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INDIVIDUAL PIN SPOTTER FOR BOWLING ALLEYS

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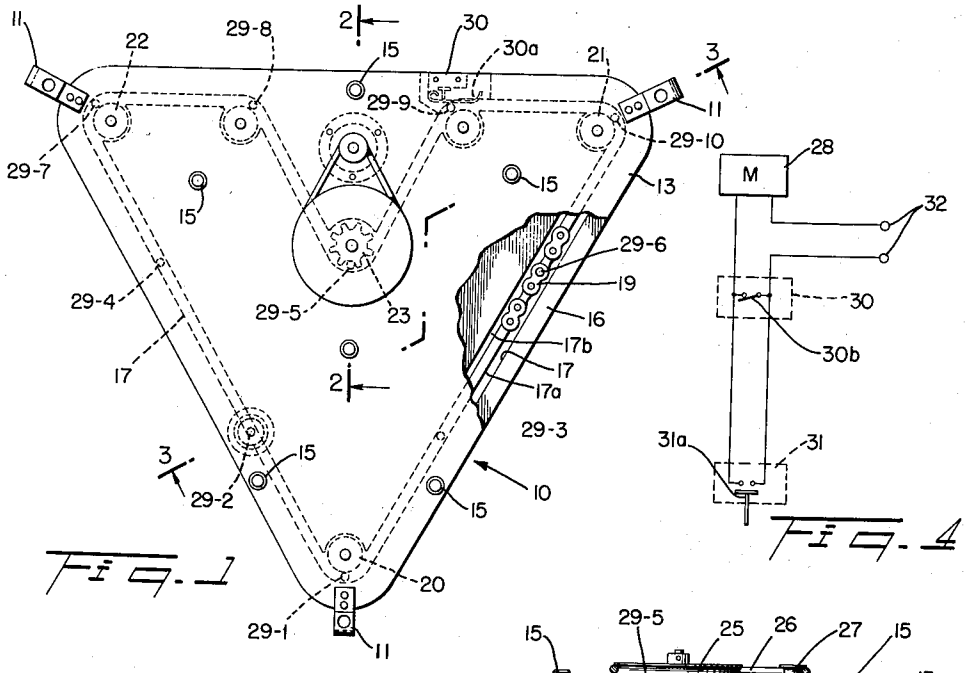


Fig. 1

Fig. 4

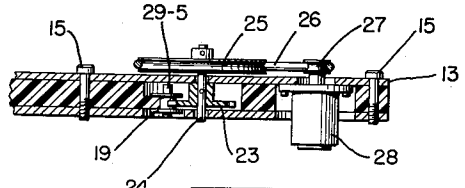


Fig. 2

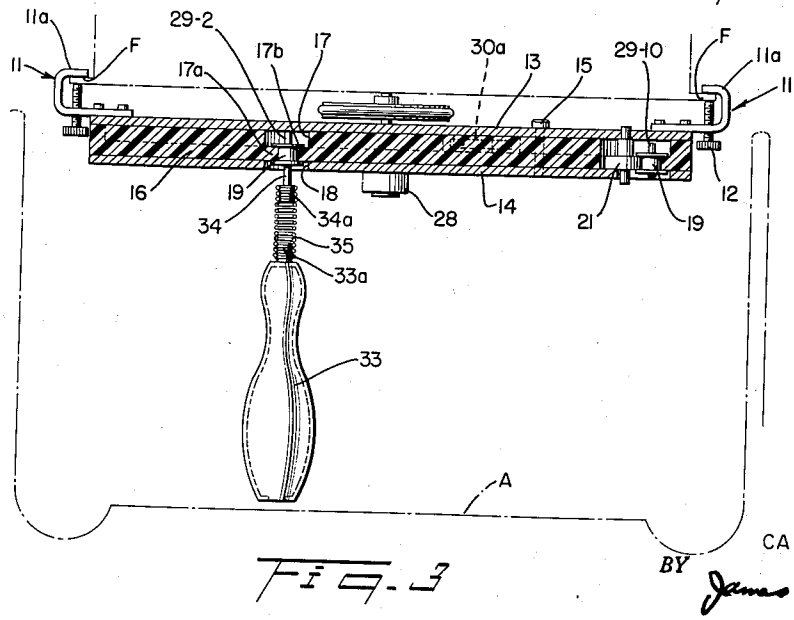


Fig. 3

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INDIVIDUAL PIN SPOTTER FOR BOWLING ALLEYS

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This invention relates to pin positioning apparatus for bowling alleys and more particularly to apparatus for use in bowling practice whereby a practicing bowler can bowl repeatedly at an individual pin or pins which can be automatically positioned at any desired pin location.

With the advent of automatic pin setting apparatus for bowling alleys making the pin setting area virtually inaccessible for a manual pin setting, it has become impractical in most cases for bowlers to practice bowling shots in which they aim repeatedly at a particular pin. Previously, it was common for experienced bowlers to practice with the aid of a pin boy who would replace a particular strategic pin at which the bowler would aim his shots. Little effort and time were consumed because the pin boy had simply to set up one pin, thereby either simulating a condition encountered in bowling matches in which the bowler failed to achieve a strike or enabling the bowler to perfect a desired roll path without the expense and effort of a complete pin set up. While it is possible in some cases to utilize complete, automatic pin setting mechanisms to set individual pins, the automatic apparatus must go the complete and relatively more costly motions attendant a complete set up procedure.

Accordingly, it is one object of the present invention to provide simplified apparatus for spotting one or more pins individually at desired locations in the pin layout for facilitating bowling practice in an automatic alley without requiring a pin boy.

Another object of the invention is to provide apparatus whereby a bowler may automatically set a practice pin at any desired location by remote control.

Another object of the invention is to provide apparatus for supporting an individual pin at any desired pin location for practice purposes within a relatively brief time interval so that a bowler can achieve a large number of practice shots at an individual pin without requiring the relatively complex cycling of a complete automatic pin setting apparatus.

Still another object of the invention is to provide a captured pin assembly for practice bowling.

Still another object of the invention is to provide bowling practice apparatus for supporting individual pins for repeated practice shots, which can be readily integrated with existing automatic pin setting equipment, despite the limited head room available for auxiliary apparatus, and which can be quickly and easily mounted in position on any given bowling alley without structural modification to the permanent mechanism, but which is able to make use of the ball returning feature of automatic equipment.

Still another object of the invention is to provide apparatus for enabling bowling alley operators to derive revenue from their alleys during off-hours and off-seasons by facilitating practice sessions without need for disturbing or removing existing automatic pin setting equipment.

In accordance with the present invention, there is provided a frame assembly including peripheral hanger elements for supporting the frame immediately beneath the

frame of existing automatic pin setting equipment in a bowling alley. The frame takes the general triangular configuration of the ten pin setup and surmounts the pin setting area with sufficient clearance to allow pins to be disposed therebeneath. The frame includes supporting means for carrying an individual practice pin supported from above, preferably by pre-stressed spring means so that the pin, when struck by the bowling ball, will quickly reassume its supported position as determined by its supporting point in the frame assembly. In one preferred arrangement of the invention, the individual pin support is movable so that it can be automatically spotted at any desired pin location point. To this end the assembly includes a movable support which is driven by a remotely controlled motor to traverse the pin spots. The movable support can take the form of a flexible, endless belt or chain from which a practice pin is hung and which is supported in a triangular track, the back or transverse limb of which includes a forward jog between the eight and nine pin spots to transverse the five pin spot. A series of spaced actuators on the movable support successively engage a control station interposed in the path of travel to stop the drive mechanism at the successive pin spots.

The above and other features and objects of the preferred embodiments of the invention are described below having reference to the accompanying drawings, in which:

Figure 1 is a plan view looking downwardly on apparatus for spotting a practice bowling pin at any desired pin location.

Figure 2 is a view in vertical section taken substantially on the line 2—2 of Figure 1, looking in the direction of the arrows.

Figure 3 is a view in vertical section taken on the line 3—3 of Figure 1, looking in the direction of the arrows; and

Figure 4 is a schematic diagram of the control circuit for automatically setting the pin at any desired pin spot.

Referring to the drawings and more particularly to Figures 1 and 2, the invention is illustrated as embodied in a practice pin spotting assembly including a generally triangular frame **10**, the dimensions of which are slightly larger than the standard ten pin setup of bowling pins. The frame **10** carries a plurality of at least three hangers **11**, best seen in Figures 1 and 3, including inturned hooks **11***a* on their upper ends adapted to hook over the peripheral flange F of the existing pin setting machine. Thumb screws **12** on the threaded shanks of the hangers **11** enable the assembly to be drawn up tightly against the frame of the pin setting apparatus. The frame assembly **10** is thereby slung beneath the existing pin setting apparatus in the relatively limited head space above the alley A (Figure 3).

The frame **10**, in the illustrated arrangement of the invention, includes upper and lower plate members **13** and **14** clamped together by bolts **15** across a central core portion **16** preferably formed of an easily worked material such as laminated Bakelite. The central core **16** and the lower plate **14** are formed with endless slots or channels **17** and **18** respectively which define an endless track of generally triangular form, the shape of which is best seen in Figure 1. The channel **17** includes inwardly extending shoulders **17***a* and **17***b* (Figure 3) which define slides for receiving a flexible carrier member in the form of a link chain **19**, the side or flange members of which embrace the shoulders **17***a* and **17***b*. At the three apices of the frame assembly **10**, there are mounted guide rollers or sprockets **20**, **21** and **22** about which the carrier member **19** passes. The back or transverse limb of the triangular track, between the eight and nine pin locations, jogs inwardly in a small triangular configuration to pass over the five pin location, the carrier member **19**

passing over a drive sprocket 23 at the forward apex. As best seen in Figure 2, the drive sprocket 23 is affixed to a shaft 24 journaled in the upper and lower plate members 13 and 14. The shaft 23 also has attached thereto a drive pulley 25 coupled by a flexible belt 26 to the output pulley 27 of an electric motor 28, which is bolted to the upper plate member 13.

The carrier member 19 includes at equally spaced points along its length, upwardly extending fingers 29–1, 29–2, 29–3 . . . 29–10 which in the illustrated arrangement comprise extensions of the couplings of the articulated chain. As viewed in Figure 1, the ten upwardly extending fingers 29–1 . . . 29–10 are disposed for convenience of illustration, in the ten pin locations, numbered sequentially, of the conventional bowling pin setup. The upwardly extending fingers 29–1 . . . 29–10 comprise actuating means for successively de-energizing the motor 28, as will be described below. To this end, there is provided a control switch 30 having an elongated actuator 30*a* interposed in the path of travel of the carrier member 19 so that the contacts 30*b* (Figure 4) of the switch 30, which are normally closed, will be opened with the arrival of each actuating finger. The motor 28 is adapted to be started from a remote point, i.e. the point at which the bowler stands, by means of a momentary push switch 31 having normally open contacts 31*a*. Thus both of the switches 31 are connected in parallel and in series with energizing circuit for the motor 28, energized from a suitable source of electrical energy connected across the terminals 32.

At one point along the length of the carrier member 19, there is mounted a practice bowling pin 33 which is affixed to the carrier by a downwardly extending member 34 through a prestressed spring 35 attached to the member 34 at a coupling member 34*a* and attached to the pin 33 through a coupling member 33*a*. The pin 33 is preferably lighter than a conventional bowling pin, and in a preferred embodiment takes the form of a hollow rubber shell. The resilience in the suspension system including the prestressed spring 35 and the rubber forming the walls of the bowling pin 33 enables it to be driven out of the path of travel of an approaching ball, the pin assuming its normal position quickly after the ball passes.

In operation the bowler at the head end of the alley actuates the momentary push switch 31 to energize the motor 28 to set the carrier member 19 into motion to move the practice bowling pin 33 to a desired pin station. The pin will sequentially traverse all of the pin locations and will come to rest at a particular pin location when the switch 31 is released to open its contacts 31*a*. The contacts 30*b* of the control switch 30 will be automatically opened as the practice pin reaches each successive station and, if the momentary manual control switch 31 has been released, will cause the motor 28 to stop. The bowler then proceeds to practice his bowling shots by bowling at the pre-positioned practice pin, which as described above, yields when hit, but quickly returns to its upright position. The automatic ball return mechanism, which is part of all automatic pin setting machinery, is utilized to return the ball. Any number of practice shots may be taken at any of the ten pin positions.

While the invention has been described above having reference to a preferred embodiment thereof, it will be understood that it can take other forms and arrangements. Thus, for example, less than ten pin locations can be provided by correspondingly reducing the drive or pin track. Also, movable positioning abutment can be used in conjunction with the switch 30 to arrest the movement of the carrier member 19 at a precise point. Preferably the abutment is integrated with the switch actuator 30*a* to establish a fixed stopping point which is released at the time the system is next actuated to move the practice pin to the next station. Various other modifications and arrangements will readily suggest themselves to those skilled in the art and the invention should not therefore be regarded as limited except as defined in the following claims.

I claim:

1. Apparatus for facilitating bowling practice comprising a supporting frame, means to mount the frame adjacent the pin area of the bowling alley, a pin assembly including a practice bowling pin supported by the frame for translational movement about the pin locations of the alley, drive means for the pin assembly, and control means to actuate the drive means to move the pin assembly to desired pin spots.

2. Apparatus for facilitating bowling practice comprising a frame, means to attach the frame to an external support to hold the frame above the pin area of a bowling alley, a carrier member on the frame selectively movable over the pin locations disposed therebeneath, a pin supporting member attached to the carrier member and movable therewith, and a practice bowling pin permanently attached to the supporting member.

3. Apparatus as set forth in claim 2, said pin and pin supporting member being resiliently yieldable under the impact of a bowling ball to return the pin to its initial position after the ball passes.

4. Apparatus as set forth in claim 3, said supporting member including a prestressed helical spring.

5. Apparatus as set forth in claim 2, including drive means to move said carrier member, and remotely located control means for said drive means to position the practice pin at any one of a plurality of pin spots of the bowling alley.

6. Apparatus as set forth in claim 5, said drive means comprising an electric motor, said remotely located control means including a first switch adjacent the bowling end of the alley to selectively energize the motor to displace in translation the carrier member and practice pin carried thereby, second switch means to de-energize the motor, and actuating means movable with the carrier member to actuate the second switch as the practice pin reaches successive pin spots on the bowling alley.

7. Apparatus as set forth in claim 2, said frame including a generally triangularly shaped track having one apex disposed adjacent the number one pin spot of the bowling alley and its other apices disposed respectively adjacent the seven and ten pin spots, said carrier member comprising an endless flexible member movably supported in the triangular track, and drive means for the carrier member.

8. Apparatus as set forth in claim 7, said track including a forward jog in the rear transverse limb of the track to dispose the carrier member and the practice pin over the number five pin spot.

9. Apparatus as set forth in claim 7, said carrier member including a chain having a succession of articulated side plates and central rollers journalled therein, said track including support surfaces for the side plates of the chain, said practice bowling pin being hung from the chain.

10. Apparatus as set forth in claim 7, said drive means comprising an electric motor, switch means on the frame adjacent the track, and spaced apart actuators on the carrier member to operate the switch means to de-energize the motor as the bowling pin reaches successive pin locations on the bowling alley.

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