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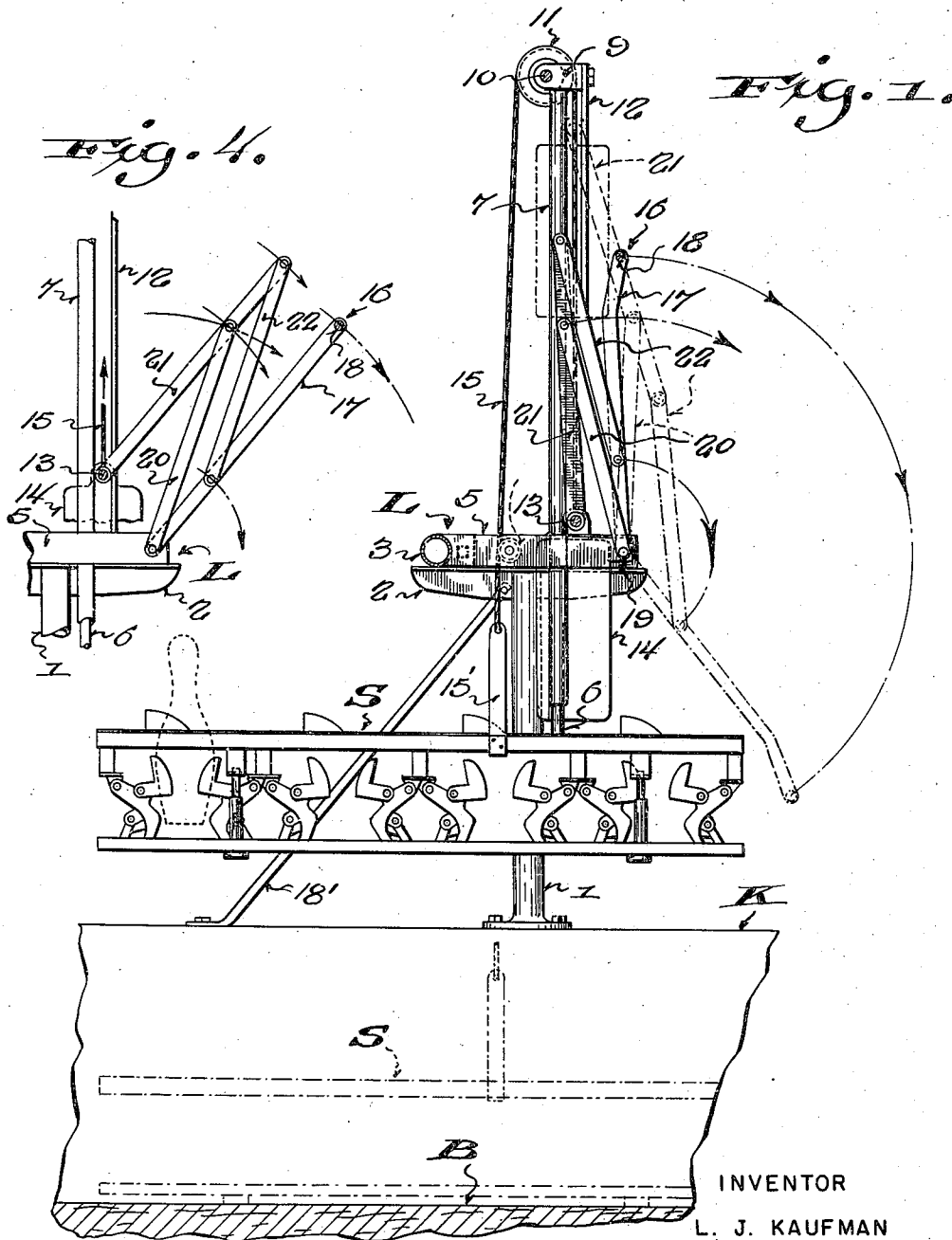
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PIN SETTING MACHINE

Filed Oct. 19, 1939

2 Sheets-Sheet 1



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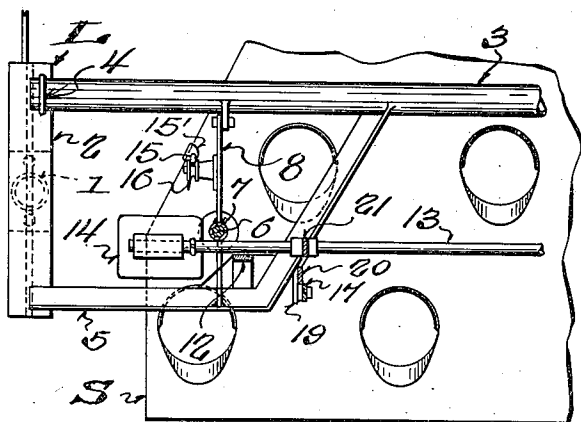
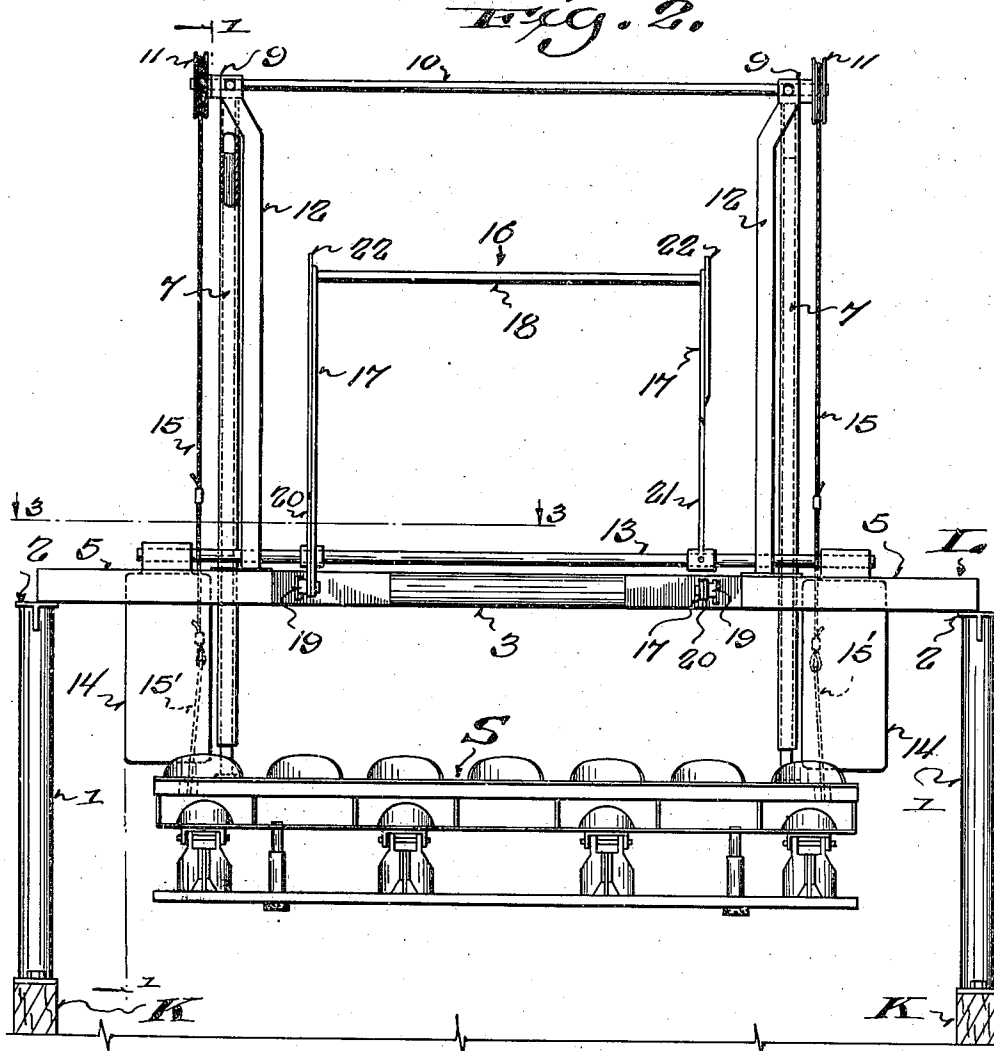
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PIN SETTING MACHINE

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8 Claims. (Cl. 273—42)

This invention pertains to improvements in manually operated pin setting machines employed on bowling alleys, and more particularly to the apparatus for supporting, and elevating and lowering the pin setting mechanism.

The invention has primarily for its object to improve apparatus of the foregoing character, with respect to simplicity of construction, efficiency, and ease of operation.

Incidental to the foregoing, a more specific object of the invention, resides in the provision of a manually operated apparatus for elevating and lowering the pin setter through the raising and lowering of a counter-balance weight, the former operation permitting lowering of the setter by gravity, thus eliminating shifting by lateral forces and insuring accurate spotting of the pins.

Another important object resides in the provision of a novel arrangement of levers for elevating and lowering the counter-balance weight including, a lever connected with the counter-balance weight, and pivotally mounted upon a floating fulcrum, in combination with a manually operated lever connected with the first-mentioned lever by a link for actuating said lever to raise and lower the counter-balance weight.

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 a longitudinal section of an apparatus constructed in accordance with one form of the present invention, the same being taken on the line 1—1 of Figure 2,

Figure 2 is a rear elevation,

Figure 3 is a fragmentary plan section taken on the line 3—3 of Figure 2; and

Figure 4 is a diagrammatic view showing the levers and counter-balance weight in an intermediate position.

Referring now more particularly to the accompanying drawings, the conventional alley bed is

designated by the letter B, the same being provided with the customary side kick-backs K. Mounted upon the kick-backs is the apparatus L, comprising the present invention, for supporting, elevating, and lowering the pin spotting and setting mechanism S, which may be of any conventional structure automatically actuated upon elevation or engagement with the alley bed.

The apparatus L comprises a pair of standards 1, mounted upon the top of the kick-backs K, and having horizontal supporting brackets 2 secured upon their upper ends. A transverse bar 3 is supported upon the forward ends of the brackets, and is secured thereto by U bolts 4. To anchor the bar 3 against rotation, an angular brace 5 is secured upon the rear ends of the brackets 2, and is welded or otherwise connected to the bar 3 intermediate its ends. Diagonal struts 18', connected to the brackets 2 and the kick-backs, securely anchor the standards against swaying.

Adjacent each side of the setter S, in approximate alinement with its transverse center of gravity, guide rods 6 are fastened to the upper frame, and extend into vertical tubes 7 connected at their lower ends to the bar 3 and braces 5 by welded fins 8. Mounted upon the upper ends of the tubes 7 are bearing brackets 9 in which a transverse shaft 10 is journaled, having secured to its outer ends sheaves 11. Retaining straps 12, secured at their upper ends to the brackets 9, and to the braces 5 at their lower ends, serve both to support the upper ends of the tubes 7, and, in cooperation with the tubes, form guides for a transverse, vertically reciprocative shaft 13, having secured upon its outer ends counterbalance weights 14. Cables 15, connected to the shaft 13, are trained over the sheaves 11, and connected at their opposite ends to hooks 15', suitably attached to the upper frame of the spotter S. The front stretches of the cables 15 are engaged by the guide sheaves 16 carried by the anchoring fins 8.

For the purpose of elevating and lowering the counter-balance weights 14, to provide for actuation of the setter S, a handle 16 comprising side arms 17, connected at their outer ends by a cross bar 18 is pivotally mounted upon brackets 19 carried by the braces 5. Also mounted on the same pivotal connections for the arm 17, are straps 20, pivotally connected at their outer ends to the levers 21, to provide a floating fulcrum for the same. The free ends of the levers 21, are connected to the arms 17 by means of links 22.

The foregoing describes the detail structure

illustrated in the drawings, the operation of which is as follows:

In the drawings the setter S is shown in its normal elevated position, sufficiently spaced above the alley bed to permit play without interference with flying pins, while the lowered position of the setter is indicated in dotted lines on Figure 1.

After a play is completed, and the setter is again loaded, the handle 16 is swung away from the supporting frame, as indicated by the dot and dash line in Figure 1, through the intermediate position shown in Figure 4, which raises the weight to lower the setter to the alley bed, and effects its automatic operation to release and deposit the pins on the spots provided on the bed.

In the lowering operation of the setter, it will be noted that the levers 21 are actuated through the link connections 22 with the arms 17 to raise the transverse bar 13, and consequently the counter-balance weights 14, the straps 20 serving as floating fulcrums to permit the bar 13 to travel in a straight vertical path, the bar being guided in its movement between the tubes 7 and the retaining straps 12. Obviously, upon elevation of the counter-balance weights, the setter frame is lowered by gravity, during which movement it is guided by the rods 6 slidable within the tubes 7, to accurately align the setter with the pin spots on the alley bed.

After the pins are deposited upon the bed, the handle 16 is swung upwardly to allow the counter-balance weights to move downwardly, thus elevating the setter to its normal position shown in Figure 1.

Here it may be explained that the weights of the counter-balances 14 are substantially equal to the combined weight of the setter and pins, requiring practically no effort upon the part of the operator in raising the counter-balance weights to permit lowering of the loaded setter. However, when the pins have been released from the setter and deposited upon the alley bed, the weight of the setter is materially reduced, and therefore overcome by the weight of the counter-balances, which merely requires the operator to start the handle 16, in order to permit the counter-balance weights to raise the setter and hold the same in elevated position for reloading.

From the foregoing explanation considered in connection with the accompanying drawings, it will be apparent that an exceedingly simple and efficient apparatus has been provided for supporting and actuating conventional pin setters, in which lowering and raising of the setter is accomplished through actuation of the counter-balance weights, rather than a direct rigid connection between the operating handle and setter, which must exert a lateral force against the setter, causing the same to sway and shift when lowered to the alley bed, due to the fact that the distance required between the setter and tubular guides must be sufficient to allow necessary elevation of the setter to avoid obstruction of the pins. Obviously, even slight shifting of the setter, when lowered or raised from the alley bed, will result in inaccurate spotting of the pins. Furthermore, by the present invention, the spotter is supported at points in substantial alignment with its center of gravity. Consequently, bind and friction between the guide bars and receiving tubes are reduced to a minimum.

Furthermore, it will be noted that in the event one of the supporting cables 15 should break, the counter-balance weights will be prevented

from dropping, due to the fact that the transverse bar is still supported by the other cable, and it will be appreciated that simultaneous breaking of both cables at the same time is highly improbable.

Other important advantages of the present structure are, clear vision of the supporting and setting mechanism and the factor of safety to the operator, due to the elevation of all of the transverse members of the supporting apparatus "L", and the disposition of the counter-balance weights at the sides of the apparatus. Obviously, the spaced side arms of the actuating handle clears the operator's vision of the setter, while the obstruction offered by the transverse bar 3, and the reciprocative shaft 13 is so slight as to be negligible. The counterbalance weights being positioned beyond the pin field of the setter cannot contact the operator under any conditions.

While the invention has been illustrated and described in considerable detail, it is to be understood that the principles thereof may be accomplished by various structural modifications, the salient features of the invention residing in the combinations as hereinafter set forth in the claims.

I claim:

1. In a pin-setting machine for bowling alleys including a vertically movable pin-setter, an apparatus for supporting and imparting vertical movement to said pin-setter comprising, a supporting frame positioned above the alley bed, a counter-balance weight for said setter, a manually operative oscillating handle carried by said supporting frame, a lever operatively connected with said counter-balance weight, a movable fulcrum for said lever, an operative connection between said lever and handle, and means for guiding the load end of the lever in a straight path.

2. In a pin-setting machine for bowling alleys including a vertically movable pin-setter, an apparatus for supporting and imparting vertical movement to said pin-setter comprising, a supporting frame positioned above the alley bed, a counter-balance weight for said setter, a manually operative oscillating handle carried by said supporting frame, a lever operatively connected with said counter-balance weight, an oscillating strap mounted on said frame and pivotally connected to said lever to provide a movable fulcrum for the same, means for guiding the load end of the lever in a straight path, and a link connection between said lever and handle for actuating said lever upon oscillation of said handle.

3. In a pin-setting machine for bowling alleys including a vertically movable pin-setter, an apparatus for supporting and imparting vertical movement to said pin-setter comprising, a supporting frame positioned above the alley bed, a counter-balance weight for said setter, a flexible connection between the setter and counter-balance weight, means on the supporting apparatus for guiding the setter during its vertical movement, a manually operative handle pivotally connected to said supporting frame, a lever operatively connected at one end with said counter-balance weight, a movable fulcrum for said lever, means for guiding the load end of the lever in a straight path, and an operative connection between said lever and handle.

4. In a pin-setting machine for bowling alleys including a vertically movable pin-setter, an ap-

paratus for supporting and imparting vertical movement to said pin-setter comprising, a supporting frame positioned above the alley bed, a counter-balance weight for said setter, a flexible connection between said weight and setter, means carried by said supporting frame for guiding the setter during its vertical movement, a manually operative handle pivotally connected to said supporting frame, a lever operatively connected with said counter-balance weight, an oscillated strap mounted on said frame and pivotally connected to said lever to provide a movable fulcrum, means for guiding the load end of the lever in a straight path, and a link connection between the free end of the lever and said handle.

5. In a pin-setting machine for bowling alleys including a vertically movable pin-setter, an apparatus for supporting and imparting vertical movement to said pin-setter comprising, a supporting frame positioned above the alley bed and including upright members spaced upon opposite sides of the alley, a transverse bar slidably guided with relation to said uprights, counter-balance weights carried by said bar adjacent opposite sides of the alley, sheaves mounted adjacent the top of said uprights, flexible connections passing over said sheaves and connecting said transverse bar with said pin-setter, a manually operative handle including spaced arms pivotally connected to said supporting frame upon opposite sides of the alley, a pair of levers connected to said transverse bar adjacent its opposite ends, oscillating straps connected to said supporting frame and pivotally connected to said levers to provide movable fulcrums, link connections between said levers and the arms of said manually operative handle, and means carried by said supporting frame for guiding the setter during its vertical movement.

6. In a pin-setting machine for bowling alleys including a vertically movable pin-setter, an

apparatus for imparting vertical movement to said pin-setter comprising, a supporting frame positioned above and straddling the alley bed, a counter-balance weight mounted upon each side of said frame, a flexible connection between each of said weights and said setter, a manually operative oscillating handle carried by said supporting frame and transversely spaced levers operatively connected with said counter-balance weights, an operative connection between said levers and handle, and a rigid transverse connection between said weights.

7. In a pin-setting machine for bowling alleys including a vertically movable pin-setter, an apparatus for imparting vertical movement to said pin-setter comprising, a supporting frame positioned above and straddling the alley bed, a transverse bar guided in said supporting frame, a counter-balance weight mounted upon each end of said transverse bar, spaced flexible connections between said bar and the sides of said setter, a manually operative oscillating handle comprising spaced arms pivotally connected to said supporting frame, a lever operatively connected to each of said arms and said transverse bar, and an operative connection between said levers and the side arms of said handle.

8. In a pin-setting machine for bowling alleys including a vertically movable pin-setter, an apparatus for supporting and imparting vertical movement to said pin-setter comprising, a counter-balance weight for said setter, a lever operatively connected with said balance weight, a lever pivotally connected with said balance weight, a fulcrum pivotally connected to said frame and said lever, a manually operative oscillating handle pivotally connected to said fulcrum, an operative connection between said lever and handle and means for guiding the load end of the lever in a straight path.

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