a plan view of the device, the wiring being shown diagrammatically;

Fig. 4 is a detail rear view of one of the pins and the switch operating mechanism.

In general the device comprises a board A, electric lights 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10 representing pins arranged in the usual order, means for normally lighting said lights, a plurality of switches for controlling the operation of said lights, dummy pins p', p^2, p^3, p^4, p^6, p^7, p^8, p^9, p^{10} arranged in the alley in proper order, switch operating light circuits and thus extinguish some or means mounted on the pins and adapted to be struck by the ball to open certain of the all of the lights to indicate what pins would be struck if the usual pins were used, and means for returning the ball.

The lights 1 to 10 are normally lighted by current from a suitable source 13 passing through a conductor 14 which is connected by conductors 15 to one terminal of each light and conductor wires 16 lead from the other terminal of each light to the movable contacts 17 of switches 1^x, 2^x, 3^x, 4^x, 5^x, 6^x, 7^x, 8^x, 9^x and 10^x respectively. The fixed contacts 18 of each of these switches are connected to a common conductor 19 which is grounded. The battery 13 is also grounded and a switch 20 is provided in the circuit to turn the lights off or on.

The contacts 17 and 18 are normally held in engagement with each other by means of a spring 21 secured to the alley frame 22 and to a rod 23 carried by the pivoted switch arm 24. Under certain conditions hereinafter described the contacts are separated and in this condition are held separated by a spring latch 25 on the arm 24 having a notched end 26 engaging a base board 27. With the switches held open means are provided for resetting all of the switches comprising a cam shaft 28 extending across the alley and carrying cams 29, one for each switch, adapted to engage its respective latch 25 so as to allow the springs 21 to return the switches to closed position. The cam shaft 28 is normally held against actuation by a spring 30 fixed to the alley frame and connected to a crank 31 on the shaft. The shaft is operated from the head of the alley by means of a pull cord 32 and crank 33.

Journaled in the sides of the alley frame and extending transversely of the alley are a plurality of shafts respectively designated by the numerals 34 to 52 inclusive. The movable contact of the switch 1^x is connected by linkage consisting of cranks 53 and wires 54 to the shafts 34 and 35. The wires 54 are loosely connected to the movable switch arm so as to permit the switch to be operated by a pull on any of the wires connected to it independent of the other wires. The movable contact of the switch 2^x is connected by similar linkage to shafts 34, 35, 36, 52, 51, and 50. The

movable contact of the switch 3^x is connected by similar linkage to shafts 34, 35, 36, 37, 38, and 52. In a similar way the switch 4^x is connected to shafts 50, 51, 52, 49, 48, 47, 38, 36, 35 and 34, the switch 5^x to shafts 49, 50, 51, 52, 39, 38, 37, 36, 35 and 34, the switch 6^x to shafts 39, 40, 41, 52, 37, 36, 35 and 34, the switch 7^x to shafts 35, 36, 38, 42, 46, 47, 52, 51, 50, 49 and 48, the switch 8^x to shafts 34, 35, 36, 37, 38, 39, 40, 50, 51, 52, 49, 48, 47 and 45, the switch 9^x to shafts 34, 35, 36, 50, 51, 52, 49, 47, 44, 41, 40, 39, 38 and 37, and the switch 10^x to shafts 35, 36, 37, 38, 39, 52, 50, 43, 42, 41 and 40. When these rock shafts 34 to 52 inclusive are actuated they will operate the linkages connected to them to open the switches connected to these linkages.

The means for operating these rock shafts comprises in each instance ball-operated means carried by the pins and operatively connected to said shafts. The dummy pins are supported from transverse frame members 53 and are only half pins, the lower part 54′ consisting of a flexible piece of material such as canvas. The ball-operated means in each instance consists of a rod 55 vertically slidably mounted in guides 56 upon the pin and having a conical head 57 at their lower end disposed within an opening in part 54′ of the pin and is connected at its upper end to one arm of a bell crank lever 59, the other end of said lever being connected by linkage consisting of a wire 60 and crank 61 to one of the shafts 34 to 52 previously mentioned. These bell crank levers 59 are mounted upon supporting rods 62 and the rods 55 are normally held in operative position by means of springs 63. The pin p' has a ball operated rod 55 disposed in the center and one each at the left and right hand side of said pin. The raising of the center rod by the ball striking and lifting up the head 57 serves to actuate the shaft 34 through the operation of the linkage between this rod and shaft. In a similar manner the raising of either left hand or right hand rod 55 of the pin p' serves to actuate the shaft 35. In a similar manner the rods on the other pins are connected up to certain of the rock shafts as will be apparent from Fig. 3.

As an illustration of the method of operation of the device let us assume that the bowler has struck the center rod of the pin p' and thereby turned the shaft 34. On the turning of said shaft the switches 1^x to 6^x inclusive, 8^x and 9^x will be opened through a pull on the wires connecting this shaft with these switches and all the lights on the pin board will go out except numbers 7 and 10 thus showing that the bowler in this particular instance would have knocked down eight pins were regular pins used. Without going into a detailed explanation of what occurs wherenever the bowler strikes any of the rods on any of the pins, the operation is here tabulated as follows:

Pin struck.	Rod on pin.	Pins knocked down.
No. 1	Center	8—Nos. 1, 2, 3, 4, 5, 6, 8 and 9.
No. 1	Left	10—Strike.
No. 1	Right	10—Strike.
No. 2	Center	6—Nos. 2, 4, 5, 7, 8 and 9.
No. 2	Left	7—Nos. 2, 4, 5, 7, 8, 9 and 10.
No. 2	Right	9—Nos. 2, 3, 4, 5, 6, 7, 8, 9 and 10.
No. 3	Center	6—Nos. 3, 5, 6, 8, 9 and 10.
No. 3	Left	9—Nos. 2, 3, 4, 5, 6, 7, 8, 9 and 10.
No. 3	Right	7—Nos. 3, 4, 5, 7, 8, 9 and 10.
No. 4	Center	3—Nos. 4, 7 and 8.
No. 4	Left	4—Nos. 4, 7, 8 and 9.
No. 4	Right	5—Nos. 4, 5, 7, 8 and 9.
No. 6	Center	3—Nos. 6, 9 and 10.
No. 6	Left	5—Nos. 5, 6, 8, 9 and 10.
No. 6	Right	4—Nos. 6, 8, 9 and 10.
No. 7	Left	1—No. 7.
No. 7	Right	1—No. 7.
No. 8	Center	1—No. 8.
No. 9	Center	1—No. 9.
No. 10	Left	1—No. 10.
No. 10	Right	1—No. 10.

The device may be installed in the usual alley and I have provided means for automatically returning the balls consisting of a pit 64 having tapered sides 65 with an opening 66 at one side of the alley communicating with a ball return conduit 67 through which the balls pass back by gravity down to the head of the alley where they are picked up and again used.

With this construction it will be noted that the players enjoy all the exercise and pleasure of a regular game of bowling though the use of pin boys and pin setters is dispensed with.

I am aware that the details of construction of the device herein shown and described are capable of some modification and change and I therefore desire it to be understood that such changes in construction as come within the scope of the appended claims I deem to be within the spirit of my invention.

What I claim as my invention is:

1. In an apparatus of the character described, the combination of a board provided with pin-indicators, dummy pins disposed in the alley, and ball-operated means including parts carried by the pins for operating said pin-indicators when the dummy pins are struck, said ball operated means operating one or more of said indicators depending upon the particular pin struck.

2. In an apparatus of the character described, the combination, with the alley, of a board provided with visible pin-indicators, dummy pins disposed in the alley, and ball-operated means including parts carried by the pins for operating said pin-indicators when the dummy pins are struck, said ball operated means operating one or more of said indicators depending upon the particular pin struck.

3. In an apparatus of the character described, the combination, with the alley, of a plurality of electric lights in pin "set up"

position, an electrical circuit for supplying current to said lights, a plurality of switches in said circuit, dummy pins disposed in the alley, and ball-operated means for operating one or more of said switches when one of the dummy pins is struck.

4. In a bowling game, the combination, with the alley, of dummy pins disposed in the alley in ten pin formation, a board provided with pin indicators, means carried by the pins and operatively connected to the pin indicators and adapted to be struck by the balls to indicate how many pins would have been knocked down if real pins were used.

5. In a bowling game, the combination, with the alley, of a plurality of visible indicators in pin "set up" position, an electrical circuit for supplying current to operate said indicators, a plurality of switches in said circuit, dummy pins disposed in the alley in ten pin formation, ball-operated means carried by the pins and operatively connected to said switches for operating said switches to indicate the number of pins struck if real pins were used, and means for resetting the switches.

6. In an apparatus of the character described, the combination with the alley, of a plurality of electric lights in pin "set up" position, an electrical circuit for supplying current to said lights, a plurality of switches in said circuit, dummy pins disposed in the alley, rods carried by said dummy pins and adapted to be moved by the bowling balls, and means operatively connecting said rods to said switches whereby certain of the said switches will be operated when certain of the rods on the dummy pins are struck.

In testimony whereof, I affix my signature.

MAX A. DREWS.