Jan. 12, 1943. L. J. KAUFMAN 2,307,839

BOWLING PIN SETTING MACHINE

Filed May 8, 1941 5 Sheets-Sheet 1

Fig. 1.

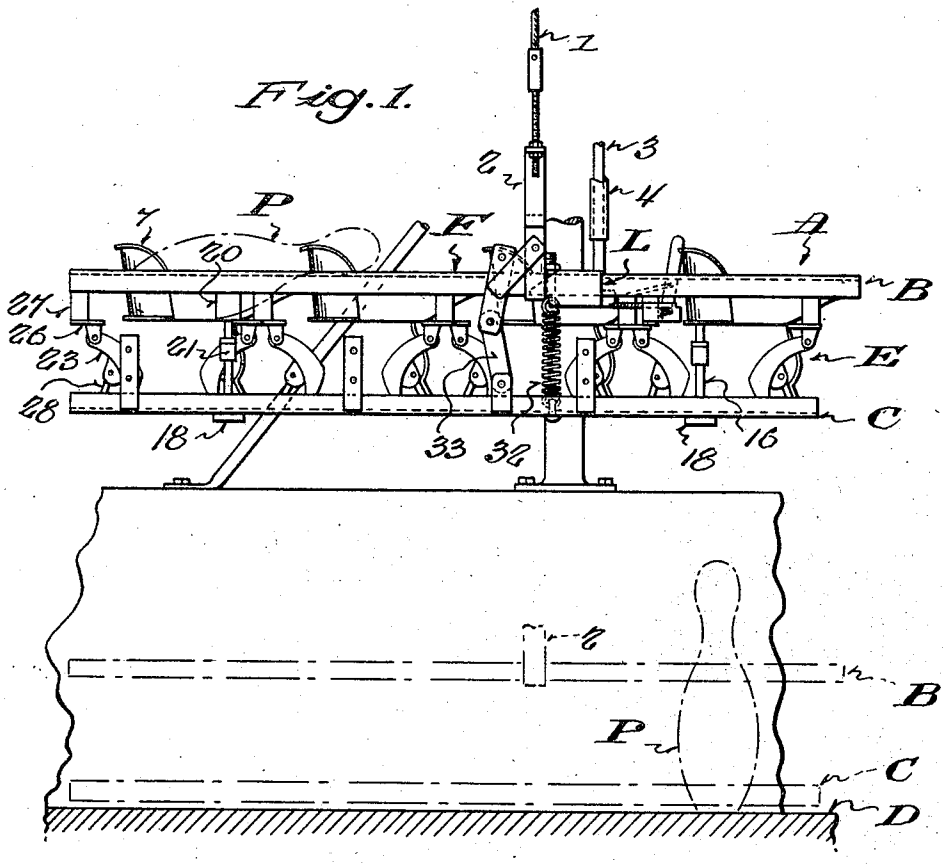


Fig. 8.

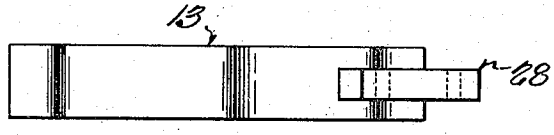
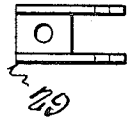


Fig. 9.



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BOWLING PIN SETTING MACHINE

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Fig. 2.

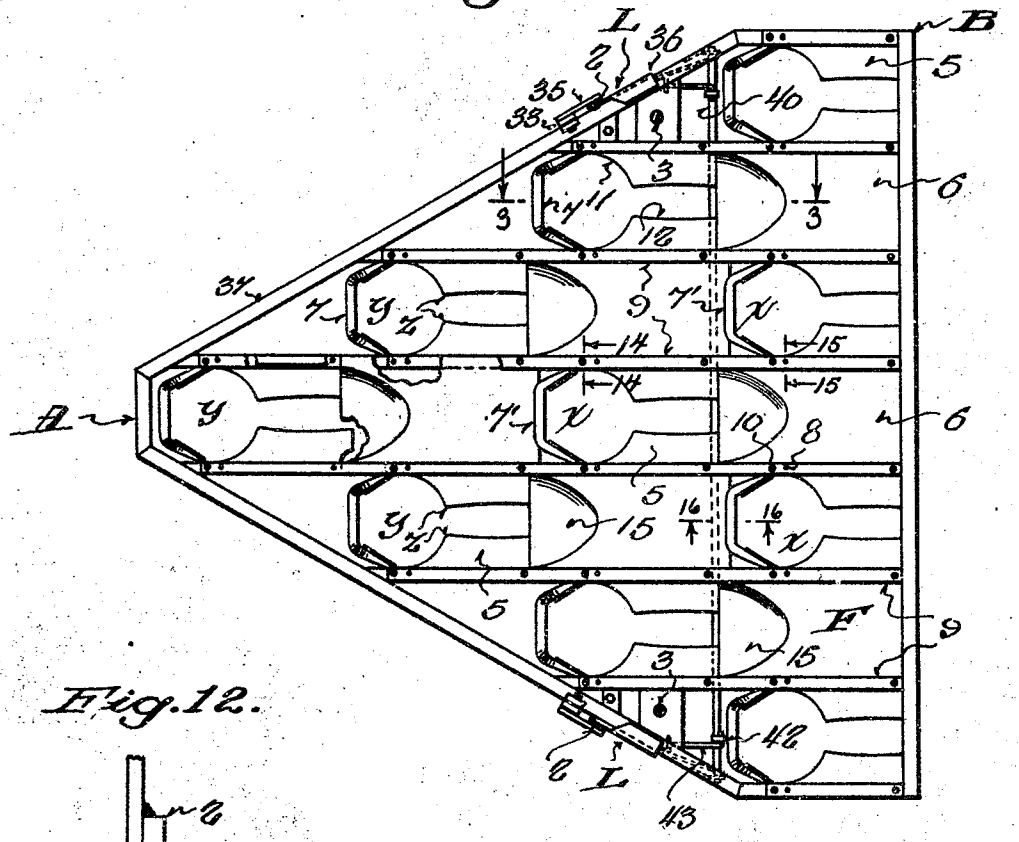


Fig. 12.

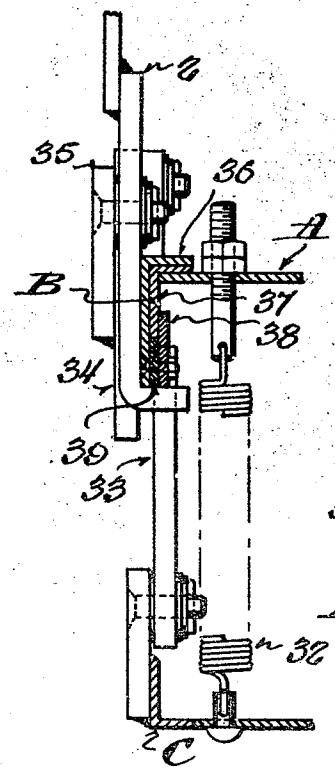


Fig. 13.

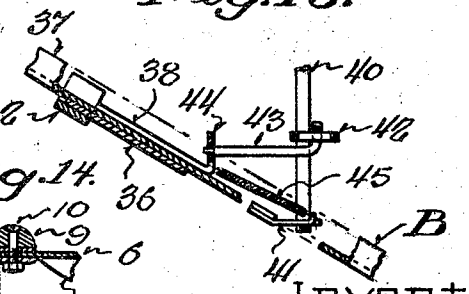


Fig. 14.

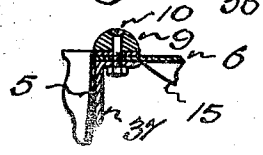
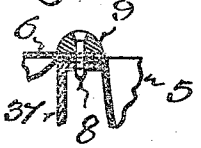


Fig. 15.



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BOWLING PIN SETTING MACHINE

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Fig. 3.

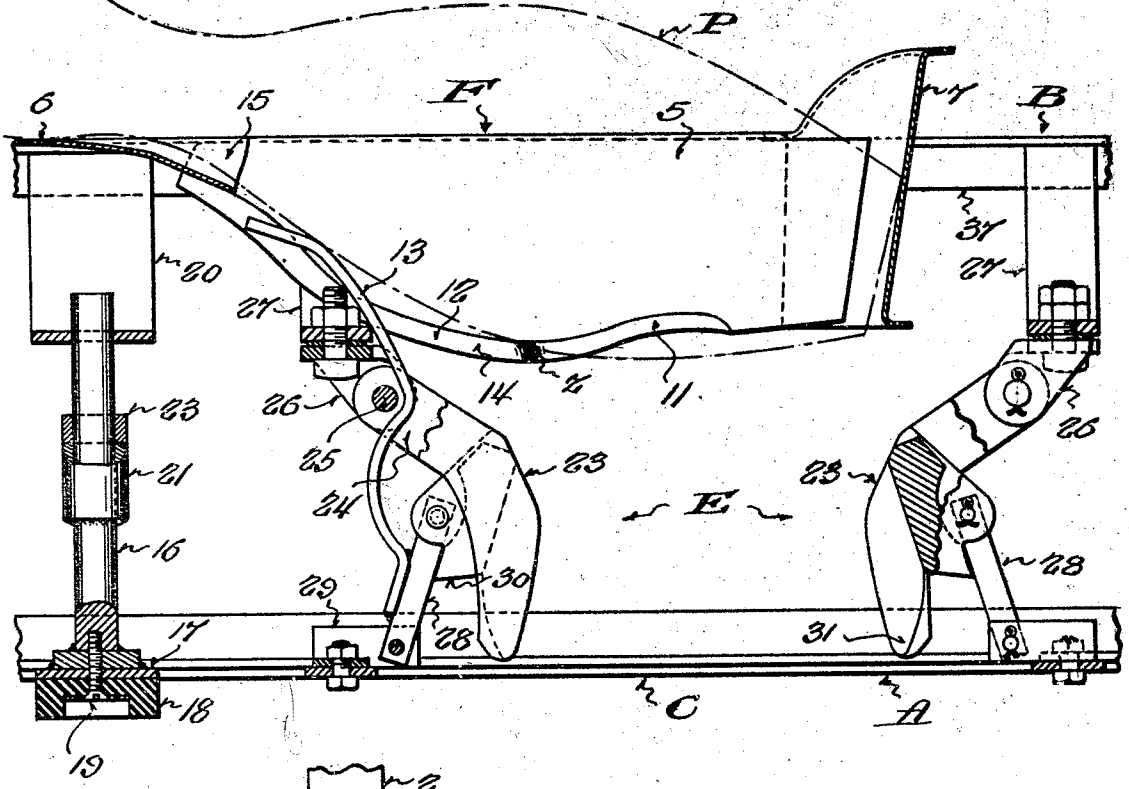
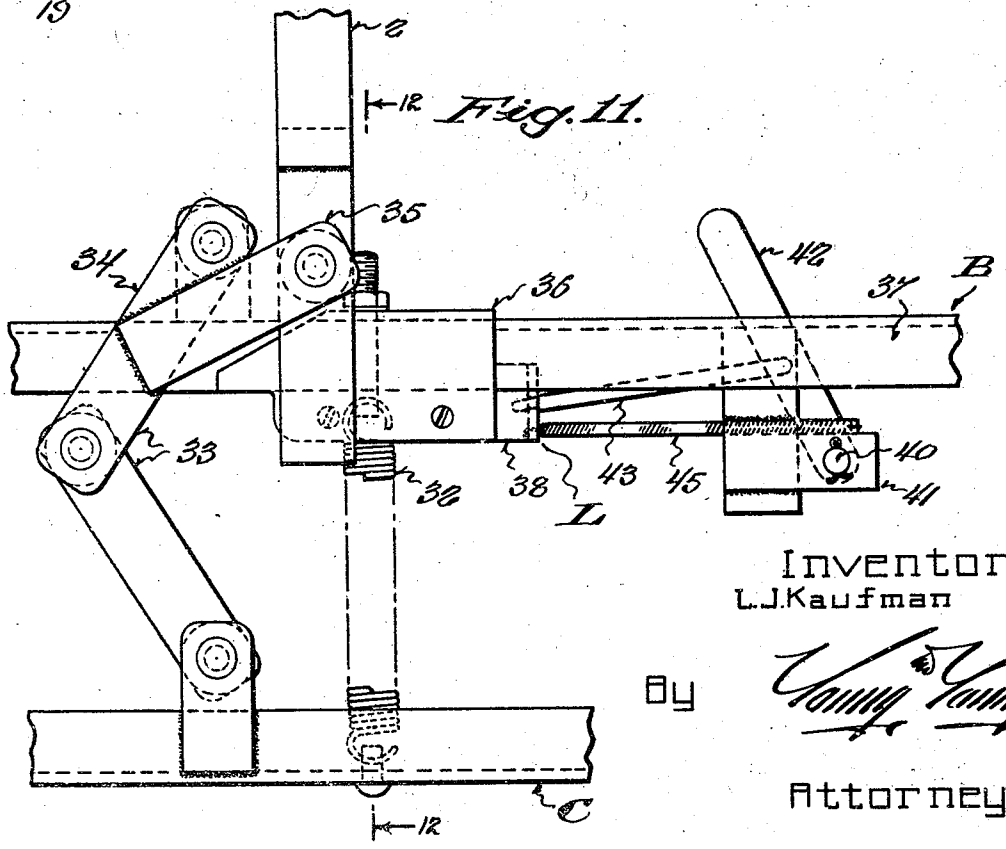


Fig. 11.



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BOWLING PIN SETTING MACHINE

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Fig. 4.

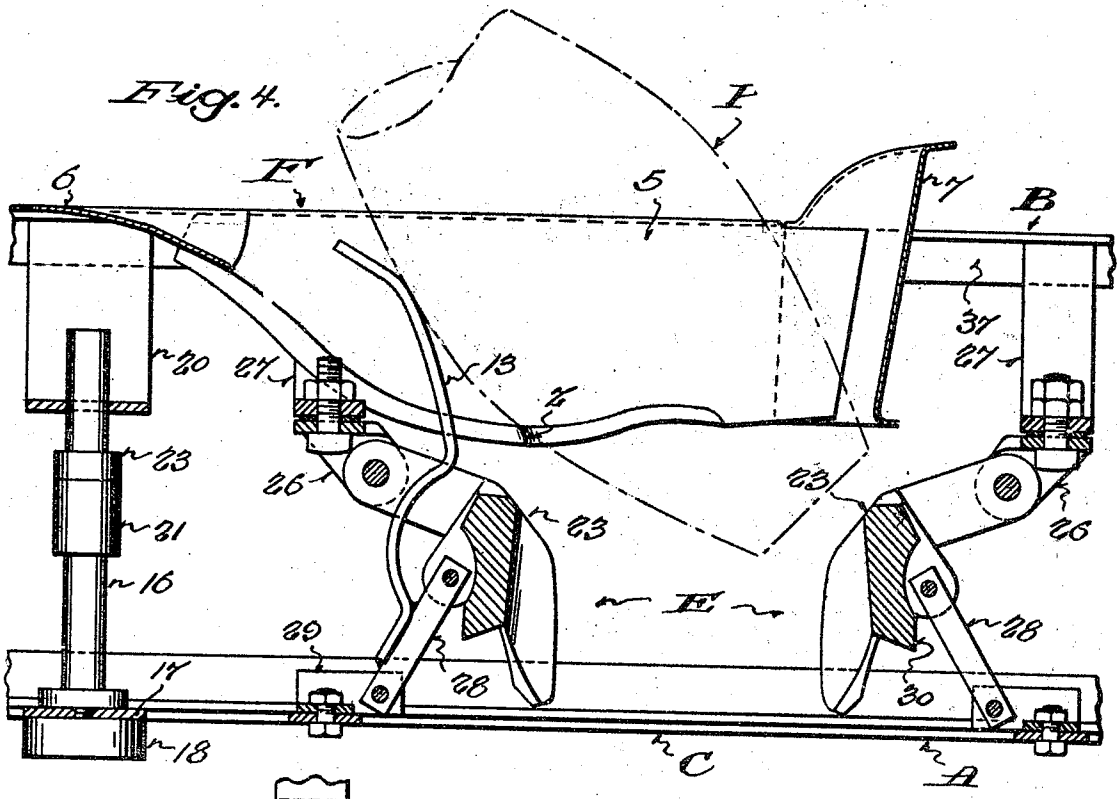
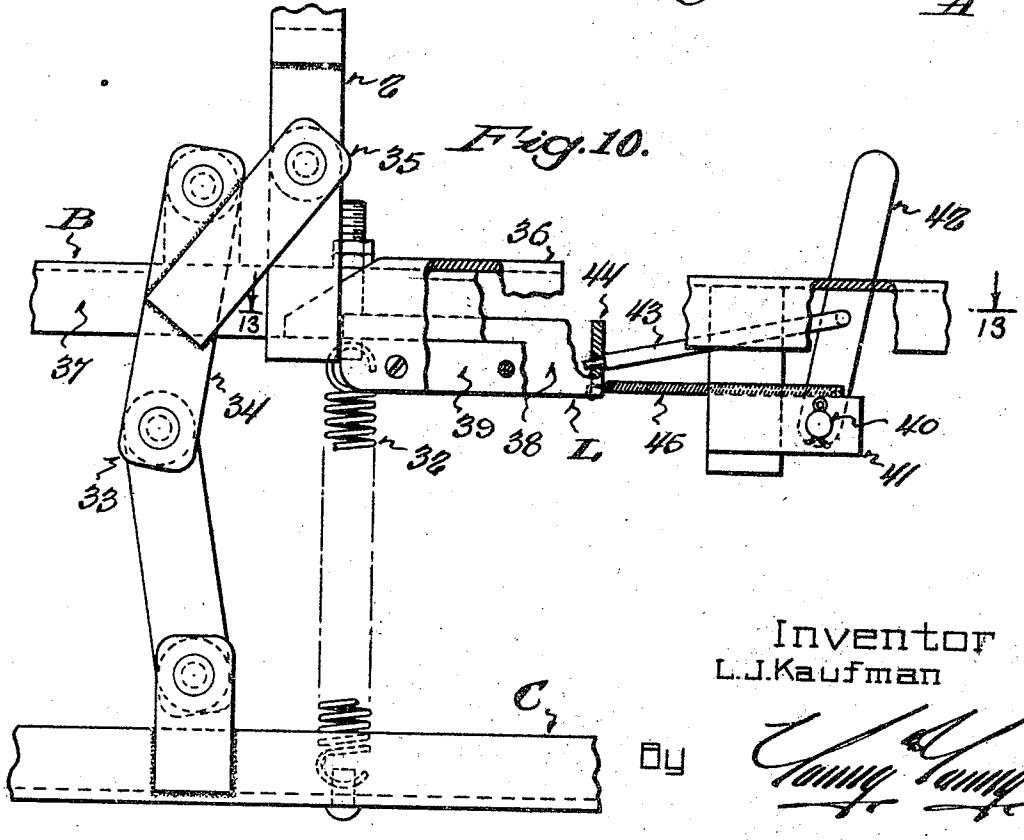


Fig. 10.



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Fig. 5.

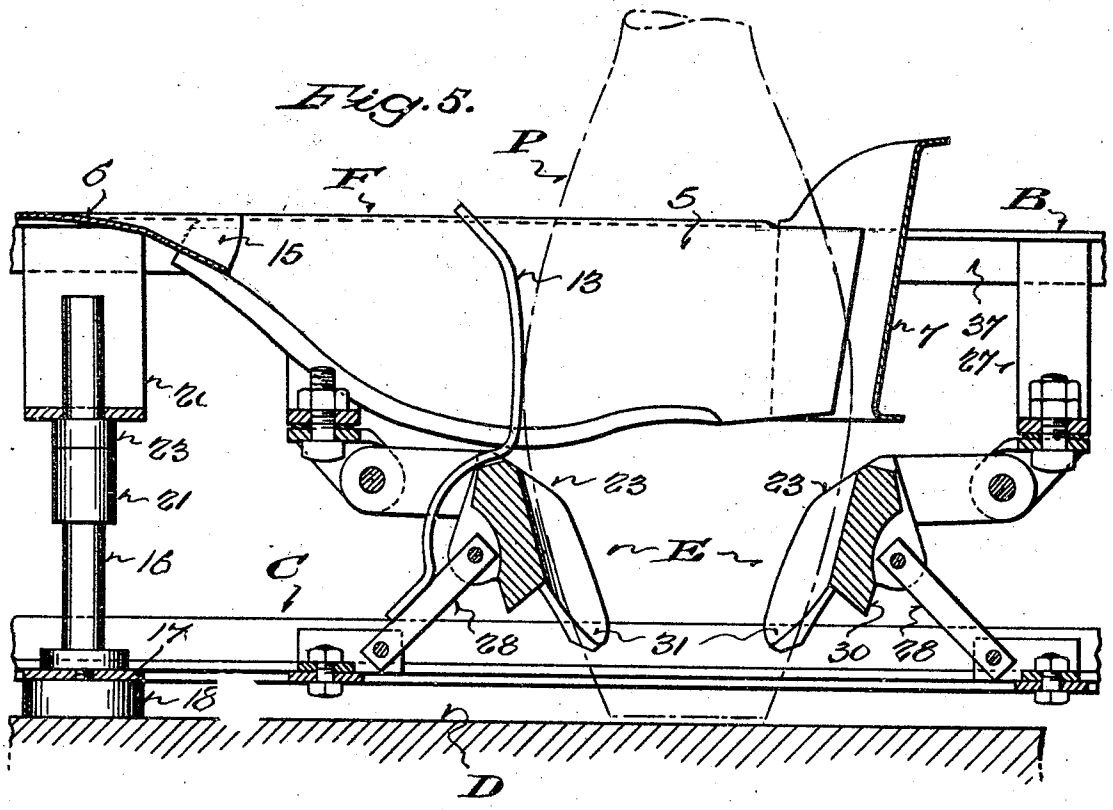


Fig. 6.

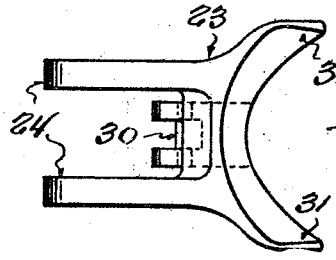


Fig. 16.

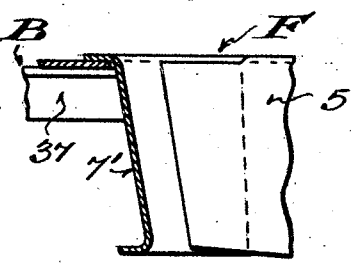
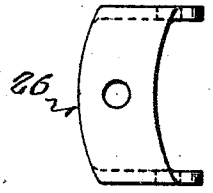


Fig. 7.



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UNITED STATES PATENT OFFICE

2,307,839

BOWLING PIN SETTING MACHINE

Leonard J. Kaufman, Manitowoc, Wis.

Application May 8, 1941, Serial No. 392,403

12 Claims. (Cl. 273—42)

The present invention relates to pin setting machines for bowling alleys, and has primarily for its object to simplify and improve such machines with respect to both structure and mode of operation.

More particularly, the present invention is designed as an improvement upon machines of the type disclosed in my allowed application Serial No. 300,143 for Bowling pin spotters.

The mechanism disclosed in said application employs relative movable upper and lower frames provided with a plurality of receiving and spotting devices, each comprising a pair of opposed holding jaws adapted to receive a pin in upright position and subsequently release the same for engagement by a pair of spotting saddles.

Several objections have been encountered in machines of the foregoing type, due to the fact that in many instances the pins had to be manually up-ended in order to pass through the deck pockets to the holding jaws, which, because of their contact with a substantial surface of the pins, quickly caused the same to become soiled.

Also, upon release of the spotting saddles during the setting operation, the holding jaws, in riding over the upper restricted surface of the pins, have a tendency to tilt and rock the same, frequently causing their displacement. The foregoing condition is particularly true in the event of any slight disalinement between the holding jaws and spotting saddles.

Therefore, an important object of the present invention is to overcome the foregoing objections by the provision of a spotting and setting machine, in which holding jaws are eliminated, and the pins supported in substantially horizontal position upon the receiving deck until subsequently tilted to upright position by positive means associated with the spotting saddles, thus causing the pins to drop through openings in the deck pockets for reception by the spotting saddles, which, upon release of the pins, cause the tilting means to move out of contact with the pins to avoid rocking and displacement.

Incidental to the foregoing, a more specific object of the invention resides in the provision of auxiliary means for aiding in effecting relative movement between the spaced upper and lower frames.

In connection with the foregoing, a more detailed object is to provide resilient means for retracting the frames, and positive means for expanding the same against the tension of said resilient means.

Another object resides in the provision of a novel type of deck pocket for receiving and normally supporting a pin in substantially horizontal position, said pockets preferably consisting of independent interchangeable units, whereby the cost of manufacture and assembly is reduced to a minimum.

A still further object is to provide manually operative means for preventing relative expansion of the upper and lower frames when it is desired to lift pins from the alley bed.

With the above and other objects in view, which will appear as the description proceeds, the invention resides in the novel construction, combination, and arrangement of parts, substantially as hereinafter described, and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the herein disclosed invention may be made as come within the scope of the claims.

In the accompanying drawings is illustrated one complete example of the physical embodiment of the present invention constructed according to the best mode so far devised for the practical application of the principles thereof.

In the drawings:

Figure 1 is an elevational view of a pin setter constructed in accordance with one form of the present invention;

Figure 2 is a plan view of the same;

Figure 3 is an enlarged, fragmentary sectional view taken on the line 3—3 of Figure 2 and illustrating the parts in their pin-receiving position;

Figure 4 is a similar view showing the pin being tilted to upright position;

Figure 5 is a similar view showing the pins supported by the spotting saddles and about to be deposited upon the alley bed;

Figure 6 is a top plan view of one of the spotting saddles;

Figure 7 is a top plan view of one of the clevices to which the spotting saddles are pivotally connected;

Figure 8 is a detail, elevational view of one of the tilting fingers;

Figure 9 is a top plan view of one of the brackets through which the toggle links are pivotally connected with the lower frame;

Figure 10 is an enlarged, fragmentary elevational view, with parts broken away and in section, illustrating the auxiliary mechanism for effecting relative movement between the upper and lower frames, together with the mechanism for locking the frames against expansion, the frame members being shown in their expanded position;

Figure 11 is a similar view showing the frames in collapsed position, and the locking mechanism in operative position;

Figure 12 is a detail sectional view taken on the line 12—12 of Figure 11;

Figure 13 is a detail sectional view taken on the line 13—13 of Figure 10;

Figure 14 is a detail sectional view taken on

the line 14—14 of Figure 2 through a portion of the deck;

Figure 15 is a similar view taken on the line 15—15 of Figure 2; and

Figure 16 is a similar view taken on the line 16—16 of Figure 2.

Referring now more particularly to the accompanying drawings, the letter A designates generally a pin setting machine consisting of spaced, relatively movable upper and lower frames B and C, respectively. The upper frame B forms a receiving deck for the bowling pins P, indicated in the several views by dot and dash lines; while the lower frame C comprises a setting frame, in that it serves to actuate a plurality of setting devices E disposed between the upper and lower frames B and C, actuation of said setting devices E being dependent upon engagement of the lower frame C with the alley bed D, and subsequent relative movement between the frames.

The setting machine A is supported above the alley bed D for vertical movement by either a manual or power-actuated mechanism, which forms no part of the present invention. As shown in Figure 1, the machine is supported by cables 1 connected with any suitable hoisting mechanism (not shown), and having secured to their lower ends hooks 2, which are connected with the upper and lower frames B and C for raising and lowering the entire machine, as will be hereinafter described in detail.

To guide the setting machine in its vertical movement, the upper frame B is provided with rods 3 slidably journaled in sleeves 4, which are carried by the supporting and elevating mechanism.

The upper and lower frames B and C are preferably fabricated from strips of stock material, such as angle and strap iron, and are of corresponding triangular shape and size.

The top frame is provided with a receiving deck F, which preferably consists of a plurality of pocket units 5 corresponding in size, and interchangeable to reduce the cost of production and assembly.

As best shown in Figures 2 and 3, certain of the pockets 5 are provided with aprons 6, welded or otherwise secured thereto to from extensions over which the pins may be slid to the pockets, particularly the forward ones remotely positioned from the operator, which eliminates the necessity of extreme care in positioning the pins on the deck.

Those pockets to which clear access is had from the rear of the machine are provided with arcuate end plates 7, which extend above the surface of the deck to serve as stops for the pins as they are slid forwardly, with the result that the pins are supported in substantially horizontal position within the pockets, as best shown in Figure 3, with the bottom ends of the pins in abutting engagement with the arcuate plates 7.

The intermediate pockets x are positioned rearwardly of the forward pockets y, and although the pockets x are provided with arcuate stop plates 7', as best shown in Figure 16, the top of the plates are substantially flush with the surface of the deck, in order to eliminate obstruction to the forward pockets y.

The pockets 5 and aprons 6 are supported by the longitudinal struts of the fabricated frame A, and as best shown in Figures 14 and 15, their edges are overlapped and centered by means of dowel pins 8 carried by dowel pins 8 half-round molding strips 9, which are secured to the longitudinal struts of the frame by stove bolts 10.

It will be apparent from the foregoing that the pockets 5 may be quickly and accurately assembled to form the deck F, the dowels 8 serving to hold the same in assembled relation during the attachment of the molding strips 9 by means of the stove bolts 10.

As best shown in Figures 2 and 3, the pockets 5 adjacent their forward ends are provided with openings 11 to permit the pins P to pass through the deck to the setting devices E, as will be later explained in detail. Communicating with the openings 11, the pockets 5 are provided with longitudinal slots 12, through which tilting fingers 13 operate to up-end the pins P within the pockets, and allow the same to drop by gravity to the setting devices E.

In order to prevent mutilation of the pins, the edges of the slots 12 and a portion of the pocket openings terminate in downwardly rounded lips 14 to avoid sharp edges. Also, the forward ends of the apron 6 are provided with gulleys 15, which assist in guiding the pins P to the pockets 5.

The receiving and setting frames B and C are held in vertical alinement by means of suitably spaced pins 16 secured to straps 17 carried by the setting frame. Resilient feet 18, formed of rubber or other cushioning material, are attached to the bottom of the straps 17 by screws 19 threaded into the pins 16, as best shown in Figure 3.

The upper ends of the pins 16 extend through stirrups 20 fastened to the upper frame B, and for the purpose of limiting relative collapsing movement of the frames B and C, sleeves 21 are secured upon the pins 16. Due to wear, it has been found desirable to regulate the collapsing action of the frames B and C, and, therefore, loose collars 22 are placed on the pins 16 and supported by the sleeves 21 to serve as an abutment for the straps 20. As wear occurs in the spotting devices, collars 22 of different size may be readily substituted to compensate for the same in regulating relative collapsing movement of the frames.

The spotting devices E, disposed between the upper and lower frames, each comprise a pair of opposed arcuate saddles 23, provided with spaced lateral ears 24 mounted upon pintles 25 carried by clevices 26, which, in turn, are connected to depending yokes 27 attached to the upper frame B.

Connected to the spotting saddles 23 intermediate their upper and lower ends are toggle links 28 pivotally connected to brackets 29 carried by the setting frame C. Laterally projecting bosses 30 carried by the saddles engage the toggle links 28 to limit relative spreading movement of the upper and lower frames, as best shown in Figure 3, in which the frames are shown in extended pin receiving position.

As best shown in Figures 5 and 6, the lower portions of the spotting saddles are arcuate in shape, and so formed that their lower extremities 31 serve to ultimately engage and support the pins P in slightly raised position above the alley bed D. The intermediate arcuate portions of the saddles merely serve as guides for the lower ends of the pins, as they are delivered from the pockets 5 to the saddles.

Secured to one of the toggle links 28 of each pair of spotting saddles is a tilting finger 13, heretofore referred to and alined with the slot

12 in the corresponding pocket to engage a pin and up-end the same for delivery through the pocket opening 11, as will be hereinafter described in connection with the operation of the apparatus.

In order to better describe additional features of the apparatus, operation of the receiving and setting frames, together with that of the spotting devices will be briefly explained at this point.

As shown in Figure 3, the upper and lower frames are in their extended position, in which the pins P are supported in the pockets 5 in substantially horizontal position, the lower ends of the pins P being abutted against the arcuate plates 7. In this position of the pins, their center of gravity is in approximate alinement with the rear edges z of the pocket opening 11, and because of support of their lower ends by the arcuate plate 7, the pins are prevented from upending through the action of gravity.

After the pins have been positioned in their respective pockets, the machine is lowered to the alley bed D, which causes the upper and lower frames to be collapsed to the position shown in Figure 5, after which further collapsing movement of the upper and lower frames is initiated to cause the spotting saddles 23 and toggle links 29 to break inwardly, which, in turn, projects the tilting fingers 13 through the slots 12 of the pockets 5 to engage and rock the pins upon the lip or edge z in the bottom of the pockets, in the manner shown in Figure 4.

During the initial tilting operation, the bottom edges of the pins P engage the arcuate plates 7, causing the center of gravity of the pin to be shifted slightly rearwardly until the pins reach a point where their bottom edges clear the arcuate plates 7, and then upon further collapsing of the upper and lower frames, the spotting saddles 23 continue to move inwardly with the tilting fingers 13 to the position shown in Figure 5, in which the pins have been up-ended by the tilting finger and delivered by gravity through the pocket opening 11 to the spotting saddles, which support the pins, as shown in Figure 5, slightly above the alley bed D.

The machine is then raised through the lifting cables 1 to cause relative expansion between the upper and lower frames, and simultaneous outward movement of the spotting saddles and tilting finger to release and deposit the pins on the alley bed. Inasmuch as the releasing action takes place practically simultaneously with lifting of the upper frame and withdrawal of the spotting saddles and tilting fingers, there is no sliding contact between these elements and the surface of the pins to soil the same, or cause subsequent rocking of the pins on the alley bed and resultant displacement.

In actual practice, it has been found that because of the extent of friction created between the pins and pockets during the up-ending operation, the combined weight of the pins and upper frame was insufficient to overcome the frictional resistance and cause collapse of the frames for tilting the pins.

Therefore, to assist gravity during the foregoing operation, a pair of contractile springs 32 are connected between the upper and lower frames B and C, respectively, and, being normally extended, naturally tend to draw the frames together.

However, in order for the springs 32 to perform their function, it was found that they had to be of such tension that the weight of the lower frame was insufficient to overcome the tension and allow relative expansion of the frames required for releasing the pins during the setting operation.

Therefore, in order to overcome the tension of the springs 32 and provide relative expansion of the frames, when required, two sets of toggle links 33 are connected to the sides of the upper and lower frames B and C, and, as best shown in Figures 10 and 11, the upper links 34 are provided with offset arms 35, which, in substance, form bell cranks of the upper links. The ends of the arms 35 are pivotally connected to the hooks 2, the lower ends of which extend below the upper frame, as best shown in Figure 12.

In operation, the hooks 2 are vertically movable relative to the frame B, and consequently when the lower frame C engages the alley bed, the weight of the upper frame, together with the tension of the springs 32, is sufficient to break the toggle links 33 and draw the upper frame toward the lower frame. As the breaking action of the toggles 33 continues, the pivotal connection between the arms 35 and the hooks 2 causes the hooks to move away from the upper frame, and assume the position shown in Figure 11.

When the frames have been completely collapsed and the hooks 2 are again elevated, sufficient leverage is provided through the connection between the hooks and upper toggle links to overcome the tension of the springs 32 and expand the frames, which action opens the spotting saddles to release and deposit the pins upon the alley bed. Upon expansion of the frames, the lower ends of the hooks 2 engage the upper frame B to again raise the machine from the alley bed.

When it is desired to raise pins from the alley bed, it is necessary to prevent expansion of the upper and lower frames and consequent release of the spotting saddles, as the machine is raised. This is accomplished by a manually actuated mechanism L, carried by the upper frame B, and consisting of angular slides 36 supported upon the side angles 37 of the upper frame, and guided thereon by plates 38 and spacer blocks 39, secured to the lower edges of the slides 36, all of which extend below the bottom of the frame angles 37 in alinement with the ends of the hooks 2.

When the frames are in their collapsed position as shown in Figure 11, and the lower ends of the hooks are spaced from the upper frame, the slides 36 may be shifted forwardly to project their lower edges between the lower edges of the frame angles 37 and the ends of the hooks 2, which prevents relative movement between the hooks and frame B and consequent extension of the toggle links 33 to relatively expand the upper and lower frames for release of the pins. Subsequent elevation of the hooks will raise the entire machine with the frames in collapsed position, and the pins supported in the spotting saddles.

To shift the locking slides 36 forwardly, a transverse shaft 40 is journaled in brackets 41 carried by the frame angles 37, and mounted on the shaft at opposite sides of the machine are hand levers 42 to which rods 43 are connected. The forward ends of the rods are restricted to project through lateral extensions 44 formed on the plates 38, while springs 45, connected with the extensions 44 and the brackets 41, tend to normally withdraw the locking mechanism from operative position. However, the tension of the springs 45 is relatively light, and consequently

insufficient to withdraw the slides 36 from between the upper frame B and the lower ends of the hooks 2, until such time as the machine is again set on the alley bed D to relieve pressure upon the slides.

From the foregoing explanation, considered in connection with the accompanying drawings, it will be seen that a pin setting machine has been devised, which not only simplifies machines of the present type, but also insures positive and accurate operation, and, in addition, facilitates loading of the machine and avoids marring of the pins.

I claim:

1. A bowling pin setting machine comprising, spaced upper and lower frames co-jointly and relatively movable, means carried by the upper frame for normally supporting the pins in substantially horizontal position, a plurality of shiftable spotting devices interposed between and pivotally connected with said frames, and means carried by the pivotal connections between the spotting devices and the lower frame for tilting said pins to upright position upon relative collapsing of said frames to cause the pins to be delivered to said spotting devices.

2. A bowling pin setting machine comprising, spaced upper and lower frames co-jointly and relatively movable, pockets carried by the upper frame for normally supporting bowling pins in substantially horizontal position, a plurality of shiftable spotting devices interposed between and pivotally connected wth said frames, and means pivotally connected with said spotting devices and movable therewith for tilting said pins to upright position upon relative collapsing of said frames to cause the pins to be delivered to said spotting devices.

3. A bowling pin setting machine comprising, spaced upper and lower frames co-jointly and relatively movable, means carried by the upper frame for normally supporting the pins in substantially horizontal position, a plurality of shiftable spotting devices interposed between and pivotally connected with said frames, and fingers carried by the pivotal connections between said spotting devices and the lower frame for tilting said pins to upright position upon relative collapsing of said frames to cause the pins to be delivered to said spotting devices.

4. A bowling pin setting machine comprising, spaced upper and lower frames co-jointly and relatively movable, means carried by the upper frame for normally supporting the pins in substantially horizontal position, spotting saddles pivotally carried by said upper frame, links connecting said saddles to said lower frame, and fingers carried by certain of said links for tilting said pins to upright position upon relative collapsing of said frames to cause the pins to be delivered to said spotting saddles.

5. A bowling pin setting machine comprising, spaced upper and lower frames co-jointly and relatively movable, a plurality of spotting devices interposed between and pivotally connected with said frames, resilient means for retracting the frames, and positive means for expanding the same against the tension of said resilient means.

6. A bowling pin setting machine comprising, spaced upper and lower frames co-jointly and relatively movable, a plurality of spotting devices interposed between and pivotally connected to said frames, elevating and supporting members movably connected to said frames, contractile springs for normally urging said frames together, and positive means connected with said frames and supporting members for expanding said frames against the tension of said springs.

7. A bowling pin setting machine comprising, spaced upper and lower frames co-jointly and relatively movable, a plurality of spotting devices interposed between and pivotally connected with said frames, toggle links connecting said upper and lower frames, elevating and supporting members connected with said toggle links for expanding the same, and resilient means for urging the frames to collapsed position when the weight of the frames is relieved from said supporting members.

8. A bowling pin setting machine comprising, spaced upper and lower frames co-jointly and relatively movable, a plurality of spotting devices interposed between and pivotally connected with said frames, toggle links connecting said upper and lower frames, elevating and supporting members connected with said toggle links for expanding the same, and springs connecting said frames for urging them to collapsed position.

9. A bowling pin setting machine comprising, a receiving deck and a spaced lower frame co-jointly and relatively movable, said receiving deck comprising a plurality of individual pockets for normally supporting bowling pins in substantially horizontal position, said pockets being provided with delivery openings and longitudinal slots communicating with said openings, a plurality of spotting devices interposed between and pivotally connected with said receiving deck and lower frame, and means associated with said spotting devices for actuation through said slots to tilt said pins, and cause the same to be delivered through the pocket openings to said spotting devices.

10. A bowling pin setting machine comprising, spaced upper and lower frames co-jointly and relatively movable, a plurality of spotting devices interposed between and pivotally connected with said frames, and manually operable means for locking said frames against relative vertical expansion to prevent actuation of said spotting devices and release of said pins.

11. A bowling pin setting machine comprising, spaced upper and lower frames co-jointly and relatively movable, a plurality of spotting devices interposed between and pivotally connected with said frames, elevating and supporting elements movably connected to said frames, and manually operable means for locking said elevating and supporting members against relative movement with said frames to prevent expansion of said frames and release of the pins from said spotting devices.

12. A bowling pin setting machine comprising, spaced upper and lower frames co-jointly and relatively movable, a plurality of spotting devices interposed between and pivotally connected with said frames, elevating and supporting mechanism movably connected with said frames, manually controlled means for locking said elevating and supporting mechanism against movement relative to said frames, and means actuated by said elevating and supporting mechanism for controlling relative movement of said frames to prevent actuation of said spotting devices and release of said pins.

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