(No Model.) 3 Sheets—Sheet 1.

P. P. NELSON.

ELECTRIC BOWLING ALLEY.

No. 504,087. Patented Aug. 29, 1893.

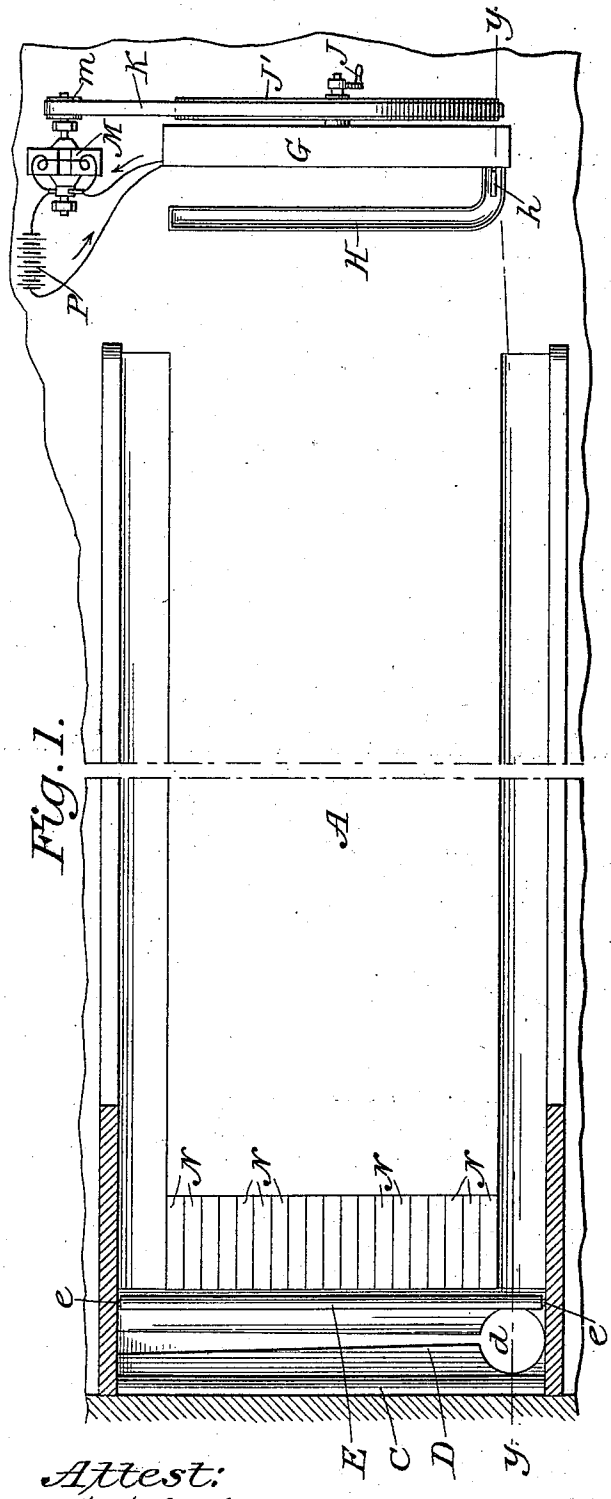

Fig. 1.

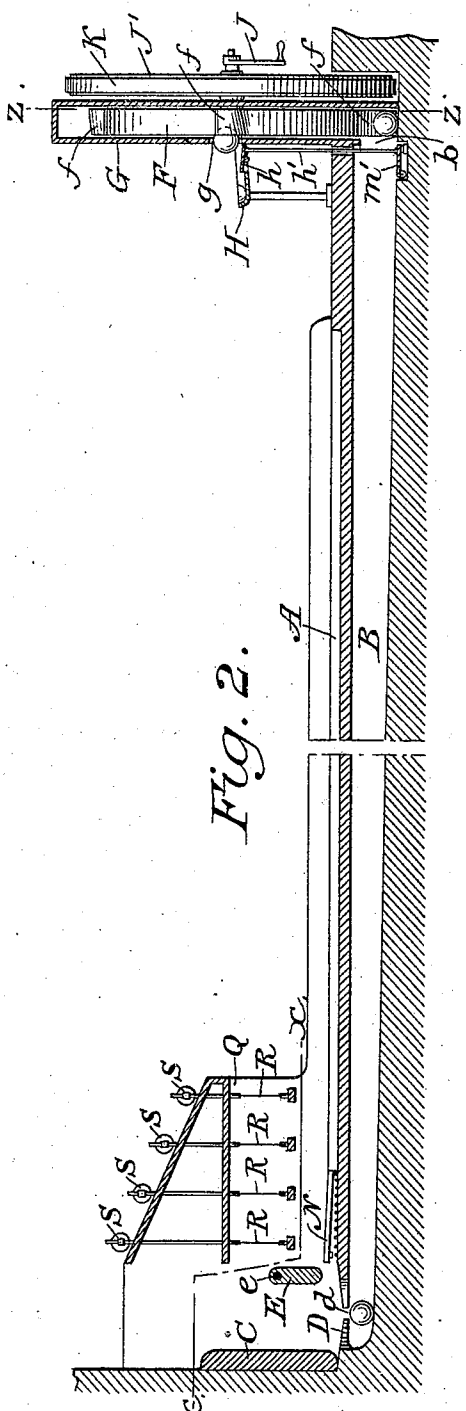

Fig. 2.

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Fig. 3.

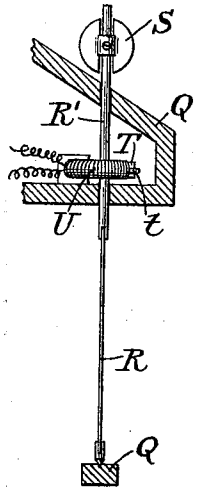

Fig. 4.

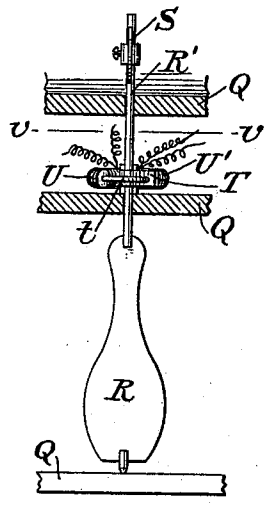

Fig. 5.

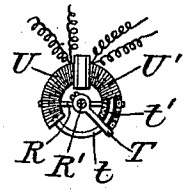

Fig. 6.

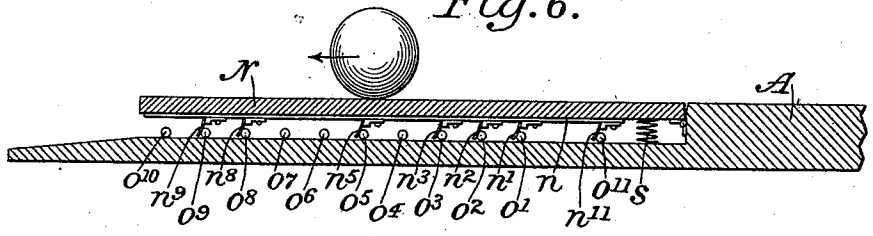

Fig. 7.

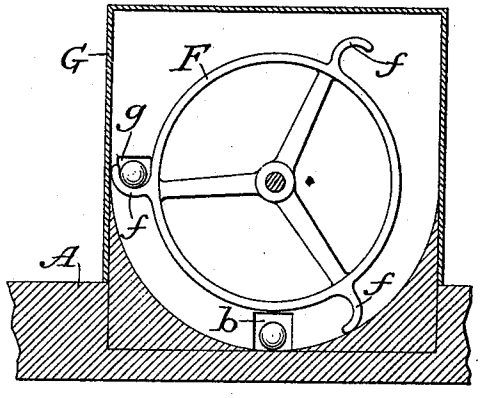

Fig. 8.

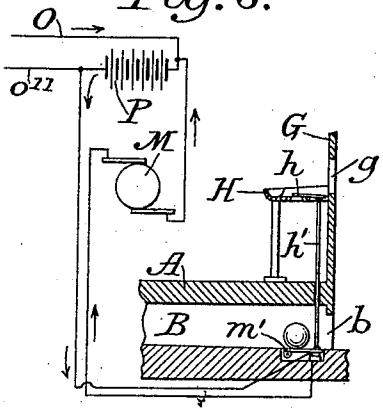

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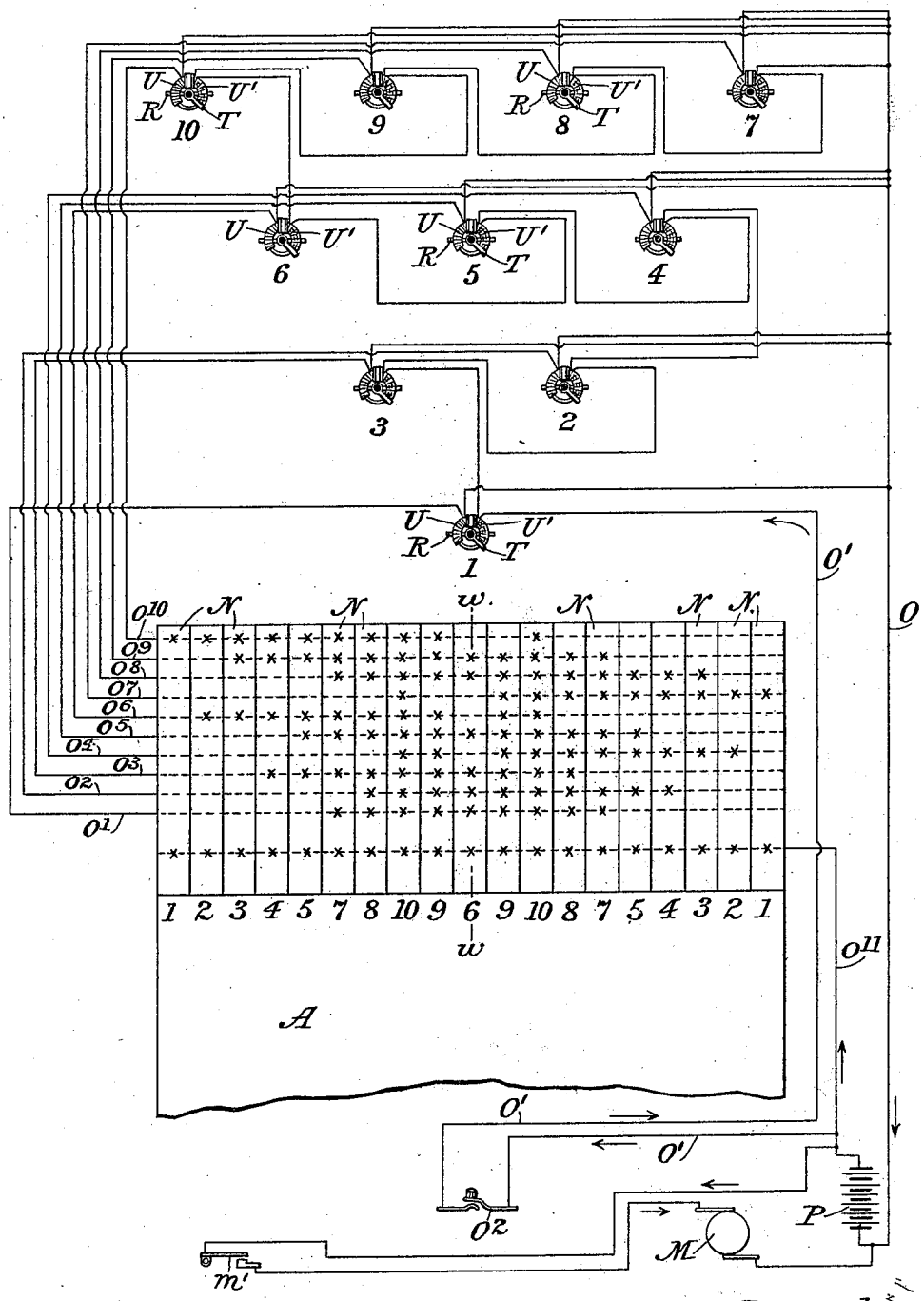
Fig. 9.



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UNITED STATES PATENT OFFICE.

PEHR PRISCO NELSON, OF NEW YORK, N. Y.

ELECTRIC BOWLING-ALLEY.

SPECIFICATION forming part of Letters Patent No. 504,087, dated August 29, 1893.

Application filed September 21, 1892. Serial No. 446,381. (No model.)

To all whom it may concern:

Be it known that I, PEHR PRISCO NELSON, of the city, county, and State of New York, have invented certain new and useful Improvements in Electric Bowling-Alleys; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters and numerals of reference marked thereon, making a part of this specification.

My invention relates to bowling alleys and to other recreative devices of like character on which a ball is directed by the player toward certain objects or points.

It is my object to provide improved automatic devices for recording the effect of the ball, for avoiding the necessity of an attendant to set up pins, and for returning the ball immediately to the player. Furthermore, in bowling alleys of the usual type it is well understood that if a ball passes over a particular point at the pin end of the alley it will knock down the same pin or pins every time provided other conditions remain the same. Therefore in such alleys as constructed in accordance with my improvements I take advantage of this fact and cause the passage of a ball over any position in the pin end of the alley to make a corresponding indication upon a suitable annunciator or visual indicator, no actual pins to be struck and knocked down by the ball being used.

In the accompanying drawings: Figure 1 is a plan view of a single bowling alley equipped with my improvements, the view being partly in section on the line *x*—*x* of Fig. 2 and the alley being broken out to save space. Fig. 2 is a vertical section of an alley on the line *y*—*y* of Fig. 1, the annunciator, which is omitted from Fig. 1, being shown in position. Figs. 3 and 4 are respectively side and front elevations of a single indicator, the supporting frame-work being shown in section. Fig. 5 is a horizontal section on the line *v*—*v* of Fig. 4. Fig. 6 is a longitudinal central section of the pin end of the alley, on the line *w*—*w* of Fig. 9, on an enlarged scale. Fig. 7 is a vertical section on the line *z*—*z* of Fig. 2 showing the ball elevator in detail. Fig. 8 is a partly diagrammatic, partly sectional detail view showing means for driving and controlling the elevator; and Fig. 9 is a diagram illustrating the electrical connections.

The table or alley A may be of any desired construction and is provided, preferably below the level of the playing surface, with an inclined ball-returning chute B. The usual space may be provided beyond the position of the pins backed by an ordinary buffer C and having an inclined bottom D with a hole *d* through which the balls may pass to the return chute B. In order to prevent the rebounding of the balls upon the end of the alley I hinge or swing on pivots, as at *e*, *e*, a supplementary buffer E just beyond and above the end of the alley and give it such weight that it shall permit the balls to pass under it readily as they come from the alley but shall prevent their rebounding or rolling back onto the alley.

At the players' end of the alley is placed the elevator which raises the balls from the chute B to a convenient height. As shown (see Figs. 1, 2 and 7) the elevator consists of a wheel F, armed with buckets *f*, *f*, and rotating between the walls of a casing G. The ball which is returned to the player rolls through an opening *b* at the end of the chute B into the path of the advancing bucket by which it is caught up and raised until it reaches the level of an opening *g* when, the bottom of the bucket being suitably inclined, it is delivered through said opening to a suitable trough H.

The elevator may be operated by a crank J, but I prefer to fix to the shaft of the wheel F a pulley J′ over which a belt K passes from the pulley *m* of an electric motor M.

In order that the elevator and motor may not be in motion except when needed the circuit of the motor is normally open at a circuit breaker *m′* which is placed in the chute B near its lower end and is adapted to be closed by the ball as it rolls into the path of the buckets *f*, *f*, of the wheel F and to remain closed until it is opened by other means. In the trough H, near the opening *g* is placed a lever *h* which is connected by a rod *h′* to the circuit breaker *m′* so that as the ball rolls from the bucket *f* of the wheel F it again opens the circuit of the motor and stops the elevator. It is evident that the elevator might be made as an endless belt if desired and that

it might be placed at the pin end of the alley and made to raise the balls there to an elevated return chute, but I prefer the arrangement shown.

At that part of the table or alley where the pins or other objects are usually set up, are placed a number of plates N, N, such plates being pivoted or hinged in such manner that they offer little or no obstacle to the passage of a ball and yet are moved by the ball to complete one or more electric circuits. As shown in the drawings (see Figs. 1, 2, 6 and 9) these form a continuous row across the end of the alley and are hinged thereto with their upper surfaces flush with the surface of the alley, the free end of each plate being upheld by a light spring *s*. For convenience of description these plates have been numbered 1, 2, 3, 4, &c. Each plate bears on its under side a conducting strip *n* to which are secured one or more contacts n', n^2, n^3, &c., (Fig. 6) which are adapted to make contact with one or more of a series of wires or conducting strips o', o^2, o^3, o^4, &c., which are stretched transversely across the bed of the alley beneath the plates N, N, as shown in dotted lines in Fig. 9. All of the conducting strips *n*, *n*, are connected, either directly or through a contact n^{11} for each and a common conductor o^{11}, with one pole of the battery or other source of electrical supply P. Each of the conductors o', o^2, o^3, o^4, &c., is connected through its respective annunciator coil with a common conductor O and the other pole of said battery.

The annunciators may be constructed in any desired manner but I prefer the construction and arrangement shown in the drawings, (see Figs. 2, 3, 4 and 5.)

At the pin end of the alley and at a sufficient height above its surface to permit the balls to roll freely thereunder is fixed a suitable frame Q in which are supported to turn freely on their pivots a series of thin plates R, R, which are severally formed to represent the profile of an ordinary ten-pin. The normal position of these dummy pins is such that they present a side view to the player who stands at the farther end of the alley so that they have the appearance of the full number of ordinary pins set up as usual on the end of the alley. Each pin is adapted to be turned, by means hereinafter described, so that it shall stand with its edge toward the player and therefore shall apparently disappear as would the ordinary pins when knocked down. A shaft R′ is fixed to the upper end of each dummy pin and passes freely through suitable bearings in the upper part of the frame Q. The upper end of the shaft carries an annunciator disk or plate S which may be fixed in a plane at right angles to that of the dummy pin so that when the latter disappears the disk shall be exposed to view. At a suitable point on the shaft R′ is fixed a radial arm T which carries two oppositely projecting arms *t* and *t′* curved on an arc concentric with the axis of the shaft R′. In the same plane with the rods *t* and *t′* and also curved on an arc concentric with the arc of the rods *t* and *t′* and of the same radius, two electro magnetic coils or solenoids U and U′ are fixed to the frame Q. The arm T stands between the ends of the two solenoids, which are about ninety degrees apart, and when the solenoid U is energized the arm *t* is drawn into it, turning the dummy pin from its normal position so that it shall stand with its edge toward the player, while if the other solenoid U′ is energized the arm *t′* will be drawn into it and the pin will be turned to its normal position.

The solenoids U of the several pins or indicators marked 1, 2, 3, &c., upon the diagram, Fig. 9, are respectively included in the respective branches from the conductors o', o^2, o^3, &c., to the common conductor O, so that as the circuit is closed through any branch by the movement of a plate N, the corresponding pin or indicator R will be turned.

As hereinbefore stated it is intended that when a ball rolls over any one of the plates N it shall produce the same effect that it would have if it were bowled at ordinary pins set up in the usual manner. Therefore each plate N is provided with one or more contacts n', n^2, n^3, &c., according to its position. Thus a ball bowled over the plate marked 1 at either side would, on an ordinary alley, knock down the single pin 7 or 10; therefore the plate marked 1 at the left in Fig. 9 has a single contact n^{10} to complete the circuit through conductor o^{10} and the solenoid U of pin 10. Similarly, plate 2 at the left has two contacts n^{10} and n^6 to complete the circuit through conductors o^6 and o^{10} and the solenoids U of pins 6 and 10; the plate 10 has ten contacts n' to n^{10}, inclusive, to complete the circuit through all the conductors o' to o^{10}, inclusive, and the solenoids U of all the pins; and plate 6, in the middle, has contacts n', n^2, n^3, n^5, n^8, n^9, to complete the circuit through conductors o', o^2, o^3, o^5, o^8, o^9, and the solenoids U of the pins 1, 2, 3, 5, 8, 9.

Further description of the arrangement of the contacts is unnecessary as the same is clearly shown in Fig. 9.

All of the solenoids U′ are connected in series to the battery P, on the one side by the common conductor O and on the other side by a conductor O′ which includes a normally open circuit closer O^2, whereby any or all pins which may have been turned to their "knock-down" positions may be returned to their normal position by closing the circuit at O^2.

It is obvious that the plates 1, 2, 3, &c., might be otherwise disposed than in the floor of the alley, that the indicating devices might be placed at any convenient point, and that various other changes might be made without departing from the spirit of my invention. It is also to be understood that I do not

intend to limit my invention to the game of ten-pins, but that it is readily applicable to any form of floor or table game.

I claim as my invention—

1. The combination of an elevator for balls, an electric motor for operating said elevator, a chute to deliver balls to the elevator, a receptacle to receive balls from the elevator, a circuit closer operated by a ball as it passes from the chute to the elevator and means to open said circuit closer operated by the ball as it passes from the elevator to the receptacle, substantially as shown and described.

2. The combination of a series of indicators, a series of electro-magnetic coils in independent branches, a series of plates movable by the passage of a ball one or more contacts for each of said plates whereby the movement of each plate closes one or a plurality of said branches, according to the position of the plate in the series, to cause the corresponding coils to move one or more of said indicators in one direction, a second series of electro-magnetic coils acting severally in opposition to said first named coils to move said indicators in the opposite direction, and an independent circuit closer to close the circuit of said second series of coils, substantially as shown and described.

3. The combination of electric indicators, connected to one side of a battery, a series of conductors severally connected to said indicators, and a series of plates movable by a ball and each having, according to its relative position, one or more contacts connected to the other side of said battery and each adapted to complete the circuit through one of said conductors, substantially as shown and described.

4. The combination of a series of electrical indicators connected to one side of a battery, a series of conductors connected severally to said indicators, and a series of plates overlying said series of conductors and movable by a ball, one of said plates having a single contact connected to the other side of said battery and adapted to complete the circuit through one of said conductors, another of said plates having a series of contacts also connected to the battery and adapted to complete the circuit through all of said conductors and the intermediate plates of the series having each two or more contacts according to its position to complete the circuit through two or more of said conductors, substantially as shown and described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

PEHR PRISCO NELSON.

Witnesses:
A. N. JESBERA,
A. WIDDER.