May 10, 1966 M. PATTERSON ETAL 3,250,535

BOWLING LANE SIGNALLING MECHANISM

Filed Oct. 8, 1962 3 Sheets-Sheet 1

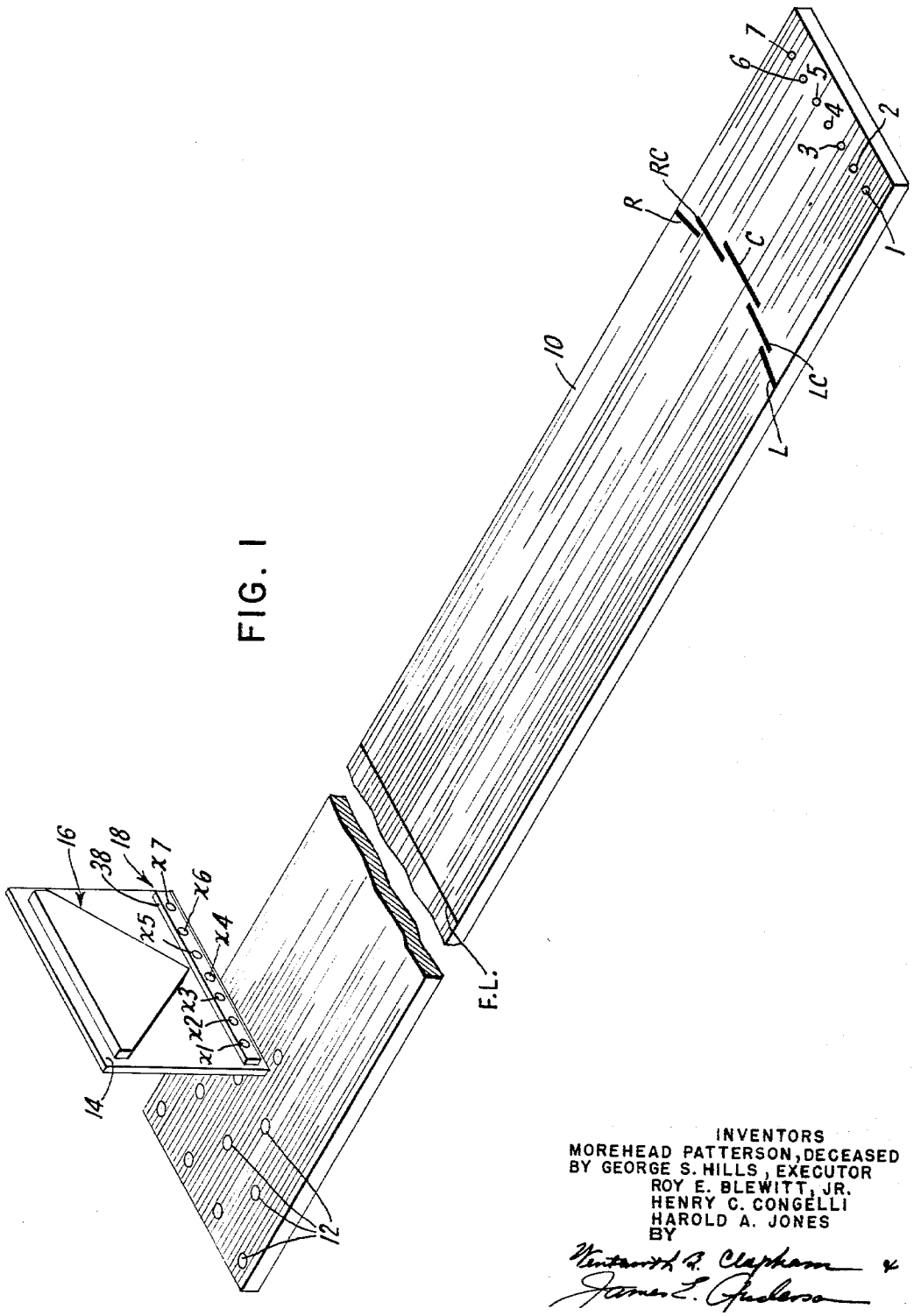


FIG. 1

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BOWLING LANE SIGNALLING MECHANISM

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FIG. 3

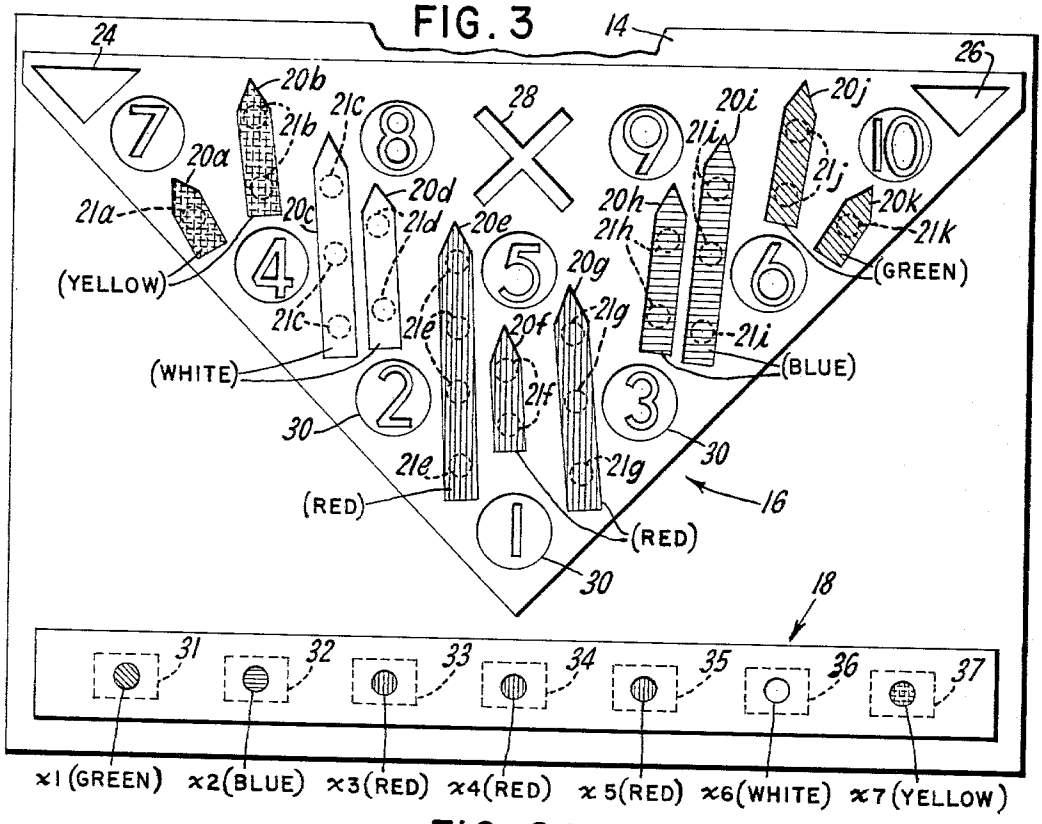


FIG. 2A

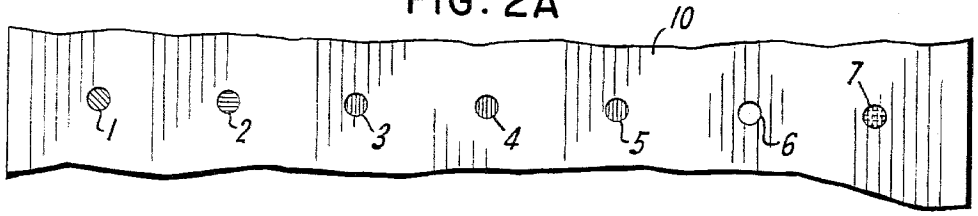
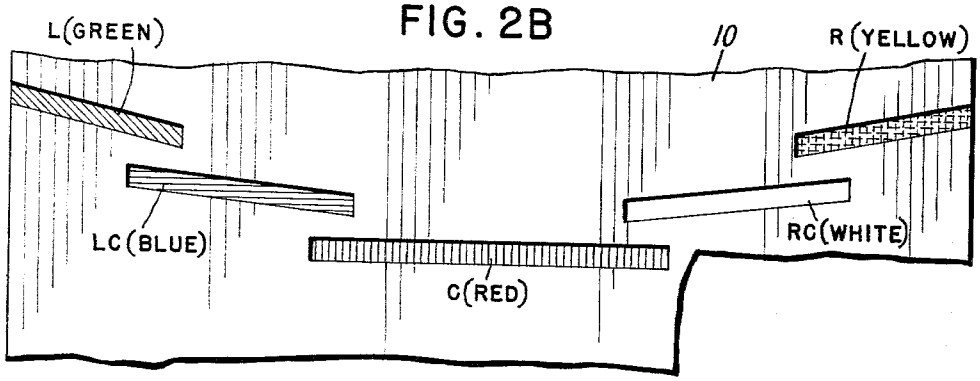


FIG. 2B



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BOWLING LANE SIGNALLING MECHANISM

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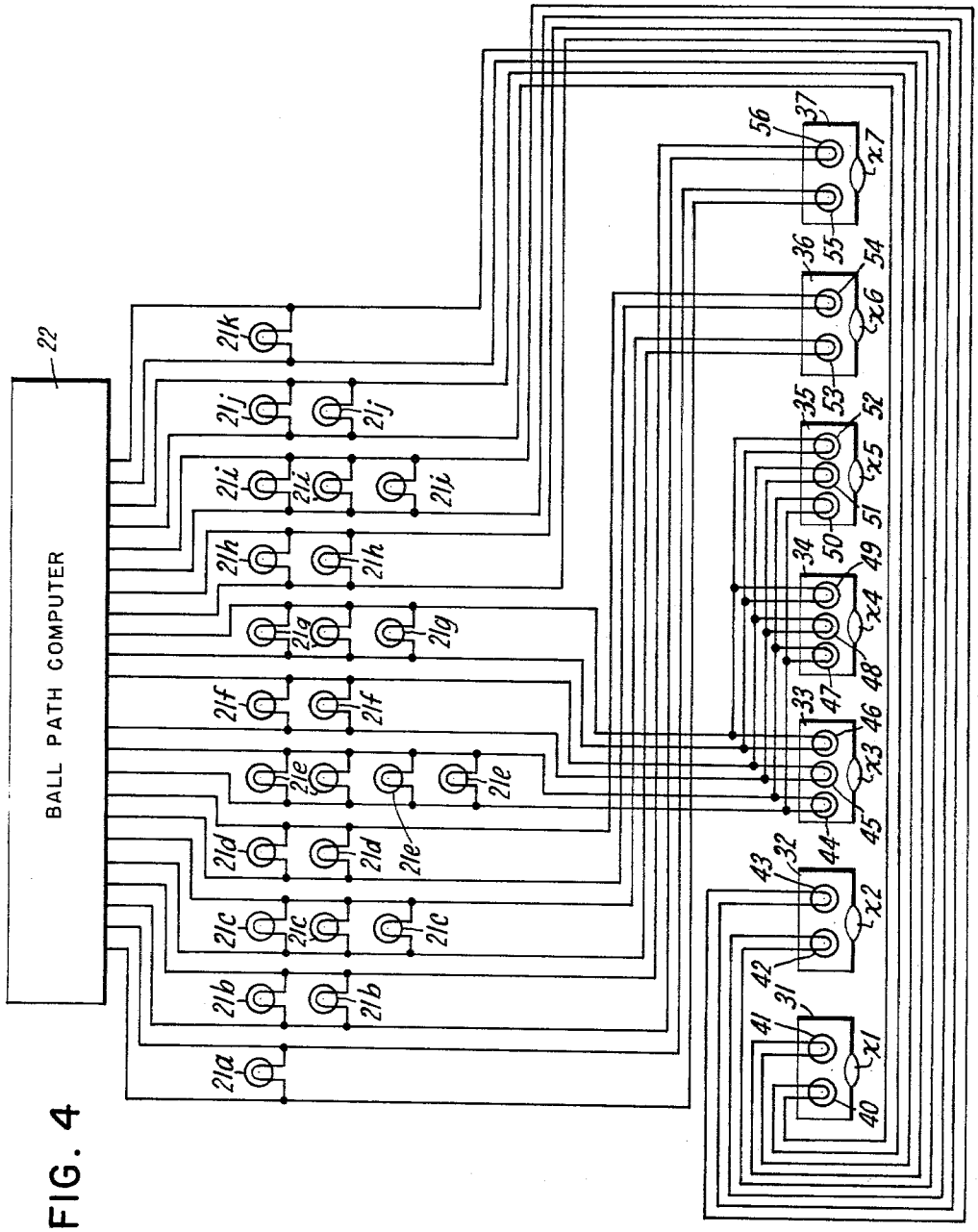


FIG. 4

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3,250,535

BOWLING LANE SIGNALLING MECHANISM

Morehead Patterson, deceased, late of New York, N.Y., by George S. Hills, executor, New Rochelle, N.Y., and Roy E. Blewitt, Jr., Southport, Henry C. Congelli, Stamford, and Harold A. Jones, Westport, Conn., assignors to American Machine & Foundry Company, a corporation of New Jersey

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16 Claims. (Cl. 273—54)

This invention relates to the construction of bowling lanes and to automatic pinspotting equipment used therein.

In the game of tenpin bowling two balls may be rolled in a frame, and in the game of ordinary duck pins three balls may be rolled in a frame. There are, naturally, many combinations of pins which will possibly remain standing if a strike is not scored on the first ball, and the consistent scoring of "spares" (the knocking down of all these pins remaining standing by the second ball) presents one of the basic challenges of this sport. The difficulties experienced in scoring spares being considerably more perplexing to average or less experienced bowlers than to the experts, who have mastered fairly set patterns in handling the basic, commonly occcurring spare combinations, certain instructive automatic aids have been developed to make bowling more pleasurable for those less expert. Specifically, there was developed a system, now widely known and accepted publicly, wherein the number and position of pins left standing is sensed and the "optimum ball path" for knocking down these pins is automatically computed and indicated. Such a system is described in the copending application of George A. Gruss and Arthur B. Viescas, Serial No. 166,616, filed January 16, 1962, and entitled "Bowling Pin Indicating System."

It is the object of the invention to provide further assistance ind instruction to bowlers, in regard to the skillful techniques of scoring given spare combinations, through novel improvements and additions in commercially practicable bowling lane equipment.

Although highly accomplished bowlers may have different individual preferences with respect to some of the "finer points" of bowling, in bowling for spares they do tend to agree on the various positions from which the bowler should start his delivery from the lane approach. That is, for any given spare there is a recommended delivery position at approximately the left-hand, central or right-hand portion of the lane. I general, pin spare combinations concentrated toward one side of the lane at the pin deck end are bowled against by a ball delivery (diagonally) from the opposite side of the lane at its approach end. On the other hand, certain other spares (such as the 1–3–6, 1–3–6–10 and 5–9) are usually handled by a delivery starting centrally of the alley.

This invention resides broadly in means for indicating to the bowler the lane approach position from which he should deliver the ball in order to knock down a particular spare combination of pins. As will be evident from the description herein, the signalling of approach position can be either independent of ball path signalling means or combined therewith.

In accordance with specifically disclosed preferred embodiments of the invention, the signalling of position is effected automatically in accordance with the sensed number and combination of pins left standing. It has been found that this can be accomplished in response to a determination derived from the same system, previously mentioned, which computes the optimum ball path for each spare combination.

If desired, at the lane approach there can be provided markers having a significance which is tied to corresponding characteristics in the nature of the signalling means employed. For example, the signals designating different positions can have colors matched with the colors of markers at these positions on the lane approach. In one such arrangement, wherein the means signalling bowler position are incorporated in the means signalling optimum ball path, the bowler starts from the location of a marker having a color corresponding to the color of the lighted arrow in the ball path indicator.

A particularly significant aspect of the present invention is that in a great many bowling establishments the introduction of this additional aid to bowlers can be accomplished with simplicity and economy.

Further details and advantages of the invention will become evident from the following description thereof in conjunction with the accompanying drawings in which:

FIG. 1 is a perspective view of only the bed of a bowling lane, without the accessories such as a pinspotting machine, in combination with signalling mechanism according to the invention;

FIG. 2A is a plan view of a portion of the lane approach area having position markers embedded or otherwise provided thereon;

FIG. 2B is a plan view of the lane approach, showing particularly a form of marking to designate different starting positions;

FIG. 3 is a front view of the entire signalling apparatus; and

FIG. 4 is a diagram, partly schematic, showing a suitable signalling control circuit.

In a modern bowling lane constructed and equipped according to recognized regulations there will obviously be a pit, rear cushion, kickbacks, division boards, gutters and so forth, but it will be understood that these parts are not shown in FIG. 1 because they have no direct bearing on the present invention. The bowling lane itself is designated **10**, and as constructed in accordance with widely adopted regulations should be 41 to 42 inches wide (typically made up of boards each about 1 inch across) and over-all about 78 feet long, including an approach of at least 15 feet long. As viewed in FIG. 1 the portion of the lane to the right of the foul line, designated F.L., is the "approach" in accordance with accepted nomenclature.

Adjacent the front end of the approach there is embedded a series of seven guides, each of said guides being circular and about ¾ inch in diameter. In FIG. 1 these guides are identified by the numbers **1** through **7**. The multicolored characteristics of guides **1** to **7**, as well as their significance in conjunction with apparatus for signalling proper bowler positioning, will be described hereafter. Also explained hereafter is the function of seven stripe-like marks designated "L" for left, "LC" for left-center, "C" for center, "RC" for right-center, and "R" for right.

At the other end of the lane **10**, there is constituted the usual pin deck having ten triangularly arranged pin spots **12**. A panel **14** mounted above that end of the lane by suitable means (not shown) carries an optimum ball path indicator **16** and a unit **18** for signalling proper bowler positions.

In actual construction, the indicator **16** comprises an opaque "mask" having transluscent openings which, when illuminated from behind, present visible signals and directions to bowlers at the head end of the lane. Arrows serve the purpose of indicating optimum ball paths to be followed for knocking down various spare combinations, eleven of these arrows being provided and identified *a* to *k* (i.e. **20***a* through **20***k* inclusive, occasionally referred to collectively herein as merely arrows **20**). Arrows **20***a* to **20***k* are illuminated individually by lamps positioned therebehind and indicated at **21***a* through **21***k* inclusive,

respectively (also referred to collectively as lamps **21**). Lamps **21** are controlled by a "Ball Path Computer" **22**, schematically represented in FIG. 4. Triangularly arranged translucent spots **30** on the mask of the indicator **16** are individually illuminated to indicate the number and positions of pins standing after the first ball, and it will be noted that arrows **20** and simulated pin spots **30** are physically related according to a carefully arranged plan. Indicator **16** also incorporates a first ball indicator **24**, a second ball indicator **26** and a strike indicator **28**. To the extent that the functional aspects of indicator **16** have been described thus far, it is now well known publicly. This indicator **16**, and a form of Ball Path Computer **22** for operating the same, are fully described in the aforementioned copending application of Gruss et al., Serial No. 166,616, the disclosure of which may be considered incorporated herein by reference. The operation of the system disclosed therein is such that after rolling of the first ball of each frame the pins still standing are sensed and flashed on the corresponding pin spots **30**; the optimum ball path for knocking down the maximum number of these pins is computed and indicated by the energization of lamps **21** associated with an appropriate arrow pointing to a target pin "pocket."

The unit **18** conveniently can be associated directly with the indicator **16** as in the illustrated case, but these components need not be closely related physically. Unit **18** is made up of seven horizontally arranged wiring junction boxes numbered **31** through **37**, which are mounted in a decorative front panel **38**. Each of the boxes **31** to **37** has a single, central lens opening therein. The total number of these boxes is the same as the number of guides **1** to **7** and preferably, but not necessarily, the boxes have the same center-to-center spacing as these guides. Accordingly, the indicators provided by these lens openings are designated *x*1, *x*2, *x*3, *x*4, *x*5, *x*6 and *x*7, with a signal light emitted through any one of these lens openings being intended to direct one's attention to a corresponding guide on the lane approach.

Referring to FIG. 4, the selective illumination of indicators *x*1 to *x*7 involves the installation of lamps, numbered **41** to **56**, inclusive, in the boxes **31** to **37**. In the far left-hand box **31** the lamp **40** is connected in parallel with the single lamp **21***k* behind the far right-hand arrow **20***k*, and lamp **41** is in parallel with the lamps **21***j* of arrow **20***j*. The lamp **42** in the next box **32** is connected in parallel with the lamps **21***i* associated with arrow **20***i*, and lamp **43** is in parallel with the lamps **21***h* of arrow **20***h*. Each of three lamps **44**, **47** and **50** in boxes **33**, **34** and **35**, respectively, is connected in parallel with the lamps **21***e* associated with arrow **20***e*. Similarly, the lamps **45**, **48** and **51** are in parallel with the lamps **21***f* of arrow **20***f*, and lamps **46**, **49** and **52** are in parallel with lamps **21***g* of arrow **20***g* (FIG. 4). In box **36** the lamp **53** is connected in parallel with the lamps **21***c* behind arrow **20***c*, and lamp **54** is in parallel with the lamps **21***d* of arrow **20***d*. Finally, in the far right-hand box **37** the lamp **55** is in parallel connection with the lamp **21***a* behind the far left-hand arrow **20***a*, and lamp **56** is in parallel with lamps **21***b* of arrow **20***b*. It will be evident from the above description that the far-left indicator *x*1 will be lighted simultaneously with flashing of either of the arrows **20***j* and **20***k* at the diagonally opposite far right-hand side in response to control by Ball Path Computer **22**. Similarly, indicator *x*2 will be lighted when either of arrows **20***h* and **20***i* flashes. All of the indicators *x*3, *x*4 and *x*5 together take up the central lane location and all are lighted simultaneously when any one of the centrally located arrows **20***f*, **20***g* and **20***h* is activated. Indicator *x*6 is lighted simultaneously with activation of either of ball path arrows **20***c* and **20***d*, and the far-right indicator *x*7 is lighted simultaneously with activation of either of the arrows **20***a* and **20***b* at the diagonally opposite side.

It is intended that the bowler will position himself on the approach at the position indicated by unit **18**. The indicator *x*1 signals a far-left position, the indicator *x*2 a left-center position, all of the indicators *x*3, *x*4 and *x*5 a central position, the indicator *x*6 a right-center position, and the indicator *x*7 a far-right position. It will be noted further that the "off-center" indicators (*x*1, *x*2, *x*6 and *x*7) will be diagonally opposite the target pockets of the spare pin combination as indicated by ball path arrows **20**. For example, if the 3–6 pocket at right-center is indicated by arrow **20***i*, the lighting of indicator *x*2 will instruct the bowler to begin his delivery from left-center at the lane approach. For the added convenience of bowlers, the indicators *x*1 to *x*7 have been matched in number and spacing with guides **1** to **7** embedded in the lane. Alternatively, only five such indicators and five matching approach guides can be used. The indicators *x*1 to *x*7 all can be the same color and the guides **1** to **7** can be the usual dark wood color.

An even further aid in correlating position signals to actual positions at the approach involves the multi-colored aspects illustrated by conventional drafting symbols in FIGS. 2A, 2B and 3. The indicators *x*1 to *x*7 can have lens colors matching the colors of their corresponding guides **1** to **7**. Although many different color combinations obviously can be used, the exemplary contrasting colors illustrated are green, blue, red, white and yellow. Thus the bowler's attention is directed to a given approach position not only by the matching side-to-side position of one of the indicators *x*1 to *x*7, but also by the matching color of that one indicator.

When position markers on the approach are characterized by different colors a bowler can be directed to one of these markers merely by the communication of matching color signals. In other words, although the multi-colored indicators are so arranged that they point, in a sense, to the approach positions, their function of transmitting colar signals alone can fulfill the desired object.

To extend further the matter of color "coding," in FIG. 3 each of the arrows **20** is the same color as its corresponding position indicator. That is, the arrows **20** match indicators *x*1 to *x*7 as follows: *x*1 and **20***j*, **20***k*; *x*2 and **20***h*, **20***i*; *x*3, *x*4, *x*5 and **20***e*, **20***f*, **20***g*; *x*6 and **20***c*, **20***d*; *x*7 and **20***a*, **20***b*. Therefore, for any given spare combination the color of the arrow which is automatically illuminated, to indicate a target pocket, will in itself serve to direct the bowler to the location of a guide or marker (**1** through **7**) having a matching color. In such case, it will be understood that the entire unit **18** can be eliminated if desired.

Referring to FIG. 2B, an optional form of marking the approach to identify bowler positions is illustrated. These markers also can be color-related to position signalling means in the same manner as fully explained with regard to guides **1** to **7**, and this aspect will not be further elaborated. (It should be noted, however, that each of the stripe-like off-center markers L, LC, RC and R is slanted to face diagonally down the lane toward the pin pocket which would be the target when bowling from that particular location, and is intended to remind a bowler that he or she should start a delivery facing the target.) In practice, it has been found that each of the markers L and R should be of a length extending approximately across the first through eighth lane boards from their respective sides of the approach. The inwardly located markers LC and RC extend in length across approximately the sixth through fifteenth lane boards counting from their respective sides of the approach. The marker C extends in length approximately between the number 13 boards counting from opposite sides. The form of markers shown in FIG. 2B can be used with or without the colored guides **1** to **7**, and can be used in conjunction with either the indicator unit **18** or the colored ball path arrows **20**, or with both as illustrated.

As mentioned in the introduction hereto, it is particularly significant that existing bowling lanes can be easily converted to incorporate the present invention. The simplest form of conversion may involve nothing more than the coloring of existing approach guides **1** to **7** and the application of matching colors to the appropriate arrows in an existing ball path indicating system. With only slightly more effort and expense, a position indicating unit **18** can be added to the existing ball path indicating system and operated thereby.

In conclusion, it will be seen that the principal object of the invention has been attained by the presently disclosed system. With this system, the bowler is not only advised of the approach position from which he or she should begin a delivery but can also be guided directly to this position through the use of special markers on the approach. This is of great assistance to the bowler, particularly when combined with a system for indicating in addition an optimum ball path for each spare combination.

It will be understood that various departures from the specifically disclosed embodiments of the invention can be effected without departing from the scope thereof as defined by the following claims.

What is claimed is:

1. In combination, a bowling lane having an approach area and a pin deck, means for producing individually different signals identifying different locations on said approach area, means for determining the combination of pins standing after the first ball in each frame, and means responsive to the last-mentioned means for operating and controlling the first-mentioned means.

2. In combination, a bowling lane having an approach area and a pin deck, means for sensing the identity of pins standing on said pin deck, means responsive to said sensing means for indicating to a bowler a selected path along which to roll a ball to knock down a maximum number of pins, and means responsive to said sensing means for indicating to the bowler a lane approach position from which the said ball should be rolled along said selected path.

3. In combination, a bowling lane having an approach area and a pin deck, a plurality of markers spaced transversely on said approach area and designating different bowler positions, a signalling system including a horizontally arranged series of indicators each corresponding to at least one of said markers and individually operable to identify the same, and means responsive to detection of a spare combination of pins mainly concentrated toward one side of said pin deck diagonally opposite one of said markers to activate the indicator identifying said one marker.

4. In combination, a bowling lane having an approach area and a pin deck, means providing differently colored markings on said approach area indicating bowling positions at different locations across the width thereof, means for communicating to a bowler color signals corresponding selectively to the colors of said markings, and means for selectively operating the last-mentioned means.

5. In combination, a bowling lane having an approach area and a pin deck, a ball path indicator including a facsimile of a triangular arrangement of pins and means associated with the facsimile for indicating thereon selected ball paths for knocking down different combinations of pins, signalling means associated with said indicator operable selectively to produce visible signals identifying left, center and right transverse positions at said approach area, means for sensing a given combination of pins standing on said pin deck after rolling of the first ball in a frame, and means responsive to the last-mentioned means for operating said indicating means to indicate a selected ball path and for operating said signalling means to indicate selectively the left, center or right approach position from which the rolling of a ball along said selected path should begin.

6. In combination, a bowling lane having an approach area and a pin deck, a plurality of signal lights arranged in substantially horizontal alignment above the lane toward the pin deck end thereof whereby the signal lights are visible from said approach area, a plurality of markers on said approach area extending thereacross transversely substantially in alignment, said signal lights each corresponding to at least one of said markers and the lighting of any one of said signal lights serving to identify the corresponding one of said markers at a given location between the sides of the apporach area, means for sensing a given combination of pins standing on said pin deck after rolling of the first ball in a frame, and means controlled by the last-mentioned means for automatically selectively operating at least one of said signal lights causing the same to identify the approach area location from which the next ball should be rolled to knock down a said given combination.

7. In combination, a bowling lane having an approach area and a pin deck, a plurality of signal lights arranged in substantially horizontal alignment above the lane at the pin deck end thereof whereby the signal lights are visible from said approach area, a plurality of markers on said approach area extending thereacross transversely substantially in alignment, said signal lights each corresponding to at least one of said markers and the lighting of any one of said signal lights serving to identify one of said markers at a given location between the sides of the lane approach, and means for selectively activating said signal lights causing the same to identify individual markers at said approach area.

8. In combination, a bowling lane having an approach area and a pin deck, means providing a facsimile, visible from said approach area, of the pin spots on said deck, a plurality of indicia associated with said fascimile, each of said indicia indicating a selected path of approach of a ball relative to pins standing on said deck, signalling means responsive to the number and position of pins standing on said deck for selectively identifying one of said indicia to indicate thereby a selected ball path, a plurality of markers on said approach area each representing an approximate position from which the bowler should deliver a ball along at least one of said ball paths, said markers being of different distinguishable colors, and each of said identified indicia representing a selected ball path having a color matching that of the said marker representing the bowler position from which said selected ball paths begins.

9. In combination, a bowling lane having an approach area divisible into generally left side, central and right side areas, means for selectively producing distinctly different signals directly identifying any one of said left, central and right areas, and means controlling and operating the last-mentioned means to effect the production of said signals.

10. In combination, a bowling lane having an approach area divisible into different bowling starting positions across its width, means for determining the presence of a spare combination of pins located principally toward one side of the pin deck, and means responsive to the last-mentioned means for automatically producing a signal directly identifying and being correlated with the side of said approach area diagonally opposite said spare combination.

11. In combination, a bowling lane having an approach area, a plurality of distinctly different signal means each designating a portion of said approach area generally located toward the left-hand side, toward the right-hand side, and approximately centrally thereof; means associated with said signal means for translating any of the signals produced thereby to the bowler at said approach area; and means for controlling and operating said signal means selectively to effect the production and transmittal of a given signal directing the bowler to one of said approach area portions.

12. In combination, a bowling lane having an approach area at one end and a pin deck at the other end; a plurality of distinctly different signal means each designating a portion of said approach area generally located toward the left-hand side, toward the right-hand side, and approximately centrally thereof; means connected to said signal means for translating any of the signals produced thereby including, indicating means positioned away from said approach area in the direction of said pin deck and visible to a bowler at said approach area; and means for controlling and operating the first-mentioned means selectively to effect the production and transmittal of a given signal directing the bowler to one of said approach area positions.

13. In combination, a bowling lane having an approach area at one end and a pin deck at the other end; a plurality of distinctly different signal means each designating a portion of said said approach area generally located toward the left-hand side, toward the right-hand side, and approximately centrally thereof; means connected to said signal means for automatically communicating to the bowler a signal produced thereby; means for detecting the identity of pins in a spare combination standing on said pin deck; and means responsive to said detection by the last-mentioned means for operating said signal means to signal the proper lane approach portion from which a ball should be rolled against said spare combination.

14. In combination, a bowling lane having an approach area at one end and a pin deck at the other end; means for detecting the presence of a spare combination of standing pins located principally at either the left or right-hand side of said pin deck; means positioned away from said approach area in the direction of said pin deck and selectively operable to produce visible signals designating either the left or right-hand portion of said approach area; and means controlled by the first-mentioned means for automatically operating the last-mentioned means to produce the signal designating the side of the approach diagonally opposite the side of said pin combination on the pin deck.

15. In combination, a bowling lane having an approach area and a pin deck; means for detecting the identity

of pins standing on said pin deck after the first ball in a frame; means selectively operable to produce distinctly different visual signals designating bowling positions at different locations across the width of said approach area; means selectively operable to indicate selected ball paths for knocking down different spare combinations of pins; and means responsive to pin detection by said detecting means for automatically computing and selecting both a said bowling position and a said ball path for knocking down a given spare combination of pins, said selectively operable means being connected to the last-mentioned means and operated thereby to signal the selected bowling position and ball path.

16. In combination, a bowling lane having an approach area at one end and a pin deck at the other end; means for detecting the presence of a spare combination of standing pins located principally at either side or approximately centrally on the pin deck; means positioned away from said approach area in the direction of said pin deck and selectively operable to produce visible signals designating either the left or right-hand portion or approximately the central portion of said approach area; and means controlled by the first-mentioned means for automatically operating the last-mentioned means to produce either a signal designating the side of the approach diagonally opposite a spare combination at the side of the pin deck or a signal designating a central approach portion in the case of a centrally located spare combination.

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