

July 31, 1945.

H. J. LUTH ET AL

2,380,601

BOWLING PIN SETTER

Filed Aug. 27, 1943

3 Sheets-Sheet 1

Fig. 1.

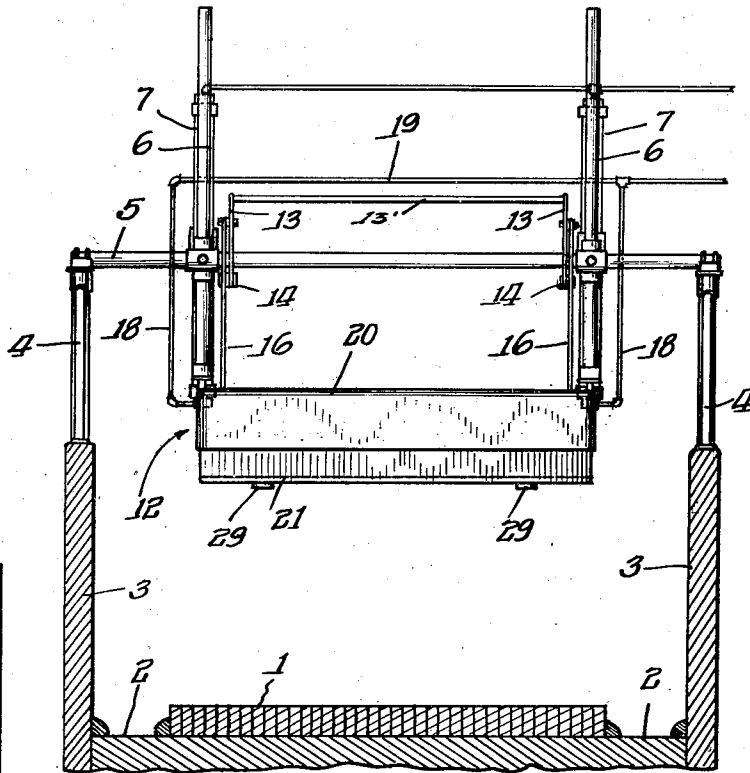


Fig. 3.

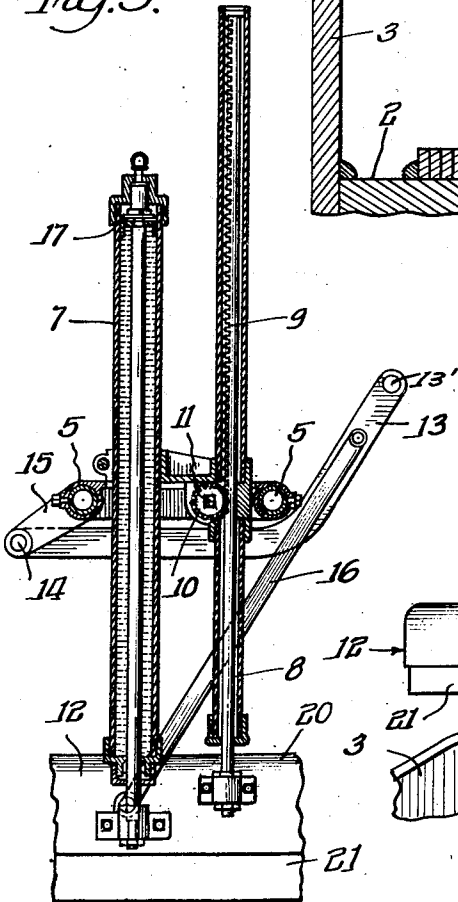
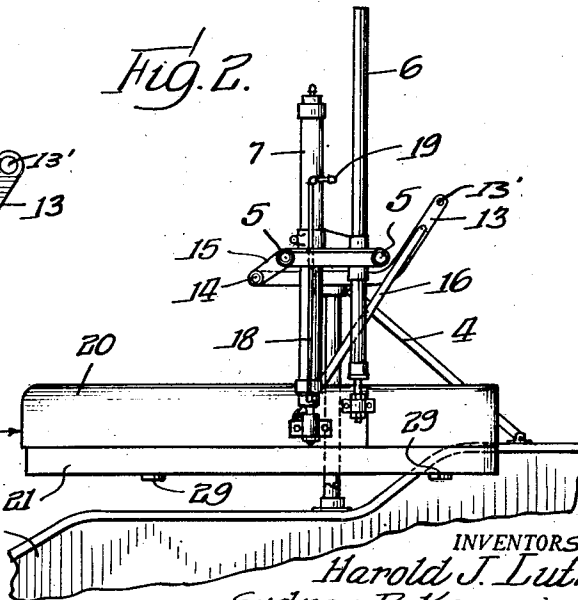


Fig. 2.



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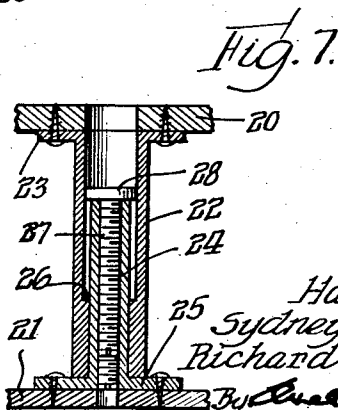
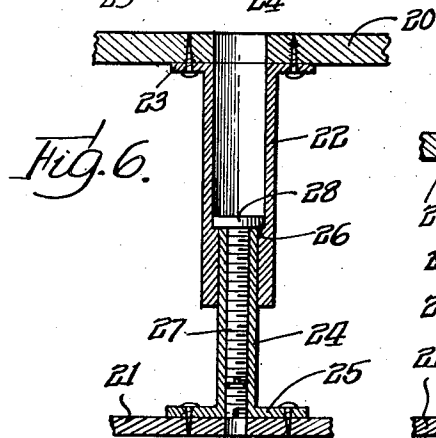
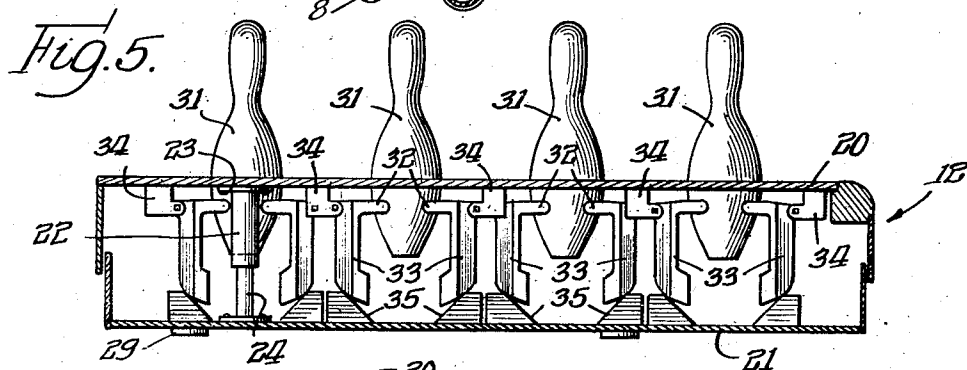
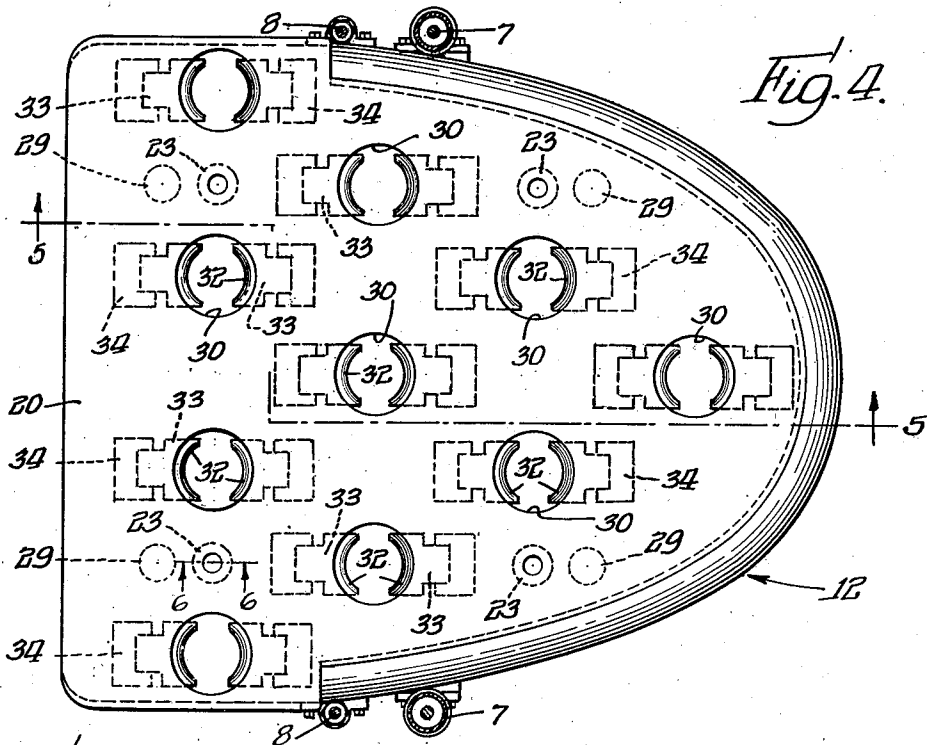
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BOWLING PIN SETTER

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3 Sheets-Sheet 2



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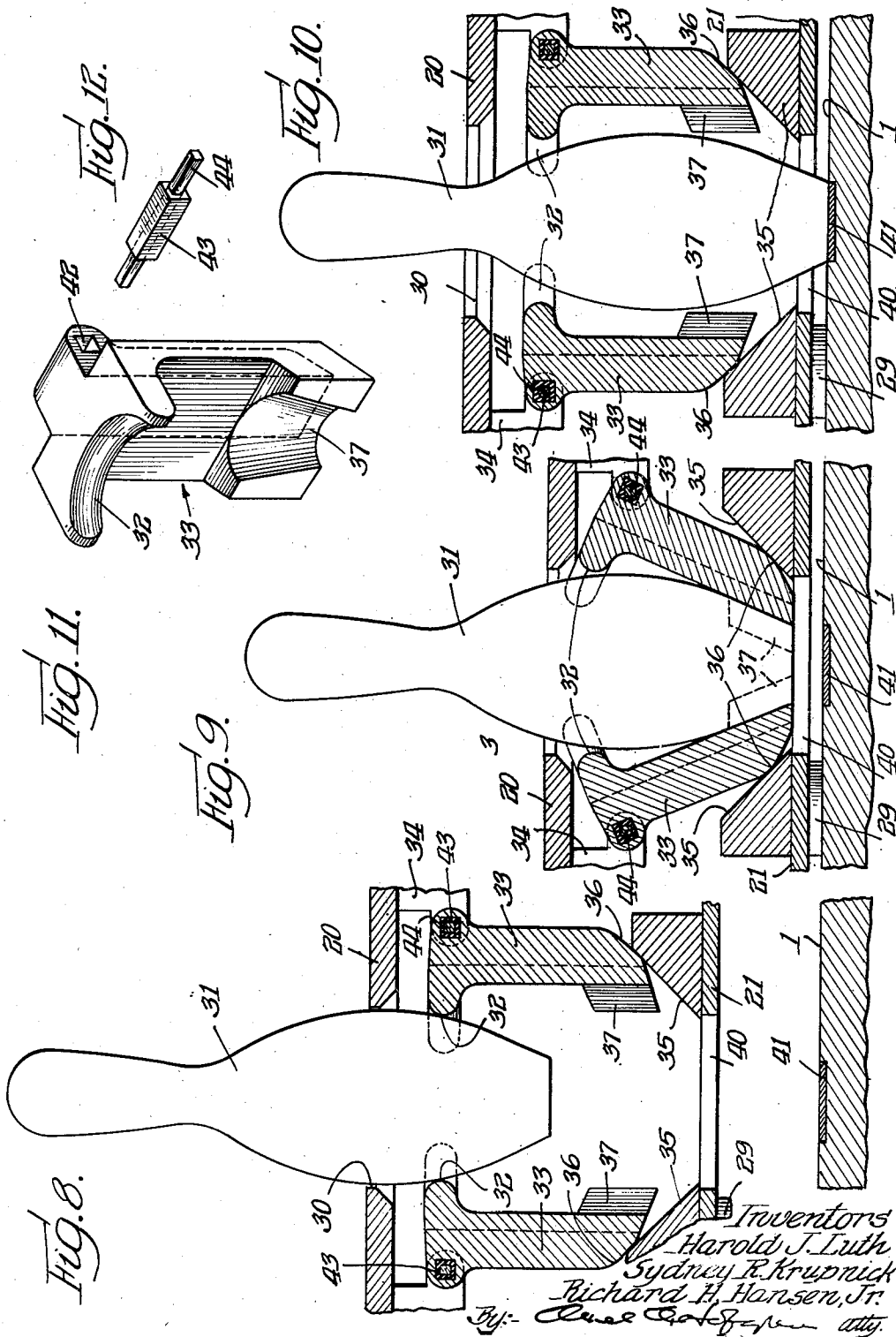
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UNITED STATES PATENT OFFICE

2,380,601

BOWLING PIN SETTER

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Application August 27, 1943, Serial No. 500,200

12 Claims. (Cl. 273-42)

This invention relates to pin setting machines employed on bowling alleys for placing the pins in position for play, and it is shown herein as applied to a machine of the hand-operated type. In such a mechanism there is provided a frame or deck upon which the pins are deposited in approximately correct relative position to each other, and by which they are lowered to a position adjacent the alley bed, whereupon all the pins are released and left standing on the alley while the setter frame is returned to its uppermost position, out of the way, until the play is completed. The pins are then picked up by hand and replaced in the setter frame, to be re-deposited in position on the alley for the next period of play.

The present invention relates particularly to the frame or deck structure by which the pins are held in correct relative position, and from which they are released for placement on the alley, the raising and lowering mechanism herein shown being substantially like that disclosed in United States Letters Patent No. 1,581,378, dated April 20, 1926.

One object of the present invention is to provide a new and improved pin setting machine having a pin setter deck which is simple in construction and accurate in operation.

Another object of the invention is to provide a pin setter deck with pin-controlling means by which the pins may be brought very close to the surface of the alley before being released, so as to insure accurate placement and minimize the possibility of any of the pins being displaced or tipped over in the process.

A further object of the invention is to provide retaining and controlling means for the pins in the setter deck, adapted to accommodate themselves to fairly large variances in the diameters of the pins which frequently occur as between new bowling pins and old ones which have been worn in play, or refinished.

More specifically, it is an object of the invention to provide pin-holding shoes which include pivotally mounted jaw members, and which are pivotally carried by rubber or similar material, acting in torsion to provide a yielding pivotal action.

It is also an object of the invention to provide pin-holding elements of such a design that they may be readily molded in plastic material, if desired.

Other objects and advantages of the invention will appear from the following description taken in connection with the drawings, in which:

Fig. 1 is an elevational view of a pin-setting machine adapted to embody this invention, the pin setter frame being shown at the upper limit of its movement over the alley, and the alley itself and adjacent structure being shown in section.

Fig. 2 is a partial side elevation of the pin-setting machine illustrated in Fig. 1.

Fig. 3 is a vertical sectional detail view of the raising and lowering mechanism for the frame.

Fig. 4 is a top plan view of the pin setter frame itself, showing the upper deck with openings to receive the pins.

Fig. 5 is a longitudinal section taken substantially as indicated at line 5-5 on Fig. 4.

Fig. 6 is a fragmentary detail section, showing the means interconnecting the upper and lower decks of the pin-setting frame as positioned when the decks are spaced apart to a maximum extent, being taken at line 6-6 on Fig. 4.

Fig. 7 is a similar sectional detail view showing the connecting means as positioned with the decks at minimum separation.

Fig. 8 is a detail vertical section on an enlarged scale, showing the initial position of a bowling pin as placed in the pin setter deck.

Fig. 9 is a sectional view similar to Fig. 8, but showing the altered position of the pin and its holding shoes as the deck arrives on the alley.

Fig. 10 is also an enlarged detail section taken as Figs. 8 and 9, and showing the bowling pin and shoes in the positions which they assume as the pin is released for placement on the alley.

Fig. 11 is a detail perspective view of one of the holding shoes.

Fig. 12 is a perspective view of the rubber-encased pivot for the shoe.

To assist in a general understanding of the operation of the machine the raising and lowering mechanism, which is similar to that shown in Patent No. 1,581,378, may be briefly explained. Fig. 1 shows the bed or playing surface 1 of the alley, with gutters 2, 2 at the sides thereof, and with upstanding guard walls 3, 3 adjacent the gutters. Posts 4, 4 are supported on side walls 3, 3 and carry transverse frame members 5, 5 on which there are mounted the guide tubes 6, 6 and hydraulic cylinders 7, 7. In each of the guide tubes a guide rod 8 is mounted for reciprocation, and these guide rods are provided with rack teeth 9 which mesh with pinions 10, 10 on a transverse shaft 11, operating as an equalizer to insure uniform movement of the guide rods as the pin setter frame 12, to which they are connected, is raised and lowered.

Bent levers 13 are fulcrumed at 14 on bracket arms 15 extending from the transverse bars 5, and links 16 are pivotally connected at their upper ends to the levers 13 and at their lower ends to the pin setter frame 12. Thus, when the levers 13 are swung downwardly about their fulcrum pivots 14, as by means of a cross bar 13', they move the pin setter frame downwardly. As explained in the aforesaid patent, No. 1,581,378, this movement is accompanied by downward travel of the pistons 17 in their cylinders 7, expelling the liquid therefrom by way of the pipes 18 leading from the lower ends of the cylinders 17. This liquid is carried by a pipe 19, to an accumulator chamber (not shown) into which it is forced against a yielding resistance, such as a weighted piston, so that the energy thus stored will operate to return the pistons 17 to the upper ends of the cylinders 7 and raise the pin setter deck when the downward pressure on the handle 13 is relieved or removed.

The operative movement of the pin setter frame 12, as a whole, is thus simply a vertical reciprocation which, in the form chosen for illustration, may be controlled by the hand levers 13, or by supplying fluid under pressure (preferably oil) to the upper ends of the cylinders 7.

The pin setter frame comprises an upper deck 20 and a lower deck 21, which are connected at spaced points as by the means shown in Figs. 6 and 7. This means may comprise a downwardly open guide tube 22 secured by a flange 23 to the upper deck 20, and an upwardly extending guide tube 24, having a flange 25 by which it is secured to the lower deck 21. Near the lower end of the upper tube 22 its bore is reduced to form a stop shoulder 26, and the bore of the lower tube 24 is threaded to secure adjustably the threaded stem 27 of a stop member, having a head or flange 28 disposed within the tube 22 and dimensioned to engage the stop shoulder 26 thereof. Longitudinal adjustment of the threaded stem 27 determines the maximum distance by which the lower deck 21 may be separated from the upper deck 20. These telescopic connecting devices are placed at several points in the area of the pin setter frame, as indicated at 23 on Fig. 4; hence, by the careful adjustment of the stop member stems 27 in the several tubes 24, the lower deck may be positioned so that when the frame is lowered, the lower deck will engage the alley 1 simultaneously over its entire area. It should be explained that the deck 21 itself does not actually engage the surface of the alley, but that it is shod with rubber bumper pads, indicated at 29 in Fig. 1 and in Figs. 8, 9 and 10, and that these pads engage the surface of the alley 1, while the upper deck 20 continues to be lowered by the links 16 and hand levers 13, and the upper and lower decks approach each other substantially to the extent indicated in Fig. 7.

This relative movement of the upper and lower decks 20 and 21 is utilized to control and release the bowling pins for placing them in proper position on the alley. Each of the openings 30 in the upper deck 20 is slightly larger than the maximum diameter of a bowling pin 31, and as the pin is placed in the opening 30, it first encounters the upper jaws 32 of a pair of shoes 33, which are disposed between the upper and lower decks, and pivotally supported by lugs or hangers 34 extending from the under surface of the upper deck 20. The lower deck 21 carries cam blocks 35, having inclined faces which engage cam surfaces 36 formed adjacent the lower

ends of the shoes 33, as seen in Fig. 8. The initial spacing between the arcuate jaws 32 when the shoes are thus positioned with their cam surfaces engaging the upper portions of the sloping faces of the cam blocks 35, is less than the maximum diameter of the bowling pin 31; accordingly, the pin cannot slip through the jaws, but is held in elevated position, as seen in Fig. 8.

A bowling pin 31 is placed in each of the openings 30 of the upper deck 20, as seen in Fig. 5, and the deck is then lowered toward the alley by the mechanism already described. As the bumper pads 29 strike the surface 1 of the alley, and the upper deck 20 is caused to approach the lower deck 21, the inclined surfaces of the cam blocks 35 rock the lower ends of the shoes 33 toward each other, thus swinging the upper jaws 32, 32 upwardly and farther apart, and permitting the pins 31 to slide downwardly between them. The approach of the lower end portions of the shoes 33, however, brings the lower jaws 37, 37 into position to embrace the lower end portion of the bowling pins 31 and prevent them from descending through the openings 40 in the lower deck 21, as seen in Fig. 9. Then, as the upper deck 20 begins to rise in its return movement, it first separates from the lower deck 21 to the extent permitted by the telescopic connecting members 22, 24, and this separation is sufficient to allow the lower jaws 37 of the shoes 33 to swing apart as their cam surfaces 36 traverse the upwardly divergent cam faces of the blocks 35. The jaws 37 thus release the pin 31, and it drops through the remaining short distance onto the receiving spot 41 of the alley 1.

As a matter of fact, the pins 31 are under substantial control until they actually come into contact with the spots 41 as their downwardly tapering form wedges itself downward between the gradually opening jaws 37. At all positions in their range of movement the lower end portions of the shoes 33 are held in contact with the sloping cam surfaces of the blocks 35 so that no sudden change in the position of the jaws 37 occurs, and the pins 31 are therefore "eased" onto the alley by the relative movement of the upper and lower decks 20 and 21, as described. It may also be noted that the pins are held upright in the frame at all times. Each opening 30 in the upper deck is just slightly larger in diameter than the largest portion of the pin 31, and as shown in Fig. 8, when the pin is supported by the upper jaws 32 of the shoes 33, the opening 30 is spaced above the jaws 32 in position to engage the pin at its greatest diameter and prevent it from tipping out of vertical position. Then when the pin is dropped into the lower jaws 37, the upper jaws 32, as seen in Fig. 9, are spaced apart by only a little more than the diameter of the portion of the pin body which is registered with these upper jaws, and the pin is, again prevented from tipping, and its arrival on the alley in correct upright position is assured.

To insure maintaining the lower ends of the shoes 33 in contact with the cam blocks 35, they should be yieldingly biased toward such contacting positions, and a convenient and simple arrangement to insure this consists in providing each shoe 33 with a square hole 42, into which there is fitted a bushing 43 of rubber or like resilient substance, of square cross-section, said rubber bushing being snugly fitted onto a square rod 44, the end portions of which are non-rotatably

engaged in square holes in the bearing lugs 34, as seen in Figs. 8, 9 and 10. The normal position of the parts is substantially that which is shown in Figs. 8 and 10, but when the shoes are swung to inclined positions, as shown in Fig. 9, the resilient rubber bushings 43 are stressed in torsion so as to store the required force for automatically returning the shoes 33 to their normal vertical positions, as shown in Fig. 10, as fast as the decks 20 and 21 separate in the final movement for delivery of the pins 31 onto the alley.

In actual practice, bowling pins vary by as much as $\frac{3}{8}$ of an inch in their maximum diameter; therefore in designing the present device we have provided for this variation. The initial spacing of the upper jaws 32 is close enough to hold a pin of minimum size, but the range of movement of the jaws 32 afforded by the cam surfaces 36 is sufficient to insure that they will always open widely enough to release a pin of maximum diameter. This range also operates to swing the lower jaws 37 close enough together to catch a pin of minimum size and to separate them sufficiently to release a pin of the largest diameter. Hence the machine will accommodate itself automatically to the pins, whether they be new and of full dimensions, or old pins which have been re-finished and slightly reduced in the process.

In some instances it is desirable to pick up all of the pins from the alley and retain them in the pin setter instead of sweeping them off the alley. This may be accomplished by lowering the pin setter over the pins, the lower jaws 37 being swung into engagement with the pins as the upper deck 20 completes its downward travel after the lower deck has been arrested on the alley bed. Then, by means of a suitable latching or locking device (not shown), the upper and lower decks may be secured together in this collapsed relation, so that the frame may be raised to its upper position with all of the pins therein. Thereafter when it is desired to set the pins, it is merely necessary to lower the frame, thereby releasing the latch when the frame is in pin setting position, and the decks will be permitted to separate in the normal manner when the frame is raised again.

It will be seen that the construction herein shown and described results in an extremely simple mechanism of relatively few working parts. Each of the shoes 33 with its integral upper and lower jaw portions may be molded of suitable plastic material; and the use of the torsion bearings provided by the rubber bushing 43 eliminates wear in the pivotal mountings and avoids the need for separate springs to control the shoes. If desired, the entire upper deck 20 may be molded of plastic material, and if the lower deck is so constructed, the cam blocks 35 may be made integral with it, simplifying assembly and reducing cost.

We have illustrated in the drawings and herein described in detail a preferred form of the invention for the purpose of exemplifying the principles thereof and not with the intention of limiting the invention to this particular form. The scope of the invention will be pointed out in the appended claims.

We claim:

1. In a bowling pin setter, a frame with means for moving it toward and from the alley bed, means to hold a pin upright in the frame comprising shoes rockably mounted on said frame and each having an upper jaw and a lower jaw both rigidly carried by the shoe, the upper jaws being normally positioned to cooperate in embracing the pin below its greatest diameter, means on the

frame operable by engagement with the alley bed to rock said shoes, moving the upper jaws apart to release the pin and swinging the lower jaws toward each other in pin-receiving position.

2. In a bowling pin setter, a frame with means for moving it toward and from the alley bed, means to hold a pin upright in the frame comprising shoes rockably mounted on said frame and each having an upper jaw and a lower jaw both rigidly carried by the shoe, the upper jaws being normally positioned to cooperate in embracing the pin below its greatest diameter, means on the frame operable by engagement with the alley bed to rock said shoes, moving the upper jaws apart to release the pin and swinging the lower jaws toward each other in pin-receiving position, together with means operable to rock the shoes reversely as the frame rises from the alley bed, thereby opening the lower jaws and releasing the pin onto the alley.

3. In a bowling pin setter, a frame with means for moving it toward and from the alley bed, means to hold a pin upright in the frame comprising shoes rockably mounted on said frame and each having an upper jaw and a lower jaw both rigidly carried by the shoe, the upper jaws being normally positioned to engage the pin below its greatest diameter and support it by such engagement, the lower jaws being formed to embrace the pin adjacent its base, said upper and lower jaws of a shoe being movable oppositely in relation to the pin when the shoe is rocked, and means for rocking the shoes simultaneously to release the pin from engagement by the upper jaws and swing the lower jaws into pin-receiving position.

4. In a bowling pin setter, a frame with means for moving it toward and from the alley bed, means to hold a pin upright in the frame comprising shoes rockably mounted on said frame and each having an upper jaw and a lower jaw both rigidly carried by the shoe, the upper jaws being normally positioned to engage the pin below its greatest diameter and support it by such engagement, the lower jaws being formed to embrace the pin adjacent its base, said upper and lower jaws of a shoe being movable oppositely in relation to the pin when the shoe is rocked, and means for rocking the shoes simultaneously to release the pin from engagement by the upper jaws and swing the lower jaws into pin-receiving position, the upper jaws having a shorter range of movement than the lower jaws and remaining closely adjacent the pin to retain it in upright position as the lower jaws receive it.

5. In a bowling pin setter, a frame with means for moving it toward and from the alley bed, means to hold a pin upright in the frame comprising shoes pivotally carried by said frame and each having an upper jaw and a lower jaw integral with the shoe, the pivotal connections of the shoes to the frame including tubular members of rubber or like resilient material forming torsion bearings which yieldingly hold the shoes in position for supporting a pin by engagement of the upper jaws with the pin below its greatest diameter, and means operable by engagement with the alley bed to rock the shoes and swing the upper jaws apart, releasing the pin, the lower jaws being thereby swung into pin-receiving position and being opened by the torsional action at the pivots as the frame rises from the alley.

6. In the combination defined in claim 5, the pivotal mounting of each shoe comprising a rod of non-circular cross-section with means on the

frame in which said rod is fixed, and said tubular members comprising bushings of non-circular cross-section each fitted into a non-circular bore in a shoe, and each bushing having a non-circular bore into which the said rod is fitted.

7. In the combination defined in claim 5, the pivotal mounting of each shoe comprising a rod fixed in the frame with said resilient tubular member fixed non-rotatably on the rod and secured non-rotatably in the shoe.

8. In a bowling pin setter, a frame and means for moving it toward and from the alley bed, said frame including a deck having an opening to receive a pin, said opening approximating the greatest diameter of the pin, pin holding shoes pivotally supported by the frame and having integral upper jaws normally disposed below the opening in spaced relation thereto and positioned to engage a portion of the pin below its greatest diameter, with the largest portion of the pin registered in the opening, whereby the pin is held upright in the frame, said shoes having integral lower jaws which are brought close to the alley bed when the frame is lowered, and means for then swinging the shoes on their pivots to move the upper jaws apart and release the pin, such movement causing the lower jaws to approach each other in position to engage the base portion of the pin, the upper jaws being then spaced apart to fit approximately an upper portion of the pin body and hold it upright in the frame.

9. In a bowling pin setter, a frame and means for moving it toward and from the alley bed, said frame including a deck having an opening to receive a pin, said opening approximating the greatest diameter of the pin, pin holding shoes pivotally supported by the frame and having integral upper jaws normally disposed below the opening in spaced relation thereto and positioned to engage a portion of the pin below its greatest diameter, with the largest portion of the pin registered in the opening, whereby the pin is held upright in the frame, said shoes having integral lower jaws which are brought close to the alley bed when the frame is lowered, and means for then swinging the shoes on their pivots to move the upper jaws apart and release the pin, such movement causing the lower jaws to approach each other in position to engage the base portion of the pin, the upper jaws being then spaced apart to fit approximately an upper portion of the pin body and hold it upright in the frame, together with means operating to open the lower jaws and release the pin onto the alley as the frame rises therefrom.

10. In a bowling pin setter, a frame with means for moving it toward and from the alley bed, means to hold a pin upright in the frame comprising shoes rockably mounted on said frame and each having an upper jaw and a lower jaw, both rigidly carried by the shoe, means yieldingly holding the upper jaws in position to cooperate in embracing the pin below its greatest diameter, said frame comprising an upper deck and a lower deck connected for relative vertical movement which is caused by engagement of the lower deck with the alley bed while the upper

deck continues to move toward said bed, said pin holding shoes being mounted on one deck and the other deck having cam means which rock said shoes in directions to separate the upper jaws in response to the relative movement of the decks toward each other, said rocking movement of the shoes swinging the lower jaws toward each other into pin receiving position and said yielding means operating automatically to rock the shoes reversely in response to movement of the decks away from each other when the frame is raised from the alley bed.

11. In a bowling pin setter, a frame with means for moving it toward and from the alley bed, means to hold a pin upright in the frame comprising shoes rockably mounted on said frame and each having an upper jaw and a lower jaw, the upper jaws being normally positioned to cooperate in embracing the pin below its greatest diameter, said frame comprising an upper deck and a lower deck connected for relative vertical movement which is caused by engagement of the lower deck with the alley bed while the upper deck continues to move toward said bed, said pin holding shoes being mounted on one deck by pivotal means which includes tubular members of rubber or like resilient material forming torsion bearings to hold the shoes normally in position for engagement of their upper jaws with the pin, the other deck having cam means for rocking said shoes in response to the relative movement of the decks when the lower deck engages the alley, such rocking movement causing the upper jaws to separate and release the pin and swinging the lower jaws toward each other in pin receiving position, and said torsion bearings acting to rock the shoes reversely to open the lower jaws and release the pin onto the alley as the frame rises therefrom.

12. In a bowling pin setter, a frame with means for moving it toward and from the alley bed, means to hold the pin upright in the frame comprising shoes rockably mounted on said frame and each having an upper jaw and a lower jaw, both rigidly carried by the shoe, yielding means normally holding the upper jaws in position to cooperate in embracing the pin below its greatest diameter, said frame comprising an upper deck and a lower deck connected for relative vertical movement which is caused by engagement of the lower deck with the alley bed while the upper deck continues to move towards said bed, the pin holding shoes being mounted on the upper deck and the lower deck having cam means which rock said shoes in directions to separate their upper jaws in response to the relative movement of the decks toward each other whereby the upper jaws are separated to release the pin and the lower jaws are swung toward each other in pin receiving position, said yielding means acting automatically to rock the shoes reversely to open the lower jaws and release the pin onto the alley as the upper and lower decks are separated when the frame is raised from the alley.

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