The present invention relates to an automatic device for raising and lowering curtains, and more particularly to a spot curtain game for bowling alleys.

The primary object of the present invention is to provide a spot curtain game for bowling alleys including a mechanism for automatically and periodically raising and lowering a curtain.

Another object is to provide a novel means for periodically raising and lowering a curtain, in combination with additional manually operated mechanism to adjust the limits of movement of said curtain.

In one of its broad aspects, the invention relates to a device for raising and lowering a curtain including an electric motor, a toggle switch in circuit with said motor, a shaft rotatably driven by said motor, means controlled by said toggle switch to operate a curtain, and control means carried by, or associated with, said driven shaft to periodically engage the toggle of said toggle switch to reverse the operation of said motor and said driven shaft.

Other and further objects and advantages of the present invention will be apparent from the following description thereof, and from the claims appended thereto.

In the drawing wherein like numerals refer to like or corresponding parts throughout the several views:

- Figure 1 is a top plan view illustrating the curtain raising and lowering mechanism in combination with a bowling alley and embodying the features of the present invention.
- Figure 2 is a front elevation view of the curtain raising and lowering mechanism.
- Figure 3 is a top plan view of the curtain raising and lowering mechanism, partly in section.
- Figure 4 is a side elevation view of the device of the present invention, partly in section.
- Figure 5 is a side elevation view as seen from the left in Figure 2; and
- Figure 6 is a wiring sketch showing the toggle switch circuit in circuit with the motor and with a suitable source of electric power.

Referring now to the drawing, the numeral 10 represents a E. M. C., 115 volt, A. C.-D. C. motor, or a similar motor. A worm 11 is driven by motor 10 and engages a worm wheel 12 which is keyed to a worm wheel shaft 13, which is rotatable therewith. The worm gear shaft 13 may be in one section, or may be in several sections suitably associated with each other, as desired.

At one end of the worm gear shaft 13 is disposed a bearing or housing 14 suitably carried by a standard or brace 15 which is attached to a beam or other cross member 16 for purpose of support. The beam 16 may be suitably secured to the ceiling, as shown at 21d in Figure 2, or to other upright standards.

The worm gear shaft 13 is journaled in the bearing 14 and is keyed therein by means of a set-screw 17 which screws through a threaded aperture in said bearing 14. The bearing 14 has an enlarged head portion 18 which is apertured to receive fastening members such as nails 19, to secure the bearing 14 to a drum portion 20, which carries on the opposite side thereof a bearing 14a, which is similar in construction to bearing 14, and is likewise provided with an enlarged head portion 18a, which is secured to the opposite end of the drum 28 by means of fastening elements 19a. The bearing 14a is carried in a standard 18a which is suitably secured to the cross member 16 for support.

The worm wheel shaft 13 is suitably braced by means of an L-shaped standard 22 which is suitably secured to the upright member 15 by means of a threaded screw 23, or by any other desired means. The free end of member 22 carries bearing means 22a for supporting the shaft. Any suitable means may be employed to brace or support the curtain raising and lowering mechanism in position.

On the other end of the worm wheel shaft 13 is disposed a threaded portion 13a. A sleeve 24 engages on said threaded portion 13a and said sleeve comprises an internally and externally threaded shank portion 25 with a stationary head 26 and a movable head 27 which is adapted to move on the external threads of the shank portion 25 of the sleeve 24. The movable head 27 is apertured to receive a set screw 28 which locks the said head 27 against relative movement in any desired position.

A bracket 29 is carried by the motor 10 and is appropriately slotted at 30 to receive a shaft or finger 31 which engages the stationary head 26 of the sleeve 24, to hold the same stationary so that it will not turn with the rotation of the worm wheel shaft 13. The finger 31 is adapted to ride laterally back and forth in the slot 30, as the sleeve 24 moves backwards and forward along the threaded portion 13a of the worm wheel shaft 13.

A two pole, two throw, toggle switch 32 is mounted on the bracket 29 carried by the motor 10 so as to hold the said toggle switch 32 directly over the sleeve 24 which rides along the- threaded worm wheel shaft portion 13a.
The two pole, two throw, toggle switch has a depending toggle 33 which is positioned between the movable head 27 and the stationary head 26 of the threaded sleeve 24, so that movement of the sleeve 24 along the threaded portion 13a causes the periodic engagement of the head 26 with the toggle 33 so as to reverse the operation of the motor 10. Likewise, the movable head 27 periodically engages the toggle 33 to reverse the operation of the motor 10.

The drum portion 20 has a curtain 21a secured thereto, for operation therewith. The curtain 21a may be made of any suitable material which is adapted to roll and unroll upon the drum portion 20 as it operates. A plurality of spots generally indicated by the numeral 21b are disposed upon the curtain 21a and generally represent the spots for ten bowling pins which are disposed at the bottom of the bowling alley as is conventional in the game of ten pins.

Any suitable supporting member or brace may be employed to secure the drum portion 20 and curtain over the bowling alley for use in combination therewith. This particular feature is not a part of the invention per se, so it has not been described in detail.

Referring to Figure 6, there is shown a schematic wiring diagram with the motor 10 in circuit with the toggle switch 32, including the toggle 33. Power may be furnished to drive the motor by any suitable source. It is preferred that the motor 10 be operated by a remotely controlled press button switch, which is connected into the circuit with said motor and may be operated from a position near the bowlers' seats at the bowling alley.

In operation, the curtain raising and lowering mechanism is positioned in combination with a bowling alley so that the curtain 21a is disposed over the bowling alley, and the ten pins generally represented by the letter P are hidden from the view of the bowler.

The curtain 21a may be disposed anywhere along the bowling alley, but it is preferable that it be disposed from forty to forty-five feet from the foul line. In employing the spot curtain bowling game, the bowler picks a certain spot under the curtain 21a as represented by the numerals 21b. In other words, the bowler picks a spot on said curtain 21a without actually seeing the ten pins P when the ball leaves his hand at the foul line. By operation of a push button switch disposed near the bowlers' seats, the curtain is raised so that the ball passes thereunder and the bowler can see how the ball hits the pins P, having in mind that the ball was pointed toward a certain spot on the curtain 21a. By constant practice, the bowler can improve his bowling game through this spot curtain bowling method.

In the operation of the curtain raising and lowering mechanism, as the push button is operated near the bowlers' seats, the motor 10 is energized, which in turn rotates the worm 11, which is engaged with the worm wheel 12, which is keyed to the shaft 13. The shaft 13 is thus rotated turning the drum 20 to either elevate or lower the curtain 21d depending upon the direction of rotation of the worm gear shaft 13. As the worm gear shaft 13 rotates, the finger 31 holds the sleeve 24 against rotation therewith, causing the sleeve 24 to travel along the threaded portion 13a, for example to permit the head 26 of the sleeve 24 to engage the toggle 33 and to reverse the operation of the motor 10. Upon reversion of the operation of the motor 10, the worm 11 reverses its direction of rotation to correspondingly reverse the direction of rotation of the worm wheel 12 to likewise reverse the rotation of the worm wheel shaft 13. The reversal of the rotation of the worm wheel shaft 13 causes the sleeve 24 to reverse its direction of lateral movement along the threaded portion 13a to thus cause the head 21 to engage the toggle 33 and to again cause the reversal of the direction of operation of the motor 10, after the sleeve 24 has traveled through a sufficient distance so that the head 27 can throw the toggle 33.

The curtain 21a may be automatically and periodically raised and lowered between certain limits depending upon the adjustment of the movable head 27 of the sleeve 24. Movement of the head 27 closer to the head 26 of the sleeve 24 will cause the curtain 21a to be raised and lowered within narrower limits. The movement of the head 27 away from the head 26 increases the length of the curtain 21a which is periodically rolled and unrolled by the operation of the motor 10.

Various modifications of the present invention will be apparent to those skilled in the art without departing from the spirit thereof, and it is therefore desired to be limited only by the scope of the appended claims.

What I claim is:

1. The combination with a bowling alley having spots for pins, of a spot curtain game comprising a reversible electric motor, a two-pole, two-throw toggle reversing switch in circuit with said motor, a worm driven by said motor, a worm gear shaft having a worm gear keyed thereto with the teeth of said worm gear engaging said worm, a curtain roller mounted above the bowling alley and between the pin spots and the head of the alley and coupled to one end of said worm gear shaft and rotatable therewith, a curtain carried by said curtain roller and adapted to roll and unroll, said curtain having a plurality of spots thereon having an arrangement corresponding to that of the pins, said worm gear shaft having a threaded portion at the other end thereof, a sleeve having internally and externally threaded portions and provided with two heads threadedly engaging the threaded portion of said worm gear shaft, a finger carried by said sleeve, means for preventing rotation of said finger with the worm gear shaft while permitting sliding movement thereof so that said finger prevents rotation of the sleeve with said worm gear shaft but permits movement of said sleeve along the threaded portion of said worm gear shaft in any of said heads being movable and being internally threaded and in threaded engagement with the externally threaded portion of said sleeve, said movable head having a threaded aperture, and a set screw engaging in the threaded aperture in said movable head and engaging said sleeve to lock the movable head in position, said toggle switch having a lever disposed between the two heads on said sleeve for alternate engagement by the heads to reverse the operation of said motor and said curtain roller shaft.

2. The combination with a bowling alley having spots for pins, of a spot curtain game comprising a reversible electric motor, a toggle reversing switch in circuit with said motor, a worm driven by said motor, a worm gear shaft having a worm gear keyed thereto with the teeth of said worm gear engaging said worm, a curtain roller shaft mounted above the bowling alley and be-
between the pin spots and the head of the alley and coupled to one end of said worm gear shaft and rotatable therewith, a curtain carried by said curtain roller and adapted to roll and unroll, said curtain having a plurality of spots thereon having an arrangement corresponding to that of the pins, said worm gear shaft having a threaded portion on its other end, a control means including a sleeve threadedly engaging the threaded portion of said worm gear shaft and a pair of spaced apart heads carried by said sleeve, said toggle switch having a lever disposed between said heads, and means for preventing rotation of said sleeve on the threaded portion of the worm gear shaft but permitting longitudinal movement of the sleeve and heads with respect to said worm gear shaft so that the heads will alternately engage the lever of the toggle switch upon rotation of the worm gear shaft to reverse the operation of said motor and said curtain roller shaft.

3. The combination with a bowling alley having spots for pins, of a spot curtain game comprising a reversible electric motor, a reversing switch in circuit with said motor, a shaft driven by said motor, a curtain roller mounted above the bowling alley and disposed between the pin spots and the head of the alley, a curtain carried by said roller and having a plurality of spots thereon having an arrangement corresponding to that of the pins, means for driving said roller from said shaft, and control means operatively connected to said driven shaft for operation in response to rotation thereof to periodically actuate said switch to reverse the direction of operation of said motor and said curtain roller.

4. For use with a bowling alley having spots for pins, a spot curtain game comprising a reversible electric motor, a toggle reversing switch in circuit with said motor, a worm driven by said motor, a worm gear shaft having a worm gear keyed thereto and in mesh with said worm, a curtain roller shaft adapted to be mounted above the bowling alley between the pin spots and the head of the alley and coupled to one end of said worm gear shaft and rotatable therewith, a curtain carried by said curtain roller for rolling and unrolling, said curtain having a plurality of spots thereon having an arrangement corresponding to that of the pin spots on the bowling alley, said curtain adapted to conceal the ten pins from the bowler until the bowler has released the bowling ball, and a control means operatively connected to the worm gear shaft for operation in response to rotation thereof for periodically actuating the toggle switch to periodically reverse the direction of the operation of said motor.

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