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PRACTICE BOWLING ALLEY

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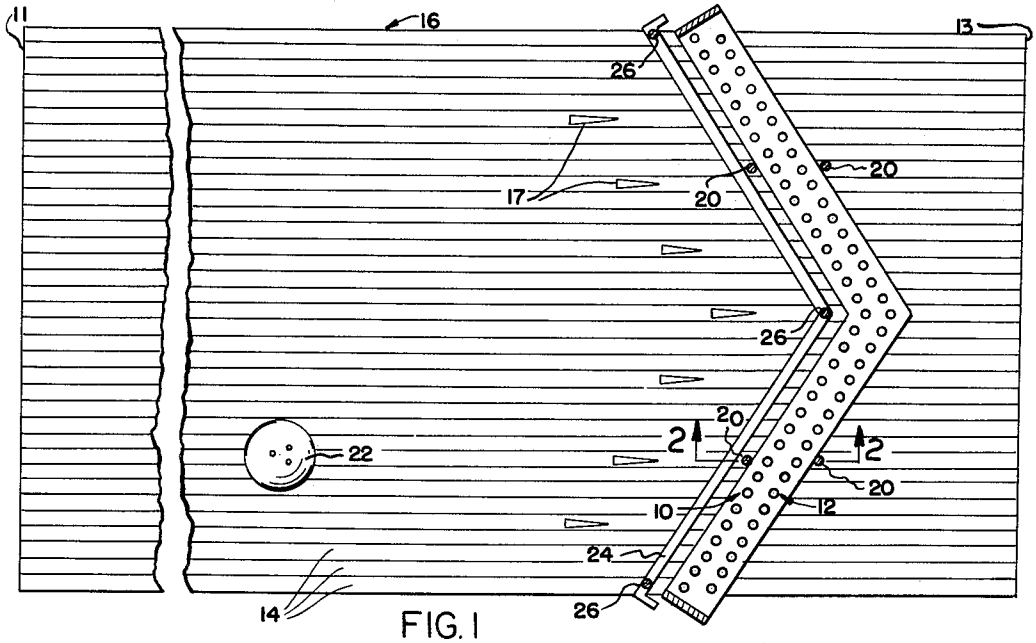


FIG. 1

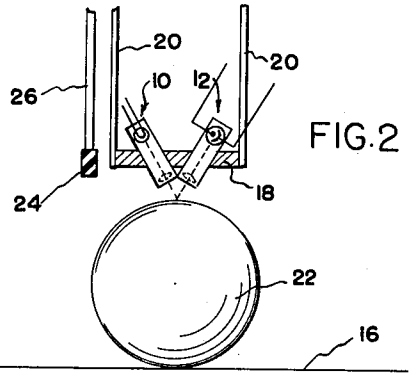


FIG. 2

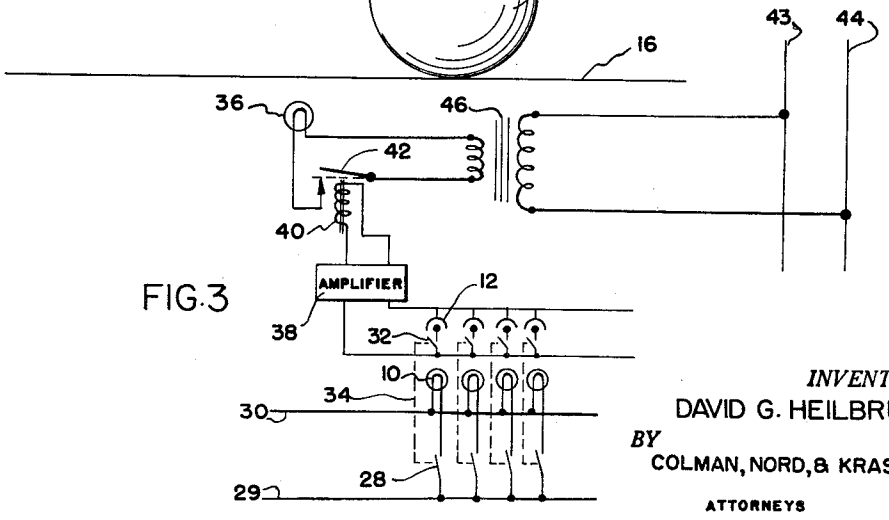


FIG. 3

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PRACTICE BOWLING ALLEY

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This invention relates to a device for practicing bowling and, more particularly, relates to a practice bowling alley which includes devices substituted for the customary bowling pins and the half of the alley on which they normally stand, which indicate whether or not the bowling ball has passed over a preselected spot on the alley.

In a conventional bowling alley, the only test of the bowler's accuracy or inaccuracy is the ultimate one of the number of pins knocked down. However, this is not sufficient for practice purposes, since it provides no positive indication of the exact position of the bowling ball on the alley at any given point. That is to say, it gives no accurate indication of whether or not the "spot" bowler has passed over the spot on the bowling alley which he has aimed at in his delivery. The present invention is therefore designed to furnish such a positive indication with an apparatus which is both simple in construction and low in cost.

In using the present invention, the bowler selects the spot over which he will attempt to pass the bowling ball (e.g. the sixth board from the right side of the alley, along an imaginary diagonal line running between the conventional diamond-shaped spots which are placed on the alley at every fifth board), and closes a switch designated for that particular board. If the bowling ball passes over the desired spot, the light from an electric lamp is reflected off the top of the bowling ball passing thereunder into a corresponding photoelectric cell, which emits a small voltage. By means of an amplifier and a relay, an electric lamp is illuminated or other signal is actuated, thus indicating to the bowler that the ball has passed over the desired spot.

It is therefore the general object of this invention to provide positive indication, during practice, of whether or not the ball passes over a spot previously selected by the bowler.

It is a further object of this invention to provide a device for testing the accuracy of the bowler which eliminates the customary bowling pins and the half of the alley on which they normally stand.

Still another object is to provide photoelectric means for determining whether or not a bowling ball has passed over a preselected spot on a bowling alley or practice bowling alley.

An advantage of the invention is that it provides a device which is inexpensive, occupies less room than a conventional bowling alley, and yet provides a positive and accurate indication of whether or not the bowler has been able to pass over the "spot" used by him in aiming his delivery.

A further advantage of the invention is that it does not require any modification of the surface of the alley, which might affect the motion of a bowling ball thereon.

Other objects and advantages will more fully appear from the following description and drawings, wherein is disclosed a preferred embodiment of the invention.

In the drawings:

FIGURE 1 represents a fragmentary horizontal cross-sectional view of a preferred embodiment of the practice bowling alley of the present invention;

FIGURE 2 represents a cross-sectional view taken along the lines 2—2 of FIGURE 1; and

FIGURE 3 represents a schematic diagram showing suitable electric circuits for use in the invention.

In the drawings, similar numerals represent similar parts.

Referring now more particularly to the drawings, an embodiment of the invention is shown as comprising two banks of electric lamps and photoelectric cell tubes 10 and 12, respectively, arranged in pairs, each pair being suspended over and aligned with one of the boards 14 comprising the half-alley 16. There is such a pair for each of the "boards" of the alley, e.g. a pair for board one, a pair for board two, etc.

The delivery line of the practice bowling alley is designated as 11, and the end of the alley is designated as 13. It will be observed that the end of the alley 13 need not be far beyond the aforesaid banks 10 and 12; hence a half-alley 16 is sufficient, i.e. one which is only roughly half the normal length, though otherwise the same as a conventional bowling alley. Known means (not shown) for the return of bowling balls from the end of the alley 13 to the delivery line 11 may be employed.

The half-alley 16 contains the conventional diamond-shaped "spot" markers 17 in the conventional diagonal arrangement, imbedded in the alley 16, each marker 17 being five boards apart on the alley 16.

The electric lamps 10 and photoelectric cells 12 are mounted on a horizontal support member 18, as shown in FIGURE 2, which horizontal support member 18 is suspended from above by means of a plurality of vertical support rods 20, as shown. In order to prevent a bouncing ball 22 from striking and damaging a lamp 10 or cell 12, a suitable guard bumper 24 may be suspended immediately before and parallel to the horizontal support member 18 by means of vertical rods 26, as shown.

Each pair of lamps and cell tubes, 10, 12, is aimed downwardly at the board below at equal converging angles to the vertical such that their longitudinal axes intersect at a point substantially equal to the height of a bowling ball 22 on alley 16. Thus, if the bowling ball 22 passes under the lamp 10, the light will be reflected upwardly along the longitudinal axis of the corresponding photoelectric cell tube 12, as shown by the dotted lines in FIGURE 2. By activating a suitable electric switch arrangement, only one pair 10, 12 is operating at a given time, as described below. Thus, the activated photoelectric cell 12 will emit electrical current if but only if the ball 22 passes directly below the selected pair 10, 12 aligned along the preselected board 14. By proper design, the accuracy of such an arrangement may readily be made equal, for example, to half the width of a board. Thus, if the center of the ball 22 passes over any part of the preselected board 14, the preselected photoelectric cell 12 will emit electrical current, which will in turn activate a signal light or other signal device, as described below.

Thus, the bowler first selects the spot he will aim at on the alley. This spot is defined on the bowling alley as a position along a preselected board 14 and along an imaginary diagonal line connecting the adjacent spot markers 17. For the purposes of this invention, sufficient accuracy is achieved if one determines that his ball 22 has passed over the preselected board 14 a short distance back of this exact spot, immediately below the banks 10, 12. This makes it possible for the bowler's view of his "spot" to be entirely unimpeded by overhanging equipment, without sacrificing substantial accuracy. Therefore, I prefer to place banks 10 and 12 parallel to the imaginary diagonal lines defined by the spot markers 12, and a suitable short distance back therefrom, as shown in FIGURE 1.

After having selected his spot, the bowler closes a suitable switch (as discussed below) which has the effect of lighting the lamp 10 over his preselected board 14, as well as placing the corresponding photoelectric cell tube 12 over the same board 14 in a closed circuit ready to actuate a signal device when and if light from said lamp

10 is reflected thereto from the top of bowling ball 22 as it passes thereunder.

As shown in FIGURE 3, the preselected lamp 10 may be lit by closing switch 28, which then draws electric current from electrical power lines 29, 30. At the same time, switch 32 is also closed, preferably by means of an automatic interlocking mechanism indicated schematically as 34, thereby placing the corresponding photoelectric cell 12 aligned over the same board 14 in the circuit containing the signal light 36 or other signal device. Thus, the bowler selects the appropriate switch pair 28, 32, to throw into closed position, in accordance with the correspondingly preselected board 14.

Then upon his delivery of the ball to alley 16, the aforesaid preselected photoelectric cell 12 will emit a small electrical current if the ball 22 passes under said cell 12, i.e. if the ball has been properly aimed. This small current may then be amplified by a suitable amplifier 38. The amplified current activates a time delay relay 40, which closes a switch 42. When the switch 42 is closed, a current, supplied by electrical power lines 43, 44 and suitably reduced by a transformer 46, illuminates signal lamp 36 (or other signal device), thereby serving to indicate to the bowler that he has delivered the ball 22 to the preselected board or "spot."

Various modifications may be made in the structural details without departing from the spirit of the invention, the principal novel features of which are set forth in the following claims.

I claim:

1. A practice bowling alley adapted for the rolling of a bowling ball thereover, comprising: a longitudinal section of a bowling alley provided with a plurality of longitudinal boards; a plurality of lamps each suspended over a preselected board of said alley and directing a beam of light downwardly toward said board at an angle to the vertical; a plurality of photoelectric cells, each being suspended over a board corresponding to one of said lamps to form a pair therewith, and being directed downwardly toward said board at an angle to the vertical

which is equal to the aforesaid angle formed by said beam of light and in converging manner with respect thereto, said angles being so selected as to intersect at a height above said board substantially equal to the height of a bowling ball; electrical switching means adapted for activating one such pair; and signal means responsive to the flow of current from one of said photoelectric cells when activated by the reflection of light thereto from said lamp off the surface of a bowling ball passing thereunder.

2. The practice bowling alley set forth in claim 1, wherein said alley is provided with a plurality of conventional spaced apart spot markers in the surface thereof arranged in a line across said alley, and wherein said lamps and photoelectric cells are arranged in banks parallel to said line at a suitable small distance, further down said alley, said alley also being provided with a guard bumper suspended over said alley between said spot markers and said lamps at approximately the same height as said lamps.

3. A practice bowling alley adapted for the rolling of a bowling ball thereover, comprising: a longitudinal section of a bowling alley; a suitable lamp adapted for generating a directed light beam at said bowling alley section, the angle of said light being inclined with respect to the plane of the alley; a photoelectric unit disposed at a selected point with respect to said lamp and said alley section and operative to be actuated by the reflection of light originating from said lamp off the surface of a bowling ball passing over a pre-selected spot on the alley; and signalling means connected to said photoelectric unit so as to be actuated upon the activating of said unit.

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