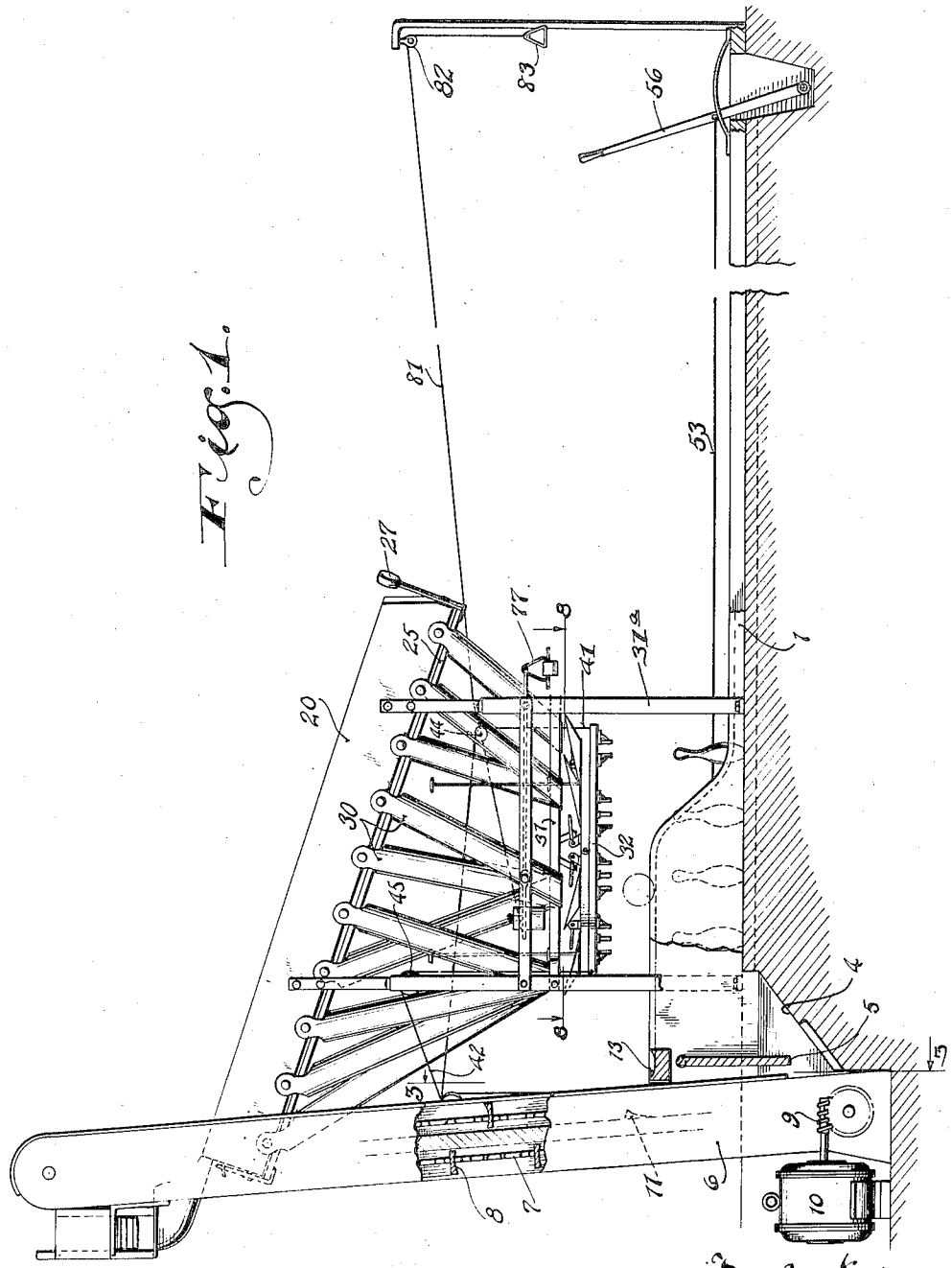
Mar. 20, 1923. 1,449,012

C. LORENZ ET AL

AUTOMATIC PIN SPOTTING MECHANISM

Filed June 9, 1921 7 sheets-sheet 1

Fig. 1.



Inventors.
Charles Lorenz
Emil Kumsh
By
Young & Young
Attorneys.

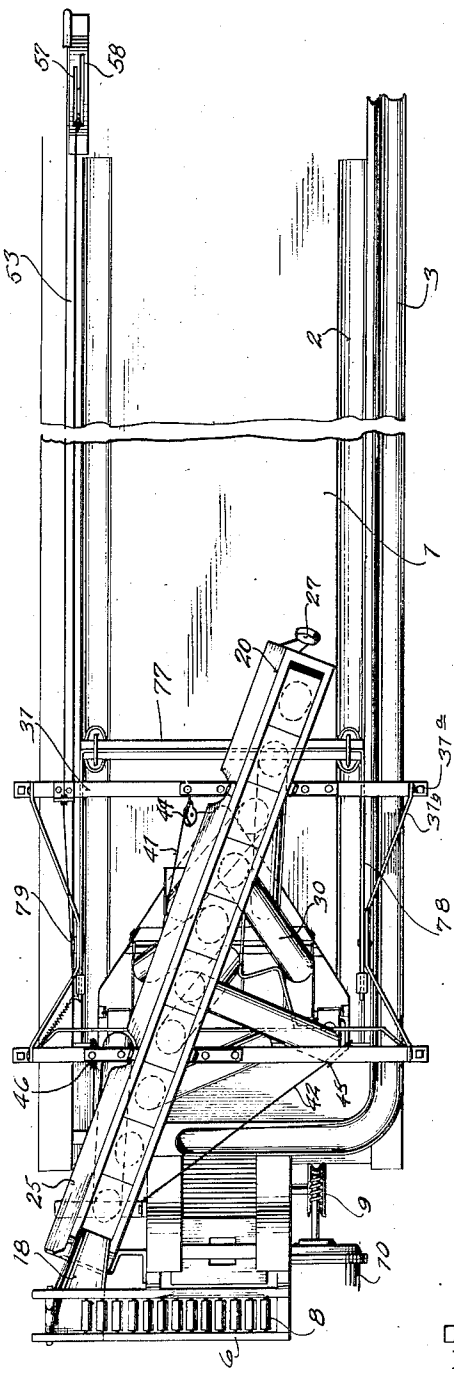
Mar. 20, 1923. 1,449,012

C. LORENZ ET AL

AUTOMATIC PIN SPOTTING MECHANISM

Filed June 9, 1921 7 sheets-sheet 2

Fig. 2.



Inventors.
Charles Lorenz
Emil Kumsh
By. Young & Young
Attorneys.

Mar. 20, 1923. 1,449,012

C. LORENZ ET AL

AUTOMATIC PIN SPOTTING MECHANISM

Filed June 9, 1921 7 sheets-sheet 3

Fig. 3.

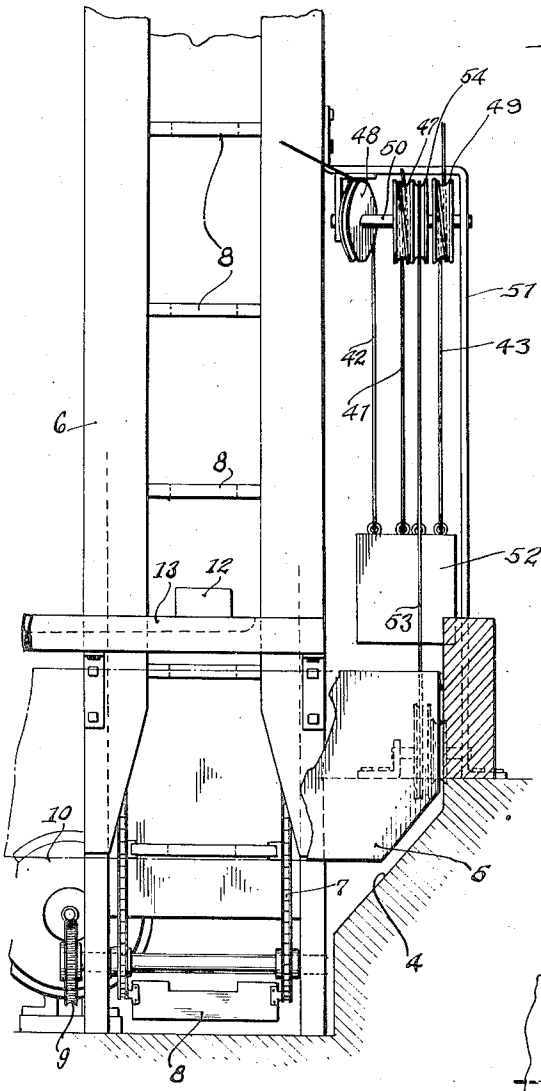
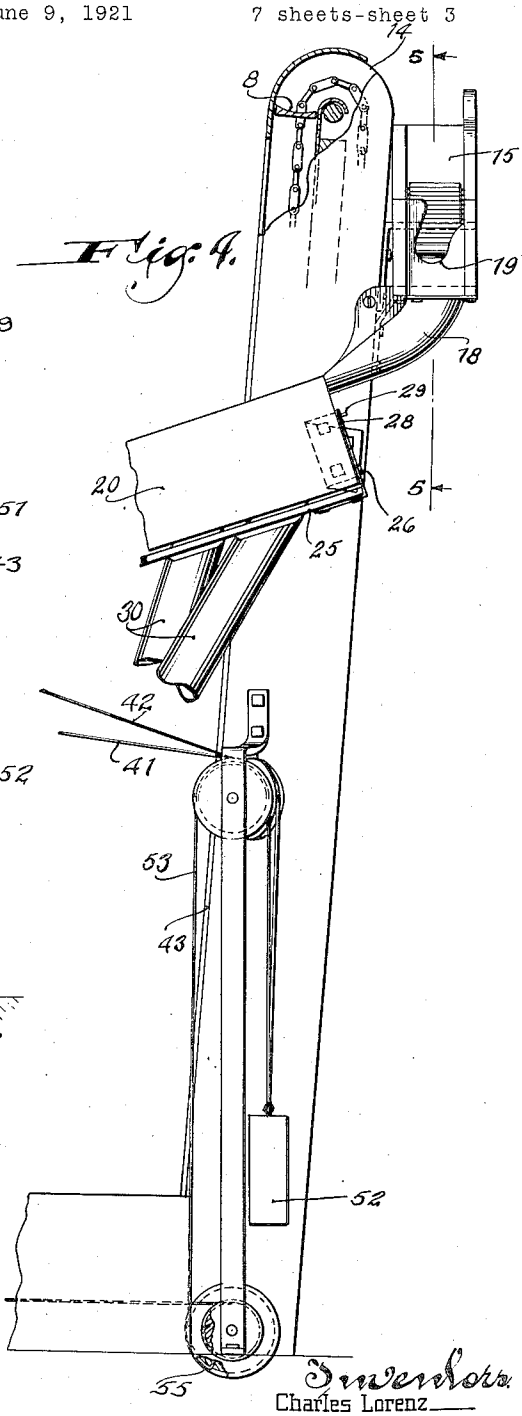


Fig. 4.



Inventors.
Charles Lorenz
Emil Kumsh
By. Young & Young
Attorneys.

Mar. 20, 1923. 1,449,012

C. LORENZ ET AL

AUTOMATIC PIN SPOTTING MECHANISM

Filed June 9, 1921 7 sheets-sheet 4

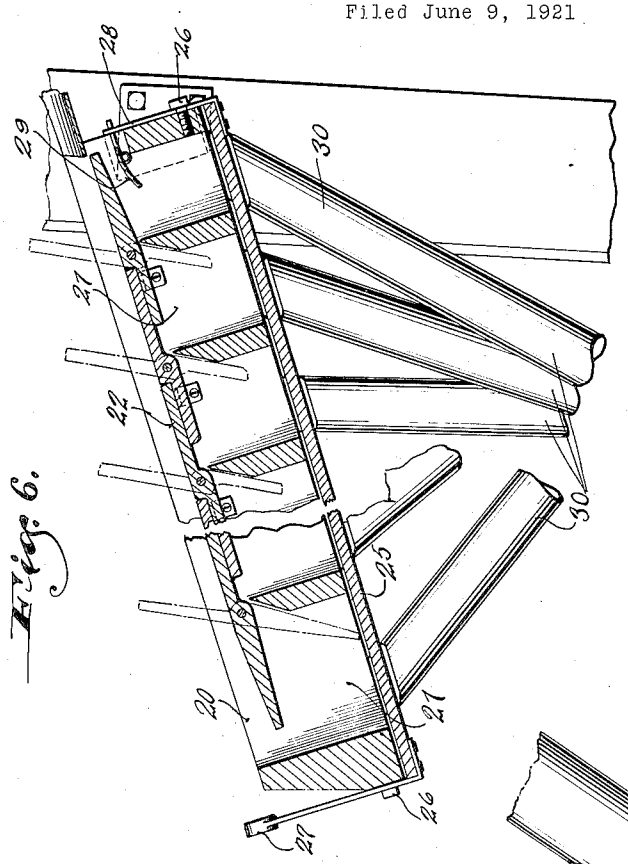


Fig. 6.

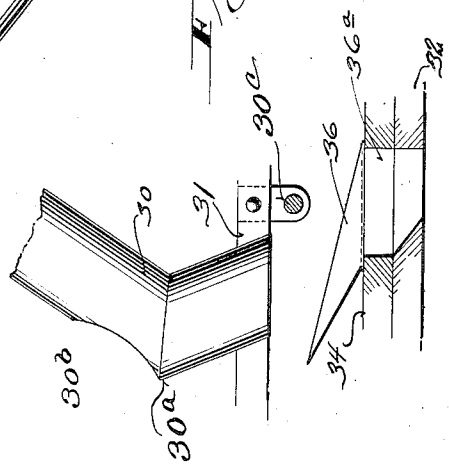


Fig. 12.

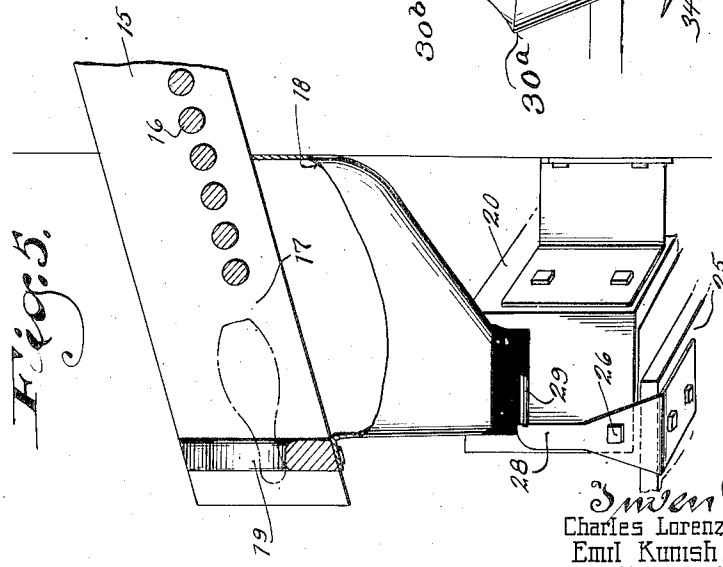


Fig. 5.

Inventors.
Charles Lorenz
Emil Kumish
Young & Young
Attorneys.

Mar. 20, 1923. 1,449,012

C. LORENZ ET AL

AUTOMATIC PIN SPOTTING MECHANISM

Filed June 9, 1921 7 sheets-sheet 5

Fig. 11.

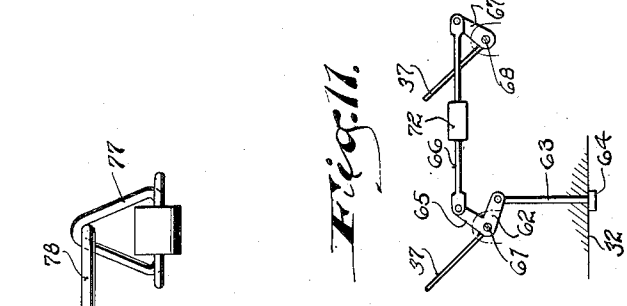
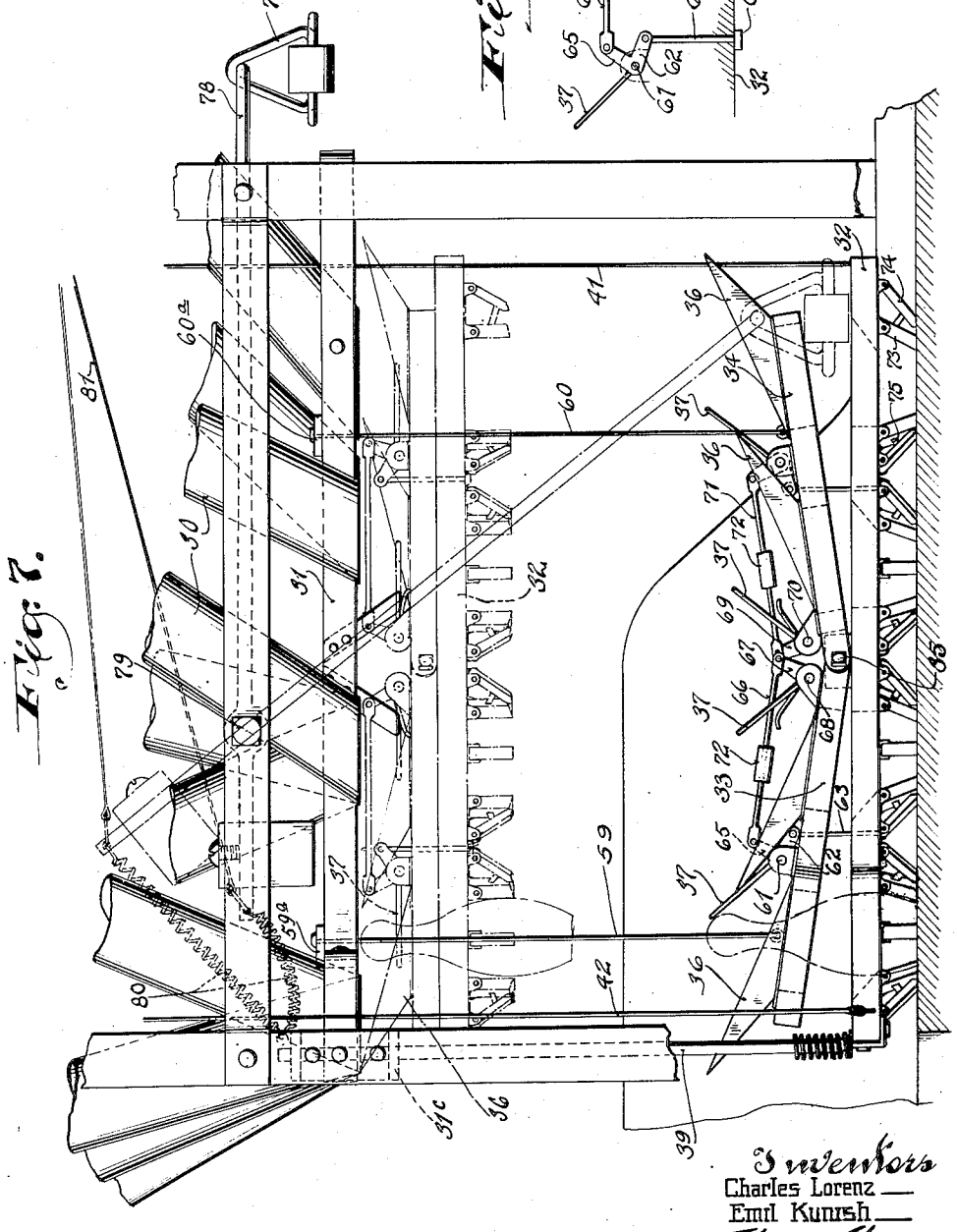


Fig. 7.



Inventors
Charles Lorenz
Emil Kunish
By Young & Young
Attorneys.

Mar. 20, 1923. 1,449,012

C. LORENZ ET AL

AUTOMATIC PIN SPOTTING MECHANISM

Filed June 9, 1921 7 sheets-sheet 6

Fig. 8.

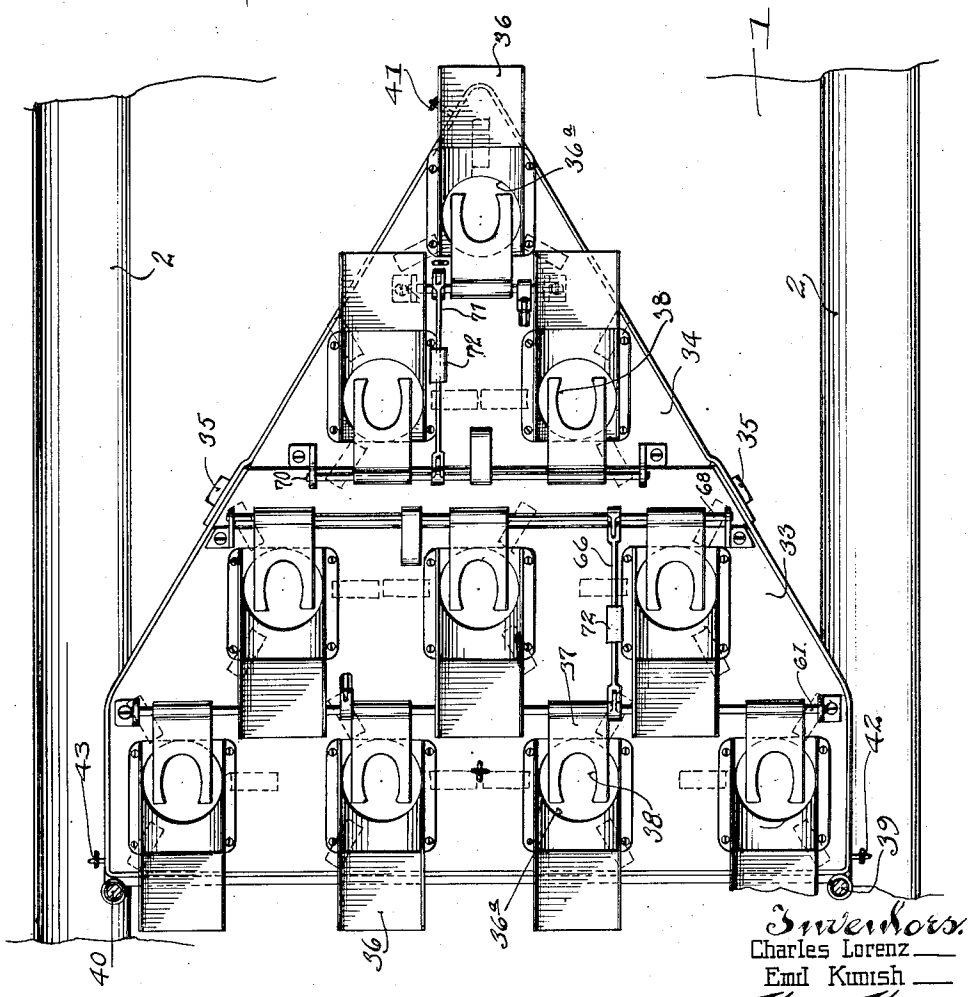


Fig. 13.

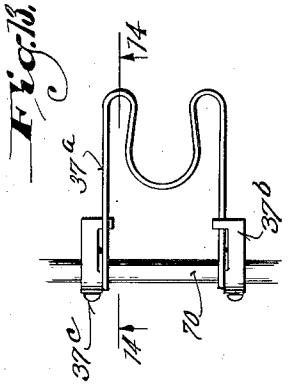
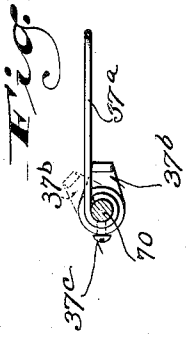


Fig. 14.



Inventors.
Charles Lorenz
Emil Kumish
By. Young & Young
Attorneys.

Mar. 20, 1923. 1,449,012

C. LORENZ ET AL

AUTOMATIC PIN SPOTTING MECHANISM

Filed June 9, 1921 7 sheets-sheet 7

Fig. 9.

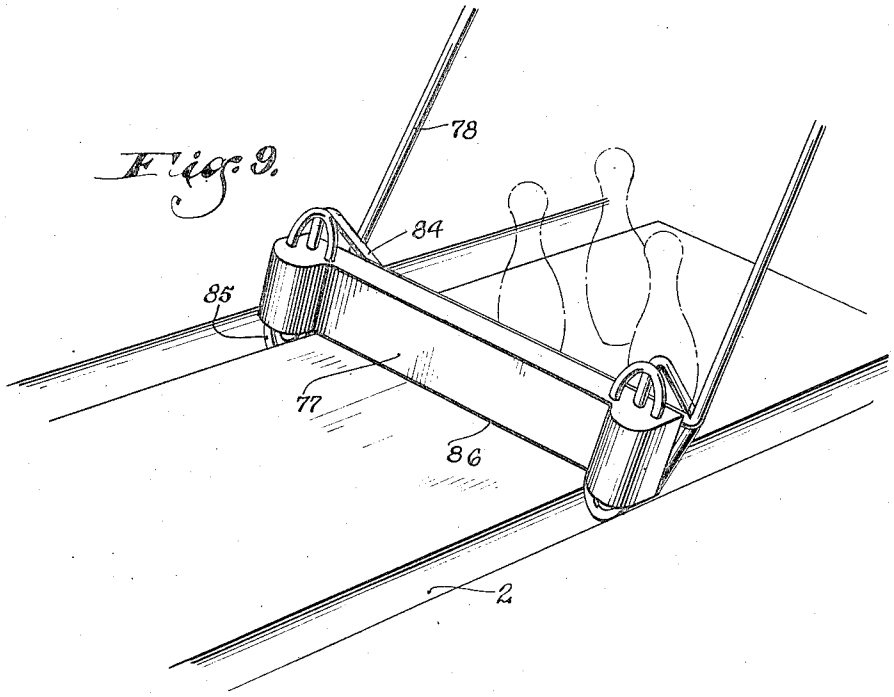
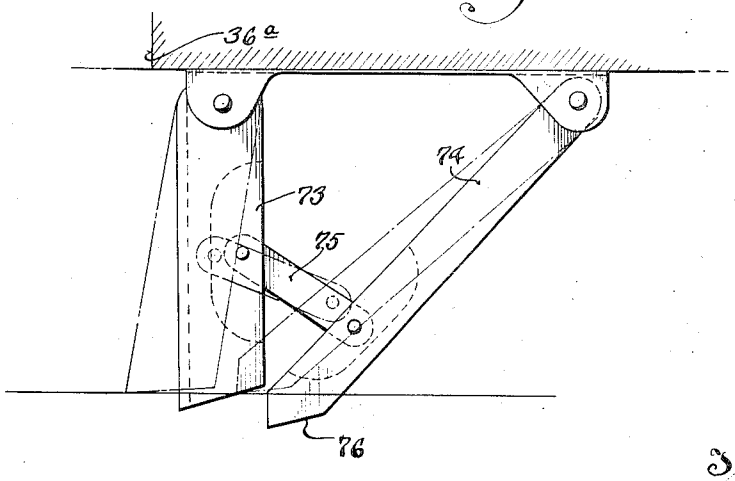


Fig. 10.



Inventors.
Charles Lorenz
Emil Kunish
By Young & Young
Attorneys.

Patented Mar. 20, 1923. 1,449,012

UNITED STATES PATENT OFFICE.

CHARLES LORENZ AND EMIL KUNISH, OF MANITOWOC, WISCONSIN.

AUTOMATIC PIN-SPOTTING MECHANISM.

Application filed June 9, 1921. Serial No. 476,218.

To all whom it may concern:

Be it known that we, CHARLES LORENZ and EMIL KUNISH, both citizens of the United States, and residents of Manitowoc, in the county of Manitowoc and State of Wisconsin, have invented certain new and useful Improvements in Automatic Pin-Spotting Mechanism; and we do hereby declare that the following is a full, clear, and exact description thereof.

Our invention relates to a new automatic pin spotting mechanism which is adapted to be used in connection with a bowling alley to perform the work which is ordinarily done by alley boys.

The primary object of our invention is to construct an automatic device which may be used in connection with standard pins for resetting the same, and operated by the attendant from the front end of the alley.

A further object of our invention is to construct an automatic device operated from the front end of the alley which may also be used to clear the alley after each ball and leave the spare pins standing in their original position.

With the above and other objects in view which will be apparent as the description proceeds, our invention includes certain structural details which are fully described hereinafter, and illustrated in the accompanying drawings, in which:

Figure 1 is a side elevation of our invention attached to a bowling alley.

Figure 2 is a plan view of the same.

Figure 3 is a front elevation of a portion of the mechanism as viewed from the line 3—3 of Figure 1.

Figure 4 is a side elevation of a portion of the invention including the delivery chute.

Figure 5 is a sectional elevational view taken on the line 5—5 of Figure 4.

Figure 6 is a longitudinal section through the separator box, and showing the distributing tubes leading therefrom.

Figure 7 is a side elevation of the spotter frame, and certain mechanism cooperating therewith.

Figure 8 is a plan view of the spotter frame viewed from the line 8—8 of Figure 1.

Figure 9 is a perspective detailed view of the sweeper.

Figure 10 is a detailed view of the means for positioning the pins.

Figure 11 is a detailed view of the means for operating the carrying plates.

Figure 12 is a detailed view of the lower end of a modified from of delivery tube.

Figure 13 is a plan view of a modified form of carrying plate, and

Figure 14 is a sectional view taken on line 14—14 of Figure 13.

Referring in detail to the drawings, the numeral 1 designates a standard alley having the grooves 2 at each side of the space where the pins are set and a return trough 3. When the pins are knocked down they roll or are afterward swept into the pit 4. The bottom of the pit is formed with a stepped portion as shown in Figure 1 and above this we provide a vertical board 5. This board serves to stop the pins and balls as they are thrown backward and no matter how the pins fall into the pit whether head or butt first, they will strike the board and will drop sidewise into the stepped portion of the pit beneath the board and be fed sidewise, one at a time, into the elevator 6, which is mounted at the rear thereof. This elevator comprises an endless belt 7 which carries the flights 8, which receive the pins and balls as they are delivered underneath the board 5. The elevator is driven by means of the worm gearing 9, which is operated by a suitable motor 10. As the pins and balls are carried up the elevator, the balls are pushed outwardly by the projection 11 and fall through the hole 12 into the portion 13 of the return trough, as shown in Figures 1 and 3. The projection 11 is not big enough and the pins are not short enough for the latter to be pushed through the hole 12. The pins are, therefore, carried to the top of the elevator and delivered through the mouth 14 thereof, as shown in Figure 4, and fall into the hopper 15.

The bottom of the hopper 15 is formed with a plurality of rollers 16, as shown in Figures 4 and 5, and at the lower end there is an opening 17 through which the pins are delivered to the chute 18. It will be noted that the pins as they are delivered from the mouth of the elevator, will fall into the hopper lengthwise thereof. If the bottom of the pin is disposed downwardly, it will pass over the last roller 16, and the weight thereof will tip the pin and cause it to fall butt first into the chute 18. If, however, the pin comes down over the hopper head first,

the weight of the butt thereof will prevent it from tipping until its head passes into the slot 19. The butt will then pass from the last roller and drop into the chute. Thus it will be seen that all of the pins will pass into and through the chute 18 butt first. From the chute 18 they pass into the separator box 20. This separator box is initially disposed, as shown in Figure 6, that is, each of its ten compartments 21 are covered by the pivoted covers 22, which are rabbeted so as to form a continuous plane upper surface. The compartments 21 are separaated by partitions 23 which have each a beveled upper edge 24 against which the cover 22 abuts when it has been rocked by one of the pins.

Upon reference to Figure 6, it will be seen that the first pin sliding butt first over the covers 22, will reach the cover over the last compartment 21 and the weight of the butt will tilt the cover and leave the pin standing in the compartment. In the same manner the next pin will be delivered to the second compartment, and so on.

The separator box is provided with a bottom 25 which is pivotally mounted on the pins 26, and when empty the bottom will gravitate to closed position owing to the counterweight 27. It is normally locked in this position by means of the finger 28, which is held by the spring trip member 29. When the last pin falls into the last compartment it strikes the trip member 29 and unlocks the finger 28, and the combined weight of the pins swings the bottom in opposition to the weight of the counterbalance 27 and the pins are dropped into the delivery tubes 30. The other ends of the delivery tubes are arranged in the proper position for delivering the pins to the spotter frame, and are secured to a frame 31 which is supported by standards 31^a which are mounted on the sides of the alley and braced by the rods 31^b.

The spotter frame 32 is normally held in the position shown in Figure 1, and shown in dotted lines in Figure 7. Above the spotter frame is a secondary two-piece frame 33 and 34 which is pivoted to the spotter frame at 35. This secondary frame is pivoted with guide plates 36 which are disposed underneath the lower ends of the respective distributing tubes and guide the pins butt first underneath the carrying plates 37. The butts of the pins drop through the holes 36^a which are provided in the lower ends of the guiding plates 36 and extend through the spotter frame 32. The neck of the pin is then caught in the recess 38, Figure 8, in the end of the carrying plate, and suspended as shown in the upper dotted line position in Figure 7.

The spotter frame is securely attached to guide rods 39 and 40, which are guided in suitable brackets 31^c from the frame 31. The frame 32 is suspended in the desired position by the cables 41, 42 and 43 which are secured at their lower ends to the corners of the spotter frame and pass therefrom upwardly over the sheaves 44, 45 and 46, as shown in Figures 1 and 2 and thence over the sheaves 47, 48 and 49 respectively. As shown in Figures 3 and 4, the sheaves 47, 48 and 49 are mounted on the shaft 50 which is rotatably mounted in the bracket 51 secured to the side of the alley and to the elevator frame. The ends of the cables 41, 42, and 43 are secured to the counterweight 52 which normally holds the spotter frame 32 in its uppermost position. For the purpose of lowering the spotter frame in opposition to the counterweight 52, a cable 53 is provided which is mounted on a sheave 54 and passes around the sheave 55 and thence to a lever 56 mounted at the front end of the alley. Thus when the lever 56 is moved so as to exert a pull on the cable 53, the same will rotate the sheaves on the shaft 50 raising the counterweight 52 and allowing the spotter frame to descend toward the alley.

The lever 56 may be moved into the end of either one of two slots 57 and 58 as shown in Figure 2. One of these slots is slightly longer than the other, the purpose of which will later be explained.

In order to spot the pins, the spotter frame is lowered to the position shown in full lines in Figure 7. When lowered to this position it will be observed that the rods 59 and 60 which are connected to the respective sections 33 and 34 of the secondary frame will ride downwardly through the frame 31 until the nuts or washers 59^a and 60^a at the upper ends thereof, engage the frame 31, and the sections 33 and 34 are raised about their pivot 35 as shown in Figure 7.

The carrying plates 37 from the rear rank of pins are secured to a transverse rod or shaft 61, which is pivotally mounted on the section 33 of the secondary frame. Projecting from the shaft 61, is an arm 62 to which is pivoted a rod 63 which passes downwardly through the spotter frame 32 and has a nut 64 on the end thereof. When the section 33 is raised by the rod 59 the nut 64 engages the frame 32 and rocks the shaft 61 so as to raise the carrying plates 37 and release the pins. In order to release the pins in the other ranks at the same time, an arm 65 is secured to the shaft 61, which arm is connected by a link 66 with an arm 67 secured to a shaft 68 which carries the plates for the next rank of pins. An arm 69 secured to the shaft 70 is also connected by the link 66 and the link 71 is also connected thereto, so that all of the carrier plates are rocked simultaneously to release all of the pins.

The links 66 and 71 carry weights 72 so that when the carrier plates have once been

rocked to this position they will be held therein by gravity. Consequently when the spotter frame is again raised, the pins will be left standing on the alley.

It will be understood that the holes 36ª must be made somewhat larger than the diameter of the pins. In order to properly set the pins accurately, we have, therefore, provided the fingers 73 and 74 as best shown in Figure 10. These fingers are pivotally connected to the spotter frame and connected to each other by the link 75. The lower end 76 of the finger 74 first engages the surface of the alley and both fingers are swung to the position shown in dotted lines in Figure 10, whereupon the pin is firmly seized and accurately positioned, the spotter frame is then drawn to its uppermost position and the pins are ready for the next player.

It frequently occurs during the play, that the first or second ball will leave pins which have been knocked down lying in the alley. It is, therefore, necessary to provide means for clearing the alley while leaving the spare pins standing. This may be done by means of our invention by the following operation. The spotter frame is lowered until the sections 33 and 34 reach their lowermost position, but not low enough to have the secondary frame raised by the rods 59 and 60. The slot 57 in Figure 2, indicates the limit of this movement when the spotter frame is left in this position. The carrier plates 37 corresponding to the spare pins will be raised sufficiently to slip past the heads of the pins and will then drop back to horizontal position. In this operation the plates 57 are not moved far enough for the weights 72 to overbalance the same. The spotter frame is then raised, the spare pins are picked up, and the sweeper may then be operated to clear the alley. After the alley has been cleared, the spotter frame is again lowered but this time to its lowermost position, which position is indicated by the slot 58, as shown in Figure 2. In this position the spare pins will be reset in the manner hereinbefore described, and the spotter frame will be again raised to its original position.

The means for clearing the alley either after the spare pins have been raised or when the players turn has been completed and it is desired to reset the pins will now be described. This means for clearing the alley comprises the sweeper element 77, which is loosely mounted on a rectangular frame 78 which is pivoted at 79 to the supporting frame. The sweeper is normally held in the position shown in full lines in Figure 7, by means of the spring 80 connected to the other end of the frame 78 and to the supporting frame. When it is desired to clear the alley, the frame 78 is swung about its pivot by means of the cable 81, which extends forwardly to the front end of the alley, and passes over the sheaves 82 and is provided with a handle 83. The sweeper element 77 is loosely supported by means of the brackets 84, and is provided with feet 85 which are connected by the crossbar 86 and are adapted to ride in the grooves 2 when the sweeper element is lowered. As the attendant continues to pull on the cable 81, the sweeper element is drawn upwardly to sweep the pins back into the pit. The feet 85 are made of sufficient depth so that the cross bar 86 will not come into actual contact with the surface of the alley. Thus there is no danger of injuring the smooth surface.

In order that the pins may strike the guide plates 36 at an oblique angle and thus slide freely under the plates 37 it may be preferable to form some of the delivery tubes 30 with a bend or elbow near the lower end as shown at 30ª in Figure 12. In this structure it is necessary to provide the opening 30ᵇ to allow free passage of the head of the pin in making the turn so as to prevent sticking.

A transverse rod 30ᶜ is also carried by the frame 31 so as to prevent the head of the pin from tipping up, when the butt enters the hole 36ª, until it has reached the proper position for the neck to be engaged by the recess 38 in the carrying member 37.

In Figures 13 and 14, we have shown a modified form of pin carrying member 37ª which consists of a skeleton framework loosely journaled on the shaft 70. This permits the carrying member to be lifted up easily when the spotter frame is lowered to pick up the spare pins, without knocking the pins over. When the pins are lifted, the member 37ª engages the fixed abutments 37ᵇ which are held to the shaft by the set screw 37ᶜ.

From the foregoing description, it will be seen that we have invented a mechanism which is entirely automatic in its nature, and may be actuated wholly by the attendant in front of the alley. No alley boys are needed. No inconvenience is caused by the alley boys going on a strike or failing to report for duty, and the pins are always accurately set.

It will be understood that the structure herein described is merely illustrative and that many modifications may be made in the structural details thereof, without departing from the spirit of the invention as defined by the appended claims.

We claim as our invention:

1. In an automatic pin spotter for bowling alleys, means for clearing the pins from the alley, a separator box above the alley having a compartment for each pin, means for delivering the pins to their respective compartments and the balls to the return trough, a setter frame suspended above the alley, distributing tubes for guiding the

pins from the box to the frame, means tripped by the last pin for discharging the pins from the box into the distributing tubes, and means for lowering the frame and setting the pins in their proper position in the alley.

2. In an automatic pin spotter for bowling alleys, means for picking up the spare pins after each ball, means for clearing the alley, means for subsequently resetting said spare pins, said clearing means being again operable after the completion of the player's turn, a separator box above the alley having a compartment for each pin, means for delivering the pins to their respective compartments and the balls to the return trough, a setter frame suspended above the alley, distributing tubes for guiding the pins from the box to the frame, means tripped by the last pin for discharging the pins from the box into the distributing tubes, and means for lowering the frame and setting the pins in their proper position in the alley.

In testimony that we claim the foregoing we have hereunto set our hands at Manitowoc, in the county of Manitowoc and State of Wisconsin.

CHARLES LORENZ.
EMIL KUNISH.